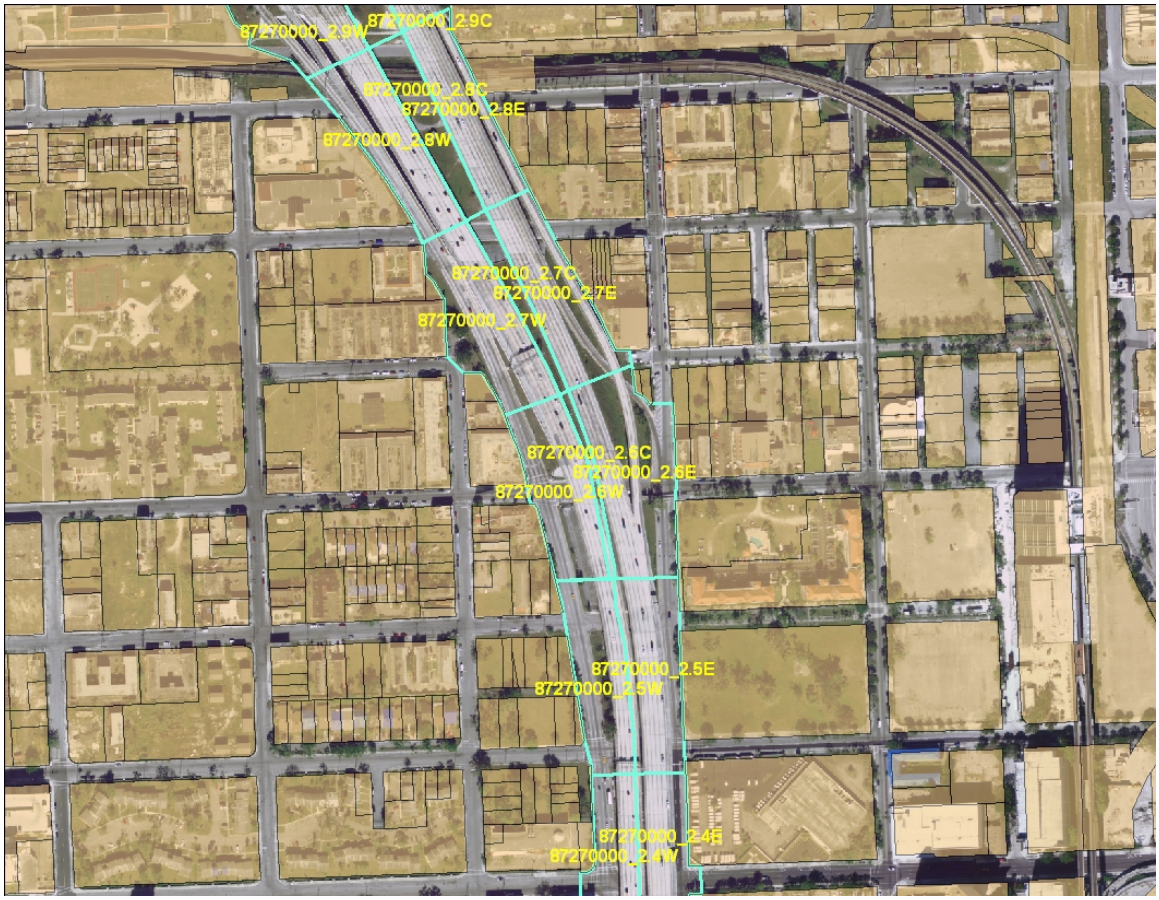
Mapping of Invasive Exotic Plants and Rare Native Plants on Florida Department of Transportation District 6 Right-of-Way in Miami-Dade and Monroe Counties, Florida



Prepared For
Florida Department of Transportation District 6

Prepared By
The University of Florida,
The Institute for Regional Conservation, and
Florida Natural Areas Inventory of Florida State University

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Final Report

Prepared for the Florida Department of Transportation District 6

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Credits

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The opinions, findings and conclusions expressed in this publication are those of the authors and not necessarily those of the Florida Department of Transportation.

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Doria Gordon was principal investigator for this project. She is Courtesy Professor of Botany at UF and Senior Ecologist & Associate Director of Conservation Science at the Florida Chapter of The Nature Conservancy. We thank Kathy Jones and other UF staff who helped to manage the contract administration and finances.

George Gann, Keith Bradley and Steve Green of The Institute for Regional Conservation implemented the bulk of this project. Josh Mahoney assisted with the development of the RREP Geodatabase and with field data collection. Patty Castillo-Trenn, Eric Fleites, Kirsten Hines and Debbie Lada assisted with field data collection.

Amy Jenkins managed this project for the Florida Natural Areas Inventory (FNAI), which integrated data collected during this project into statewide databases and assisted with data analysis. Other FNAI personnel who helped with data entry and/or analysis are Glenn Woodsum, Amy Knight, Pete Diamond and Caitlin Elam.

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List of Acronyms

BICY	Big Cypress National Preserve
BIPM	Bureau of Invasive Plant Management
DERM	Miami-Dade County Department of Environmental Resource Management
DOD	United States Department of Defense
ENP	Everglades National Park
FDACS	Florida Department of Agriculture and Consumer Services
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FFWCC	Florida Fish and Wildlife Conservation Commission
FKIETF	Florida Keys Invasive Exotic Task Force
FLEPPC	Florida Exotic Pest Plant Council
FLINV	Florida Invasive Plants Geodatabase
FNAI	Florida Natural Areas Inventory of Florida State University
IRC	The Institute for Regional Conservation
IRPA	Important Rare Plant Area
NPS	National Park Service
NWI	National Wetlands Inventory
OHT	Overseas Heritage Trail
RREP	Roadway Rare and Exotic Plant Geodatabase
SFWMD	South Florida Water Management District
TNC	The Nature Conservancy
UF	University of Florida
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service

Executive Summary

Two groups of plants are of concern to land managers in south Florida: invasive exotic plants and rare native plants. Invasive exotic plants are widely regarded as nuisance species, both due to their impact on native ecosystems as well as for the additional control costs borne by transportation agencies, conservation agencies and other land managers. Rare native plants are also of management concern.

In order to better understand the location and extent of invasive exotic plants and rare native plants along its road system, the Florida Department of Transportation (FDOT) collaborated on and funded a study of the approximately 650 miles of FDOT roadway in Miami-Dade and Monroe counties (District 6). The study was conducted by The University of Florida (UF), in collaboration with The Institute for Regional Conservation (IRC) and the Florida Natural Areas Inventory (FNAI).

The purpose of this project was to survey and map exotic and rare native plants along FDOT right-of-way within Miami-Dade and Monroe counties and to create a database that can be updated to reflect future activities and conditions. The information in the database can also be used as a reference by roadside managers. The project period extended from May, 2005 through November, 2007.

Eighty-eight of 121 (72.7%) total target invasive exotic plant species were found in at least one road segment. Of the 16,412 road segments surveyed, 6,264 (38.2%) contained at least one exotic plant species. Some segments contained more than one species of invasive exotic plant (up to 15), and a total of 12,996 observations were recorded. Fifty-seven of 200 (28.5%) target rare plant species were found in at least one road segment. Of the 16,412 road segments surveyed, 600 (3.7%) contained at least one rare plant species. Some segments contained more than one species of rare native plant (up to 9), and a total of 1,065 observations were recorded. About 80% of all rare native plant observations were from Monroe County.

About 7.2% of the road segments surveyed were found to be directly or within 5 meters of a public conservation area and about 23.4% of the road segments surveyed were found to be directly or within 5 meters of native vegetation.

All data collected by IRC and processed by IRC and FNAI have been provided to FDOT for its use. IRC also conducted a demonstration for FDOT personnel in the use of the collected data and applications that were developed. FDOT can use in-house staff to develop a number of database queries and ArcGIS applications to mine the data and provide information relevant to management concerns.

In addition, both IRC and FNAI have provided examples of how the information can be used. For instance, FNAI has used the data to generate a sample map of areas with high concentrations of invasive exotic plants, which could be used to prioritize invasive exotics

control projects. IRC identified 13 Important Rare Plant Areas (IRPAs), which could help guide the management of rare plants in the FDOT right-of-way.

Introduction

Background

Two groups of plants are of concern to land managers in south Florida: invasive exotic plants and rare native plants. Invasive exotic plants are widely regarded as nuisance species, both due to their impact on native ecosystems as well as for the additional control costs borne by transportation agencies, conservation agencies and other land managers. The Florida Exotic Pest Plant Council (FLEPPC)[1] currently lists 135 species of plants as invasive exotics, of which 125 are problematic in the southern part of the state. Thirty-five of these species (34 in southern Florida) are regulated by the U.S. Department of Agriculture (USDA), Florida Department of Environmental Protection (FDEP), Florida Department of Agriculture and Consumer Services (FDACS) and/or the Miami-Dade County Department of Environmental Resources Management (DERM). Annual control costs for these species in Florida have been estimated at more than $30,000,000 (Florida Department of Environmental Protection, 2006a and 2006b). Invasive exotic plants are widespread across south Florida and are found in every native ecosystem as well as in agricultural fields, along transportation corridors and throughout the urban landscape.

Rare native plants are also of management concern. In south Florida, 25 species of native plants are either listed by or candidates for listing by the U.S. Fish and Wildlife Service (USFWS) under the Endangered Species Act. FDACS currently regulates 553 rare plant species in the state[2], while the Florida Natural Areas Inventory (FNAI) tracks 489 species of plants and lichens[3]. The Institute for Regional Conservation (IRC), based in Miami, tracks about 350 of the FDACS regulated plants and 250 of the FNAI-tracked plants in the southern part of the state[4]. While these species primarily occur in intact native ecosystems, some plants are found along or on the edges of transportation corridors and scattered throughout the urban and agricultural landscape.

In order to better understand the location and extent of invasive exotic plants and rare native plants along its road system, the Florida Department of Transportation (FDOT) collaborated on and funded a study of the approximately 650 miles of FDOT roadway in Miami-Dade and Monroe counties (District 6). The study was conducted by The University of Florida (UF), in collaboration with IRC and FNAI.

Purpose and Timeline

The purpose of this project was to survey and map exotic and rare native plants along FDOT right-of-way within Miami-Dade and Monroe counties and to create a database that can be updated to reflect future activities and conditions. The information in the database can also

[1] FLEPPC is an independent non-profit organization whose mission it is to support the management of invasive exotic plants in Florida's natural areas by providing a forum for the exchange of scientific, educational and technical information (www.fleppc.org).

[2] www.flrules.org/gateway/ruleNo.asp?ID=5B-40.0055.

[3] FNAI is the primary agency charged with tracking native plants, animals and ecosystems for the state of Florida. FNAI also has recently developed a spatial database for invasive exotic plants. FNAI is an institute within Florida State University in Tallahassee (www.fnai.org).

[4] IRC is the leading botanical research institute studying the distributions of invasive exotic plants and rare native plants in south Florida (www.regionalconservation.org).

be used as a reference when addressing management practices by roadside managers. The project period extended from May, 2005 through November, 2007.

Methods

Development of Target Plant Lists

IRC, FNAI and FDOT developed a target list of 121 invasive exotic plant species listed by FLEPPC (2005)[5] or otherwise known to be invasive exotic plants in south Florida (Appendix A). All species on the FLEPPC list known to be invasive in Miami-Dade or Monroe counties were included. Species with no known habitat within the survey area (e.g. silktree [*Albizia julibrissin*]) were excluded. Additional exotic species known to be invasive based on research by IRC were added to the list.

IRC, FNAI and FDOT also developed a target list of 200 rare plant species tracked by IRC and/or FNAI, and/or are regulated by FDACS[6] (Appendix B). All species tracked by FNAI or listed by FDACS and known to occur in Miami-Dade or Monroe counties were included. Additional species tracked by IRC were added to the list.

Design of RREP[7] Geodatabase

IRC staff hand digitized 16,412 road segments along 648 miles of FDOT right-of-way. All FDOT roadways in Miami-Dade County were included, excluding the Florida Turnpike. The standard size of each road segment was 1/10th of a mile long. The width of road segments was dependent on the width of the right-of-way, which varied from nearly zero to more than 1,500 feet. Some road segments were shorter, especially around intersections and interchanges. Miami-Dade and Monroe County property tax appraiser shapefiles were used to determine the boundaries of the FDOT right-of-way. Microstation files provided by FDOT were used, when needed. See Figures 1.1 and 1.2 for FDOT roadways in Miami-Dade and Monroe counties respectively. Figure 2 illustrates an example of resulting road segments in northern Miami-Dade County. See Appendix C for a list of all roads surveyed.

IRC staff also developed a Microsoft Access database as part of the RREP Geodatabase with the following data fields:

- Date surveyed
- Observer(s)
- Target plant taxa found (taxon code)
- Estimate of abundance[8] of target taxa using a range scale conforming to FNAI data standards (1-10, 11-50, 51-100, 101-1000, or >1000 individuals)
- Cover[9] class description of target taxa conforming to FNAI data standards (single plant or clump, scattered plants, scattered dense patches, dominant cover, or dense monoculture)
- Maintained condition (yes/no, e.g. by mowing)
- Cultivated (yes/no)
- Notes

[5] The FLEPPC list contains all species regulated by USDA, FDEP, FDACS, and DERM.
[6] All USFWS-listed and candidate species are included in the FDACS list.
[7] RREP stands for Roadway Rare and Exotic Plants.
[8] Defined as numbers of individuals within a segment.
[9] Defined as the horizontal space occupied by the target species within a segment.

Figure 1.1. FDOT roadways in Miami-Dade County excluding the Florida Turnpike.

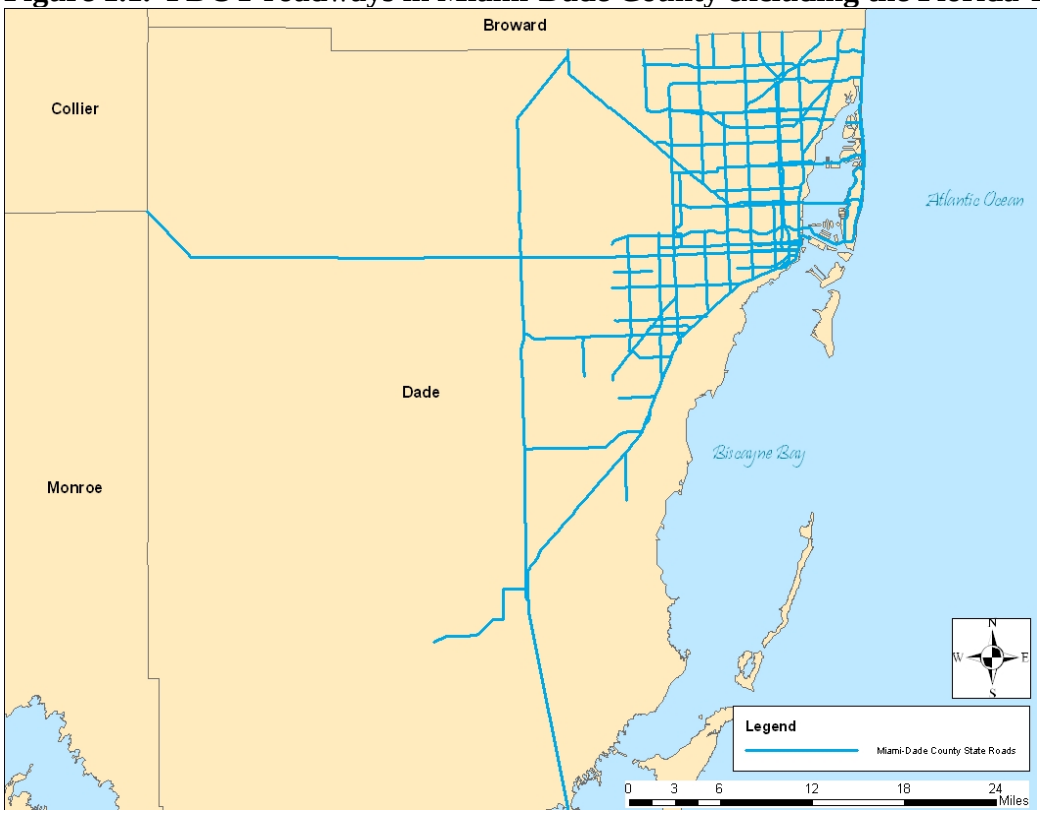


Figure 1.2. FDOT roadways in Monroe County.

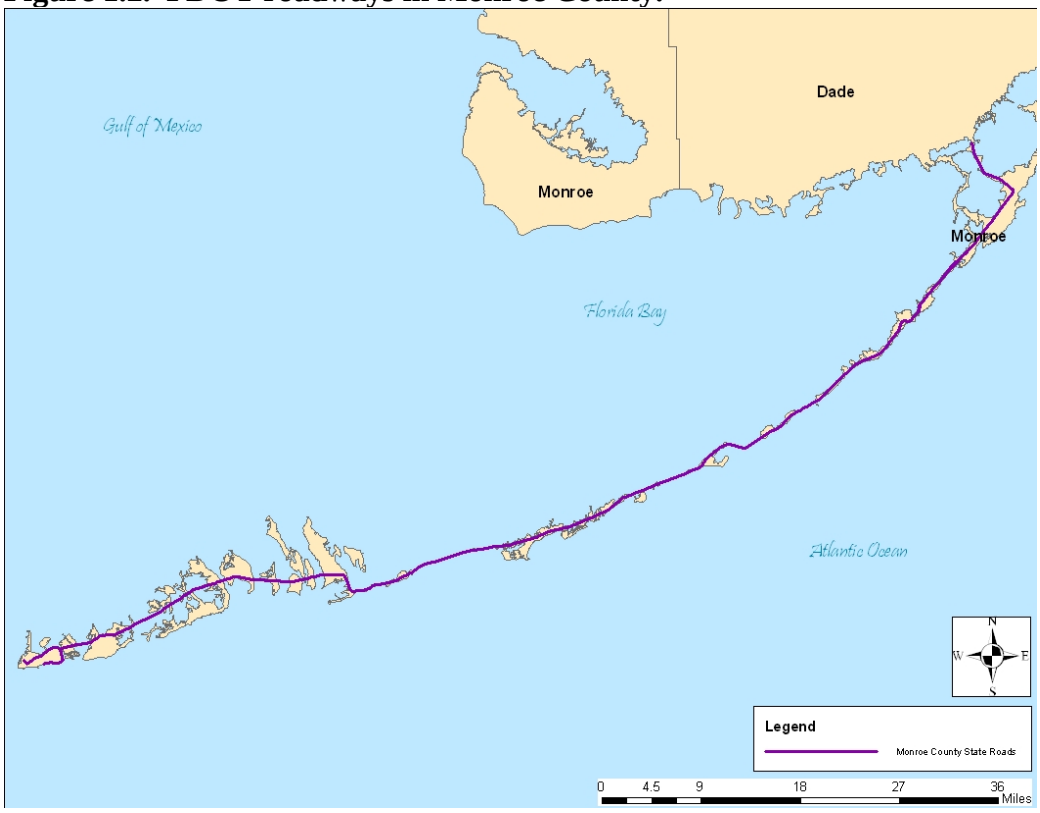


Figure 2. Sample road segments mapped in northern Miami-Dade County.

Field Work

Field work consisted first of systematic drive-by surveys from a vehicle followed by mapping of specific plants within a subset of the road segments as described in more detail below.

Surveys were carried out by two IRC researchers (one driver and one observer) traveling in a vehicle at slow speeds (c. 0-20 mph). A sub-meter accuracy Trimble GPS receiver was mounted on the roof of the vehicle and connected via cable to a Dell Precision M20 laptop computer with ArcGIS version 9.2. The observer could view the vehicle's location within a specific road segment on the laptop screen at all times. The team traveled along both sides of the road, capturing data from the right-of-way adjacent to the road (left, right and center medians, when present). Data collection was carried out by filling out the relevant fields in Microsoft Access on the laptop as described above (date surveyed, observers, etc.). The upper speed of the vehicle was limited by realtime downloading of GIS points from the Trimble to the laptop and the ability of the observer to effectively survey for target plant species. If the identity of a plant could not be determined from the vehicle, the vehicle would stop and the observer would approach the plant on foot until an identification could be made. Hand-held binoculars were also used to aide in identification. In some cases, safety issues precluded the ability to stop the vehicle and a determination was made to the best ability of

the observer. In extreme cases (e.g. portions of SR 112), observations of plants were made at the beginning and ending of a stretch of road segments and the data were filled in at the office. Special care was made to more thoroughly survey areas with obvious rare plant habitat (e.g. mowed areas adjacent to pinelands).

A list of species to be mapped was generated by querying the RREP Geodatabase. Individuals or groups of plants were subsequently mapped using a sub-meter accuracy Thales Mobile Mapper CE with Arc Pad if they met the following criteria: 1) exotic plants with a cover class in a road segment equal to one (single plant or clump) were mapped; 2) rare plant species were mapped if they were present in two or fewer road segments within a stretch of ten road segments.

Systematic field surveys began in November, 2005 and were completed in June, 2007. Field mapping began in February, 2006 and was completed in June, 2007. All survey and mapping information gathered was entered into Microsoft Access and/or ArcGIS.

Initial Data Quality Control

IRC conducted initial data quality control for plant-related data (e.g. checked for typographical errors in names, dates, observers, etc.), and checked that every road segment had some value (e.g. at least one target plant record or null). FDOT provided verification that all road segments in the state boundary system were included in the surveys and guidance on how to survey segments that were difficult to access or which presented safety concerns.

Integration of Data into FNAI Databases

Quality-controlled data was submitted to FNAI by IRC. Additional quality control was conducted by FNAI, cross-checking survey data with mapping data to ensure consistency (e.g. insuring that all road segments with mapped data also had the same species included in the survey data). Relevant data was then migrated into the FNAI invasive exotics database (FLINV) and FNAI element occurrence[10] database for rare native plants. Criteria for inclusion in FNAI databases were as follows: 1) only FLEPPC category I and category II invasive species[11] were imported into the FLINV; and 2) only FNAI-tracked species were imported into the element occurrence database.

Before the incorporation of these FDOT data, the FLINV, with a few exceptions, only tracked observations of invasive exotic species on public conservation lands. While FNAI

[10] An "Element" is any exemplary or rare component of the natural environment, such as a species, plant community, bird rookery, spring, sinkhole, cave or other ecological feature. An "Element Occurrence" (EO) represents a spatial record of an element and is a single extant habitat which sustains or otherwise contributes to the survival of a species population or a distinct, self-sustaining example of a particular natural community. (from www.NatureServe.org)

[11] Invasive exotic plants are termed **Category I** invasives when they are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. This definition does not rely on the economic severity or geographic range of the problem, but on the documented ecological damage caused. **Category II** invasive exotics have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by **Category I** species. These species may become **Category I** if ecological damage is demonstrated. (from www.fleppc.org)

imported all of the data from this project into the FLINV database, only those records from public conservation lands will be used in analyses, displayed in publicly available data on the FNAI website, or provided as maps or figures to the public in response to public data requests.

Importation of Additional GIS Layers into the RREP Geodatabase

Additional GIS data layers were imported by IRC into the RREP Geodatabase to augment data interpretation and analysis. Data layers included native vegetation data (e.g. FNAI data, National Wetlands Inventory data, Advanced Identification of Wetlands on the Florida Keys Shapefile [ADID] and IRC upland data from Miami-Dade County) and conservation lands data from FNAI. See Appendix H for a complete list.

These GIS layers were then used to identify road segments adjacent to public conservation lands and road segments that were adjacent to native vegetation.

Identification of Existing Invasive Exotic Plants Removal Programs by Others Adjacent to the State Highway System

IRC contacted the National Park Service, Florida Fish and Wildlife Conservation Commission, FDEP, Monroe County, Miami-Dade County DERM, South Florida Water Management District, and The Nature Conservancy's Florida Keys office to obtain information on existing invasive exotic plant control programs.

Results

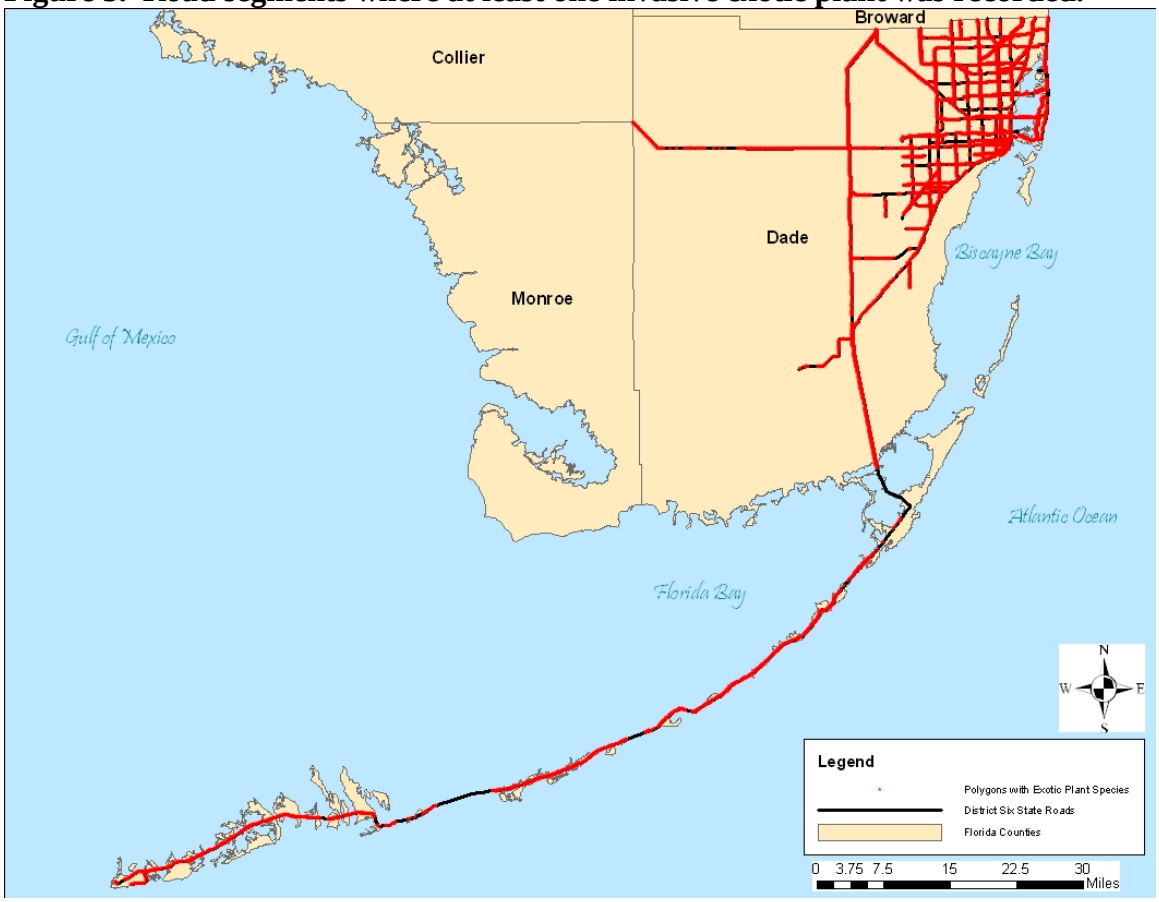
Invasive Exotic Plants

Eighty-eight of 121 (72.7%) total target exotic plant species were found in at least one road segment (Appendix A, Table 1). Of the 16,412 road segments surveyed, 6,264 (38.2%) contained at least one exotic plant species (Figure 3). Some segments contained more than

Table 1. Ten most frequent naturalized invasive exotic plants recorded on FDOT right-of-way.

Number of Segments	Percent Presence (n= 16412)	Scientific Name	Common Name	FLEPPC Status
1979	12.06%	*Schinus terebinthifolius*	Brazilian-pepper	I
909	5.54%	*Tribulus cistoides*	Puncturevine	II
783	4.77%	*Leucaena leucocephala*	White leadtree	II
547	3.33%	*Pennisetum purpureum*	Napier grass	I
466	2.84%	*Casuarina equisetifolia*	Australian-pine	I
437	2.66%	*Wedelia trilobata*	Creeping wedelia	II
394	2.40%	*Panicum repens*	Torpedo grass	I
378	2.30%	*Melaleuca quinquenervia*	Punktree	I
321	1.96%	*Neyraudia reynaudiana*	Burmareed	I
318	1.94%	*Tradescantia spathacea*	Oysterplant	I

Figure 3. Road segments where at least one invasive exotic plant was recorded.



one species of invasive exotic plant (up to 15), and a total of 12,996 observations were recorded. The three most frequent naturalized[12] invasive exotic plants recorded were Brazilian-pepper (*Schinus terebinthifolius*), punctureweed (*Tribulus cistoides*) and white leadtree (*Leucaena leucocephala*) (Table 1). A complete list of all invasive exotic plant species recorded and the number of road segments they were recorded in is found in Appendix A.

In Miami-Dade County, the most frequent naturalized invasive exotic plants recorded were Brazilian-pepper, punctureweed and napier grass (*Pennisetum purpureum*), while in Monroe County the most frequent invasive exotic plants recorded were Brazilian-pepper, white leadtree and punctureweed (Tables 2 and 3 respectively).

Seventy-one of the 88 exotic species found were FLEPPC category I or II species and thus were imported into the FLINV – totaling 10,600 of the 12,996 total exotics records. Figure 4 shows the FLINV map for Miami-Dade and Monroe counties, which excludes data from outside of public conservation areas.

Some target invasive exotic plants have been planted along the right-of-way. Some of these plants are persisting from old plantings done long ago. Others are still being planted on the right-of-way, sometimes by FDOT, but more frequently by adjacent land owners. Appendix A lists these species, the total number of road segments they were recorded in and the number of road segments they were recorded in as cultivated plants.

Table 2. Ten most frequent naturalized invasive exotic plants recorded on FDOT right-of-way in Miami-Dade County.

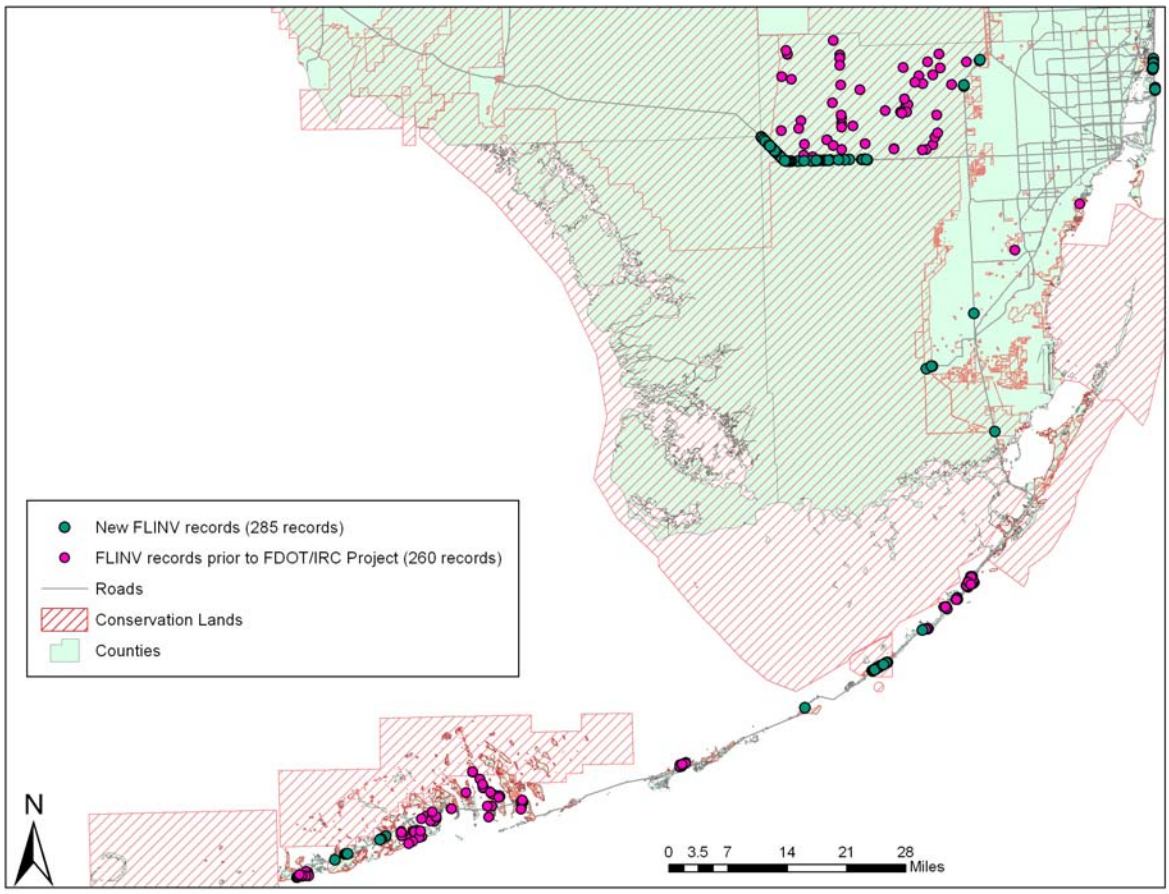
Number of Segments	Percent Presence (n= 13668)	Scientific Name	Common Name	FLEPPC Status
1573	11.51%	*Schinus terebinthifolius*	Brazilian-pepper	I
653	4.78%	*Tribulus cistoides*	Punctureweed	II
544	3.98%	*Pennisetum purpureum*	Napier grass	I
430	3.15%	*Wedelia trilobata*	Creeping wedelia	II
394	2.88%	*Panicum repens*	Torpedo grass	I
393	2.88%	*Casuarina equisetifolia*	Australian-pine	I
390	2.85%	*Leucaena leucocephala*	White leadtree	II
378	2.77%	*Melaleuca quinquenervia*	Punktree	I
321	2.35%	*Neyraudia reynaudiana*	Burmareed	I
293	2.14%	*Tradescantia spathacea*	Oysterplant	I

[12] A plant is naturalized when it begins to reproduce without human assistance, through either sexual or asexual means.

Table 3. Ten most frequent naturalized invasive exotic plants recorded on FDOT right-of-way in Monroe County.

Number of Segments	Percent Presence (n= 2744)	Scientific Name	Common Name	FLEPPC Status
406	14.80%	*Schinus terebinthifolius*	Brazilian-pepper	I
393	14.32%	*Leucaena leucocephala*	White leadtree	II
256	9.33%	*Tribulus cistoides*	Punctureweed	II
141	5.14%	*Panicum maximum*	Guineagrass	II
91	3.32%	*Thespesia populnea*	Portiatree	I
73	2.66%	*Casuarina equisetifolia*	Australian-pine	I
62	2.26%	*Colubrina asiatica*	Latherleaf	I
61	2.22%	*Scaevola sericea*	Beach napuka	I
27	0.98%	*Sansevieria hyacinthoides*	Bowstring-hemp	II
25	0.91%	*Tradescantia spathacea*	Oysterplant	I

Figure 4. FLINV exotic plant locations (FLEPPC category I and II only) in Miami-Dade and Monroe counties.



Rare Native Plants

Fifty-seven of 200 (28.5%) target rare plant species were found in at least one road segment (Appendix B). Of the 16,412 road segments surveyed, 600 (3.7%) contained at least one rare plant species (Figure 5). Four hundred and eighty-two (480) of the roadway segments containing rare native plants also contained at least one exotic plant species (80.0%). Some segments contained more than one species of rare native plant (up to 9), and a total of 1,065 observations were recorded. Eight hundred and sixty (859) of these records were from Monroe County (80.7%). The three most frequent rare native plants recorded were Florida Keys blackbead (*Pithecellobium keyense*), green thatch palm (*Thrinax radiata*) and West Indian mahogany (*Swietenia mahagoni*). A complete list of all target rare native plant species and the number of road segments they were recorded in is found in Appendix B. Rare native plants planted and/or naturalized outside of their native ranges are not reported.

In Miami-Dade County, the most frequent rare native plants recorded were southern frogfruit (*Phyla stoechadifolia*), stiff-leaved wild-pine (*Tillandsia fasciculata* var. *densispica*) and pine pink (*Bletia purpurea*), while in Monroe County the most frequent rare native plants recorded were Florida Keys blackbead, green thatch palm, and silver thatch palm (*Thrinax morrisii*) (Tables 4 and 5 respectively). Garber's spurge (*Chamaesyce garberi*) was the only federally-listed plant recorded during the study. It was found in 18 road segments in Monroe County, primarily in areas previously documented by FDOT.

Twenty-seven of the 57 rare species recorded were FNAI-tracked species. IRC's field observations allowed FNAI to update existing records for 48 occurrences of 15 species and add 78 previously undocumented records for 20 species. Figure 6 shows a map of FNAI-tracked species in Miami-Dade and Monroe counties before and after new data were added.

Figure 5. Road segments where at least one rare native plant was recorded.

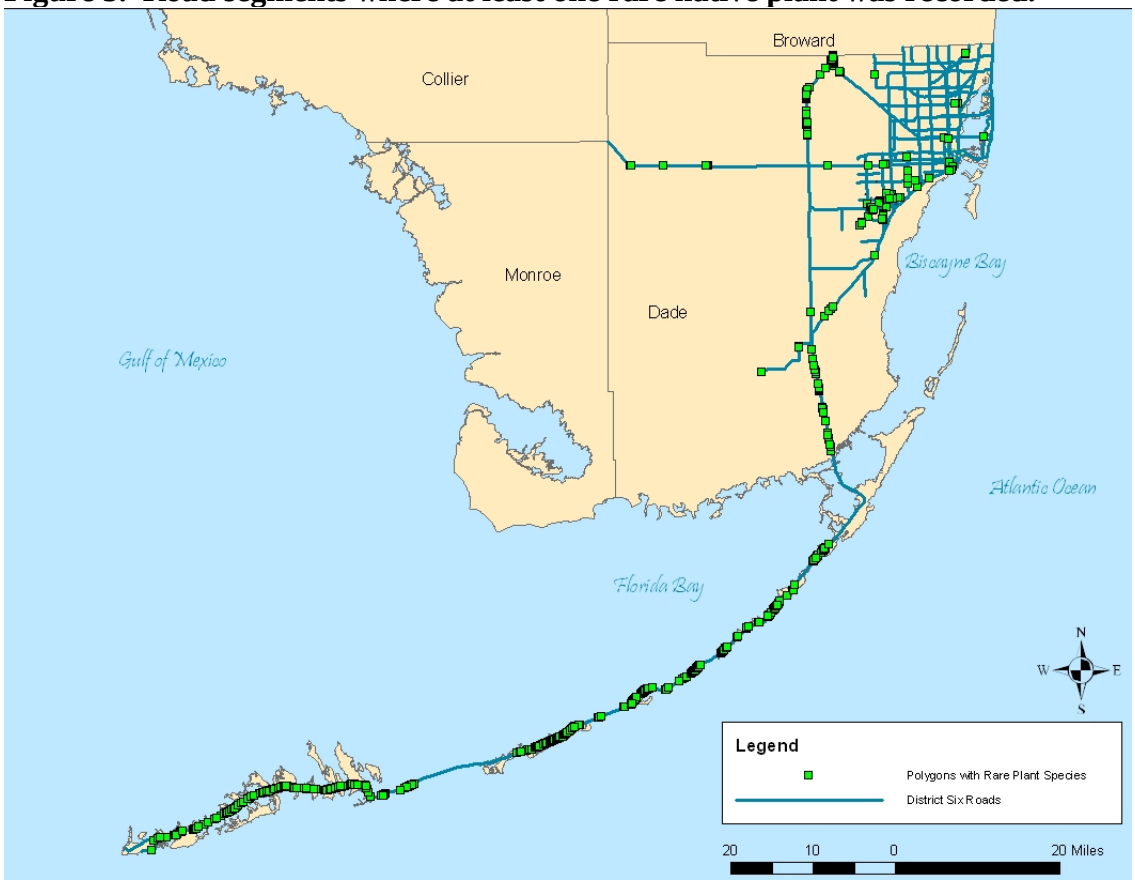


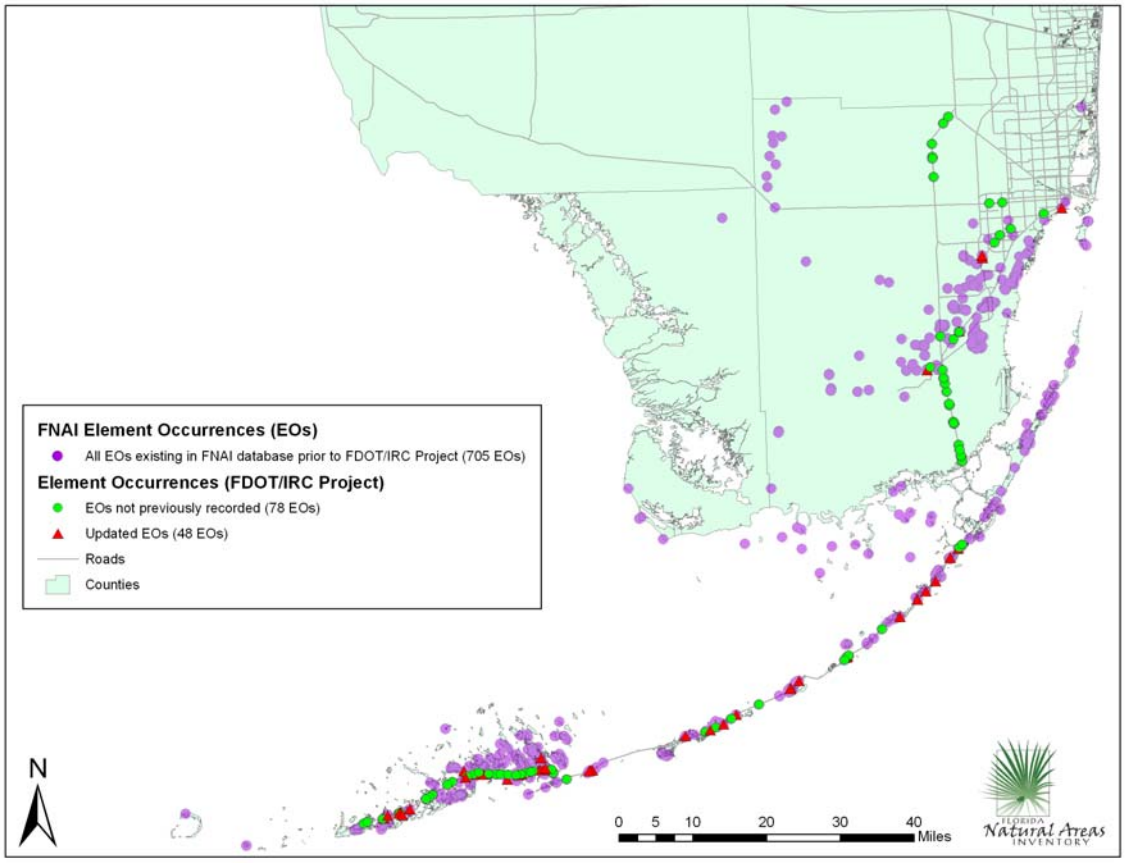
Table 4. Ten most frequent rare native plants recorded on FDOT right-of-way in Miami-Dade County.

Number of Segments	Percent Presence (n= 13668)	Scientific Name	Common Name	State Status
32	0.23%	*Phyla stoechadifolia*	Southern fogfruit	E
22	0.16%	*Tillandsia fasciculata* var. *densispica*	Stiff-leaved wild-pine	E
20	0.15%	*Bletia purpurea*	Pinepink	T
18	0.13%	*Tillandsia utriculata*	Giant wild-pine	E
13	0.10%	*Swietenia mahagoni*	West Indian mahogany	T
13	0.10%	*Zamia integrifolia*	Coontie	C
12	0.09%	*Trema lamarckianum*	West Indian trema	E
11	0.08%	*Stylosanthes calcicola*	Everglades key pencilflower	E
8	0.06%	*Angadenia berteroi*	Pineland-allamanda	T
8	0.06%	*Crossopetalum ilicifolium*	Quailberry	T

Table 5. Ten most frequent rare native plants recorded on FDOT right-of-way in Monroe County.

Number of Segments	Percent Presence (n= 2744)	Scientific Name	Common Name	State Status
301	10.97%	*Pithecellobium keyense*	Florida Keys blackbead	T
118	4.30%	*Thrinax radiata*	Green thatch palm	E
57	2.08%	*Thrinax morrisii*	Silver thatch palm	E
48	1.75%	*Swietenia mahagoni*	West Indian mahogany	T
47	1.71%	*Bourreria succulenta*	Smooth strongback	E
40	1.46%	*Manilkara jaimiqui subsp. emarginata*	Wild dilly	T
34	1.24%	*Erithalis fruticosa*	Blacktorch	T
29	1.06%	*Jacquinia keyensis*	Joewood	T
28	1.02%	*Byrsonima lucida*	Locustberry	T
23	0.84%	*Crossopetalum rhacoma*	Rhacoma	T

Figure 6. Element occurrences in the FNAI element occurrence database in Miami-Dade and Monroe counties prior to this project and new and updated element occurrences as a result of the project.



Adjacent Areas of Interest

Of the 16,412 road segments surveyed, 1,183 road segments (7.2%) were found to be directly or within 5 meters of a public conservation area. Of 13,668 road segments surveyed in Miami-Dade County, 824 segments (6.0%) were found to be adjacent to conservation areas. Of the 2,744 road segments in Monroe County, 359 segments (13.1%) were found to be adjacent to conservation areas.

Of the 16,412 road segments surveyed, 3,841 road segments (23.4%) were found to be directly or within 5 meters of native vegetation. Of 13,668 road segments surveyed in Miami-Dade County, 2,013 (14.7%) were found to be adjacent to native vegetation. Of the 2,744 road segments in Monroe County, 1,828 segments (66.6%) were found to be adjacent to native vegetation.

The RREP Geodatabase identifies these road segments. Table 6 provides a list of the public agencies and the number of segments their property is adjacent to.

Table 6: Public agencies with land adjacent to the FDOT right-of-way.

Managing Agency	Number of Adjacent Segments
FL Fish and Wildlife Conservation Commission (FFWCC)	428
South Florida Water Management District (SFWMD)	244
FL Dept. of Environmental Protection, Div. of Recreation and Parks (FDEP)	169
Miami-Dade County	141
US Dept. of the Interior, Fish and Wildlife Service (USFWS)	60
US Dept. of Defense, Navy (DOD)	41
US Dept. of the Interior, National Park Service (NPS)	37
Monroe County	14
City of Miami Beach	13
City of Marathon	5
Islamorada, Village of Islands	2
City of Miami Parks and Recreation Dept.	2

Identification of Existing Invasive Exotics Control Programs

The Florida Fish and Wildlife Conservation Commission (FFWCC) is the public agency with the most land adjacent to the FDOT District 6 right-of-way. The Everglades and Francis S. Taylor Wildlife Management Area, which includes Water Conservation Areas 3A and 3B, is owned by FFWCC and co-managed with the SFWMD. In Miami-Dade County, this extensive management area is bounded by state roads to the south (US Highway 41/SR 90) and to the east (Krome Avenue/SR 997 and US Highway 27/SR 25). Exotic management by FFWCC on this property has been well funded since the mid 1990s and continues today. Exotic plant management is primarily focused on Brazilian-pepper and Old World climbing fern (*Lygodium microphyllum*) infestations in tree islands. However, the SFWMD treats exotic plant species throughout this property (see below).

There are several other conservation areas in the Florida Keys managed by FFWCC, many of which are adjacent to Overseas Highway/SR 5. Exotic plant management on these properties

has been ongoing for several years. Portions of the exotic plant control program are funded by grants, and are currently co-managed by the Nature Conservancy (TNC) and the USFWS as part of the Florida Keys Invasive Exotics Task Force (FKIETF). FFWCC also has several biological technicians in charge of exotic plant control programs on specific properties (e.g. Tavernier Creek, Snake Creek Hammock, and Sugarloaf Hammocks). Exotic management on these properties usually begins in November. In the past, FFWCC has partnered with FDOT in the Florida Keys,

SFWMD manages or co-manages four properties adjacent to FDOT District 6 right-of-way. Exotic control programs on these properties have been well funded in the past, with budgets in excess of $500,000 per year, including funds from the Florida Legislature to eradicate punktree (*Melalueca quinquinervia*). Other problem species currently being treated on SFWMD properties are Brazilian-pepper, Old World climbing fern, and shoe-button ardisia (*Ardisia elliptica*). SFWMD partners with FFWCC to conduct maintenance level exotic control activities on several of their sites, but does bulk exotic plant control with in-house resources.

Approximately 169 segments are directly adjacent to or within 5 meters of FDEP property. The vast majority of these segments are in Monroe County, with the exception of 14 segments adjacent to Oleta River State Park in Miami-Dade County. Every year FDEP proposes projects for funding through their Bureau of Invasive Plant Management, which has received a significant amount of money from the Florida Legislature. Recently, invasive exotic plant control has focused on maintenance level activities, but this varies from year to year. In the past, FDEP technicians managed invasive exotic plant removal projects in specific areas. However, private contractors are currently managing most of these exotic removal projects. In 2007, the Florida Department of Environmental Protection, Bureau of Invasive Plant Management (BIPM) partnered with Monroe County and FDOT to conduct exotic plant removal along portions of the Overseas Heritage Trail using a private contractor.

Miami-Dade County has been active in exotic plant management on their properties for several years. In 1991, the Park & Recreation Department established Natural Areas Management (NAM) to initiate active management of the natural areas under its jurisdiction. Funding for exotic removal was forthcoming in the past, with money coming from Miami-Dade County, grants from private organizations, as well as USFWS and FDEP. NAM has received many accolades for its efforts in habitat restoration, and also conducts community outreach and education. Exotic removal programs in Miami-Dade County are currently focused on rockland hammocks (due to recent damage from hurricanes) and continued maintenance level activities on other sites. NAM has been contracted by FDOT in the past to conduct exotic plant removal on a portion of the Florida Turnpike.

The USFWS manages two conservation areas that are adjacent to the FDOT right-of-way: the National Key Deer Refuge and the Great White Heron National Wildlife Refuge. For the most part, exotic plant management on these conservation lands has been funded through BIPM. However, these efforts have been sporadic. USFWS has made more organized and thorough efforts to control exotic plants on these refuges as a member of the FKIETF.

FDOT right-of-way is directly adjacent or within 5 meters of NPS land for approximately three miles along Tamiami Trail/US Highway 41/SR 90 through the southeastern edge of Big Cypress National Preserve (BICY). The FDOT right-of-way is also adjacent to Everglades National Park (ENP) near the main park entrance on Inrgaham Highway/SR 9336 (two segments) and the extreme southeastern edge of ENP in Monroe County along US Highway 1/SR 5 (two segments). Current exotic control programs at ENP are focused on punktree and Australian-pine (*Casuarina* spp.) eradication in the eastern part of the park. Funding for this project is limited. BICY currently does not have anyone in charge of their exotic removal program, but efforts in the past were focused along the right-of-way of US Highway 41/SR 90 in Collier County. Expansion of these programs in the future is possible, but is limited by available funding.

Monroe County has conservation lands adjacent to the FDOT right of way in both the lower keys (approximately 1 mile) and upper keys (approximately ½ mile). Monroe County treats all EPPC Category I and II species with the most common species being Brazilian-pepper, Australian-pine, leadtree, and latherleaf (*Colubrina asiatica*). The program is funded through grants from FDEP's Bureau of Invasive Plant Management. This year, Monroe County has received $80,000 for contracted removal and $96,000 for invasive exotic technicians. Monroe County currently has four technicians working on exotics from September to June. Recent activities include follow-up treatments along the Overseas Heritage Trail (OHT).

The city of Miami manages exotic plant species at several parks with remnant native vegetation. The only one of these parks adjacent to the FDOT right-of way (Rickenbacker Causway/ SR 913) is Alice C. Wainwright Park, a remnant rockland hammock fragment. Large-scale exotic plant control has not commenced at this preserve due to a lack of available resources.

In the Monroe County Keys, many exotic plant management projects are coordinated by the FKIETF, which is managed by The Nature Conservancy's Florida Keys office. FDOT is already a member of and active partner with FKIETF. As mentioned previously, FDOT has recently completed a project with FKIETF to remove invasive exotic species along the Overseas Heritage Trail (US Highway 1/SR 5). Other Members of the task force include the FDEP, USFWS, Monroe County, and NPS.

Additional programs may be being conducted by the U.S. Department of Defense (DOD), Monroe County, City of Miami Beach, City of Marathon, and Islamorada but no information from the DOD or these local governments was obtained.

Discussion

Raw Data

All data collected by IRC and processed by IRC and FNAI have been provided to FDOT for its use. IRC also conducted a demonstration for FDOT personnel in the use of the collected data and applications that were developed.

FDOT can use in-house staff to develop a number of database queries and ArcGIS applications to mine the data and provide information relevant to management concerns. For example:

- Which, if any, rare native plants have been observed between particular Mile Posts or Roadway Sections?
- In which, if any, 1/10 mile roadway segments between two particular Mile Posts or Roadway Sections does any exotic plant occur, and what are these plants and segments?

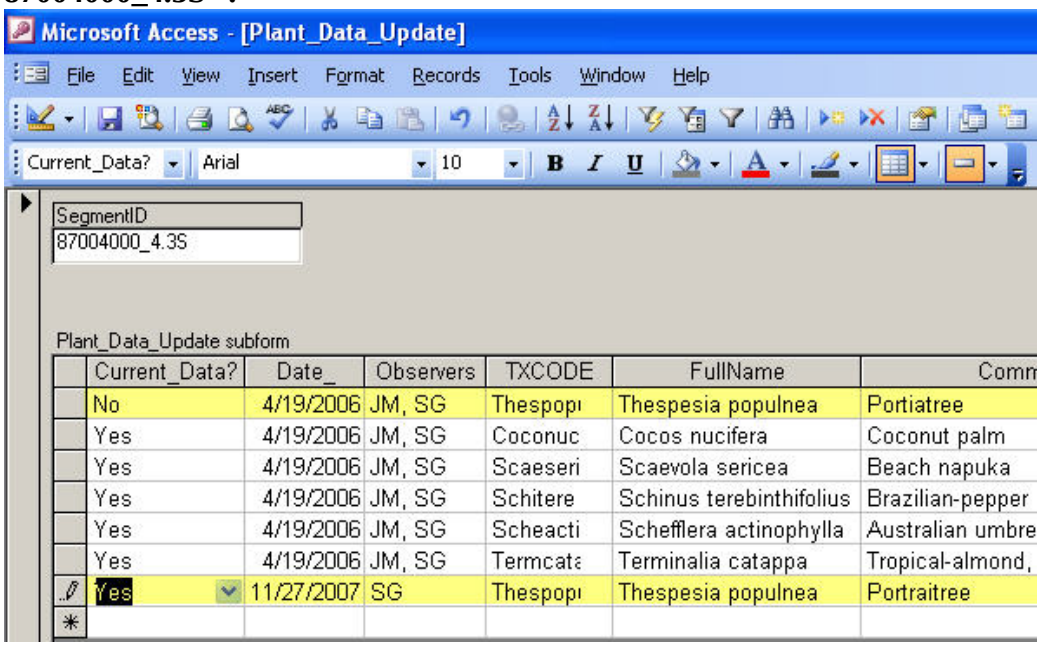
In using the data it is important to acknowledge that these data present a single snapshot of what was observed in the field at the time the data were recorded. Very small or cryptic species may have been missed. Very small patches of exotic or rare species could have been obscured by maintenance equipment, parked vehicles or other temporary features on the landscape. Recently mowed exotic grasses may have been difficult to detect. For instance cogongrass, which is tracked by FDOT, was not recorded during this project but was reported by the FDOT Roadway Maintenance Office from nine $1/10^{th}$ mile segments along I-75 in August, 2007. The plants may have been missed due to one or more of the causes described above, they could represent misidentifications of another species (for instance the closely-related Brazilian satintail, which is native, is difficult to distinguish from cogongrass without some training), or they simply could have not been present as above-ground plants when the area was surveyed during this project (December, 2006).

Furthermore, the road right-of-way is inherently dynamic and populations of plants may fluctuate or turnover in response to construction, exotics control projects, changing maintenance practices or other factors. As such, it is important not only that these data can be updated, but also that all old data can be archived so that changing conditions over time can be measured. A Microsoft Access form was created to allow for the update of the RREP Geodatabase. This form gives the user the ability to easily and quickly update plant data records, and add a new record if a new species is found. The addition of the "Current_Data?" field ensures that original baseline data can be archived, and the most current data can be used for queries and other applications (Figure 7).

Exotics

Invasive exotic plants are widespread throughout south Florida, a situation also found along FDOT roadways. The most frequently recorded species found throughout the study area and in each county tended to be FLEPPC category I species such as Brazilian-pepper. However, category II species were also frequently recorded (e.g. white leadtree and punctureweed). Not all species are of equal concern. Some species are highly invasive in the

Figure 7. Snapshot of portion of plant data update form in Microsoft Access showing both new and old data for Portriatree (*Thespesia populnea*) at Segment 87004000_4.3S[13].



Current_Data?	Date_	Observers	TXCODE	FullName	Comm
No	4/19/2006	JM, SG	Thespopı	Thespesia populnea	Portiatree
Yes	4/19/2006	JM, SG	Coconuc	Cocos nucifera	Coconut palm
Yes	4/19/2006	JM, SG	Scaeseri	Scaevola sericea	Beach napuka
Yes	4/19/2006	JM, SG	Schitere	Schinus terebinthifolius	Brazilian-pepper
Yes	4/19/2006	JM, SG	Scheacti	Schefflera actinophylla	Australian umbre
Yes	4/19/2006	JM, SG	Termcata	Terminalia catappa	Tropical-almond,
Yes	11/27/2007	SG	Thespopı	Thespesia populnea	Portraitree

study area and of major concern (Brazilian-pepper, for instance, which is was the most frequent invasive exotic plant in both counties). Other species are of little concern except in areas where roadside populations are adjacent to conservation areas or remnant native vegetation (for instance category I Napier grass [*Pennisetum purpureum*], which was the third most frequently recorded invasive exotic in the study).

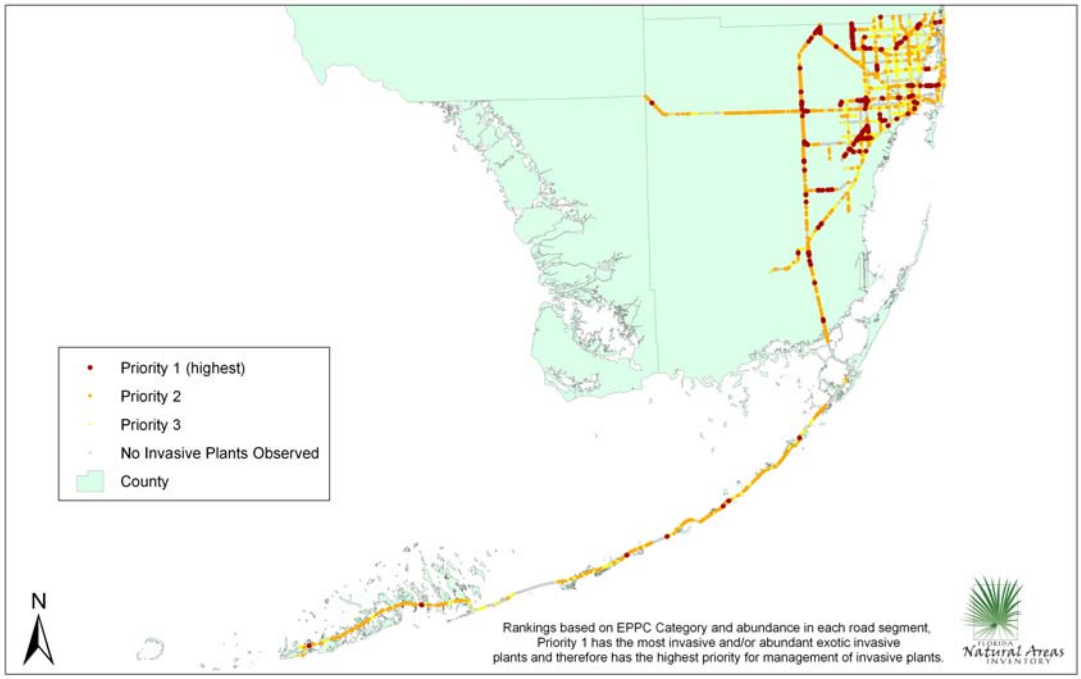
Some highly invasive FLEPPC category I species that the FDOT Roadside Maintenance Office is required to track, such as cogongrass (*Imperata cylindrica*) and tropical soda-apple (*Solanum viarum*) were not recorded during this study. They may be present in small patches that were undetectable during the surveys (both are very rare in the study area). However, new records can be incorporated into the database and both species can be tracked using the database update feature described above.

Several sample applications have been developed to illustrate how exotics data collected during this study could be used. In the first, IRC gave each target invasive exotic species a priority rank independent of its FLEPPC ranking (Appendix D). Priority 1 species are of major concern in all locations. Priority 2 species are of major concern only in areas adjacent to public conservation areas or other lands containing remnant native vegetation. A data field could be added to the RREP and maps generated showing the locations of Priority 2 species. Appendix D also provides simplified Best Management Practices for every target invasive exotic plant species.

[13] Note the highlighted records represent the observation being updated. Since this is an archival system records are not actually changed, but rather a new record is created to reflect the most up-to-date information for a particular species.

In the second example, FNAI has used the data to generate a sample map showing areas of high invasive exotic plant concentration, which could be used to prioritize exotics control projects (Figure 8). Refined or similar analyses could also be performed.

Figure 8. Sample map of areas with high invasive exotic plant concentration[14].



[14] Defined as an area of concentration of invasive exotic plants. Invasive plant species were assigned points based on density and FLEPPC category as follows:

EPPC Category	EPPC Points	Density Description	Density Points
I	5	Dense Monoculture	5
II	1	Dominant Cover	4
		Scattered Dense Patches	3
		Scattered Plants	2
		Single Plant or Clump	1

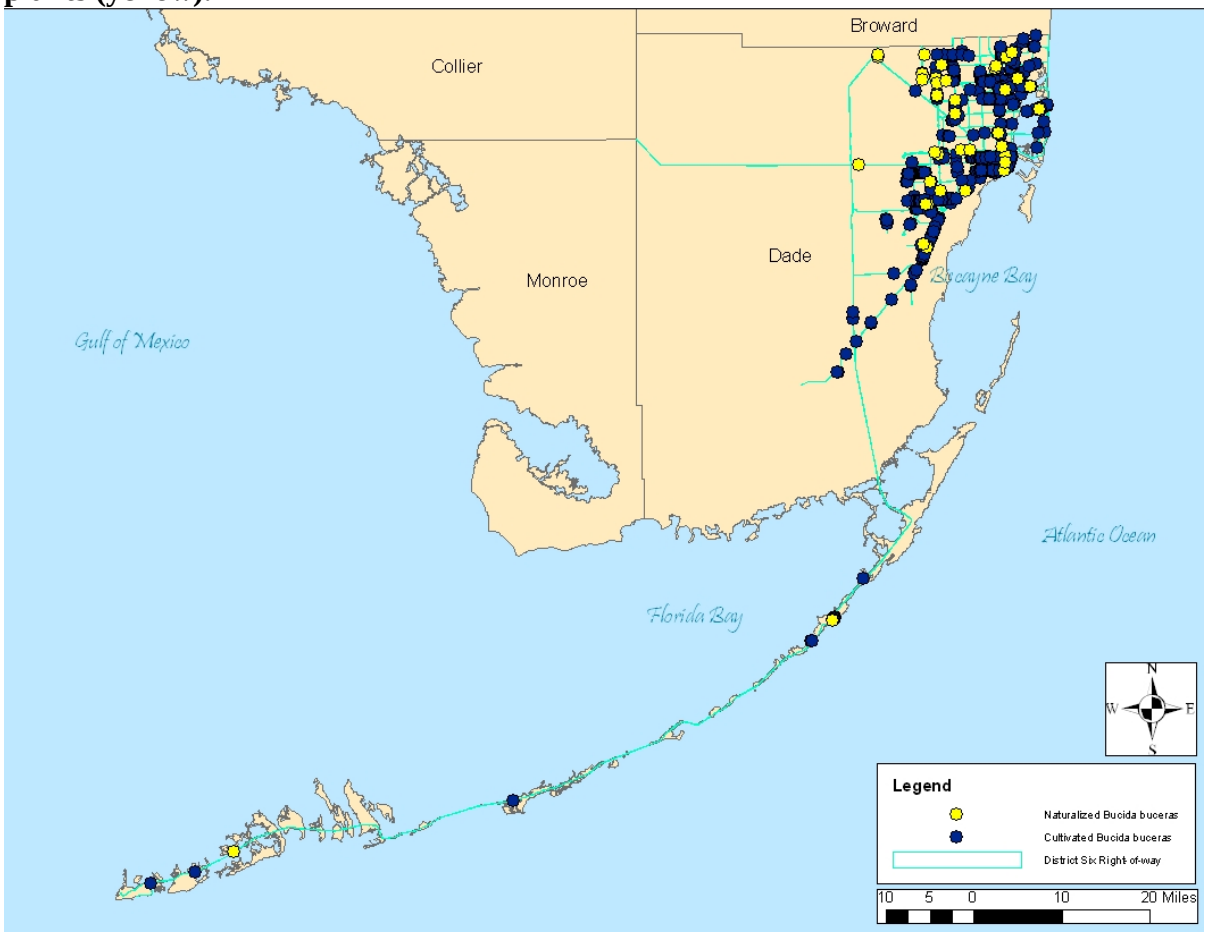
EPPC and Density Points for each invasive species occurring in a right-of-way segment were then summed for each segment. The invasive species score for each segment ranged from 2 to 88. The individual segment scores were then classed into three priority classes as follows:

Segment Score for Invasive Species	Segment Priority	Number of Segments
30 - 88	1	278
10 - 29	2	1977
2 - 9	3	2927

Priority 1 contains segments likely to have severe invasive species problems, i.e. several category I species occurring at high densities or numerous species occurring at mixed densities. Priority 2 contains all segments with a dense monoculture of a category I species not already captured in Priority 1; it also contains segments with some several overlapping species. Priority 3 contains segments with fewer species at lower densities.

These data can also be used to look for incipient populations of invasive exotic plants (low frequency, low mobility) or cultivated (planted) exotics that may become a serious problem in the future. For example, the widely cultivated common black-olive (*Bucida buceras*) is beginning to naturalize on the mainland and to a lesser extent in Monroe County (Figure 9).

Figure 9. Distribution of common black-olive as cultivated (blue) and naturalized plants (yellow).



Rare Native Plants

Rare native plants were less than 10% as frequent as exotic species along the FDOT right-of-way, with the vast majority of records being from Monroe County. Eighty percent of the road segments that contained rare plants also contained invasive exotic plants, making management even more challenging. Essentially, the road right-of-way in Miami-Dade County tends to be a highly disturbed habitat, which is generally favorable for invasive exotic plants and generally unfavorable for rare native plants.

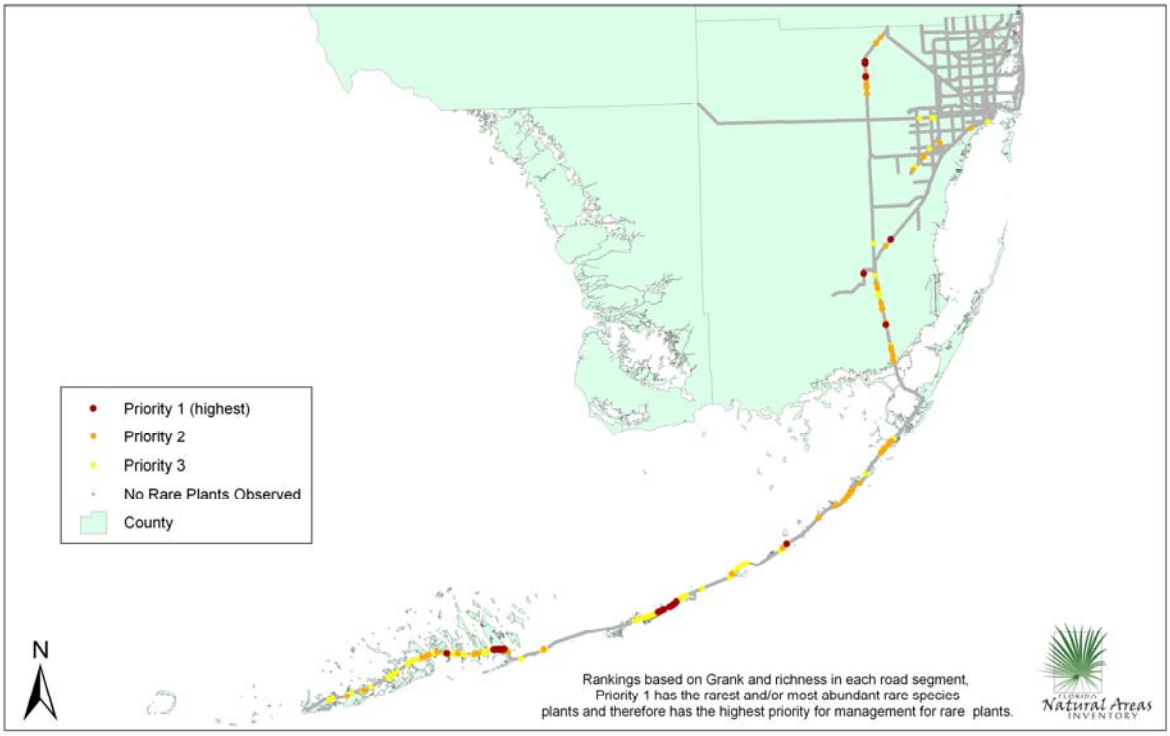
Analyses by both IRC and FNAI provide examples of how FDOT could use the data to help guide management practices for rare native plants. In the IRC example, 13 Important Rare Plant Areas (IRPAs) containing a total of 105 road segments were identified using the following criteria: 1) presence within the road segment of any species listed by or a candidate for listing by the USFWS or ranked as critically imperiled[15] in South Florida[16] by IRC; or 2) presence of any five rare plant species within any road segment. Road segments less than one-half mile apart were merged into a single IRPA. Species identified by criterion 1 are Blodgett's wild mercury (*Argythamnia blodgettii*), pineland strongback (*Bourreria cassinifolia*), Garber's spurge (*Chamaesyce garberi*), Yucatan flymallow (*Cienfuegosia yucatanensis*), white ironwood (*Hypelate trifoliata*), and pride-of-Big-Pine (*Strumpfia maritima*). Garber's spurge was the only federally-listed plant recorded during the study. IRPAs for Miami-Dade and Monroe counties are described in Appendices E and F respectively. Two additional areas in Miami-Dade County have important concentrations of rare plants, and these are also discussed in Appendix E. The 13 IRPAs comprise five major habitat types: mowed upland, rockland hammock edge, scraped coastal rock barren, scraped pine rockland and upland/wetland interface. Best Management Practices for each of these habitat types are found in Appendix G.

In the FNAI example, a map has been generated showing 340 priority areas with the rarest or most abundant rare species present (Figure 12).

[15] IRC ranks as critically imperiled in South Florida all species with five or fewer occurrences or fewer than 1,000 individuals, or because of extreme vulnerability to extinction due to some natural or human factor. For taxa with two to five occurrences, IRC ranks as critically imperiled those species with 3,000 or fewer individuals. For species with a single occurrence, IRC ranks as critically imperiled those species with 10,000 or fewer individuals.

[16] Defined by IRC as Martin, Glades and Charlotte counties southward

Figure 10. Sample FNAI-generated map of priority areas for rare plant management[17].



[17] Rare plant species were assigned points based on FNAI Global Rank as follows:

FNAI Global Rank	Global Rank Points
G1	10
G2	7
G3	4
G4	2
G5	1

Points for each species occurring in a right-of-way segment were then summed for each segment. The rare species score for each segment ranged from 1 to 15. These scores were then classed into 3 priority classes as follows:

Segment Score for Rare Species	Segment Priority	Number of Segments
7 - 15	1	42
4 - 6	2	107
1 - 3	3	191

Priority 1 contains all segments with G1 and G2 species; it also contains segments with numerous rare species. Priority 2 contains all segments with G3 species that are not already in Priority 1; it also contains segments with some overlapping G3, G4 or G5 species. Priority 3 only contains segments with G4 and G5 species not already in Priority 1 or 2; there is minimal overlap of species in Priority 3.

Conclusions

The purpose of this project was to survey and map exotic and rare native plants along FDOT right-of-way within Miami-Dade and Monroe counties and to create a database that can be updated to reflect future activities and conditions. The information in the database can also be used as a reference by roadside managers.

Eighty-eight of 121 (72.7%) total target invasive exotic plant species were found in at least one road segment. Of the 16,412 road segments surveyed, 6,264 (38.2%) contained at least one exotic plant species. Fifty-seven of 200 (28.5%) target rare plant species were found in at least one road segment. Of the 16,412 road segments surveyed, 601 (3.7%) contained at least one rare plant species. About 80% of all rare native plant observations were from Monroe County.

About 7.2% of the road segments surveyed were found to be directly or within 5 meters of a public conservation area and about 23.4% of the road segments surveyed were found to be directly or within 5 meters of native vegetation.

All data collected by IRC and processed by IRC and FNAI have been provided to FDOT for its use. IRC also conducted a demonstration for FDOT personnel in the use of the collected data and applications that were developed. FDOT can use in-house staff to develop a number of database queries and ArcGIS applications to mine the data and provide information relevant to management concerns.

Both IRC and FNAI provided examples of how the information can be used. For instance, FNAI has used the data to generate a sample map of areas with high concentrations of invasive exotic plants, which could be used to prioritize invasive exotics control projects. IRC identified 13 Important Rare Plant Areas (IRPAs), which could help guide the management of rare plants in the FDOT right-of-way.

Citations

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Gann, G.D., K.A. Bradley, and S.W. Woodmansee. 2007. The Floristic Inventory of South Florida Database. The Institute for Regional Conservation, Miami, Florida.

Appendix A: List of Target Exotic Plant Species

Appendix A: List of Target Exotic Plant Species

Scientific Name	Common Names	Total* Miami-Dade County	Total* Monroe County	Total* Cultivated	Found	FLEPPC Status
Abrus precatorius	Rosary-pea, Crab-eyes	13	0	0	Yes	I
Acacia auriculiformis	Earleaf acacia	75	0	3	Yes	I
Adenanthera pavonina	Red sandalwood, Red beardtree	0	0	0	No	II
Agave sisalana	Sisal-hemp	0	0	0	No	II
Albizia lebbeck	Woman's tongue, Rattlepod	195	23	11	Yes	I
Alstonia macrophylla	Deviltree	5	0	0	Yes	II
Antigonon leptopus	Coral vine, Queen's jewels	9	2	0	Yes	II
Ardisia elliptica	Shoe-button ardisia	58	0	0	Yes	I
Asparagus densiflorus	Sprenger's asparagus-fern	45	19	13	Yes	I
Bauhinia purpurea	Purple orchidtree, Butterfly tree	15	0	11	Yes	
Bauhinia variegata	Mountain ebony, orchidtree	12	0	10	Yes	I
Bischofia javanica	Javanese bishopwood	83	0	10	Yes	I
Broussonetia papyrifera	Paper-mulberry	2	0	0	Yes	II
Bucida buceras	Common black-olive	677	13	648	Yes	
Callisia fragrans	Basketplant	2	0	0	Yes	II
Calophyllum antillanum	Santa Maria; Galba	6	6	4	Yes	
Calophyllum inophyllum	Beautyleaf, Alexandrian laurel	27	3	22	Yes	I
Casuarina cunninghamiana	Beefwood, River sheoak	5	0	0	Yes	II
Casuarina equisetifolia	Australian-pine, Horsetail casuarina	399	74	7	Yes	I
Casuarina glauca	Suckering Australian-pine, Gray sheoak	43	1	0	Yes	I
Cecropia palmata	Snakewood tree	0	0	0	No	II
Cestrum diurnum	Dayflowering jessamine	134	0	0	Yes	II

* Total refers to the number of roadway segments in which a particular species was found, out of the 16,412 total roadway segments surveyed.

Scientific Name	Common Names	Total* Miami-Dade County	Total* Monroe County	Total* Cultivated	Found	FLEPPC Status
Chamaedorea seifrizii	Bamboo palm	0	0	0	No	II
Clusia rosea	Pitch-apple	32	22	33	Yes	
Cocos nucifera	Coconut palm	315	246	511	Yes	
Colocasia esculenta	Wild taro, Dasheen, Coco-yam	1	0	0	Yes	I
Colubrina asiatica	Latherleaf, Asian nakedwood	6	62	0	Yes	I
Cryptostegia madagascariensis	Madagascar rubbervine	0	0	0	No	II
Cupaniopsis anacardioides	Carrotwood	18	0	0	Yes	I
Cyperus involucratus	Umbrella plant	0	0	0	No	II
Cyperus prolifer		0	0	0	No	II
Dalbergia sissoo	Indian rosewood	29	1	11	Yes	II
Delonix regia	Royal poinciana, Flamboyant	207	47	201	Yes	
Dichrostachys cinerea	Aroma	0	0	0	No	
Dioscorea alata	White yam	1	0	0	Yes	I
Dioscorea bulbifera	Common air-potato	34	0	0	Yes	I
Dioscorea sansibarensis	Stiff-tipped air-potato	0	0	0	No	
Eichhornia crassipes	Common water-hyacinth	0	0	0	No	I
Epipremnum pinnatum cv. Aureum	Golden pothos	29	2	1	Yes	
Eugenia uniflora	Surinam-cherry	60	2	44	Yes	I
Ficus altissima	Council tree	150	0	53	Yes	II
Ficus microcarpa	Laurel fig, Indian laurel	263	4	15	Yes	I
Ficus religiosa	Botree, Sacred fig	110	0	25	Yes	
Flacourtia indica	Governor's-plum	4	5	0	Yes	II
Hibiscus tiliaceus	Seaside mahoe, Sea hibiscus, mahoe	5	0	3	Yes	II
Hydrilla verticillata	Water-thyme	0	0	0	No	I
Hymenachne amplexicaulis	Trompetilla	0	0	0	No	I
Imperata cylindrica	Congongrass, Cogongrass	0	0	0	No	I

Scientific Name	Common Names	Total* Miami-Dade County	Total* Monroe County	Total* Cultivated	Found	FLEPPC Status
Ipomoea carnea subsp. fistulosa	Bush morningglory	0	0	0	No	II
Jasminum dichotomum	Gold Coast jasmine	41	0	0	Yes	I
Jasminum fluminense	Corky-stemmed jasmine	43	3	0	Yes	I
Jasminum sambac	Arabian jasmine	0	0	0	No	II
Kalanchoe pinnata	Common liveleaf, Cathedral bells, Life plant	7	0	0	Yes	II
Koelreuteria elegans subsp. *formosana*	Flamegold	0	0	0	No	II
Lantana camara	Shrubverbena	203	10	4	Yes	I
Leucaena leucocephala	White leadtree	393	393	3	Yes	II
Livistona chinensis	Chinese fan palm	64	9	71	Yes	II
Lygodium japonicum	Japanese climbing fern	0	0	0	No	I
Lygodium microphyllum	Small-leaf climbing fern	0	0	0	No	I
Lysiloma sabicu	Sabicu	2	2	1	Yes	
Macfadyena unguis-cati	Claw vine, Catclawvine	0	0	0	No	I
Manilkara zapota	Sapodilla	3	7	9	Yes	I
Melaleuca quinquenervia	Punktree	408	0	30	Yes	I
Melaleuca viminalis	Weeping bottlebrush	103	8	83	Yes	
Melia azedarach	Chinaberrytree	8	0	0	Yes	II
Merremia tuberosa	Spanish arborvine, Yellow morningglory	13	1	0	Yes	II
Mucuna pruriens	Cowitch, Velvetbean	7	0	0	Yes	
Murraya paniculata	Orange jessamine	0	0	0	No	II
Nephrolepis cordifolia	Tuberous sword fern	2	0	0	Yes	I
Nephrolepis multiflora	Asian sword fern	10	0	0	Yes	I
Neyraudia reynaudiana	Burmareed, Silkreed	321	0	0	Yes	I
Paederia cruddasiana	Sewervine	0	0	0	No	I
Panicum maximum	Guineagrass	176	141	4	Yes	II

Scientific Name	Common Names	Total* Miami-Dade County	Total* Monroe County	Total* Cultivated	Found	FLEPPC Status
Panicum repens	Torpedo grass	394	0	0	Yes	I
Passiflora biflora	Twolobe passionflower	1	0	0	Yes	II
Pennisetum purpureum	Napier grass, Elephantgrass	544	3	0	Yes	I
Pennisetum setaceum	Fountaingrass	10	9	15	Yes	II
Phoenix canariensis	Canary Island date palm	89	8	90	Yes	
Phoenix dactylifera	Commercial date palm, Date	139	9	141	Yes	
Phoenix reclinata	Senegal date palm	22	2	15	Yes	II
Pistia stratiotes	Water-lettuce	1	0	0	Yes	I
Pittosporum pentandrum	Cheesewood	0	0	0	No	II
Pongamia pinnata	Karum tree, Poonga-oil tree	37	2	30	Yes	
Psidium cattleianum	Strawberry guava	3	0	1	Yes	I
Psidium guajava	Guava	12	0	0	Yes	I
Ptychosperma elegans	Solitaire palm, Alexander palm	0	0	0	No	II
Pueraria montana var. *lobata*	Kudzu	0	0	0	No	I
Rhynchelytrum repens	Rose Natalgrass	47	14	0	Yes	I
Ricinus communis	Castor-bean	136	8	0	Yes	II
Ruellia tweediana	Britton's wild petunia, Mexican bluebell	10	7	15	Yes	I
Sansevieria hyacinthoides	Bowstring-hemp, Mother-in-laws tongue	124	34	28	Yes	II
Sapium sebiferum	Popcorntree, Chinese tallowtree	0	0	0	No	I
Scaevola sericea	Beach napuka	87	83	44	Yes	I
Schefflera actinophylla	Australian umbrellatree	269	27	26	Yes	I
Schinus terebinthifolius	Brazilian-pepper	1577	407	5	Yes	I
Selenicereus coniflorus	Coneflower moonlight cactus	0		0	No	
Selenicereus pteranthus	Snake cactus, Princess-of-the-night	0	0	0	No	

Scientific Name	Common Names	Total* Miami-Dade County	Total* Monroe County	Total* Cultivated	Found	FLEPPC Status
Senna pendula var. glabrata	Valamuerto	82	0	0	Yes	I
Solanum diphyllum	Twoleaf nightshade	1	0	0	Yes	II
Solanum torvum	Turkeyberry	3	0	0	Yes	II
Solanum viarum	Tropical soda-apple	0	0	0	No	I
Sophora tomentosa var. *occidentalis*		27	18	45	Yes	
Stachytarpheta urticifolia	Nettleleaf velvetberry	17	0	1	Yes	
Syagrus romanzoffiana	Queen palm	116	5	112	Yes	II
Syngonium podophyllum	Nephthytis, American evergreen	60	0	3	Yes	I
Syzygium cumini	Jambolan-plum, Java-plum	22	0	7	Yes	I
Syzygium jambos	Rose-apple, Malabar-plum	0	0	0	No	II
Tabebuia heterophylla	White-cedar	191	22	173	Yes	
Tectaria incise	Incised halberd fern	0	0	0	No	I
Terminalia catappa	Tropical-almond, West Indian-almond	73	13	15	Yes	II
Terminalia muelleri	Mueller's tropical-almond	0	0	0	No	II
Thespesia populnea	Portiatree	68	94	6	Yes	I
Tradescantia spathacea	Oysterplant, Moses-in-the-cradle, Boatlily	307	36	25	Yes	I
Tribulus cistoides	Punctureweed, Burrnut, Jamaican feverplant	662	262	15	Yes	II
Urena lobata	Caesarweed	5	0	0	Yes	II
Urochloa mutica	Paragrass	0	0	0	No	I
Vitex trifolia	Simpleleaf chastetree	11	3	3	Yes	II
Washingtonia robusta	Desert palm, Washington fan palm	279	34	240	Yes	II
Wedelia trilobata	Creeping wedelia, Creeping oxeye	437	7	7	Yes	II

Scientific Name	Common Names	Total* Miami-Dade County	Total* Monroe County	Total* Cultivated	Found	FLEPPC Status
Xanthosoma sagittifolium	Arrowleaf elephantear	0	0	0	No	II
Zamia furfuracea	Cardboard-palm	37	10	40	Yes	

Appendix B: List of Target Rare Plant Species

Appendix B: List of Target Rare Plant Species

Scientific Name	Common Names	Total[¥] Miami-Dade	Total Monroe	Found	State Status	Federal Status	IRC Status	FNAI State Status	FNAI Global Status
Acacia choriophylla	Cinnecord	0	0	No	E		SFX		
Acacia macracantha	Porknut	0	0	No			SFH		
Acacia tortuosa	Poponax	0	0	No	E		SFH		
Acanthocereus tetragonus	Barbwire cactus, Dildoe cactus	0	4	Yes	T		SF3		
Acrostichum aureum	Golden leather fern	0	1	Yes	T		SF3	S3	G5
Adiantum tenerum	Brittle maidenhair	0	0	No	E		SF2	S3	G5
Aeschynomene pratensis	Sensitive joint-vetch, Meadow joint-vetch	6	0	Yes	E		SF2	S2	G2
Ageratum littorale	Keys ageratum, Cape Sable Whiteweed	0	0	No	E		SF2	S2	G3
Aletris bracteata	White colic-root, bracted colic-root	0	0	No	E		SF3	S2	G2
Alvaradoa amorphoides	Mexican alvaradoa	1	0	Yes	E		SF2	S1	G5
Amaranthus floridanus	Florida amaranth	0	0	No			SFX		
Amorpha herbacea var. *crenulata*	Crenulate leadplant	0	0	No	E	E	SF1	S1	G4T1
Anemia wrightii	Wright's pineland fern	0	0	No	E		SF1	S1	G2
Angadenia berteroi	Pineland-allamanda, Pineland golden trumpet	8	0	Yes	T		SF3		
Amphitecna latifolia	Black-calabash	0	0	No			SF1		
Argusia gnaphalodes	Sea-lavender, Sea-rosemary	0	0	No	E		SF3	S3	G4
Argythamnia blodgettii	Blodgett's wild mercury, Blodgett's silverbush	0	1	Yes	E	C	SF2	S2	G2
Aristida floridana	Key West threeawn	0	0	No			SF1		
Aristolochia pentandra	Marsh's dutchman's-pipe	0	0	No	E		SF1	S1	G4
Basiphyllaea corallicola	Carter's orchid	0	0	No	E		SF1	S1	G1

[¥] Total refers to the number of roadway segments in which a particular species was found, out of the 16,412 total roadway segments surveyed.

Scientific Name	Common Names	Total[¥] Miami-Dade	Total Monroe	Found	State Status	Federal Status	IRC Status	FNAI State Status	FNAI Global Status
Bletia purpurea	Pinepink	20	0	Yes	T		SF3		
Bourreria cassinifolia	Pineland strongback	1	0	Yes	E		SF1	S1	G3?
Bourreria radula	Rough strongback	0	0	No	E		SF1	S1	G2G3
Bourreria succulenta	Smooth strongback, Bahama strongbark	0	47	Yes	E		SF3		
Brickellia mosieri	Mosier's false boneset	0	0	No	E	C	SF2	S1	G1
Bucida spinosa	Spiny black-olive	0	0	No			SFH		
Byrsonima lucida	Locustberry	0	28	Yes	T		SF3	S3	G4
Caesalpinia major	Yellow nicker-bean	0	0	No	E		SF1		
Caesalpinia pauciflora	Fewflower holdback	0	0	No	E		SF1	S1	G3?
Calyptranthes pallens	Spicewood, Pale lidflower	3	5	Yes	T		SF3		
Calyptranthes zuzygium	Myrtle-of-the-river	0	0	No	E		SF2	S2	G4
Canella winterana	Cinnamon bark, Pepper cinnamon	0	1	Yes	E		SF3	S2	G4G5
Catesbaea parviflora	Smallflower lilythorn	0	0	No	E		SF1	S1	G3
Catopsis berteroniana	Powdery strap airplant	0	0	No	E		SF2	S1S2	G5?
Celosia nitida	West Indian cock's comb	0	0	No	E		SF2		
Cenchrus brownii	Slimbristle sandbur	0	0	No			SFX		
Cenchrus myosuroides	Big sandbur	0	0	No			SF1		
Ceratophyllum muricatum subsp. *australe*	Prickly hornwort	0	0	No			SFX		
Chamaesyce deltoidea subsp. *adhaerens*	Goulds wedge sandmat	0	0	No	E	E	SF1	S1	G2T1
Chamaesyce deltoidea	Wedge sandmat	0	0	No	E	E	SF2	S1	G2T1
Chamaesyce deltoidea subsp. *pinetorum*	Pineland deltoid spurge, Pineland sandmat	0	0	No	E	C	SF3	S1	G2T1
Chamaesyce deltoidea subsp. *serpyllum*	Florida Keys wedge sandmat	0	0	No	E	C	SF1	S1	G2T1
Chamaesyce garberi	Garber's sandmat	0	18	Yes	E	T	SF2	S1	G1
Chamaecrista lineata var. *keyensis*	Keys partidge-pea, Narrowpod sensitive pea	0	0	No	E	C	SF2	S2	G5T2

Scientific Name	Common Names	Total[¥] Miami-Dade	Total Monroe	Found	State Status	Federal Status	IRC Status	FNAI State Status	FNAI Global Status
Chamaesyce pergamena	Southern Florida sandmat	0	0	No	T		SF3		
Chamaesyce porteriana	Porter's sandmat	0	0	No	E		SF3	S2	G2
Chaptalia albicans	White sunbonnets	1	0	Yes	T		SF3		
Chloris elata	Tall windmillgrass	0	0	No			SFX		
Chromolaena frustrata	Cape Sable thoroughwort	0	0	No	E	C	SF1	S1	G1
Chrysophyllum oliviforme	Satinleaf	0	0	No	T		SF3		
Cienfuegosia yucatanensis	Yucatan flymallow	0	1	Yes	E		SF1	S1	G4
Cissampelos pareira	Pareira brava	0	0	No	E		SFH		
Coccothrinax argentata	Florida silver palm	2	18	Yes	T		SF5	S3	G3?
Colubrina arborescens	Coffee colubrina, Greenheart	0	4	Yes	E		SF2		
Colubrina cubensis var. *floridana*	Florida snake-bark, Cuban nakedwood	0	0	No	E		SF2	S1	G3T1
Colubrina elliptica	Nakedwood, Soldierwood	0	1	Yes	E		SF2		
Cordia globosa	Butterflybush, Curacao bush	0	2	Yes	E		SF2		
Crossopetalum ilicifolium	Quailberry, Christmasberry	8	0	Yes	T		SF3	S2	G2
Crossopetalum rhacoma	Rhacoma, Maidenberry	0	23	Yes	T		SF3	S3	G5
Croton humilis	Pepperbush	0	0	No	E		SF1		
Croton lobatus	Lobed croton	0	0	No			SF1		
Ctenitis sloanei	Florida tree fern, Red-hair comb fern	0	0	No	E		SF2	S2	G5
Cupania glabra	American toadwood	0	0	No	E		SF1	S1	G4
Cuscuta Americana	American dodder	0	0	No			SF1		
Cuscuta umbellata	Flatglobe dodder	0	0	No			SFH		
Cynanchum blodgettii	Blodgett's swallowwort	3	1	Yes	T		SF3		
Cyperus floridanus	Florida flatsedge	0	0	No	E		SF1	S1	G3
Cyperus fuligineus	Limestone flatsedge	0	0	No	E		SF1	S1	G3G5
Cyrtopodium punctatum	Cowhorn orchid, Cigar orchid	0	0	No	E		SF2	S1	G5
Dalbergia brownii	Brown's Indian rosewood	0	0	No	E		SF2		
Dalea carthagenensis var. *floridana*	Florida prairieclover	0	0	No	E	C	SF1	S1	G5T1

Scientific Name	Common Names	Total¥ Miami-Dade	Total Monroe	Found	State Status	Federal Status	IRC Status	FNAI State Status	FNAI Global Status
Digitaria filiformis var. *dolichophylla*	Caribbean crabgrass	0	0	No	T		SF2		
Digitaria pauciflora	Everglades crabgrass, Twospike crabgrass	0	0	No	E	C	SF1	S1	G1
Dodonaea elaeagnoides	Smallfruit varnishleaf	0	0	No	E		SF2	S1	G4
Drypetes diversifolia	Milkbark, Whitewood	0	0	No	E		SF2	S2	G4
Drypetes lateriflora	Guiana-plum	0	0	No	T		SF3		
Echinodorus berteroi	Upright burrhead	0	0	No			SFH		
Encyclia boothiana var. erythronioides	Dollar orchid	0	0	No	E		SF2	S1	G4T4
Encyclia cochleata	Clamshell orchid, cockleshell orchid	0	0	No	E		SF2	S2	G4
Encyclia tampensis	Florida butterfly orchid	1	0	Yes	C		SF5		
Epidendrum nocturnum	Night-blooming epidendrum, Night-scented orchid		0	No	E		SF2	S2	G4G5
Epidendrum rigidum	Stiff-flower star orchid	0	0	No	E		SF2		
Eriochloa michauxii var. *simpsonii*	Simpson's cup grass	0	0	No			SFX	S1	G4T1
Erithalis fruticosa	Blacktorch	0	34	Yes	T		SF3		
Ernodea cokeri	Coker's beach creeper	0	0	No	E		SF1	S1	G4
Eugenia confusa	Ironwood, Redberry stopper	3	0	Yes	E		SF2	S2S3	G4G5
Eugenia rhombea	Red stopper	0	0	No	E		SF1	S1	G5
Evolvulus convolvuloides	Bindweed dwarf morningglory	0	0	No	E		SF2		
Evolvulus grisebachii	Grisebach's Dwarf morningglory	0	0	No	E		SF1	S1	G2G3
Exostema caribaeum	Caribbean princewood	0	0	No	E		SF1	S2	G5
Galactia smallii	Small's milkpea	0	0	No	E	E	SF2	S1	G1Q
Glandularia maritima	Beach verbena, Coastal mock vervain	0	0	No	E		SF2	S3	G3
Gossypium hirsutum	Wild cotton, Upland cotton	0	0	No	E		SF3	S3	G4G5
Guajacum sanctum	Lignumvitae, Holywood lignumvitae	0	0	No	E		SF1	S2	G2
Gyminda latifolia	West Indian false boxwood	0	0	No	E		SF2	S2	G4

Scientific Name	Common Names	Total[¥] Miami-Dade	Total Monroe	Found	State Status	Federal Status	IRC Status	FNAI State Status	FNAI Global Status
Harrisia simpsonii	Simpson's pricklyapples, Simpson's applecactus	0	0	No	E		SF2	S2	G2
Heliotropium fruticosum	Key West heliotrope	0	0	No	E		SFH		
Hibiscus poeppigii	Poeppig's rosemallow	0	0	No	E		SF2		
Hippomane mancinella	Manchineel	0	0	No	E		SF2	S2	G5
Hypelate trifoliata	White-ironwood, Inkwood	0	7	Yes	E		SF1	S1	G4
Ilex krugiana	Krug's holly, Tawnyberry holly	0	0	No	T		SF3	S3	G4
Indigofera mucronata var. *keyensis*	Florida Keys indigo	0	0	No	E	C	SF1	S1	G5T1
Ipomoea microdactyla	Man-in-the-ground, 'Bejuco colorado'	0	0	No	E		SF2	S1S2	G2
Ipomoea tenuissima	Rockland morningglory	0	0	No	E		SF2	S1S2	G4
Jacquemontia curtisii	Pineland clustervine	2	0	Yes	T		SF3	S2	G2
Jacquemontia havanensis	Havana clustervine	0	0	No	E		SF1	S1	G5
Jacquemontia pentanthos	Skyblue clustervine	0	1	Yes	E		SF2	S2	G4
Jacquemontia reclinata	Beach clustervine	0	0	No	E	E	SF1	S1	G1
Jacquinia keyensis	Joewood	0	29	Yes	T		SF3	S3	G4
Koanophyllon villosum	Shrub eupatorium	0	0	No	E		SF3	S2	G4G5
Lantana depressa	Pineland lantana, Rockland shrubverbena	1	0	Yes	E		SF3	S3	G3T3
Lantana depressa var. *floridana*	East coast lantana, Florida shrubverbena	0	0	No	E		SF1	S2	G2T2
Leersia monandra	Bunch cutgrass	0	0	No			SFX		
Linum arenicola	Sand flax	0	0	No	E	C	SF2	S1S2	G1G2
Linum carteri	Carter's flax	0	0	No	E	C	SF1	S1	G2T1
Linum carteri var. *smallii*	Small's flax	0	0	No	E		SF2	S2	G2T2
Malachra urens	Roadside leafbract	0	0	No			SF1		
Manilkara jaimiqui subsp. emarginata	Wild dilly	0	40	Yes	T		SF3	S3	G4Q
Maytenus phyllanthoides	Florida mayten	0	1	Yes	T		SF3		
Melanthera parvifolia	Pineland blackanthers	7	0	Yes	T		SF3		

Scientific Name	Common Names	Total[¥] Miami-Dade	Total Monroe	Found	State Status	Federal Status	IRC Status	FNAI State Status	FNAI Global Status
Microgramma heterophylla	Climbing vine fern	0	0	No	E		SF2	S2	G4G5
Myrcianthes fragrans	Twinberry, Simpson's stopper	0	0	No	T		SF3		
Nephrolepis biserrata	Giant sword fern	0	0	No	T		SF3		
Ocimum campechianum	Wild basil, Wild sweet basil	0	0	No	E		SF2		
Odontosoria clavata	Wedgelet fern	0	0	No	E		SF2	S2	G4
Okenia hypogaea	Beach-peanut, Burrowing four-o'clock	0	0	No	E		SF2	S2	G3?
Opuntia corallicola	Semaphore pricklypear	0	0	No	E	C	SF1	S1	G1
Opuntia stricta	Erect pricklypear	0	11	Yes	T		SF3		
Opuntia triacanthos	Jumping cactus	0	0	No	E		SF1	S1	G2G4
Paspalidium chapmanii	Coral panicum	0	0	No	E		SF2		
Passiflora multiflora	Whiteflower passionflower	0	1	Yes	E		SF2	S1	G4
Passiflora pallens	Pineland passionflower	0	0	No	E		SF2	S2	G3G4
Passiflora sexflora	Goatsfoot	0	0	No	E		SF1	S2	G5
Pavonia paludicola	Mangrove mallow, Swampbush	0	0	No	E		SF1		
Peperomia obtusifolia	Florida peperomia, Baby rubberplant	0	0	No	E		SF2	S2	G5
Phoradendron rubrum	Mahogany mistletoe	0	0	No	E		SF1	S1	G4
Phyla stoechadifolia	Southern fogfruit	32	0	Yes	E		SF2		
Picramnia pentandra	Florida bitterbush	0	0	No	E		SF1	S1	G4G5
Pilosocereus bahamensis		0	0	No	E		SF1	S1	G3?
Pilosocereus robinii	Key tree cactus	0	0	No	E	E	SF1	S1	G1
Pisonia rotundata	Smooth devilsclaws, Blolly	0	15	Yes	E		SF3	S1	G4
Pithecellobium keyense	Florida Keys blackbead	0	301	Yes	T		SF5		
Poinsettia pinetorum	Pineland poinsettia, Pineland spurge	1	0	Yes	E		SF3	S2	G2
Polystachya concreta	Greater yellowspike orchid	0	0	No	E		SF3		
Prunus myrtifolia	West Indian cherry	0	0	No	T		SF3	S2	G4
Pseudophoenix sargentii	Sargent's palm, Sargent's cherry palm	0	0	No	E		SF1	S1	G3G5
Psidium longipes	Longstalked-stopper	0	15	Yes	T		SF4	S2	G4
Psychotria ligustrifolia	Bahama wild coffee	0	0	No	E		SF2	S1	G4
Pteris bahamensis	Bahama ladder brake	2	3	Yes	T		SF3	S3	G4

Scientific Name	Common Names	Total[¥] Miami-Dade	Total Monroe	Found	State Status	Federal Status	IRC Status	FNAI State Status	FNAI Global Status
Reynosia septentrionalis	Darlingplum	0	17	Yes	T		SF3		
Rhynchosia parvifolia	Small-leaf snoutbean	0	0	No	T		SF2		
Rhynchosia swartzii	Swartz's snoutbean	0	0	No	E		SF1	S1	G3
Roystonea regia	Royal palm, Florida royal palm	0	0	No	E		SF3		
Sachsia polycephala	Bahama sachsia	0	0	No	T		SF3	S2	G2
Salvia micrantha	Blodgett's sage, Yucatan sage	0	0	No			SFX	SX	G5TX
Savia bahamensis	Maidenbush, Bahama maidenbush	0	0	No	E		SF2	S2	G4
Scaevola plumieri	Inkberry, Beachberry, Gullfeed	0	0	No	T		SF3		
Schaefferia frutescens	Florida boxwood	0	0	No	E		SF2	S2	G5
Schizachyrium sericatum	Silky bluestem	0	0	No	E		SF1	S1	G1
Scleria lithosperma	Florida Keys nutrush	1	0	Yes	E		SF2		
Scutellaria havanensis	Havana skullcap	2	0	Yes	E		SF2	S2	G3G4
Selaginella armata var. *eatonii*	Eaton's spike-moss	0	0	No	E		SF2	S2	G2?
Senna mexicana var. *chapmanii*	Bahama senna, Chapman's wild sensitive plant	1	1	Yes	T		SF3		
Smilax havanensis	Havana greenbrier, Everglades greenbrier	1	5	Yes	T		SF3		
Solanum donianum	Mullein nightshade	0	0	No	T		SF3		
Spermacoce terminalis	Everglades Keys false buttonweed	0	0	No	T		SF3		
Spiranthes laciniata	Lacelip lady's-tresses	0	0	No	T		SF2		
Spiranthes torta	Southern lady's-tresses	0	0	No	E		SF1	S1	G4?
Strumpfia maritima	Pride-of-Big-Pine	0	1	Yes	E		SF1	S1	G4
Stylosanthes calcicola	Everglades key pencilflower	11	0	Yes	E		SF2	S2	G3G4
Swietenia mahagoni	West Indian mahogany	13	48	Yes	T		SF3	S3	G3G4
Tectaria fimbriata	Least halbard fern	0	0	No	E		SF2	S2	G4
Tectaria heracleifolia	Broad halbard fern	0	0	No	T		SF2		
Tephrosia angustissima	Narrowleaf hoarypea	0	0	No	E		SFX	SH	G1TH
Tephrosia angustissima var. *corallicola*	Coral hoarypea	0	0	No	E		SF1	S1	G1T1

Scientific Name	Common Names	Total[¥] Miami-Dade	Total Monroe	Found	State Status	Federal Status	IRC Status	FNAI State Status	FNAI Global Status
Tephrosia angustissima var. *curtissii*	Curtiss' hoarypea	0	0	No	E		SF1	S1	G1T1
Tetrazygia bicolor	West Indian-lilac, Florida clover ash	1	0	Yes	T		SF3		
Thelypteris augescens	Abrupt-tip maiden fern	0	0	No	T		SF2		
Thelypteris reptans	Creeping star-hair fern	0	0	No	E		SF2	S1	G5
Thelypteris reticulata	Lattice-vein fern	0	0	No	E		SF1		
Thelypteris serrata	Toothed lattice-vein fern	0	0	No	E		SF1	S1	G4
Thrinax morrisii	Silver thatch palm, Brittle thatch palm	0	57	Yes	E		SF3	S3	G4G5
Thrinax radiata	Green thatch palm, Florida thatch palm	2	118	Yes	E		SF3	S2	G4G5
Tillandsia balbisiana	Reflexed wild-pine, Northern needleleaf	7	0	Yes	T		SF5		
Tillandsia fasciculata var. *clavispica*	Clubspike cardinal airplant	0	0	No	E		SFX		
Tillandsia fasciculata var. *densispica*	Stiff-leaved wild-pine, Cardinal airplant	22	0	Yes	E		SF5		
Tillandsia flexuosa	Banded wild-pine, Twisted airplant	0	0	No	T		SF3	S3	G5
Tillandsia utriculata	Giant wild-pine, Giant airplant	18	0	Yes	E		SF5		
Tillandsia variabilis	Soft-leaved wild-pine, Leatherleaf airplant	0	0	No	T		SF3		
Tournefortia hirsutissima	Chiggery grapes	0	0	No	E		SF2		
Tragia saxicola	Florida Keys noseburn	0	0	No	T		SF3	S2	G2
Trema lamarckianum	West Indian trema, Pain-in-the-back	12	0	Yes	E		SF2	S2	G5
Trichostigma octandrum	Hoopvine	0	0	No	E		SF1		
Tridens eragrostoides	Love grass tridens	0	0	No			SFX		
Tripsacum floridanum	Florida gamagrass	0	0	No	T		SF3	S2	G2
Vallesia antillana	Pearlberry, Tearshrub	0	0	No	E		SF1	S1	G4
Vanilla barbellata	Wormvine orchid	0	0	No	E		SF2	S2	G4G5
Zamia integrifolia	Coontie, Florida arrowroot	13	0	Yes	C		SF4		
Zanthoxylum coriaceum	Biscayne prickly-ash	0	0	No	E		SF1	S1	G3G4

Scientific Name	Common Names	Total[¥] Miami-Dade	Total Monroe	Found	State Status	Federal Status	IRC Status	FNAI State Status	FNAI Global Status
Zanthoxylum flavum	West Indian satinwood, Yellowwood	0	0	No	E		SF1	S1	G3

Appendix C: List of Roads Surveyed

Appendix C: List of Roads Surveyed

Appendix C.1: Miami-Dade County

Section Number	Route	Local Name	Managing Agency	Miles	Quarter Completed
87001000	94	N Kendall Dr/SW 88 St	FDOT D6	10.7	3
87002000	823	Red Rd/NW 57 Ave/W 4 Ave (Hialeah)	FDOT D6	9.699	5
87004000	112	W 41 St/ Arthur Godfrey Rd	FDOT D6	4.91	4
87010000	5	US 1/S Dixie Hwy	FDOT D6	13.947	3
87012000	847	NW 47 Ave	FDOT D6	2.144	4
87015000	989	SW 112 Ave/ Allapattah Dr	FDOT D6	3.032	3
87016000	112	Airport Expwy, Julia Tuttle Cswy/I-195	FDOT D6	0.814	4
87019000	817	NW 27 Ave	FDOT D6	4.785	4
87020000	5	US 1/S Dixie Hwy	FDOT D6	20.042	3
87020001	5	US 1/S Dixie Hwy (One-Way Pair/SB)	FDOT D6	1.08	3
87021000	878	Snapper Creek Expwy	MDX	2.658	4
87026000	860	NE/NW 183/186 St/Miami Gardens Dr	FDOT D6	3.664	5
87026005	860	NW 186 St/ Miami Gardens Dr	FDOT D6	9.311	5
87037000	907	Alton Rd/63 St	FDOT D6	5.659	4
87039000	992	SW 152 St/Coral Reef Dr	FDOT D6	2.462	3
87044000	976	SW 40 St/Bird Rd	FDOT D6	8.466	4
87046000	990	SW 104/112 St/Killian Dr	FDOT D6	3.002	3
87047000	973	SW/NW 87 Ave/Galloway Rd	FDOT D6	9.505	4
87053000	968	W/E Flagler St	FDOT D6	9.298	4
87053001	968	SW/SE 1 St (One-Way Pair EB)	FDOT D6	3.009	4
87054000	972	Coral Way/Sw 22 St/Sw 3Ave/SW/SE 13 St	FDOT D6	4.164	5
87054504	972	Coral Way/Sw 22 St	FDOT D6	2.501	5
87055000	986	SW 72 St/Sunset Dr	FDOT D6	5.883	4
87060000	A1A	MacArthur Cswy/5 St/Collins Ave/44 St	FDOT D6	17.717	4
87060001	A1A	Harding Ave/Abbott Ave/Indian	FDOT D6	3.231	4
87060002	A1A	Indian Creek Dr (One-Way Pair/SB)	FDOT D6	1.034	4

Section Number	Route	Local Name	Managing Agency	Miles	Quarter Completed
87061000	886	Port Blvd	FDOT D6	0.826	4
87062000	959	SW/NW 57 Ave/Red Rd	FDOT D6	5.323	4
87066000	922	NW/NE 125/123 St/NE123 St/96 St	FDOT D6	1.002	4
87072000	985	SW/NW 107 Ave	FDOT D6	7.604	5
87080001	934	NW 81/82 St (One-Way Pair WB)	FDOT D6	3.079	4
87080900	934	W 21 St/Flamingo Way/E 25 St/NW 79 St	FDOT D6	8.937	4
87085000	933	SW/NW 12 Ave	FDOT D6	4.245	4
87090000	25	US 27/Okeechobee Rd	FDOT D6	19.638	5
87091000	994	Quail Roost Dr/SW 200 St	FDOT D6	8.058	3
87110000	90	US 41/Tamiami Trail/SW/SE 8 St	FDOT D6	25.715	5
87120000	90	US 41/Tamiami Trail/SW/SE 8 St	FDOT D6	18.147	4
87120001	90	SE/SW 7 St/SW 22 Ave Rd	FDOT D6	2.933	4
87133000	825	SW 137 Ave/Lindgren Rd	FDOT D6	2.544	3
87140000	7	US 441/SW/NW 8 Ave/NW 7 Ave	FDOT D6	14.68	5
87170000	826	NW/NE 167 St/NE 163 St/Sunny Isles Blvd/Ocean Beach Blvd	FDOT D6	5.727	4
87190000	909	West Dixie Hwy/NE 22 Ave	FDOT D6	3.17	5
87200000	836	East-West Expwy/Dolphin Expwy/I-395	MDX/FDOT D6	13.048	5
87210000	856	NE 192 St/Wm Lehman Cswy	FDOT D6	1.704	4
87240000	9	SW/NW 27 Ave/Unity Blvd	FDOT D6	13.69	4
87250000	944	Hialeah Dr/NW 54 St	FDOT D6	5.822	4
87270000	9A	I-95/North-South Expwy	FDOT D6	17.26	5
87281000	953	LeJeune Rd/NW 42 Ave/E 8 Ave (Hialeah)	FDOT D6	11.735	4
87470000	91	Florida Turnpike	FTE	3.342	4
87070000	997	Krome Avenue/SW 177 Ave.	FDOT D6	14.259	6
87150000	997	Krome Avenue/SW 177 Ave.	FDOT D6	22.396	6
87027000	969	Milam Dairy Rd./NW 72 Ave.	FDOT D6	5.367	6
87017000	913	Rickenbaker Causeway	FDOT D6	0.35	6
87038000	932	NW/NE 103 St.	FDOT D6	9.716	6
87027002	969	Milam Dairy Rd./NW 72 Ave.	FDOT D6	0.189	6

Section Number	Route	Local Name	Managing Agency	Miles	Quarter Completed
87160000	9336	Ingraham Highway/SW 192 St.	FDOT D6	8.725	6
87260000	826	Palmetto Expwy	FDOT D6	24.655	7
87030000	5	US 1/Biscayne Blvd.	FDOT D6	25.402	7
87030001	5	US 1/Biscayne Blvd.	FDOT D6	0.299	7
87060000	970	Downtown Distributor, Miami Expwy	FDOT D6	0.558	7
87080000	934	Hialeah Exwy, NE/NW 79 St.	FDOT D6	4.172	7
87080347	934	Hialeah Exwy, NE/NW 79 St.	FDOT D6	1.05	7
87066000	922	NE/NW 123/125 St.	FDOT D6	3.736	7
87008000	916	NE 153 St., NW 138 St.	FDOT D6	10.264	7
87008001	916	NE 153 St., NW 138 St.	FDOT D6	2.588	7
87052000	924	Gratigny Pkwy, NW 119 St.	MDX	3.096	7
87300000	924	Gratigny Pkwy, NW 119 St.	MDX	5.352	7
87034000	915	NE 6 Ave.	FDOT D6	5.905	7
87075000	93	I-75	FDOT D6	5.482	7
87220000	948	NW 36th St.	FDOT D6	3.835	8
87003000	112	Airport Expressway	FDOT D6	4.014	8
87021011	878	Snapper Creek Expwy. Off Ramp to Don Shula Expwy.	MDX	0.457	8
87053002	968	SW/SE 1st St.	FDOT D6	0.795	8
87050000	874	Don Shula Expressway	MDX	7.062	8
		Total		530.67	

Appendix C.2: Monroe County

Section Number	Route	Local Name	Miles	Quarter Completed
90030000	SR A1A	South Roosevelt Blvd	2.895	5
90010000	SR 5	US 1/Whitehead St/Truman Ave/N Roosevelt Blvd	4.531	5
90020000	SR 5	US 1/Overseas Hwy. – Big Pine Key to Key West	26.548	5
90060000	SR 5	US 1/Overseas Hwy. – Monroe County Line to Anne's Beach	38.777	5
90060002	SR 5	US 1/Overseas Hwy. – Key Largo to Tavernier	0.772	5
90030000	SR 5	US 1/Overseas Hwy. – Marathon to Big Pine Key	16.806	7
90040000	SR 5	US 1/Overseas Hwy. – Long Key to Marathon	11.636	7
90050000	SR 5	US 1/Overseas Hwy. – Anne's Beach to Long Key	14.105	7
90060001	SR 5	US 1/Overseas Hwy. – Middle Key Largo	3.102	8
		Total:	119.172	

Appendix D: Best Management Practices and Priority Rankings for Invasive Exotic Plants

Appendix D: Best Management Practices and Priority Rankings[18] for Invasive Exotic Plants

Scientific Name	Common Names	Priority	Recommendation
Abrus precatorius	Rosary-pea, Crab-eyes	1	Basal bark or cut stump herbicide
Acacia auriculiformis	Earleaf acacia	1	Basal bark or cut stump herbicide
Adenanthera pavonina	Red sandalwood, Red beardtree	1	Basal bark or cut stump herbicide
Agave sisalana	Sisal-hemp	1	Physical removal or bud herbicide treatment
Albizia lebbeck	Woman's tongue, Rattlepod	1	Basal bark or cut stump herbicide
Alstonia macrophylla	Deviltree	1	Basal bark or cut stump herbicide
Antigonon leptopus	Coral vine, Queen's jewels	2	Basal bark or cut stump herbicide
Ardisia elliptica	Shoe-button ardisia	1	Basal bark or cut stump herbicide
Asparagus densiflorus	Sprenger's asparagus-fern	2	Hand removal or foliar herbicide
Bauhinia purpurea	Purple orchidtree, Butterfly tree	2	Basal bark or cut stump herbicide
Bauhinia variegata	Mountain ebony, orchidtree	1	Basal bark or cut stump herbicide
Bischofia javanica	Javanese bishopwood	1	Basal bark or cut stump herbicide
Broussonetia papyrifera	Paper-mulberry	2	Basal bark or cut stump herbicide
Bucida buceras	Common black-olive	1	Basal bark or cut stump herbicide
Callisia fragrans	Basketplant	2	Physical Removal or foliar herbicide
Calophyllum antillanum	Santa Maria; Galba	1	Basal bark or cut stump herbicide
Calophyllum inophyllum	Beautyleaf, Alexandrian laurel	1	Basal bark or cut stump herbicide
Casuarina cunninghamiana	Beefwood, River sheoak	1	Basal bark or cut stump herbicide
Casuarina equisetifolia	Australian-pine, Horsetail casuarina	1	Basal bark or cut stump herbicide
Casuarina glauca	Suckering Australian-pine, Gray sheoak	1	Basal bark or cut stump herbicide
Cecropia palmata	Snakewood tree	1	Basal bark or cut stump herbicide
Cestrum diurnum	Dayflowering jessamine	1	Basal bark or cut stump herbicide
Chamaedorea seifrizii	Bamboo palm	1	Cut stump or physical removal

[18] Priority 1 species are of major concern in all locations. Priority 2 species are of major concern in areas adjacent to public conservation areas or other lands containing remnant native vegetation.

Scientific Name	Common Names	Priority	Recommendation
Clusia rosea	Pitch-apple	1	Basal bark or cut stump herbicide, outside of lower Keys. This species is native from Big Pine Key to Key West. Populations outside of this range should be treated.
Cocos nucifera	Coconut palm	2	Physical removal
Colocasia esculenta	Wild taro, Dasheen, Coco-yam	1	Mowing or foliar herbicide
Colubrina asiatica	Latherleaf, Asian nakedwood	1	Basal bark or cut stump herbicide
Cryptostegia madagascariensis	Madagascar rubbervine	1	Basal bark or cut stump herbicide
Cupaniopsis anacardioides	Carrotwood	1	Basal bark or cut stump herbicide
Cyperus involucratus	Umbrella plant	1	Mowing or foliar herbicide
Cyperus prolifer		1	Mowing or foliar herbicide
Dalbergia sissoo	Indian rosewood	1	Basal bark or cut stump herbicide
Delonix regia	Royal poinciana, Flamboyant	1	Basal bark or cut stump herbicide
Dichrostachys cinerea	Aroma	1	Basal bark or cut stump herbicide
Dioscorea alata	White yam	1	Cut vines 1 meter above the base, foliar herbicide ground foliage
Dioscorea bulbifera	Common air-potato	1	Cut vines 1 meter above the base, foliar herbicide ground foliage
Dioscorea sansibarensis	Stiff-tipped air-potato	1	Cut vines 1 meter above the base, foliar herbicide ground foliage
Eichhornia crassipes	Common water-hyacinth	1	Foliar herbicide
Epipremnum pinnatum		1	Foliar herbicide
Eugenia uniflora	Surinam-cherry	1	Basal bark or cut stump herbicide
Ficus altissima	Council tree	1	Basal bark or cut stump herbicide
Ficus microcarpa	Laurel fig, Indian laurel	1	Basal bark or cut stump herbicide
Ficus religiosa	Botree, Sacred fig	1	Basal bark or cut stump herbicide
Flacourtia indica	Governor's-plum	1	Basal bark or cut stump herbicide
Hibiscus tiliaceus	Seaside mahoe, Sea hibiscus, mahoe	2	Basal bark or cut stump herbicide
Hydrilla verticillata	Water-thyme	1	Foliar herbicide
Hymenachne amplexicaulis	Trompetilla	1	Foliar herbicide
Imperata cylindrica	Congongrass, Cogongrass	1	Foliar herbicide

Scientific Name	Common Names	Priority	Recommendation
Ipomoea carnea subsp. fistulosa	Bush morningglory	2	Basal bark or cut stump herbicide
Jasminum dichotomum	Gold Coast jasmine	1	Basal bark or cut stump herbicide
Jasminum fluminense	Corky-stemmed jasmine	1	Basal bark or cut stump herbicide
Jasminum sambac	Arabian jasmine	2	Basal bark or cut stump herbicide
Kalanchoe pinnata	Common liveleaf, Cathedral bells, Life plant	2	Physical removal
Koelreuteria elegans subsp. *formosana*	Flamegold	1	Basal bark or cut stump herbicide
Lantana camara	Shrubverbena	1	Basal bark or cut stump herbicide
Leucaena leucocephala	White leadtree	1	Basal bark or cut stump herbicide
Livistona chinensis	Chinese fan palm	1	Physical removal
Lygodium japonicum	Japanese climbing fern	1	Foliar herbicide
Lygodium microphyllum	Small-leaf climbing fern	1	Foliar herbicide
Lysiloma sabicu	Sabicu	2	Basal bark or cut stump herbicide
Macfadyena unguis-cati	Claw vine, Catclawvine	2	Basal bark or cut stump herbicide
Manilkara zapota	Sapodilla	1	Basal bark or cut stump herbicide
Melaleuca quinquenervia	Punktree	1	Basal bark or cut stump herbicide
Melaleuca viminalis	Weeping bottlebrush	1	Basal bark or cut stump herbicide
Melia azedarach	Chinaberrytree	2	Basal bark or cut stump herbicide
Merremia tuberosa	Spanish arborvine, Yellow morningglory	1	Basal bark or cut stump herbicide
Mucuna pruriens	Cowitch, Velvetbean	1	Basal bark or cut stump herbicide
Murraya paniculata	Orange jessamine	2	Basal bark or cut stump herbicide
Nephrolepis cordifolia	Tuberous sword fern	1	Foliar herbicide
Nephrolepis multiflora	Asian sword fern	1	Foliar herbicide
Neyraudia reynaudiana	Burmareed, Silkreed	1	Foliar herbicide application to new growth, after cutting mature plants
Paederia cruddasiana	Sewervine	1	Basal bark or cut stump herbicide
Panicum maximum	Guineagrass	2	Mowing or foliar herbicide
Panicum repens	Torpedo grass	2	Mowing or foliar herbicide
Passiflora biflora	Twolobe passionflower	1	Basal bark or cut stump herbicide
Pennisetum purpureum	Napier grass, Elephantgrass	2	Mowing or foliar herbicide

Scientific Name	Common Names	Priority	Recommendation
Pennisetum setaceum	Fountaingrass	1	Mowing or foliar herbicide
Phoenix canariensis	Canary Island date palm	1	Physical removal
Phoenix dactylifera	Commercial date palm, Date	1	Physical removal
Phoenix reclinata	Senegal date palm	1	Cut stump or physical removal
Pistia stratiotes	Water-lettuce	1	Foliar herbicide
Pittosporum pentandrum	Cheesewood	1	Basal bark or cut stump herbicide
Pongamia pinnata	Karum tree, Poonga-oil tree	1	Basal bark or cut stump herbicide
Psidium cattleianum	Strawberry guava	1	Basal bark or cut stump herbicide
Psidium guajava	Guava	1	Basal bark or cut stump herbicide
Ptychosperma elegans	Solitaire palm, Alexander palm	1	Physical removal
Pueraria montana var. *lobata*	Kudzu	1	Basal bark or cut stump herbicide
Rhynchelytrum repens	Rose Natalgrass	2	Mowing or foliar herbicide
Ricinus communis	Castor-bean	2	Basal bark or cut stump herbicide
Ruellia tweediana	Britton's wild petunia, Mexican bluebell	2	Foliar herbicide
Sansevieria hyacinthoides	Bowstring-hemp, Mother-in-laws tongue	2	Physical removal or foliar herbicide
Sapium sebiferum	Popcorntree, Chinese tallowtree	1	Basal bark or cut stump herbicide
Scaevola sericea	Beach napuka	1	Basal bark or cut stump herbicide
Schefflera actinophylla	Australian umbrellatree	1	Basal bark or cut stump herbicide
Schinus terebinthifolius	Brazilian-pepper	1	Basal bark or cut stump herbicide
Selenicereus coniflorus	Coneflower moonlight cactus	2	Physical removal
Selenicereus pteranthus	Snake cactus, Princess-of-the-night	2	Physical removal
Senna pendula var. glabrata	Valamuerto	1	Basal bark or cut stump herbicide
Solanum diphyllum	Twoleaf nightshade	1	Basal bark or cut stump herbicide
Solanum torvum	Turkeyberry	1	Basal bark or cut stump herbicide
Solanum viarum	Tropical soda-apple	1	Basal bark or cut stump herbicide
Sophora tomentosa var. *occidentalis*		2	Basal bark or cut stump herbicide
Stachytarpheta urticifolia	Nettleleaf velvetberry	2	Basal bark or cut stump herbicide
Syagrus romanzoffiana	Queen palm	1	Physical removal
Syngonium podophyllum	Nephthytis, American evergreen	2	Foliar herbicide
Syzygium cumini	Jambolan-plum, Java-plum	1	Basal bark or cut stump herbicide

Scientific Name	Common Names	Priority	Recommendation
Syzygium jambos	Rose-apple, Malabar-plum	1	Basal bark or cut stump herbicide
Tabebuia heterophylla	White-cedar	2	Basal bark or cut stump herbicide
Tectaria incisa	Incised halberd fern	1	Foliar herbicide
Terminalia catappa	Tropical-almond, West Indian-almond	1	Basal bark or cut stump herbicide
Terminalia muelleri	Mueller's tropical-almond	1	Basal bark or cut stump herbicide
Thespesia populnea	Portiatree	1	Basal bark or cut stump herbicide
Tradescantia spathacea	Oysterplant, Moses-in-the-cradle, Boatlily	2	Foliar herbicide
Tribulus cistoides	Punctureweed, Burrnut, Jamaican feverplant	2	Mowing or foliar herbicide
Urena lobata	Caesarweed	2	Basal bark herbicide or mowing
Urochloa mutica	Paragrass	2	Mowing or foliar herbicide
Vitex trifolia	Simpleleaf chastetree	2	Basal bark or cut stump herbicide
Washingtonia robusta	Desert palm, Washington fan palm	1	Physical removal
Wedelia trilobata	Creeping wedelia, Creeping oxeye	2	Mowing or foliar herbicide
Xanthosoma sagittifolium	Arrowleaf elephantear	2	Mowing or foliar herbicide
Zamia furfuracea	Cardboard-palm	2	Physical removal

Appendix E: Important Rare Plant Areas (IRPAs) in Miami-Dade County

Appendix E: Important Rare Plant Areas (IRPAs) in Miami-Dade County

Summary

In Miami-Dade County, there are two IRPAs, covering two roadway segments. Both of these IRPAs are represented by scraped remnant pine rockland fragments where some rare native species still persist. In addition to these two IRPASs, Miami-Dade also has two other notable areas for rare plants. Stretches of roadway in Miami-Dade County (particularly along Krome Avenue/SR 997) provide wetland/upland interface habitat for a suite of rare native plant species. See appendix G for best management practices for upland/wetland interface. Portions of the right-of-way along US 1/SR 5 and the Rickenbaker Causeway (SR 913) near the Brickell Area, harbor some large remnant rare trees: redberry stopper (*Eugenia confusa*) and spicewood (*Calyptranthes pallens*). These trees are not directly adjacent to any natural area.

IRPA on State Road 9336/Ingraham Highway (SegmentID 87160000_6.6S)

This IRPA consists of a scraped remnant pine rockland fragment. There is also an intact pine rockland fragment directly adjacent to the east of this segment. See Appendix G for best management practices for scraped pine rockland, and aides to identification of plant species. Eight rare native species and four invasive exotic species were recorded growing in this IRPA (Tables E1 and E2).

Figure E1: IRPA on SR 9336/Ingraham Highway

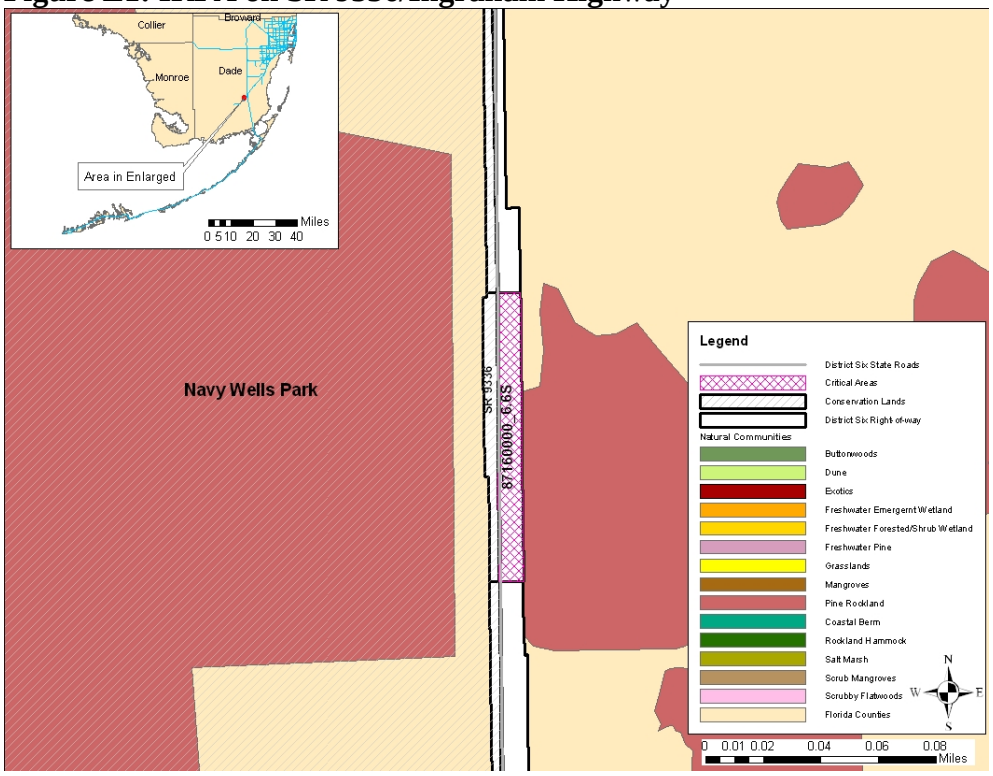

Table E1: Rare Plants Observed in IRPA on State Road 9336/Ingraham Highway

Scientific Name	Common Names
Angadenia berteroi	Pineland-allamanda, Pineland golden trumpet
Chaptalia albicans	White sunbonnets
Crossopetalum ilicifolium	Quailberry, Christmasberry
Lantana depressa	Pineland lantana, Rockland shrubverbena
Melanthera parvifolia	Pineland blackanthers
Poinsettia pinetorum	Pineland poinsettia, Pineland spurge
Scutellaria havanensis	Havana skullcap
Senna mexicana var*. chapmanii*	Bahama senna, Chapman's wild sensitive plant

Table E2: Exotic Plants Observed in IRPA on State Road 9336/Ingraham Highway

Exotic Plants Recorded in IRPA along State Road 9336	
Scientific Name	**Common Names**
Albizia lebbeck	Woman's tongue, Rattlepod
Lantana camara	Shrubverbena
Neyraudia reynaudiana	Burmareed, Silkreed
Schinus terebinthifolius	Brazilian-pepper

IRPA along State Road Five/US-1 (87020000_5.8W)

This IRPA consists of a scraped remnant pine rockland fragment. See Appendix G for best management practices for scraped pine rockland, and aides to identification of plant species. Three rare native species and four invasive exotic species were recorded growing in this IRPA. The rare species observed growing in this IRPA are pineland strongback (*Bourreria cassinifolia*), Mexican alvarodoa (*Alvarodoa amorphoides*) and quail berry (*Crossopetalum ilicifolium*). This IRPA is considered non-viable. Construction of a bus-way on the west side of this roadway has already destroyed much of the habitat present at this site. Furthermore, the remaining portion of this IRPA is slated to be cleared and zoned for light industrial use.

Figure E2: IRPA on SR 5/US-1

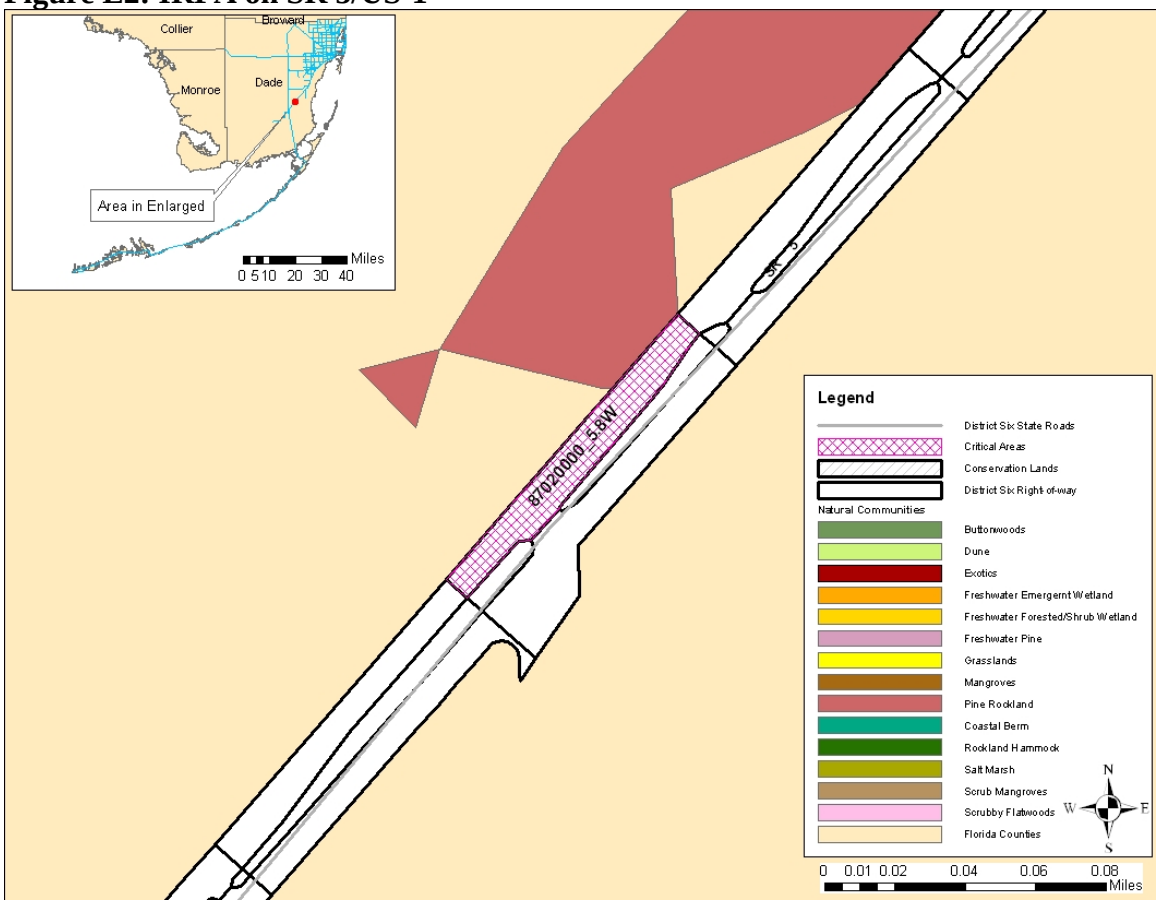

Table E3: Rare Plants Observed in IRPA along State Road Five/US-1

Rare Plants Recorded in IRPA along State Road 5 (Dade County)	
Scientific Name	**Common Names**
Alvaradoa amorphoides	Mexican alvaradoa
Bourreria cassinifolia	Pineland strongback
Crossopetalum ilicifolium	Quailberry, Christmasberry

Table E4: Exotic Plants Observed in IRPA along State Road Five/US-1

Exotic Plants Recorded in IRPA along State Road 5 (Dade County)	
Scientific Name	**Common Names**
Albizia lebbeck	Woman's tongue, Rattlepod
Neyraudia reynaudiana	Burmareed, Silkreed
Rhynchelytrum repens	Rose Natalgrass
Schinus terebinthifolius	Brazilian-pepper

Appendix F: Important Rare Plant Areas (IRPAs) in Monroe County

Appendix F: Important Rare Plant Areas (IRPA) in Monroe County

Summary

There are 11 IRPAs in Monroe County, composed of 104 segments. These IRPA's are represented by four distinct habitats including mowed upland, rockland hammock edge, scraped coastal rock barren and scraped pine rockland.

IRPA on Overseas Highway/SR 5, Key Largo (SegmentIDs 90060001_0.2 through 90060001_0.8)

This IRPA consists of a rockland hammock edge, and several segments are directly adjacent to the Lamar Louise Curry Preserve. See Appendix G for best management practices for hammock edge, and aides to identification of plant species. Four rare native species were recorded growing in this IRPA, including a population of the IRC critically imperiled white ironwood (*Hypelate trifoliata*). Four invasive exotic species were also recorded.

Figure F1: IRPA on Overseas Highway/SR 5, Key Largo

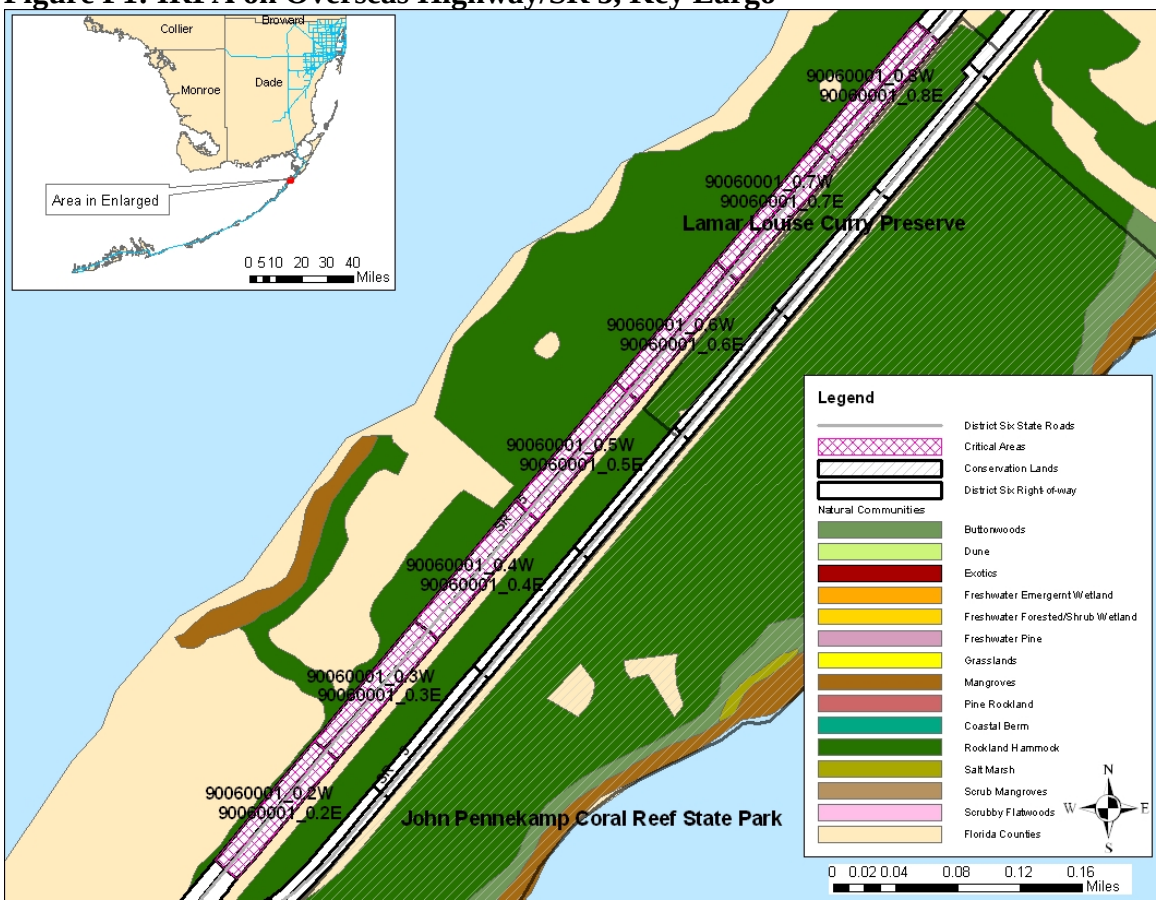

Table F1: Rare Plants Observed in IRPA on Key Largo

Scientific Name	Common Names
Canella winterana	Cinnamon bark, Pepper cinnamon
Hypelate trifoliata	White-ironwood, Inkwood
Pithecellobium keyense	Florida Keys blackbead
Swietenia mahagoni	West Indian mahogany

Table F2: Exotic Plants Observed in IRPA on Key Largo

Scientific Name	Common Names
Panicum maximum	Guineagrass
Rhynchelytrum repens	Rose Natalgrass
Schinus terebinthifolius	Brazilian-pepper
Tradescantia spathacea	Oysterplant, Moses-in-the-cradle, Boatlily

IRPA on Overseas Highway/SR 5, Lower Matecumbe Key (SegmentID 90060000_3.4W)

This IRPA consists of a scraped coastal rock barren fragment, and is directly adjacent to Lignum vitae Key Botanical State Park. See Appendix G for best management practices for scraped coastal rock barren, and aides to identification of plant species. Four rare species and one exotic species were recorded growing in this IRPA: IRC critically imperiled Yucatan flymallow (*Cienfuegosa yucatanensis*) and federally threatened Garber's spurge (*Chamaesyce garbrei*) are among these four species.

Figure F2: IRPA on Overseas Highway/SR 5, Lower Matecumbe Key

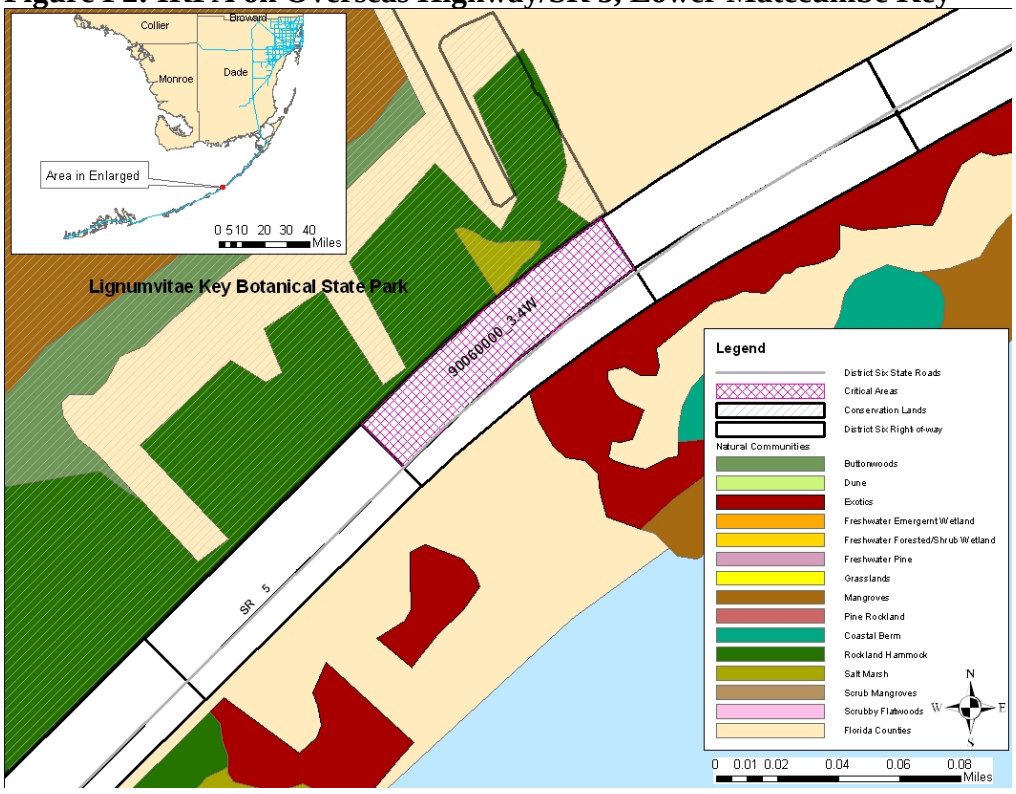

Table F3 Rare Plants Recorded in IRPA on Lower Matecumbe Key

Scientific Name	Common Names
Chamaesyce garberi	Garber's sandmat
Cienfuegosia yucatanensis	Yucatan flymallow
Jacquemontia pentanthos	Skyblue clustervine
Pithecellobium keyense	Florida Keys blackbead

Table F4: Exotic Plants Recorded in IRPA on Lower Matecumbe Key

Scientific Name	**Common Names**
Leucaena leucocephala	White leadtree

IRPA on Overseas Highway/SR 5, Grassy Key (Segment IDs 90040000_9.3 through 90040000_10.5)

This IRPA consists of mowed upland, scraped coastal rock barren and rockland hammock edge. See Appendix G for best management practices for these habitats, and aides to identification of plant species. Seven rare native species and 12 invasive exotic species were recorded growing in this IRPA. Federally threatened Garber's spurge and IRC critically imperiled pride-of-Big-Pine (*Strumpfia maritima*) were among the seven rare native plant species observed growing in this IRPA.

Figure F3: IRPA on Overseas Highway/SR 5, Grassy Key

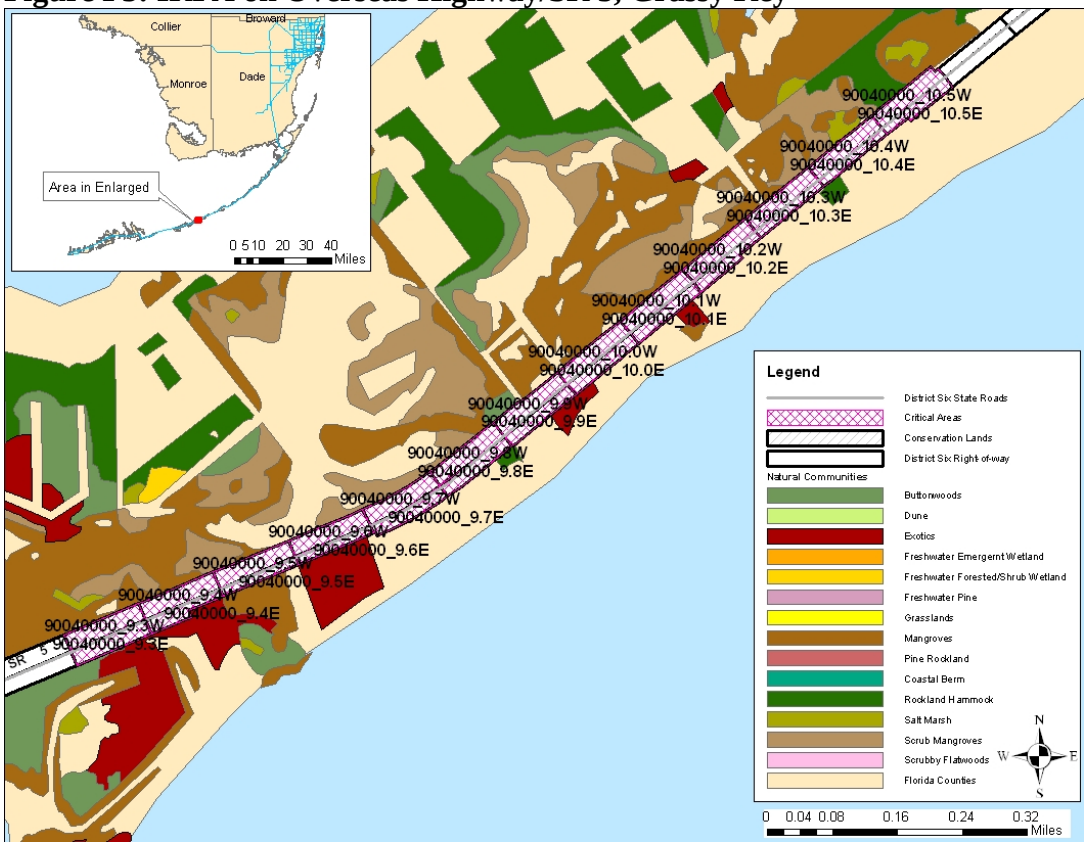

Table F5: Rare Plants Recorded in IRPA on Upper Grassy Key

Scientific Name	Common Names
Chamaesyce garberi	Garber's sandmat
Erithalis fruticosa	Blacktorch
Manilkara jaimiqui subsp. emarginata	Wild dilly
Pithecellobium keyense	Florida Keys blackbead
Strumpfia maritima	Pride-of-Big-Pine
Thrinax morrisii	Silver thatch palm, Brittle thatch palm
Thrinax radiata	Green thatch palm, Florida thatch palm

Table F6: Exotic Plants Recorded in IRPA on Upper Grassy Key

Scientific Name	Common Names
Casuarina equisetifolia	Australian-pine, Horsetail casuarina
Cocos nucifera	Coconut palm
Leucaena leucocephala	White leadtree
Manilkara zapota	Sapodilla
Ruellia tweediana	Britton's wild petunia, Mexican bluebell
Sansevieria hyacinthoides	Bowstring-hemp, Mother-in-laws tongue
Scaevola sericea	Beach napuka
Schefflera actinophylla	Australian umbrellatree
Schinus terebinthifolius	Brazilian-pepper
Thespesia populnea	Portiatree
Tribulus cistoides	Punctureweed, Burrnut, Jamaican feverplant
Washingtonia robusta	Desert palm, Washington fan palm

IRPA on Overseas Highway/SR 5, Fat Deer to Crawl Key (Segment IDs 90040000_7.5 through 90040000_8.6)

This IRPA consists of mowed upland, scraped coastal rock barren and rockland hammock edge. In addition, much of this IRPA is directly adjacent to Curry Hammock State Park. See Appendix G for best management practices for mowed upland, remnant coastal rock barren and rockland hammock edge, and aides to identification of plant species. Seven rare native species and four invasive exotic species were recorded growing in this IRPA. Federally threatened Garber's spurge was among the rare native plants found in this IRPA.

Figure F4: IRPA on Overseas Highway/SR 5, Crawl Key to Fat Deer Key

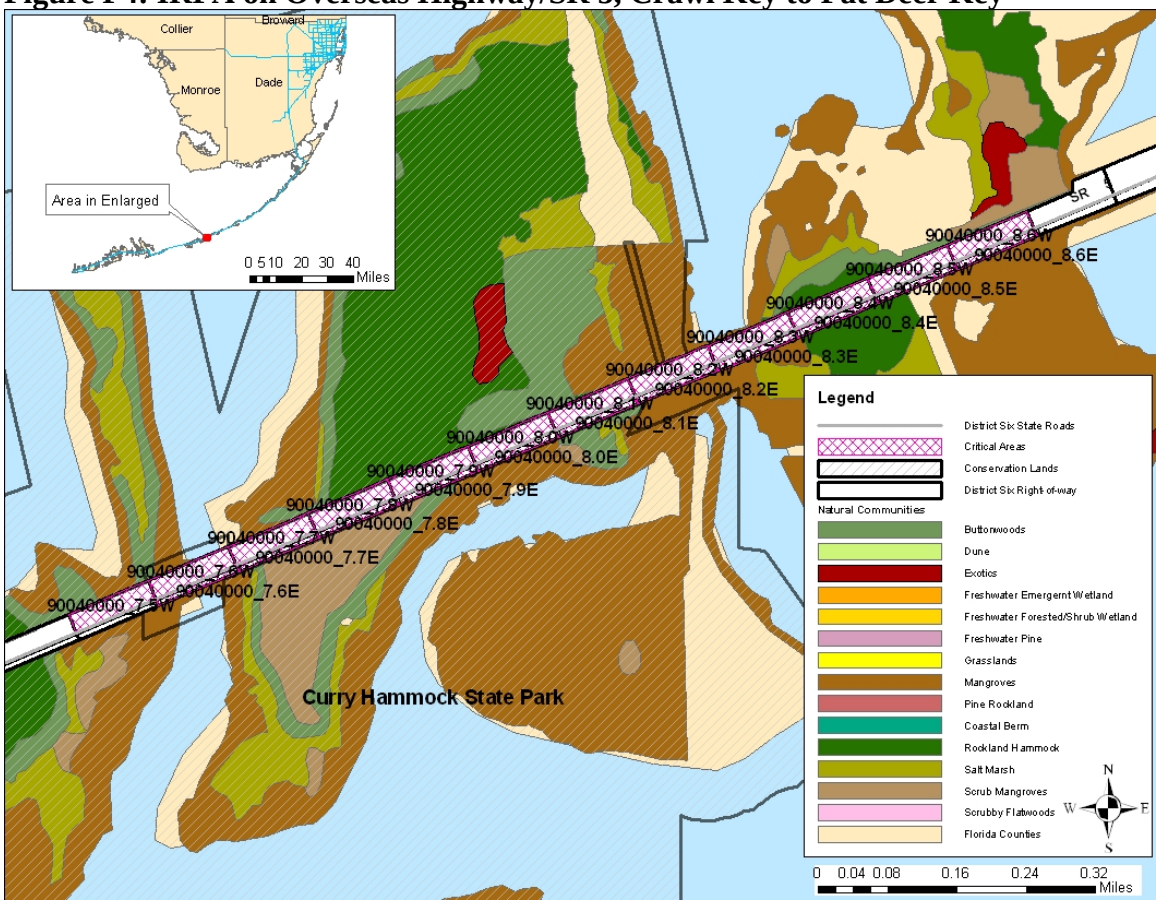

Table F7: Rare Plants Recorded in IRPA from Crawl Key to Fat Deer Key

Scientific Name	Common Names
Acanthocereus tetragonus	Barbwire cactus, Dildoe cactus
Chamaesyce garberi	Garber's sandmat
Colubrina arborescens	Coffee colubrina, Greenheart
Cordia globosa	Butterflybush, Curacao bush
Manilkara jaimiqui subsp. *emarginata*	Wild dilly
Pithecellobium keyense	Florida Keys blackbead
Reynosia septentrionalis	Darlingplum
Thrinax radiata	Green thatch palm, Florida thatch palm

Table F8: Exotic Plants Recorded in IRPA from Crawl Key to Fat Deer Key

Scientific Name	Common Names
Leucaena leucocephala	White leadtree
Schinus terebinthifolius	Brazilian-pepper
Thespesia populnea	Portiatree
Tribulus cistoides	Punctureweed, Burrnut, Jamaican feverplant

IRPA on Overseas Highway/SR 5, Ohio Key (Segment ID90030000_7.5E)

This IRPA consists of mowed upland. See Appendix G for best management practices for mowed upland, and aides to identification of plant species. The federally threatened Garber's spurge was the only rare native plant species observed growing in this IRPA. Three invasive exotic species were also recorded.

Figure F5: IRPA on Overseas Highway/SR 5, Ohio Key

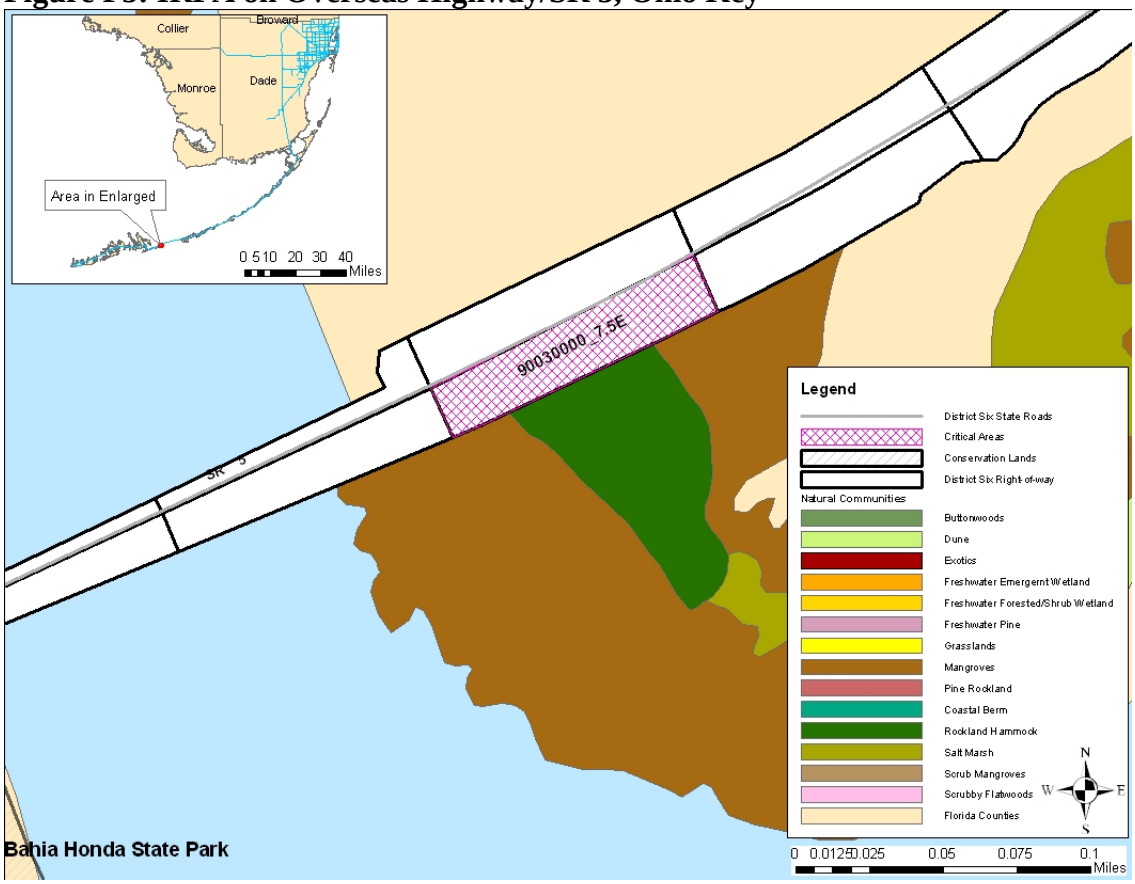

Table F9: Rare Plants Recorded in IRPA on Ohio Key

Scientific Name	Common Names
Chamaesyce garberi	Garber's sandmat

Table F10: Exotic Plants Recorded in IRPA on Ohio Key

Scientific Name	Common Names
Cocos nucifera	Coconut palm
Leucaena leucocephala	White leadtree
Washingtonia robusta	Desert palm, Washington fan palm

IRPA on Overseas Highway/SR 5, Bahia Honda Key (Segment IDs 90030000_6.8E through 90030000_6.9E)

This IRPA consists of mowed upland and rockland hammock edge, and is directly adjacent to Bahia Honda State Park. See Appendix G for best management practices for mowed upland and rockland hammock edge, and aides to identification of plant species. Seven rare native plant species were recorded growing in this IRPA. No invasive exotic plants were recorded.

Figure F6: IRPA on Overseas Highway/SR 5, Bahia Honda Key

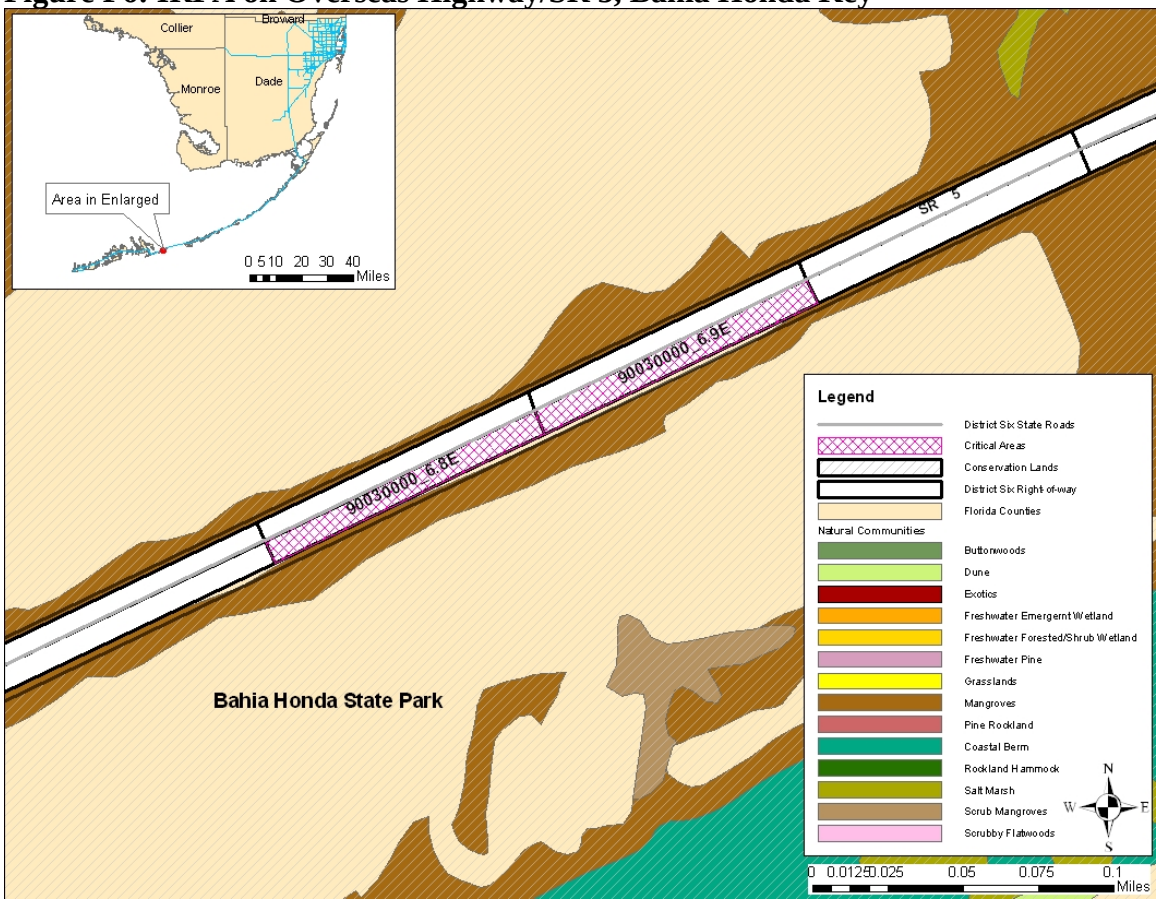

Table F11: Rare Plants Recorded in IRPA on Bahia Honda Key

Scientific Name	Common Names
Byrsonima lucida	Locustberry
Crossopetalum rhacoma	Rhacoma, Maidenberry
Erithalis fruticosa	Blacktorch
Pithecellobium keyense	Florida Keys blackbead
Reynosia septentrionalis	Darlingplum
Smilax havanensis	Havana greenbrier, Everglades greenbrier
Thrinax morrisii	Silver thatch palm, Brittle thatch palm

IRPA on Overseas Highway/SR 5, Big Pine Key (Segment IDs 90020000_25.3 through 90030000_0.0)

This IRPA consists of mowed upland, rockland hammock edge and scraped pine rockland. See Appendix G for best management practices for these habitats, and aides to identification of plant species. A candidate for federal listing, Blodgett's wild-mercury (*Argythamni blodgetti*), and 10 other rare native plant species were observed growing in this IRPA. Fourteen invasive exotic plant species were also recorded.

Figure F7: IRPA on Overseas Highway/SR 5, Big Pine Key

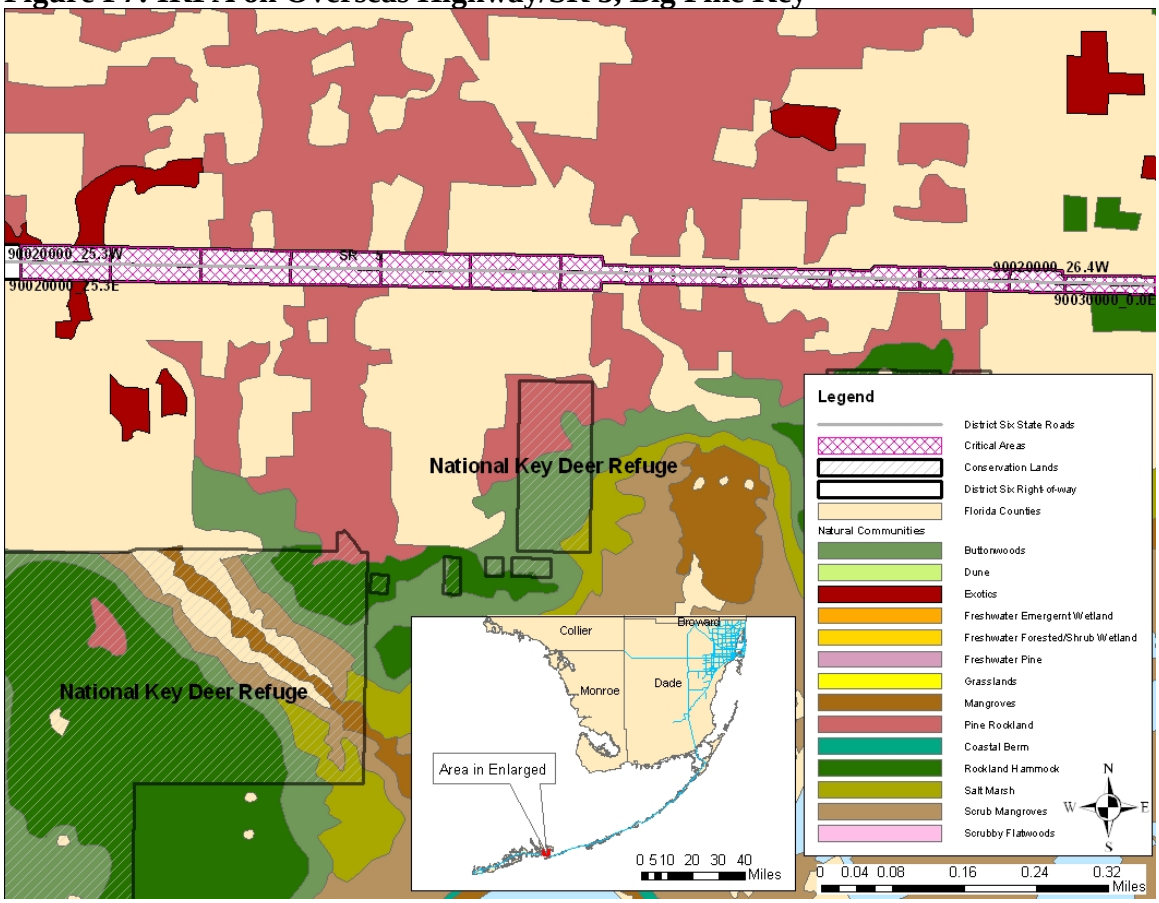

Table F12: Rare Plants Recorded in IRPA on Big Pine Key

Scientific Name	Common Names
Argythamnia blodgettii	Blodgett's wild mercury, Blodgett's silverbush
Byrsonima lucida	Locustberry
Coccothrinax argentata	Florida silver palm
Manilkara jaimiqui subsp. *emarginata*	Wild dilly
Pisonia rotundata	Smooth devilsclaws, Blolly
Pithecellobium keyense	Florida Keys blackbead
Psidium longipes	Longstalked-stopper
Reynosia septentrionalis	Darlingplum
Smilax havanensis	Havana greenbrier, Everglades greenbrier
Thrinax morrisii	Silver thatch palm, Brittle thatch palm
Thrinax radiata	Green thatch palm, Florida thatch palm

Table F13: Exotic Plants Recorded in IRPA on Big Pine Key

Scientific Name	Common Names
Albizia lebbeck	Woman's tongue, Rattlepod
Asparagus densiflorus	Sprenger's asparagus-fern
Calophyllum antillanum	Santa Maria; Galba
Casuarina equisetifolia	Australian-pine, Horsetail casuarina
Cocos nucifera	Coconut palm
Pennisetum setaceum	Fountaingrass
Sansevieria hyacinthoides	Bowstring-hemp, Mother-in-laws tongue
Scaevola sericea	Beach napuka
Schefflera actinophylla	Australian umbrellatree
Schinus terebinthifolius	Brazilian-pepper
Tradescantia spathacea	Oysterplant, Moses-in-the-cradle, Boatlily
Tribulus cistoides	Punctureweed, Burrnut, Jamaican feverplant
Wedelia trilobata	Creeping wedelia, Creeping oxeye
Zamia furfuracea	Cardboard-palm

IRPA on Overseas Highway/SR 5, Ramrod Key (Segment IDs 90020000_22.0W through 90020000_2.1W)

This IRPA consists of mowed upland and rockland hammock edge. See Appendix G for best management practices for these habitats, and aides to identification of plant species. Seven rare native plant species and two invasive exotic plant species were observed growing in this IRPA.

Figure F8: IRPA on Overseas Highway/SR 5, Ramrod Key

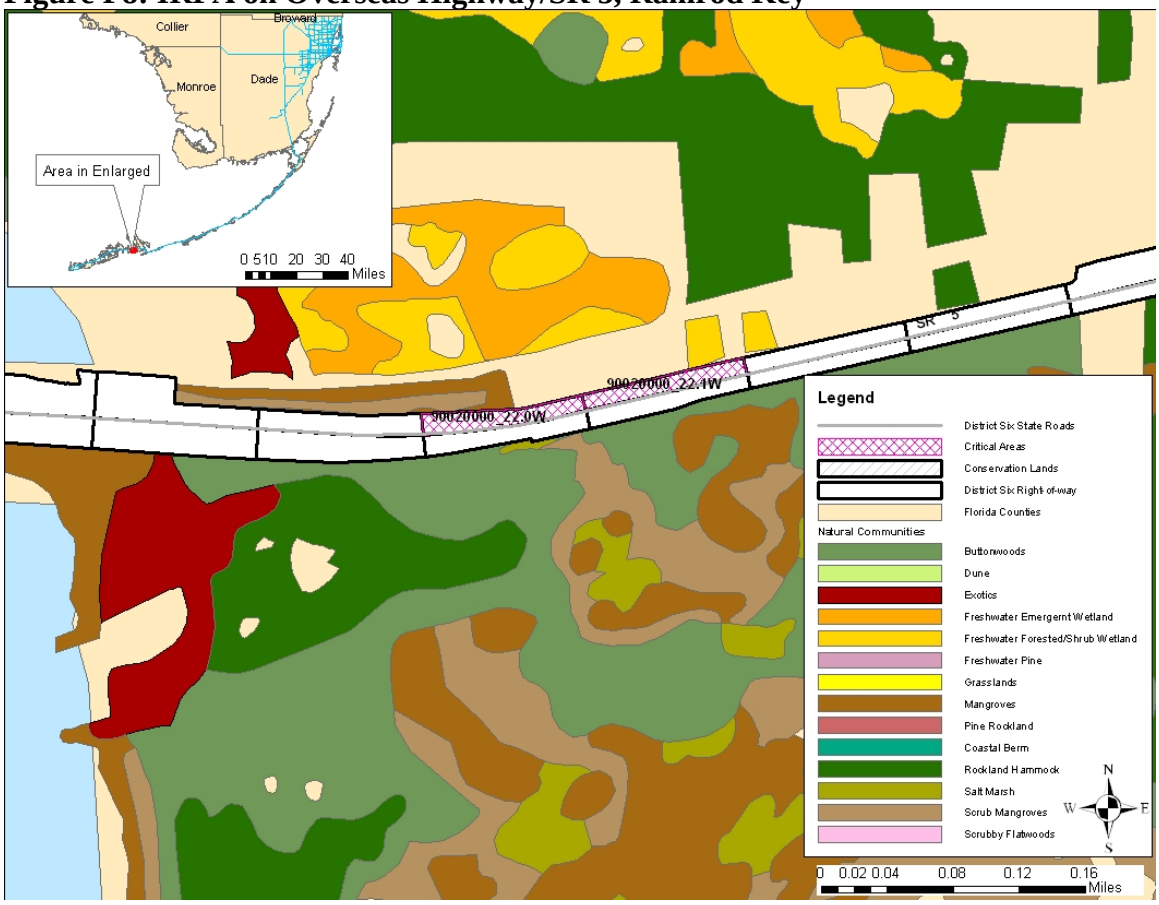

Table F14: Rare Plants Recorded in IRPA on Ramrod Key

Scientific Name	Common Names
Byrsonima lucida	Locustberry
Erithalis fruticosa	Blacktorch
Jacquinia keyensis	Joewood
Manilkara jaimiqui subsp. *emarginata*	Wild dilly
Pithecellobium keyense	Florida Keys blackbead
Reynosia septentrionalis	Darlingplum
Thrinax morrisii	Silver thatch palm, Brittle thatch palm

Table F15: Exotic Plants Recorded in IRPA on Ramrod Key

Scientific Name	Common Names
Casuarina equisetifolia	Australian-pine, Horsetail casuarina
Tribulus cistoides	Punctureweed, Burrnut, Jamaican feverplant

IRPA on Overseas Highway/SR 5, Cudjoe Key (Segment IDs 90020000_17.9W through 90020000_18.2W)

This IRPA consists of mowed upland and rockland hammock edge. See Appendix G for best management practices for these habitats, and aides to identification of plant species. Ten rare plant species were observed growing in this IRPA. Three exotic plant species were recorded growing in this IRPA.

Figure F9: IRPA on Overseas Highway/SR 5, Cudjoe Key

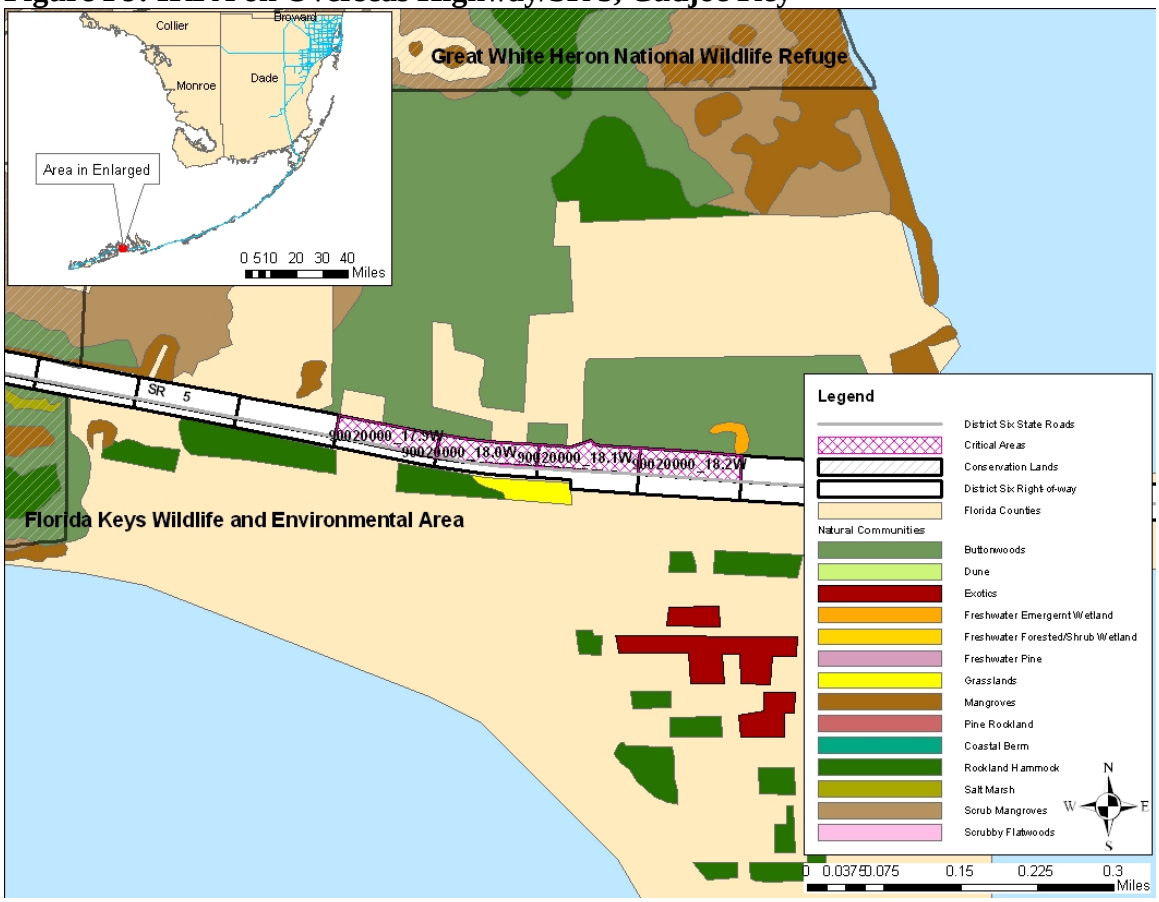

Table F16: Rare Plants Recorded in IRPA on Cudjoe Key

Scientific Name	Common Names
Byrsonima lucida	Locustberry
Calyptranthes pallens	Spicewood, Pale lidflower
Coccothrinax argentata	Florida silver palm
Crossopetalum rhacoma	Rhacoma, Maidenberry
Erithalis fruticosa	Blacktorch
Pithecellobium keyense	Florida Keys blackbead
Psidium longipes	Longstalked-stopper
Reynosia septentrionalis	Darlingplum
Thrinax morrisii	Silver thatch palm, Brittle thatch palm
Thrinax radiata	Green thatch palm, Florida thatch palm

Table F17: Exotic Plants Recorded in IRPA on Cudjoe Key

Scientific Name	Common Names
Cocos nucifera	Coconut palm
Leucaena leucocephala	White leadtree
Schinus terebinthifolius	Brazilian-pepper

IRPA on Overseas Highway/SR 5, Sugarloaf Key (Segment IDs 90020000_14.9E through 90020000_15.0E)

This IRPA consists of mowed upland and rockland hammock edge, and is directly adjacent to a Florida Key Wildlife and Environmental Area. See Appendix G for best management practices for mowed upland and rockland hammock edge, and aides to identification of plant species. Seven rare native plant species and three invasive exotic plant species were observed growing in this IRPA.

Figure F10: IRPA on SR 5/Overseas Highway, Sugarloaf Key

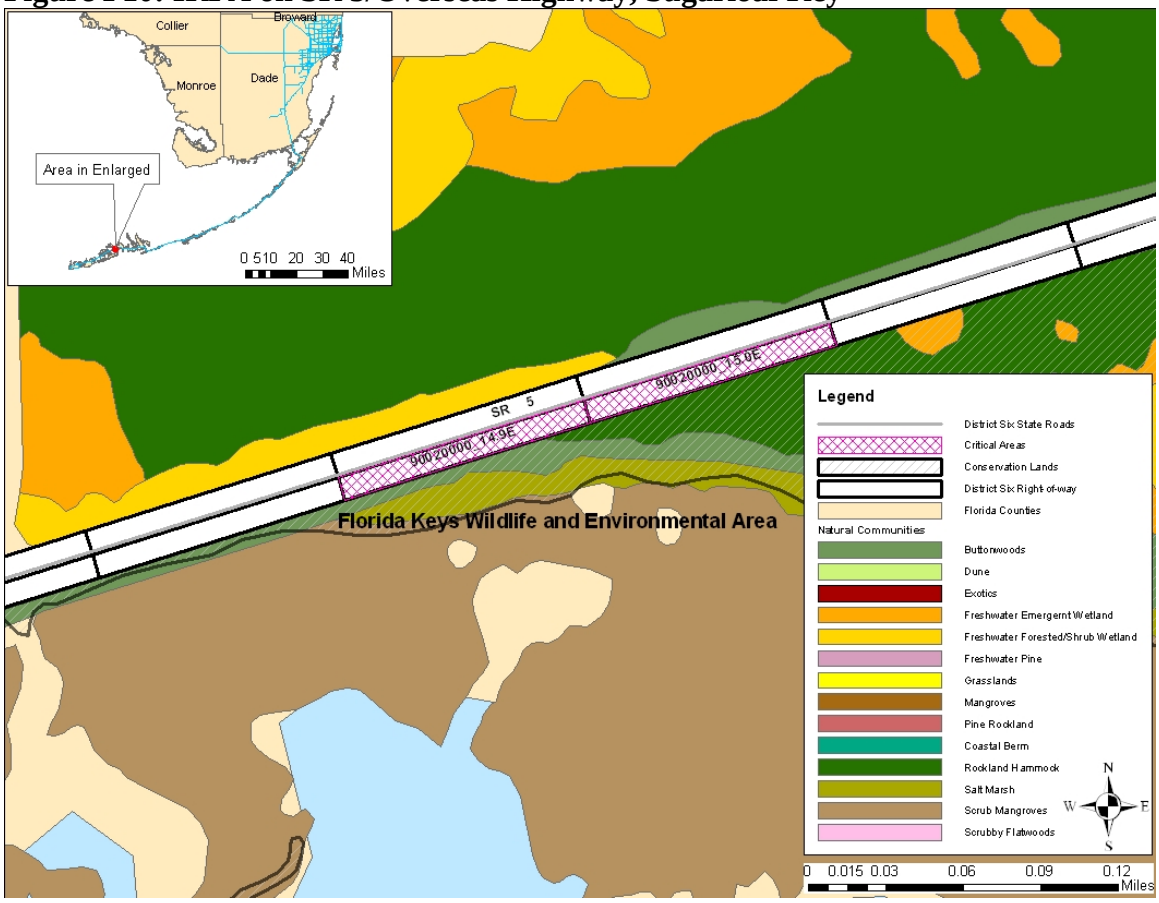

Table F18: Rare Plants Recorded in IRPA on Sugarlaof Key

Scientific Name	Common Names
Byrsonima lucida	Locustberry
Jacquinia keyensis	Joewood
Manilkara jaimiqui subsp. *emarginata*	Wild dilly
Pithecellobium keyense	Florida Keys blackbead
Reynosia septentrionalis	Darlingplum
Thrinax morrisii	Silver thatch palm, Brittle thatch palm
Thrinax radiata	Green thatch palm, Florida thatch palm

Table F19: Exotic Plants Recorded in IRPA on Sugarlaof Key

Scientific Name	Common Names
Leucaena leucocephala	White leadtree
Tabebuia heterophylla	White-cedar

IRPA on Overseas Highway/SR 5, Boca Chica Key (Segment IDs 90020000_2.9W to 90020000_3.0W)

This IRPA consists of mowed upland and rockland hammock edge, and is adjacent to the Great White Heron National Wildlife Refuge and the Key West Naval Air Station. See Appendix G for best management practices for mowed upland and rockland hammock edge, and aides to identification of plant species. Five rare native plant species were observed growing in this IRPA. No invasive exotic plant species were observed.

Figure F11: IRPA on Overseas Highway/SR 5, Boca Chica Key

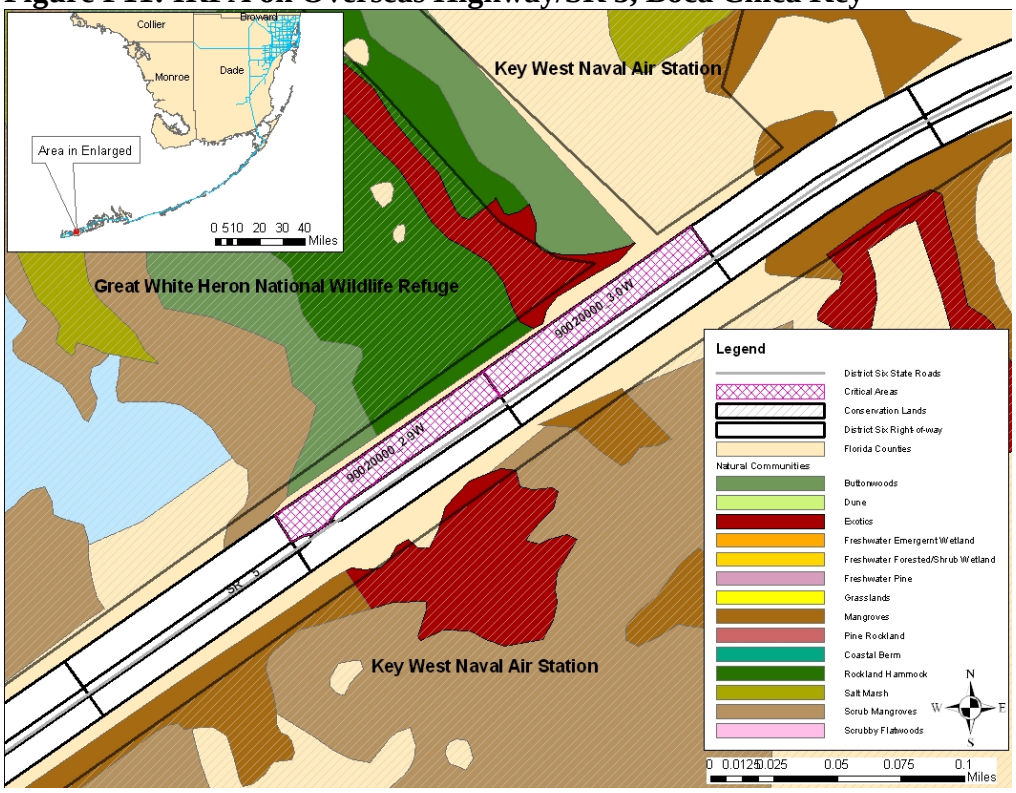

Table F20: Rare Plants Recorded in IRPA on Boca Chica Key

Scientific Name	Common Names
Byrsonima lucida	Locustberry
Crossopetalum rhacoma	Rhacoma, Maidenberry
Erithalis fruticosa	Blacktorch
Manilkara jaimiqui subsp. *emarginata*	Wild dilly
Pithecellobium keyense	Florida Keys blackbead

Appendix G: Best Management Practices and Aides to Species Identification for Important Rare Plant Areas

Appendix G: Best Management Practices and Aides to Species Identification for Important Rare Plant Areas

Table G1: Best Management Practices for Important Rare Plant Areas

Habitat Type	Best Management Practices
Mowed Upland	Occasional mowing with spot herbicide treatments of exotic plant species, especially exotic grasses
Hammock Edge	Vertical trimming with spot herbicide treatment of exotic plant species
Scraped Coastal Rock Barren	Spot herbicide treatment of exotic plant species
Scraped Pine Rockland	Occasional mowing with spot herbicide treatments of exotic plant species, especially exotic grasses
Upland/Wetland Interface	Annual mowing with spot herbicide treatments of exotic plant species with appropriate herbicide

Table G2: Aides to Rare Species Identification for Important Rare Plant Areas

Scientific Name	Common Names	Hyperlink
Acanthocereus tetragonus	Barbwire cactus, Dildoe cactus	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Acantetr
Alvaradoa amorphoides	Mexican alvaradoa	http://www.fnai.org/FieldGuide/pdf/Alvaradoa_amorphoides.PDF
Angadenia berteroi	Pineland-allamanda, Pineland golden trumpet	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Angabert
Argythamnia blodgettii	Blodgett's wild mercury, Blodgett's silverbush	http://www.fnai.org/FieldGuide/pdf/Argythamnia_blodgettii.PDF
Bourreria cassinifolia	Pineland strongback	http://www.fnai.org/FieldGuide/pdf/Bourreria_cassinifolia.PDF
Bourreria succulenta	Smooth strongback, Bahama strongbark	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Boursucc
Byrsonima lucida	Locustberry	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Byrsluci
Calyptranthes pallens	Spicewood, Pale lidflower	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Calypall
Canella winterana	Cinnamon bark, Pepper cinnamon	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Canewint
Chamaesyce garberi	Garber's sandmat	http://www.fnai.org/FieldGuide/pdf/Chamaesyce_garberi.PDF

Scientific Name	Common Names	Hyperlink
Chaptalia albicans	White sunbonnets	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Chapalbi
Cienfuegosia yucatanensis	Yucatan flymallow	http://www.fnai.org/FieldGuide/pdf/Cienfuegosia_yucatanensis.PDF
Coccothrinax argentata	Florida silver palm	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Coccarge
Colubrina arborescens	Coffee colubrina, Greenheart	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Coluarbo
Cordia globosa	Butterflybush, Curacao bush	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Cordglob
Crossopetalum ilicifolium	Quailberry, Christmasberry	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Crosilic
Crossopetalum rhacoma	Rhacoma, Maidenberry	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Crosrhac
Erithalis fruticosa	Blacktorch	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Eritfrut
Hypelate trifoliata	White-ironwood, Inkwood	http://www.fnai.org/FieldGuide/pdf/Hypelate_trifoliata.PDF
Jacquemontia pentanthos	Skyblue clustervine	http://www.fnai.org/FieldGuide/pdf/Jacquemontia_pentanthos.PDF
Jacquinia keyensis	Joewood	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Jacqkeye
Lantana depressa	Pineland lantana, Rockland shrubverbena	http://www.fnai.org/FieldGuide/pdf/Lantana_depressa_var_depressa.PDF
Manilkara jaimiqui subsp. *emarginata*	Wild dilly	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Manijaimemar
Melanthera parvifolia	Pineland blackanthers	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Melaparv
Pisonia rotundata	Smooth devilsclaws, Blolly	http://www.fnai.org/FieldGuide/pdf/Pisonia_rotundata.PDF
Pithecellobium keyense	Florida Keys blackbead	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Pithkeye
Poinsettia pinetorum	Pineland poinsettia, Pineland spurge	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Poinpine

Scientific Name	Common Names	Hyperlink
Psidium longipes	Longstalked-stopper	http://www.fnai.org/FieldGuide/pdf/Psidium_longipes.PDF
Reynosia septentrionalis	Darlingplum	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Reynsept
Scutellaria havanensis	Havana skullcap	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Scuthava
Senna mexicana var. *chapmanii*	Bahama senna, Chapman's wild sensitive plant	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Sennmexichap
Smilax havanensis	Havana greenbrier, Everglades greenbrier	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Smilhava
Strumpfia maritima	Pride-of-Big-Pine	http://www.fnai.org/FieldGuide/pdf/Strumpfia_maritima.PDF
Swietenia mahagoni	West Indian mahogany	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Swiemaha
Thrinax morrisii	Silver thatch palm, Brittle thatch palm	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Thrimorr
Thrinax radiata	Green thatch palm, Florida thatch palm	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Thriradi
Zamia integrifolia	Coontie, Florida arrowroot	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Zamiinte

Table G3: Aides to Exotic Species Identification for Important Rare Plant Areas

Scientific Name	Common Names	Hyperlink
Albizia lebbeck	Woman's tongue, Rattlepod	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Albilebb1
Asparagus densiflorus	Sprenger's asparagus-fern	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Aspadens
Calophyllum antillanum	Santa Maria; Galba	http://plants.usda.gov/java/profile?symbol=CAAN22
Casuarina equisetifolia	Australian-pine, Horsetail casuarina	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Casuequi
Cocos nucifera	Coconut palm	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Coconuci

Scientific Name	Common Names	Hyperlink
Lantana camara	Shrubverbena	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Lantcama
Leucaena leucocephala	White leadtree	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Leucleuc
Manilkara zapota	Sapodilla	http://www.plantatlas.usf.edu/images.asp?plantID=%20214
Neyraudia reynaudiana	Burmareed, Silkreed	http://www.plantatlas.usf.edu/images.asp?plantID=%201347
Panicum maximum	Guineagrass	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Panimaxi
Pennisetum setaceum	Fountaingrass	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Pennseta
Rhynchelytrum repens	Rose Natalgrass	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Rhynrepe
Ruellia tweediana	Britton's wild petunia, Mexican bluebell	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Rueltwee
Sansevieria hyacinthoides	Bowstring-hemp, Mother-in-laws tongue	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Sanshyac
Scaevola sericea	Beach napuka	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Scaeseri
Schefflera actinophylla	Australian umbrellatree	http://www.plantatlas.usf.edu/images.asp?plantID=%20423#
Schinus terebinthifolius	Brazilian-pepper	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Schitere
Tabebuia heterophylla	White-cedar	http://plants.usda.gov/java/profile?symbol=TAHE
Thespesia populnea	Portiatree	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Thespopu
Tradescantia spathacea	Oysterplant, Moses-in-the-cradle, Boatlily	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Tradspat
Tribulus cistoides	Punctureweed, Burrnut, Jamaican feverplant	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Tribcist
Washingtonia robusta	Desert palm, Washington fan palm	http://www.plantatlas.usf.edu/images.asp?plantID=%20269
Wedelia trilobata	Creeping wedelia, Creeping oxeye	http://regionalconservation.org/ircs/database/plants/PlantPage.asp?TXCODE=Wedetril
Zamia furfuracea	Cardboard-palm	http://www.plantatlas.usf.edu/images.asp?plantID=%201925

Appendix H: Source Data for GIS Layers in RREP Geodatabase and Resulting Layer

Appendix H: Source Data for GIS Layers in RREP Geodatabase and Resulting Layer

Layer Name	Source	Author(s)	Processing	Description
D6_Roads	FDOT	FDOT	None	Delineates the State Road System in Miami-Dade and Monroe counties. Also provides information such as length, route names and section numbers.
Conservation Lands	FNAI Florida Managed Areas (FLMA) 2007 shape file.	FNAI	Clipped to conform to Miami-Dade and Monroe Counties	Boundaries of Public Conservation Areas
Natural Areas	FNAI Under Represented Natural Communities Shapefile, National Wetlands Inventory (NWI) Florida Wetlands Shape File, Advanced Identification of Wetlands on the Florida Keys Shapefile (ADID), IRC Natural Forest Commnity (NFC) Mapping in Miami-Dade County Shapefile	FNAI, NWI, FDEP, IRC	Clipped to fit Miami-Dade and Monroe County Boundaries, Merged	Boundaries of Natural Communities in Miami-Dade and Monroe Counties