Rare Plants of South Florida:

Their History, Conservation, and Restoration

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Cover photos by George D. Gann: Top: mahogany mistletoe (*Phoradendron rubrum*), a tropical species that grows only on Key Largo, and one of South Florida's rarest species. Mahogany poachers and habitat loss in the 1970s brought this species to near extinction in South Florida. Bottom: fuzzywuzzy airplant (*Tillandsia pruinosa*), a tropical epiphyte that grows in several conservation areas in and around the Big Cypress Swamp. This and other rare epiphytes are threatened by poaching, hydrological change, and exotic pest plant invasions.

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Chapter 2
Status of the South Florida Flora

This chapter summarizes the status of the South Florida flora and describes the role of existing conservation areas in protecting plant diversity. All of the data presented here are the result of the FISF study and represent a synthesis of literature review, field inventories, and the findings of dozens of individuals who work in diverse capacities with the plants of South Florida.

Floristic Summary

More than 2,200 taxa of terrestrial and freshwater aquatic plants have been recorded growing without the aid of cultivation in South Florida. Of these, about 64% are native to the study area, while 36% are not. Of the native taxa, 3% are endemic to the region. An additional 5% are endemic to peninsular Florida, while 3% are subtropical near-endemics with populations only in South Florida and the Bahamas or Cuba. Of the remainder, 38% are of temperate origin, 25% are of tropical or subtropical origin, and 26% are of widespread origin—occurring in both temperate and tropical regions.

About 74% of the natives are herbs, while 19% are trees or shrubs and 7% are vines. Most of these plants are perennial, with annuals representing only 13% of the flora. Of the natives, 90% are terrestrial, while 5% are epiphytes, and 2% are submerged or floating freshwater aquatics. In addition, 16 taxa are lithophytes, 11 are parasites, seven are marine aquatics, and four are saprophytes. Of the natives, 61% are dicotyledons, while 33% are monocotyledons and 6% are pteridophytes. Only six native species are gymnosperms.

Conservation Status of Native Plants

Fifty-one kinds of native plants are regionally extinct, while 60 are historical. Together these represent about 8% of the native flora (Figure 2.1). Of the remaining taxa, about 17% are critically imperiled, 27% are imperiled, and 25% are rare. Only 23% of the flora can be considered secure or apparently secure in South

Figure 2.1. Native plant ranks in South Florida.

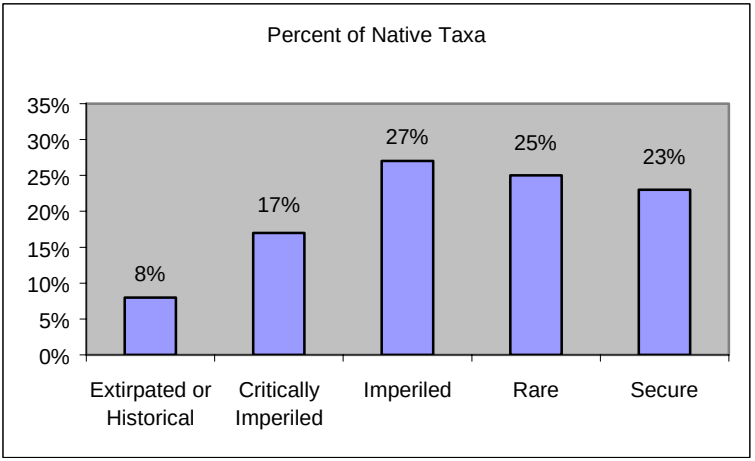
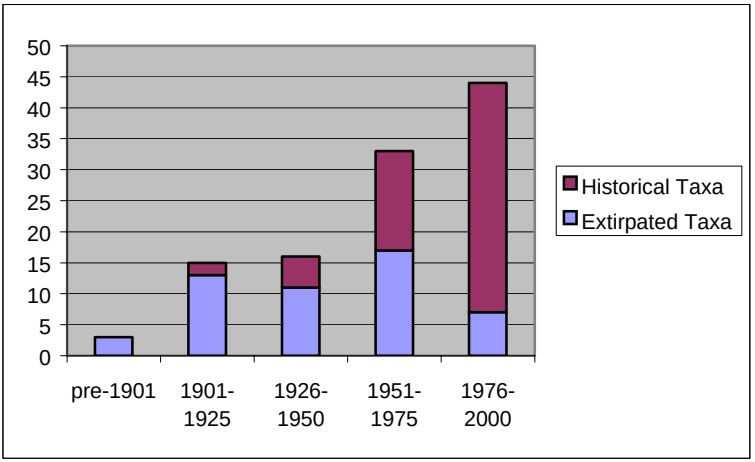


Figure 2.2. Number of apparent extirpations by quarter century based upon last known observations.



Florida. Most apparent extirpations have occurred in the last fifty years (Figure 2.2). All taxa that are extinct, extirpated, historical, or critically imperiled are discussed at length in Chapters 4 and 5.

Extinctions and Extirpations

Of the fifty-one taxa of regionally extinct plants, one (*Tephrosia angustissima* var. *angustissima*) is globally extinct. Two other extirpated plants are endemic hybrids: *Quercus* x*succulenta*, *Tectaria* x*amesiana*. No endemic South Florida species is known to be extinct. One extirpated species (*Glandularia tampensis*) is a Florida endemic. Two species are subtropical near-endemics: *Acacia choriophylla, Cordia bahamensis*. Of the remaining extirpated plants, 57% are of tropical or subtropical origin, 22% are of temperate origin, and 10% are widespread species.

Tropical taxa are more than twice as likely to be extirpated than would be expected, while temperate taxa are under-represented as extirpated taxa. Other findings indicate that epiphytes and ferns (pteridophytes) are more than three times as likely to be extirpated than would be expected when compared to each group's proportion of the native flora.

Historical Plants

Of the 60 taxa of historical plants, one is an endemic species (*Lechea lakelae*), and one is an endemic variety of a temperate species (*Eriochloa michauxii* var. *simpsonii*). Seven taxa are peninsular Florida endemics: *Amaranthus floridanus, Asclepias feayi, Chrysopsis linearifolia* subsp. *dressii*, *Chrysopsis subulata*, *Harrisia fragrans*, *Lobelia homophylla*, and *Warea carteri*. Two species are subtropical near-endemics: *Bucida spinosa*, *Ponthieva brittoniae*. Of the remainder, 43% are temperate taxa, 23% are tropical or subtropical taxa, and 15% are widespread taxa.

Peninsular Florida endemics are more than twice as likely to be historical than would be expected when compared to that group's proportion of the native flora.

Critically Imperiled Plants

About 17%, or 244 taxa, of South Florida's native flora is critically imperiled (see Chapter 5). Of those, 14 are endemic to South Florida, 17 are peninsular Florida endemics, and 15 are subtropical near endemics (Table 2.1). Of the remainder, 38% are temperate, 32% are tropical or subtropical, and 11% are widespread.

Tropical species are almost 30% more likely to be critically imperiled than would be expected. Other findings indicate that epiphytes and pteridophytes are about twice as likely to be critically imperiled than would be expected.

The Role of Conservation Areas

There are almost 400 conservation areas in South Florida (Gann et al., 2001; Jue et al., 2001). Over the last six years, IRC has collected or obtained substantial data on over 200 sites (Figure 2.3). Of the sites without adequate data, most are smaller city- and county-owned conservation areas, although many larger sites need a considerable amount of additional work. County agencies manage more than half of all of the conservation areas in South Florida (Figure 2.4).

Table 2.1. Endemic taxa that are critically imperiled.

Amorpha herbacea var. *crenulata*
Asimina tetramera
Asplenium x*biscaynianum*
Chamaesyce deltoidea subsp. *adhaerens*
Chamaesyce deltoidea subsp. *serpyllum*
Chromolaena frustrata
Dalea carthagenensis var. *floridana*
Digitaria pauciflora
Indigofera mucronata var. *keyensis*
Jacquemontia reclinata
Linum carteri var. *carteri*
Opuntia corallicola
Schizachyrium sericatum
Sideroxylon reclinatum var. *austrofloridense*

The conservation system is comprised of about five million acres, or more than 55% of the area of South Florida. Sixty-two percent of the protected lands are found in three large conservation areas: Everglades National Park, Big Cypress National Preserve, and Everglades and Francis S. Taylor Wildlife Management Area (Figure 2.5). Substantial data have been collected for all three conservation areas. Of the remaining conservation areas, about 83% of the area has been inventoried.

Figure 2.3. Number of conservation areas in South Florida by size class (in acres).

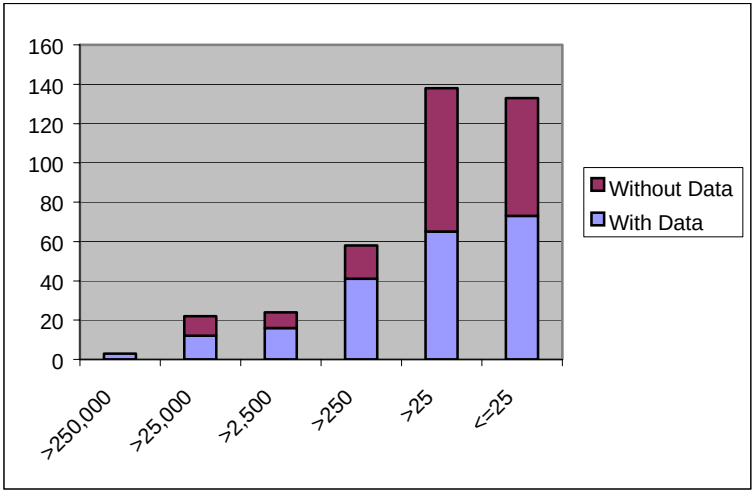
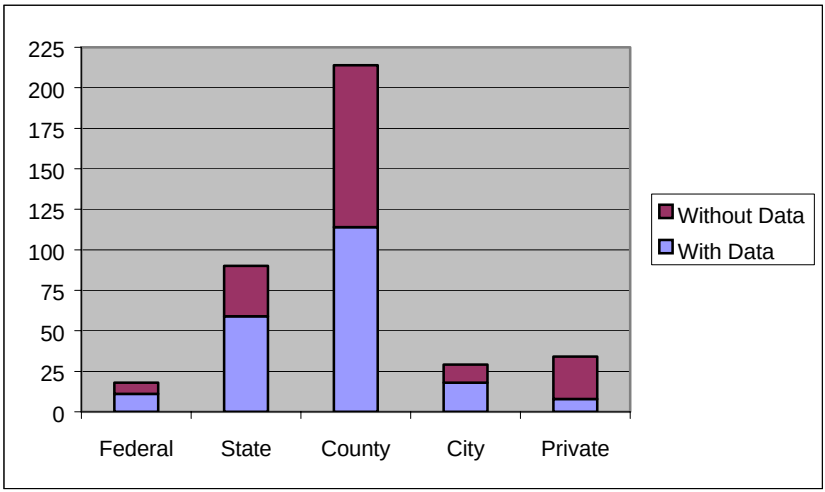


Figure 2.4. Number of conservation areas by managing agency.



The three largest conservation areas contain about two-thirds of the native plant taxa found in South Florida (Figure 2.6). Only when all of the conservation areas are added together do most native species receive some degree of protection. Furthermore,

despite a much smaller total area, relatively small conservation areas are rich in species and out-perform the largest conservation areas in capturing native plant diversity (Figure 2.7).

Most taxa that are extirpated or historical have never been found in what is now a conservation area (Figure 2.8). This suggests that habitat loss and modification is the primary cause of plant extirpation in South Florida – unprotected lands have seen the greatest diminishment of plant diversity. However, 38 of the extirpated or historical taxa are known to have occurred within the boundaries of what are now conservation areas, including Everglades National Park. While most of these taxa were collected last or observed before these areas were designated for conservation, four species were documented within conservation areas and subsequently were extirpated (Appendix 1). One of these (*Amyris balsamifera*) was apparently lost when a pipeline was constructed and one (*Cissampelos pareira*) was lost when it was mistaken for a non-native vine by a restoration crew. Two (*Brassia caudata*, *Macradenia lutescens*) were extirpated primarily by poaching. Fifteen of the historical taxa were recorded at least one time after the site was designated for conservation (Appendix 2).

Of the critically imperiled species 16 are not known from any conservation area (Appendix 3), and an additional 85 are known only from a single conservation area (Appendix 4). These two groups of plants make up the most vulnerable of the critically imperiled species in South Florida. Of the 16 taxa not currently protected by any conservation areas in South Florida, four are found in Lake Okeechobee, which currently is not being managed for plant conservation. A number of taxa are protected in only one conservation area in South Florida. Fakahatchee Strand Preserve State Park protects more of these taxa than any other conservation area (Appendix 5), and the conservation system managed by the state of Florida protects more of these taxa than that of any other agency (Appendix 6).

Relatively small conservation areas are extremely important to the conservation of critically imperiled species in South Florida. The largest conservation areas provide protection to only about 21% of all critically imperiled taxa (Figure 2.9). Furthermore, relatively small conservation areas provide protection to more occurrences

Figure 2.5. Conservation area in South Florida by conservation area size class (in acres).

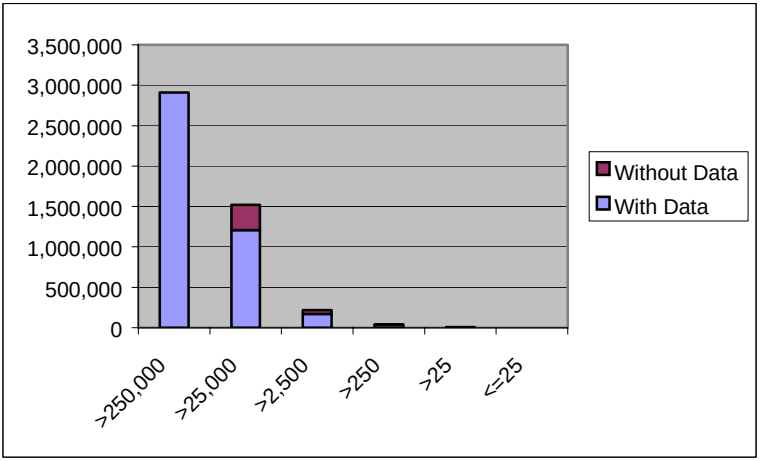


Figure 2.6. Cumulative number of taxa in conservation areas by size class – largest to smallest (in acres).

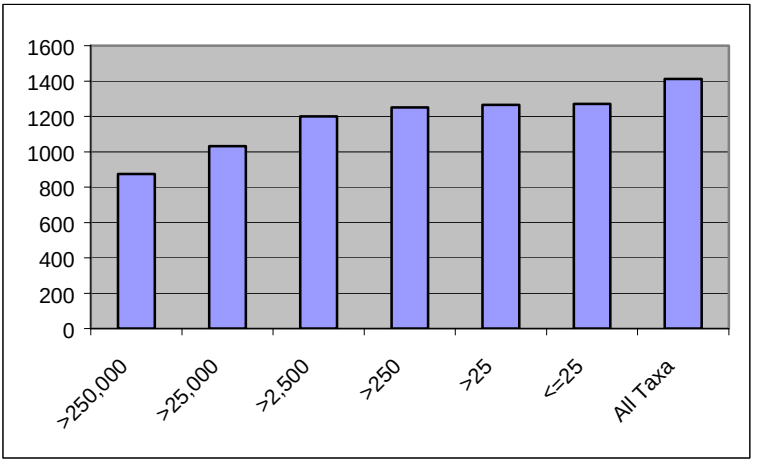


Figure 2.7. Total number of native taxa by conservation area size class (in acres).

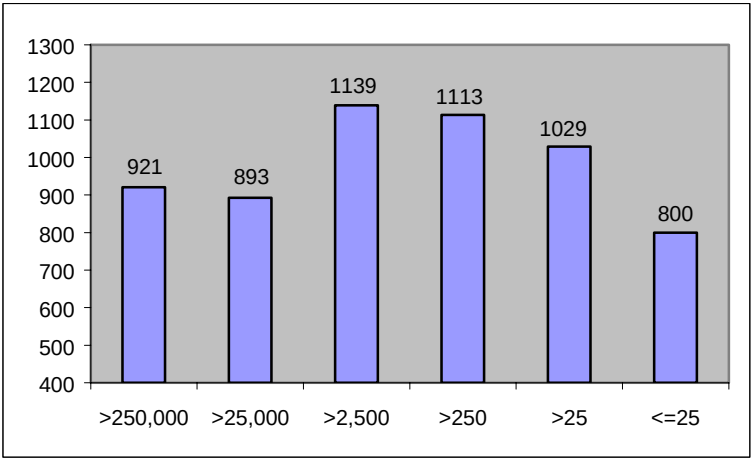
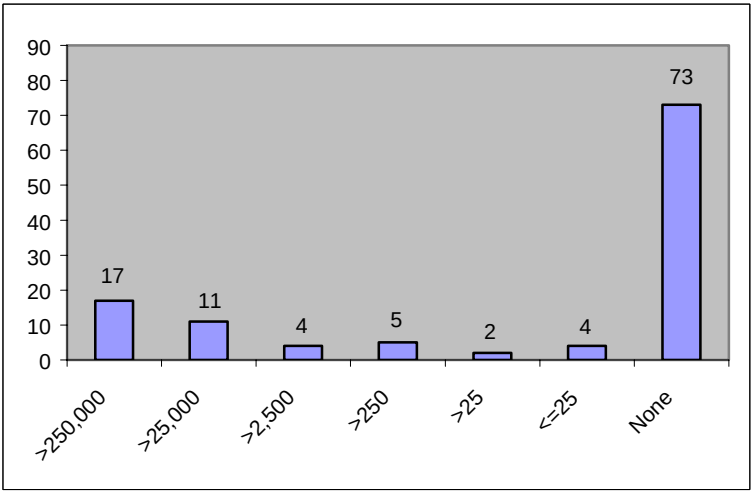


Figure 2.8. Number of historical and extirpated taxa by former presence in conservation areas by size class (in acres).



of critically imperiled taxa than the larger conservation areas (Figure 2.10).

Non-Native (Exotic) Plants

More than one-third of the South Florida flora, or approximately 800 species, is comprised of non-native plants growing without the aid of cultivation. Many of these species are weeds of roadsides, agricultural fields, and developed land. However, 272 taxa of exotic plants are invasive in relatively undisturbed natural areas. Of the invasive taxa, about 50% are trees or shrubs, 35% are herbs, and 15% are vines. Eighty-nine percent of the invasive taxa are perennials, while 10% are annuals. Ninety-seven percent are terrestrial, while only six taxa are floating or submerged freshwater wetlands plants. Four species of exotics (*Tectaria incisa* and three species of *Adiantum*) are lithophytic, and one species (*Peperomia amplexicaulis*) is an epiphyte. Of the invasive species, 67% are dicotyledons, 25% are monocotyledons, 7% are pteridophytes, and two species are gymnosperms (*Cycas circinalis*, *Zamia furfuracea*).

About 75% of all exotic plants naturalized in South Florida have been recorded in at least one conservation area. The most frequent exotic found in South Florida conservation areas is Brazilian-pepper (*Schinus terebinthifolius*), which has been recorded at more than 200 sites. In contrast, 130 taxa of naturalized exotics have been recorded in only a single conservation area. Everglades National Park, the largest conservation area in South Florida at approximately 1.5 million acres, has the largest number of exotic plant taxa (240), followed by Hugh Taylor Birch State Park (209), a conservation area with about 0.01% of the area of Everglades National Park.

Summary of Major Findings

The major findings of the FISF are:

- There are over 2200 species of native and naturalized plants in South Florida.
- About 1/3 of the South Florida flora is comprised of escaped non-native plants.

Figure 2.9. Cumulative number of critically imperiled taxa by presence in largest conservation area size class (in acres) – largest to smallest.

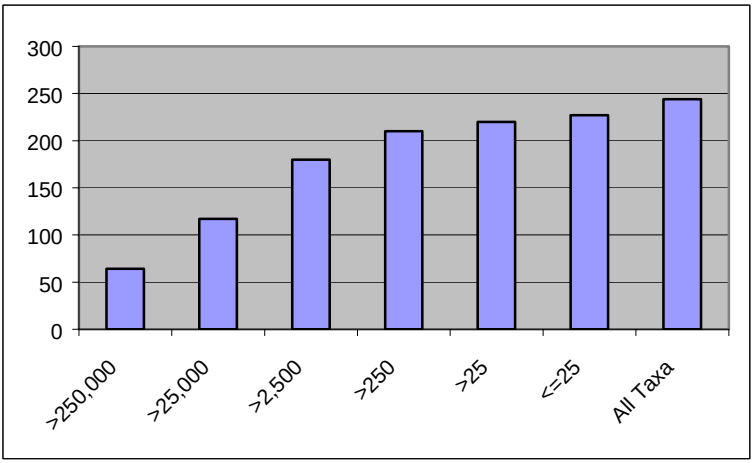
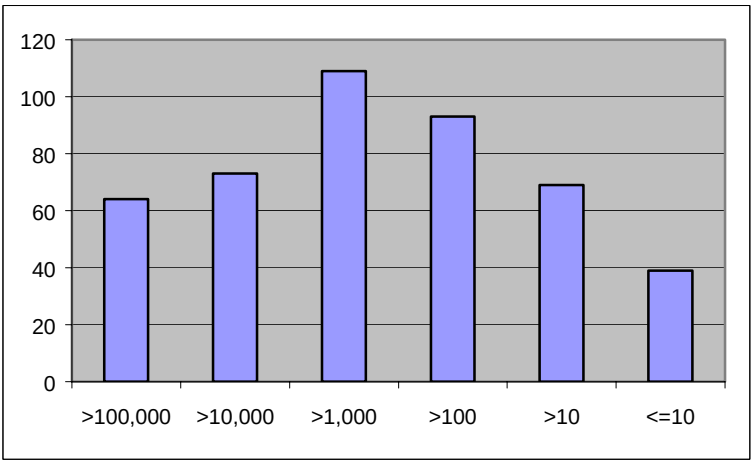


Figure 2.10. Total number of critically imperiled plant occurrences in conservation areas of different size classes (in acres).



- Over 100 species of native plants (8%) are apparently extirpated in the region.
- Another 244 species (17%) are critically imperiled using Natural Heritage Program criteria.
- Of these, nearly 100 species are protected in South Florida in a single conservation area.
- Small conservation areas are very important to the protection of the rarest plants in the region, protecting 205 of the 244 critically imperiled plants in South Florida.
- The three largest conservation areas (Big Cypress National Preserve, Everglades National Park, and Everglades and Francis R. Taylor Wildlife Management Area) provide protection to only two out of every three native plant species.

Other pertinent findings of conservation concern are:

- Habitat destruction has been the major cause of plant extirpations, but other factors such as poaching and drainage also have been important.
- Plants have been extirpated from conservation areas (including Everglades National Park) due to poaching, management error, and other causes.
- Plants of tropical origin are more likely to be extirpated than plants of temperate origin.
- Epiphytes, including rare tropical orchids, ferns, and bromeliads, are more likely to be extirpated or critically imperiled than terrestrial plants.
- Ferns and their allies are more likely to be extirpated or critically imperiled than more advanced groups of plants.

Discussion

Over the past 100 years, the native plant diversity of South Florida has been severely impacted by human activities. Not only have species and natural areas been lost, but the remaining ecosystems have been plundered by poachers, drained for water projects, and invaded by exotic pest plants. At present, South Florida is home to an impoverished flora persisting within highly stressed ecosystems.

Among the most effected groups of plants are tropical species located at the northern end of their ranges. These tropical species

include orchids, lithophytic ferns, lianas, and trees. To a large degree, these tropical species define our perception of South Florida. However, this group of native plants is suffering from regional extinctions at an alarming rate. In essence, we are losing the very species that define our biotic environment. The loss of a tropical plant is worsened by the fact that South Florida is isolated from the Caribbean flora by up to 90 miles of open water. Tropical species that are lost cannot readily re-colonize South Florida.

Epiphytes have been wiped out in large numbers. Most epiphytes native to South Florida are tropical in origin and include orchids, bromeliads, and ferns. Epiphytes have suffered catastrophic declines due to collecting pressure, including poaching in conservation areas. They also have been impacted by the lowering of the freshwater table which has dried out their niches in prime habitats such as rockland hammocks and freshwater swamps. The fern flora also has suffered declines as a result of many of the same factors. Drainage of limestone habitats on the Miami Rock Ridge, in particular, has taken a heavy toll on fern diversity in South Florida.

Finally, South Florida's ecosystems are awash in non-native plants, including highly invasive species that have the ability to modify ecosystem functions and destroy populations of rare plants. Unless immediate action is taken, the native plant heritage of South Florida will suffer irreparable damage.