Cape Florida Project

VOLUNTEER RESTORATION MANUAL

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TABLE OF CONTENTS

Acknowledgements		i
Preface		ii
1.	Introduction	1-1
2.	Natural and Cultural Resources	2-1
3.	Community Restoration Guidelines	3-1
4.	Invasive Species Control	4-1
5.	Nursery Operations	5-1
6.	Out-planting	6-1
7.	Protection and Enhancement of Rare Species	7-1
8.	Additional Considerations	8-1
9.	References Cited	9-1

Appendix A: Vascular Plant Taxa Recorded for Cape Florida, Key Biscayne, and the Upper Sandy Keys

Appendix B: Cape Florida Wildlife List

Appendix C: Ecological Restoration Zoning Plan

Appendix D: Exotic Control Data Sheet

Appendix E: Photographs

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The National Fish and Wildlife Foundation provides creative and sustainable solutions for fish, wildlife, and plant conservation. The Foundation supports species habitat protection, environmental education, public policy development, natural resource management, habitat and ecosystem rehabilitation and restoration, and leadership training for conservation professionals. By awarding challenge grants using federally appropriated funds to match private-sector funds, the Foundation leverages millions of dollars for conservation projects while foraging proactive partnerships between the public and private sectors.

The Native Plant Conservation Initiative is a national effort sponsored by the National Park Service, Bureau of Land Management, U.S. Forest Service, U.S. Fish and Wildlife Service, Agricultural Research Service, National Biological Survey, Natural Resources Conservation Service, and other federal agencies in coordination with the National Fish and Wildlife Foundation and over 40 other cooperators. The program is designed to provide funding for on-the-ground plant conservation activities in restoration, public outreach, or inventory and assessment. The Native Plant Conservation Initiative employs ecosystem management principles and techniques to ensure the sustainability of native plant ecosystems and to conserve biological diversity and ecological integrity.

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PREFACE

This manual was commissioned by the American Littoral Society to help guide the long-term implementation of the Cape Florida Project, an ecological restoration of Bill Baggs Cape Florida State Recreation Area. These guidelines are the blueprint for Cape Florida's future as we move from a federally funded hurricane relief effort to a volunteer-driven restoration.

In the early morning of August 24, 1992, Hurricane Andrew bore down on south Florida, the eye of the storm striking the coast less than 15 miles south of Cape Florida State Recreation Area. The 145 mph sustained winds of the storm leveled the Australian-pine forest at the park. Reports in the *Miami Herald* likened Cape Florida to a moonscape as a consequence of the hurricane. It was an accurate depiction.

The park was closed for nearly a year while the fallen trees were mulched and the park's facilities were rebuilt. During this time, the Florida Park Service took stock of their situation. In accordance with their natural systems management doctrine, the park service made a bold decision to restore Cape Florida as closely as possible to its original ecological condition.

The Florida Park Service has a proud tradition of managing Florida's public lands using a natural systems management approach. This philosophy is aimed at perpetuating the conditions of natural ecosystems. It cannot be said better than was stated in their *Management of Florida's State Park Lands* brochure: "The objective of the Florida Park Service is to manage the parks as natural systems--as representative examples of the landscape conditions and biological communities in Florida before they were altered by man."

Cape Florida was a disaster even before Hurricane Andrew. The park was severely degraded by dredge and fill activities in the early 1950s. At that time, the property was in private hands and slated for development. A canal was created on the northern boundary, Biscayne Bay was dredged on the western boundary, and the spoil material was used to increase the elevation of the site by four to six feet. The swale and dune topography was eliminated and the wetlands were buried. This massive disturbance obliterated the native plants present at the time and was an open invitation for exotic plants surrounding the area to invade. Although the plans for a housing development were defeated, the Australian-pines which began to take over in the 1950s were well established when the Florida Park Service took over management of the site in 1967.

Hurricane Andrew's destruction of Cape Florida's Australian-pine forest was viewed as an opportunity to restore native vegetation to the site, but only if enough funding could be secured to fully develop a restoration program. Even though Chapter 258 of the Florida Statutes mandates the Florida Park Service to "acquire typical portions of the original domain of the state...[and] conserve these natural values for all times...",

Florida's state parks do not receive general tax support. Instead, a small portion of the proceeds from the sale of documentary stamps coupled with entrance fees are their only means of financing the management of over 400,000 acres of park lands.

Faced with an incredible financial burden in the aftermath of Hurricane Andrew, the Florida Park Service sought recovery aid through the Federal Emergency Management Agency, the Florida State Legislature, and the United States Department of Agriculture. Through their efforts, over $9.3 million dollars were raised for hurricane relief.

The Florida Park Service dispatched a multi-disciplinary team made up of park planners, biologists, and a botanist to the site. Their task was to set priorities and develop strategies for reopening Cape Florida. Additionally, they were to develop a conceptual plan for the long-term ecological restoration of the park.

Planning meetings were held between the state's task force, local environmental agencies such as Dade Environmental Resource Management, and private citizens who had specific areas of expertise. Many meetings were held before the draft conceptual restoration plan was put before the community through a public workshop and approved by the Governor and Cabinet on July 21, 1993.

In their 60 year history, the Florida Park Service had never encountered a resource management task of the magnitude presented at Cape Florida. To their credit, the Florida Park Service sought help from the environmental community. In an unprecedented agreement, the Florida Park Service and the American Littoral Society joined forces to restore Cape Florida's native plant communities.

While the Florida Park Service maintains management responsibility of Bill Baggs Cape Florida State Recreation Area, the American Littoral Society is the non-profit arm of the Cape Florida Project. As the park service put the restoration infrastructure in place and executed large contracts for the project, the American Littoral Society coordinated the volunteer restoration program, public outreach, and fund raising.

The American Littoral Society began coordinating volunteer efforts at Cape Florida in June of 1993. Since then, volunteers have spent over 5,000 hours removing 228,045 exotic plants from the park.

Public outreach for the Cape Florida Project almost always combines education with volunteer service. Through the Plant-A-Seed program, elementary and middle school students are growing native plants for use in the restoration project while learning about native ecosystems. Through the Service Learning in the Environment program, high school and college students receive credit in their natural science classes while contributing over 2,000 hours annually to the restoration effort. Annual events like the Cape Florida Field Day and Weed Toss help raise awareness about the restoration project in the community while furthering efforts at reestablishing the native plant communities.

One of the most important tasks associated with the non-profit operation at Cape Florida is fund raising. The American Littoral Society has been fortunate to receive grants from private foundations such as the John S. and James L. Knight Foundation, Dade Community Foundation, and the National Fish and Wildlife Foundation. Public agencies such as Florida's Division of Forestry, South Florida Water Management District, and the Florida Advisory Council on Environmental Education have awarded funds to the project through government grant programs. Corporations like American Express have supported the project through the Corporate Citizens program. Other elements of the fund raising program include a commemorative gifts program, memberships, and sale items. Revenue from the Society's participation in the Environmental Fund for Florida, a federation of environmental organizations running payroll deduction campaigns, also goes to support the Cape Florida Project.

Today, Cape Florida has a Governor and Cabinet approved conceptual restoration plan, an on-site native plant nursery, a small restoration staff and office, a volunteer program, several educational programs, an annual event, and a modest fund raising program. Over 62,585 trees and shrubs have been planted and $1 million has been allocated for mangrove forest and freshwater wetlands restoration.

As the project moves from an emergency relief effort to a volunteer-driven community project, guidance is needed. This manual is meant to provide that guidance. Using this manual we intend to make the Cape Florida Project sustainable on a long-term basis. The hurricane related funding received for Cape Florida will be gone by September 30, 1996. Between now and then, the project will be scaled back, staffing will be trimmed, and the project will take on even more grass-roots characteristics. Although volunteers have been an integral part of this process all along, with the end of the hurricane relief funding in sight, they will become the primary force driving the restoration effort.

Kellie A. Westervelt
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INTRODUCTION

This manual has been prepared to help guide the long-term design and implementation of the Cape Florida Project, an ambitious ecological restoration project at Bill Baggs Cape Florida State Recreation Area (Cape Florida). Cape Florida is a four hundred plus acre park located on the southern tip of Key Biscayne, the southernmost barrier island on the eastern coastline of Florida. The park is situated just a few miles southeast of Miami in Dade County. Renowned for its historic lighthouse and its picturesque beach dunes, Cape Florida was once one of the busiest parks in the state system, hosting 750,000 visitors annually.

Historically, the site was dominated by a mosaic of natural communities including beach dune, coastal strand, maritime hammock, marine tidal swamp, marine tidal marsh, and isolated freshwater wetlands. These natural communities provided critical habitat for a plethora of native plants including beach jacquemontia, Biscayne prickly-ash, and Florida sedge as well as native animals such as manatee, marsh rabbit, Southeastern five-lined skink, loggerhead turtle and Peregrin falcon.

Unfortunately, the natural communities at Cape Florida were subjected to a series of anthropogenic disturbances, the most damaging of which were dredge and fill activities which took place in the 1950s. At this time, nearly 80 percent of the park was covered with fill excavated from Biscayne Bay. Subsequent to this dredging activity, the Cape was invaded by Australian-pine, an exotic pest tree which has been listed as one of the most invasive exotic pest plants in Florida. By the time the state recreation area was developed in the late 1960s, Australian-pine dominated the landscape. Only a small remnant of beach dune and coastal strand vegetation persisted along the eastern edge of the park.

In August, 1992, Hurricane Andrew hit Cape Florida, felling the Australian-pine forest which had become established throughout the park. The Florida Park Service turned this disaster to its advantage when it began to develop a plan to clear the Australian-pines and restore native vegetation to the park. As a result, all of the Australian-pines at the park were chipped.

The goal of the Cape Florida Project is to restore the natural communities which were historically found at Cape Florida including beach dune, coastal strand, maritime hammock, tidal swamp, and isolated freshwater wetlands. Together these communities will provide critical habitat for a number of rare plants and animals.

For the past three years, the Florida Park Service and the American Littoral Society have engaged in the initiation of ecological restoration activities at Cape Florida. Work by the Florida Park Service up to this point has primarily involved the removal of Australian-pine trees and other exotic species and the out-planting of nursery grown native species. Meanwhile, the American Littoral Society has helped

design and implement the restoration of Cape Florida's natural communities. The Society has contributed to the Cape Florida Project in a variety ways, including fund raising, public outreach, and the implementation of a volunteer restoration program. Volunteer activities have included exotic species removal, cultivation of native species and out-planting native species.

Unfortunately, major funding for the Florida Park Service has recently ended and years worth of work remains to be completed. As such, the American Littoral Society, The Institute for Regional Conservation, and Ecohorizons, Inc., have prepared this Volunteer Restoration Manual to help guide the volunteer component of this important project. It is intended as a "living document" which will be updated as often as possible, so that the Cape Florida Project can proceed in sure and thoughtful way.

2. NATURAL AND CULTURAL RESOURCES

Documentation and discussion of the natural resources of Cape Florida and Key Biscayne has been addressed by MacAllister (1938), Florida Department of Natural Resources (1991), Florida Department of Natural Resources (1993a), Florida Department of Natural Resources (1993b), Huck (1993), Schroeder (1994), and Schroeder (1995), among others.

Cultural resources of Cape Florida have been reviewed in detail by Carr (1987), Carr et al. (1994), and Huck & Blank (1994).

2.1 Natural Resources

In 1938, Birdie MacAllister submitted her master's thesis on the Flora of Key Biscayne. From 1935 to 1938, MacAllister studied the plant life and natural communities that existed on Key Biscayne, listing over 230 plant taxa.

The Florida Department of Natural Resources, currently known as the Department of Environmental Protection, produced a Unit Management Plan for Bill Baggs Cape Florida State Recreation Area in 1991. At that time, the park was overrun with exotic plants, especially Australian-pines. The Unit Management Plan reflected the conditions of the park prior to Hurricane Andrew. In 1993, the Department of Natural Resources developed a draft Hurricane Recovery and Restoration Plan. It was approved by the Governor and Cabinet and became Addendum 9 of the Unit Management Plan. It laid the conceptual groundwork for the current Cape Florida Project.

Robin Huck, a botanist with the Florida Park Service, was dispatched to Cape Florida to perform an analysis of the hurricane ravaged site. Huck spent six months at Cape Florida, overseeing initial recovery efforts and investigating historical conditions of the site. In 1993, Huck summarized her findings in a report that greatly aided the development of the conceptual restoration plan. In late 1993, Peter Schroeder was hired by the Florida Park Service to oversee the field work involved in the Cape Florida Project. Schroeder took up where Huck left off and has developed a number of reports regarding the restoration project, which includes an analysis of the historic vegetation of Cape Florida.

2.2 Cultural Resources

Cape Florida is widely know for its historic and cultural resources. The Cape Florida Lighthouse is the oldest structure in Dade County and listed as a national landmark. Robert Carr, Dade County's archaeologist, has documented the cultural resources at Cape Florida first in 1987 and again in a post-hurricane study in 1994.

3. COMMUNITY RESTORATION GUIDELINES

The following section outlines basic restoration goals and objectives for each natural community being restored at Cape Florida and provides the basis for the design and implementation of the volunteer restoration program. Central to this section is Table 3a, which provides target vegetation for each natural community, including presence or absence of each taxon within each community, and percent cover in each layer (canopy, shrub, and ground layers).

3.1 **Beach dune**

The goal of beach dune restoration is to re-create a species-rich community dominated by sea-oats (*Uniola paniculata*) and other pioneer dune species.

At present, the beach dune system at Cape Florida is in excellent condition and no major restoration activities are required.

Nevertheless, an organized invasive species control program should be implemented. Rare plant populations could also be augmented or re-introduced.

3.1.1 Objectives

(1) Conduct hand-clean transects on a biannual basis to prevent the colonization and spread of invasive species as described in Invasive Species Control below.

(2) Cultivate and augment populations of rare plant taxa when appropriate as described in Protection and Enhancement of Rare Plants below.

(3) Cultivate and re-introduce populations of rare plant taxa when appropriate as described in Protection and Enhancement of Rare Plants below.

3.1.2 Volunteer training and program implementation

As the beach dune system is not very diverse and has few invasive plant taxa, it would seem practical to train several volunteers to work with a Park Biologist to conduct hand-clean transects on the beach dune. Volunteers could also assist in the collection, propagation, cultivation, and out-planting of rare taxa.

3.2 **Coastal Strand**

The goal of coastal strand restoration is to re-create a species rich shrub community dominated by saw palmetto (*Serenoa repens*) intermixed with other shrubs, forbs, and graminoids. This community requires nutrient-poor soils and either fire or wind pruning to prevent succession to a maritime hammock community.

At present, the majority of the areas identified for coastal strand restoration at

Cape Florida are in poor condition. Wood chips and other organic material can be found throughout the area and this high organic load in combination with high light levels has resulted in an explosion of weedy vegetation. Although some saw palmettos were planted out as part of the USDA grant program, most areas will require many more.

In order to restore coastal strand at Cape Florida several activities are required. An invasive species control program must be developed and implemented as soon as possible, and a large number of saw palmettos and graminoids should be cultivated and out-planted as soon as possible.

3.2.1 Objectives

(1) Cultivate saw palmetto and graminoids for eventual out-planting as described in Nursery Operations below.

(2) Conduct hand-clean sweeps on a quarterly basis to prevent the colonization and spread of invasive plant taxa as described in Invasive Species Control below.

(3) Immediately following hand-clean sweeps, out-plant saw palmettos and graminoids within the treatment area as described in Out-planting below.

3.2.2 Volunteer training and program implementation

Volunteers are key to the success of coastal strand restoration at Cape Florida. Volunteers can be trained to conduct hand-clean sweeps with supervision by a Park Biologist. Volunteers can also be trained to assist in the cultivation of saw palmetto and graminoids, as well as to help out-plant these taxa.

3.3 **Mesic Flatwoods** (Pine-palmetto complex)

The goal of mesic flatwoods restoration at Cape Florida should be to re-create a species rich forest with an open canopy of south Florida slash pine and an understory dominated by saw palmetto, shrubs, graminoids and forbs. This community requires nutrient-poor soils and fire to prevent succession to a maritime hammock community.

Currently, the majority of the areas identified for mesic flatwoods restoration at Cape Florida are in poor condition. Wood chips and other organic material can be found throughout the area and this high organic load in combination high light levels has resulted in an explosion of weedy vegetation. In addition, few saw palmettos have been planted as part of the implementation of the USDA grant, and the densities of south Florida slash pine is too high.

In order to restore mesic flatwoods at Cape Florida several activities are required. An invasive species control program must be developed and implemented as soon as possible, and large numbers of saw palmettos and graminoids should be cultivated and out-planted as soon as possible.

.3.1 Objectives

(1) Cultivate saw palmetto and graminoids for eventual out-planting as described in Nursery Operations below.

(2) Conduct hand-clean sweeps on a quarterly basis to prevent the colonization and spread of invasive plant taxa as described in Invasive Species Control below.

(3) Immediately following hand-clean sweeps, out-plant saw palmettos and graminoids within the treatment area as described in Out-planting below.

(4) Develop and implement a prescribed fire program as described in Additional Considerations below.

3.3.2 Volunteer training and program implementation

Volunteers can be trained to conduct hand-clean sweeps in conjunction with a Park Biologist. Volunteers can also be trained to assist in the cultivation of saw palmetto and graminoids as well as to help out-plant these taxa. If a prescribed fire program in developed, then volunteers can be trained to participate.

3.4 **Maritime Hammock**

The goal of maritime hammock restoration at Cape Florida should be to re-create a species rich hardwood forest with a closed canopy.

Significant progress has been achieved in maritime hammock restoration during the implementation of the SBA and USDA grants. Much work, however, remains to be done as maritime hammock restoration takes decades to accomplish.

The main need at present is to develop and implement an invasive species control program. Additional out-planting may also facilitate the restoration process.

3.4.1 Objectives

(1) Cultivate hammock trees and shrubs for eventual out-planting as described in Nursery Operations below.

(2) Conduct hand-clean sweeps on a quarterly basis to prevent the colonization and spread of invasive species as described in Invasive Species Control below.

(3) Immediately following hand-clean sweeps, out-plant hammock trees and shrubs as described in Out-planting below.

3.4.2 Volunteer training and program implementation

Volunteers can be trained to conduct hand-clean sweeps in conjunction with a Park Biologist. Volunteers can also be trained to assist in the cultivation of hammock species as well as to help out-plant these taxa.

3.5 Tidal Swamp

The goal of tidal swamp restoration at Cape Florida is to re-create a mangrove-dominated forest. This component of the Cape Florida Project is being planned and will be implemented by Metro-Dade DERM. Long-term restoration objectives will be developed after the construction phase of this project is completed. Volunteer training and program implementation will be developed at that time.

3.6 Tidal Marsh

The goal of tidal marsh restoration at Cape Florida is to re-create a tidal wetland dominated by grasses and sedges. This component of the Cape Florida Project is being planned and will be implemented by Metro-Dade DERM. Long-term restoration objectives will be developed after the construction phase of this project is completed. Volunteer training and program implementation will be developed at that time.

3.7 Isolated Wetlands

The goal of isolated wetland restoration at Cape Florida should be to restore several predominantly fresh water wetlands in the interior of Cape Florida. This component of the Cape Florida Project is being planned and will be implemented by Metro-Dade DERM. Long-term restoration objectives will be developed after the construction phase of this project is completed. Volunteer training and program implementation will be developed at that time.

Table 3a. Target plant taxa by natural community, and percent cover by layer.

Scientific Name[1]	Natural Community[2]						
	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
TREES & SHRUBS							
Acacia pinetorum (I)	-	Sr	Sr	-	-	-	-
Agave decipiens	-	Sr	-	Sr	-	-	-
Annona glabra (I+)	-	-	-	-	-	-	Co
Ardisia escallonioides	-	Sr	Sr	So	-	-	-
Argusia gnaphalodes	Sr	Sr	-	-	-	-	-
Avicennia germinans (+)	-	-	-	-	Cc	Sr	-
Baccharis angustifolia (I)	-	Sr	-	-	Sr	So	Sr
Baccharis glomeruliflora	-	Sr	Sr	Sr	Sr	-	Sr
Baccharis halimifolia	-	So	So	-	Sr	-	So
Batis maritima (I)	Gr	-	-	-	Go	Gf	-
Bourreria ovata (I+)	-	-	-	Sr	-	-	-
Bursera simaruba (+)	-	Sr	-	Cf	-	-	-
Byrsonima lucida (I)	-	Sr	Sr	Sr	-	-	-
Callicarpa americana (I+)	-	Sr	Sr	Sr	-	-	-
Calyptranthes pallens (I*+)	-	-	-	Cr	-	-	-

[1] Source: Derived from Small (1913), Small (1931), Small (1933), MacAllister (1938), Godfrey & Wooten (1979), Godfrey & Wooten (1981), Correll & Correll (1982), Wunderlin (1982), Florida Natural Areas Inventory & Florida Department of Natural Resources (1990), Fairchild Tropical Garden (1991), Hammer and Popenoe (1992), Huck (1993), Carter (1995b), Schroeder (1995), and the personal observations of the author.

I=a taxon which has not been recorded growing outside of cultivation at Cape Florida, but which has been recorded for Key Biscayne and/or the Upper Sandy Keys; out-planting this taxon represents an introduction or a re-introduction to Cape Florida.

I*=a taxon which has not been recorded growing outside of cultivation at Cape Florida, on Key Biscayne, and/or the Upper Sandy Keys, but which has a range which might reasonably include Cape Florida; out-planting this taxon represents an introduction to Cape Florida.

+=a taxon which has been out-planted at Cape Florida.

R=a ruderal taxon.

[2] Layers: C=canopy, over 4m; S=subcanopy or shrub, 1-4m; G=ground, less than 1m; U=underwater, submerged aquatics.

Cover: d=dominant, >50% relative cover within layer; c=common or codominant, 25-50% relative cover within layer; f=frequent, 10-25% relative cover within layer; o=occasional, 1-10% relative cover within layer; r=rare, <1% relative cover within layer.

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
Chrysobalanus icaco (+)	Gr	Sr	Sr	Cr	-	-	So
Citharexylum fruticosum (I+)	-	Sr	Sr	Cr	-	-	-
Coccoloba diversifolia (+)	-	Sr	-	Cf	-	-	-
Coccoloba uvifera (+)	Gr	So[3]	So	Co	Sr	-	-
Conocarpus erecta (+)	-	Sr	Sr	Cr	Co	Sr	So
Crossopetalum rhacoma (I+)	-	Sr	Sr	-	-	-	-
Dalea carthaginensis ssp. domingensis (I)	-	Gr	Gr	-	-	-	-
Diospyros virginiana (I)	-	Sr	Sr	Cr	-	-	Sr
Dodonaea viscosa var. viscosa	Sr	Sr	Sr	Sr	-	-	-
Erithalis fruticosa (I+)	-	Sr	Sr	Sr	-	-	-
Erythrina herbacea (I+)	-	Sr	Sr	Sr	-	-	-
Exothea paniculata (I+)	-	-	-	Cr	-	-	-
Eugenia axillaris (+)	-	Sr	Sr	Co	-	-	-
Eugenia foetida (+)	-	So	Sr	So	Sr	-	-
Ficus aurea (+)	-	Sr	-	Cf	-	-	-
Ficus citrifolia (I+)	-	-	-	Cr	-	-	-
Forestiera segregata var. segregata (+)	-	Sr	Sr	So	-	-	-
Genipa clusiifolia	Sr	So	-	Sr	-	-	-
Guapira discolor var. longifolia (+)	-	So	Sr	So	-	-	-
Gymnanthes lucida (I)	-	-	-	Cr	-	-	-
Hamelia patens (I*+)	-	-	-	Sr	-	-	-
Krugiodendron ferreum (I+)	-	-	-	Cr	-	-	-
Laguncularia racemosa (+)	-	-	-	-	Cc	Sr	-
Lantana depressa var. floridana	-	Sr	Sr	-	-	-	-
Lantana involucrata (+)	-	Sr	Sr	Sr	-	-	-
Lycium carolinianum (I)	-	-	-	-	Sr	Sr	-

[3] Occasionally as a canopy tree along the dune ridge.

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
Lyonia fruticosa (I)[4]	-	-	-	-	-	-	-
Metopium toxiferum	-	Sr	Sr	Cr	Sr	-	-
Morus rubra (I)	-	Sr	Sr	Cr	-	-	Sr
Myrica cerifera (I+)	-	Sr	So	Sr	Sr	-	So
Myrsine floridana (I+)	-	So	So	Sr	-	-	Sr
Ocotea coriacea	-	-	-	Co	-	-	-
Persea borbonia (I+)	-	Sr	Sr	Cr	Sr	-	Sr
Pinus elliottii var. densa (I+)	-	-	Cd	-	-	-	-
Piscidia piscipula (I+)	-	-	-	Co	-	-	-
Pithecellobium keyense (+)	-	So	Sr	Sr	-	-	-
Pluchea caroliniensis (R)	-	Sr	Sr	So	-	-	-
Psychotria ligustrifolia (I)	-	Sr	-	Sr	-	-	-
Psychotria nervosa (+)	-	Sr	So	So	-	-	-
Quercus virginiana (I)	-	-	-	Cr	-	-	-
Randia aculeata (+)	-	So	Sr	Sr	So	-	-
Reynoysia septentrionalis (I)	-	-	-	Sr	-	-	-
Rhizophora mangle (I+)	-	-	-	-	Cc	So	Sr
Rhus copallina var. leucantha	-	Sr	Sr	-	-	-	-
Salix caroliniana (+)	-	-	-	-	-	-	Sf
Sambucus simpsonii	-	-	-	-	-	-	So
Sapindus saponaria	-	Sr	-	Cr	-	-	-
Schoepfia chrysophylloides (I)	-	-	-	Sr	-	-	-
Senna ligustrina (I*+)	-	-	-	Sr	-	-	-
Sideroxylon foetidissimum (+)	-	Sr	-	Co	-	-	-
Sideroxylon salicifolia (+)	-	Sr	Sr	Co	-	-	-

[4] A species of siliceous sands.

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
Simarouba glauca (+)	-	Sr	-	Co	-	-	-
Solanum donianum (I)	-	Sr	Sr	-	-	-	-
Sophora tomentosa var. truncata (+)	-	So	Sr	Sr	Sr	-	-
Suriana maritima (I)	Sr	Sr	Sr	-	-	-	-
Trema micranthum	-	Sr	Sr	Co	-	-	-
Ximenia americana (I)	-	Sr	Sr	Sr	-	-	-
Zanthoxylum clava-herculis (I)	-	Sr	Sr	Sr	-	-	-
Zanthoxylum coriaceum (I+)	-	Sr	-	-	-	-	-
Zanthoxylum fagara (I*+)	-	-	-	Cr	-	-	-
PALMS							
Coccothrinax argentata	-	Sr	Sr	-	-	-	-
Sabal palmetto (+)	So	So	So	Co	Cr	-	So
Serenoa repens (+)	-	Sd	Sd	-	-	-	So
VINES							
Ampelopsis arborea (I*+,R)[5]	-	-	-	-	-	-	-
Caesalpinia bonduc (R)	-	So	So	Sr	-	-	-
Caesalpinia major (I)	-	-	-	Sr	-	-	-
Canavalia rosea	Go	Sr	Sr	-	-	-	-
Cardiospermum halicacabum	-	Sr	Sr	Sr	-	-	-
Cardiospermum microcarpum	-	Sr	Sr	Sr	-	-	-
Cassytha filiformis (I)	-	Sr	Sr	-	-	-	-
Chiococca alba	-	So	So	Sr	-	-	-
Cissus sicyoides (I*+,R)[6]	-	-	-	-	-	-	-
Cynanchum angustifolium (I)	-	Sr	Sr	Sr	-	Sr	Sr
Cynanchum northropiae (I)	-	Sr	Sr	Sr	-	-	-

[5] Introduced accidentally on bases of **Sabal palmetto**.
[6] Introduced accidentally.

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
Cynanchum scoparium	-	Sr	Sr	Sr	-	-	-
Dalbergia ecastophyllum (R)	Gr	So	So	Sr	Sr	-	-
Echites umbellata	-	Sr	So	-	-	-	-
Eupatorium odoratum (R)	-	Sr	Sr	-	-	-	-
Galactia volubilis	-	Sr	Sr	Sr	-	-	-
Gouania lupuloides	-	Sr	Sr	Cr	-	-	-
Ipomoea alba (R)	-	Sr	Sr	Cr	-	-	Sr
Ipomoea hederifolia (R)	-	Sr	Sr	Sr	-	-	Sr
Ipomoea indica (R)	-	Sr	Sr	Cr	-	-	Sr
Ipomoea pes-capraea	Gf	Go	Gr	Gr	-	-	-
Ipomoea stolonifera	Gr	-	-	-	-	-	-
Ipomoea triloba (R)	-	Sr	Sr	Sr	-	-	-
Ipomoea violacea	-	-	-	-	Co	Cr	-
Melothria pendula (R)	-	Sr	Sr	Sr	-	-	Sr
Merremia dissecta (I,R)	-	-	-	-	-	-	-
Mikania batatifolia	-	Sr	Sr	Sr	Sr	Sr	Sr
Morinda royoc	-	Gr	Gr	-	-	-	-
Parthenocissus quinquefolia (R)	-	Sr	Sr	Cr	-	-	Sr
Passiflora suberosa	Gr	Sr	Sr	Sr	-	-	-
Pentalinon luteum (I)	-	-	-	Sr	Sr	-	-
Plumbago scandens (R)	-	Sr	Sr	Sr	-	-	-
Smilax auriculata	-	Sr	Sr	Sr	-	-	Sr
Smilax bona-nox (I+)	-	Sr	Sr	Sr	-	-	Sr
Smilax havanensis	-	Sr	Sr	Sr	-	-	-
Toxicodendron radicans ssp. radicans (I*+,R)[7]	-	-	-	-	-	-	-
Vigna luteola (R)	Gr	Sr	Sr	Cr	Cr	Sr	Sr

[7] Introduced accidentally.

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
Vitis rotundifolia (I+,R)	-	Sr	-	Sr	-	-	-
GRAMINOIDS							
Andropogon glomeratus var. pumilus (R)	Gr	Gr	Gr	Gr	Gr	Gr	Gr
Cenchrus echinatus (R)	Go	Go	Go	-	-	-	-
Cenchrus incertus (R)	Go	Go	Go	-	-	-	-
Cladium jamaicense (I)	-	-	-	-	-	-	Gf
Cyperus compressus (R)	-	Gr	Gr	-	-	-	Gr
Cyperus croceus (R)	-	Gr	Gr	Gr	-	Gr	Gr
Cyperus floridanus	-	Gr	Gr	-	-	-	-
Cyperus ligularis (R)	Gr	Gr	Gr	Gr	Gr	Gr	Gr
Cyperus nashii (I)[8]	-	-	-	-	-	-	-
Cyperus odoratus	-	-	-	-	Gr	Go	Go
Cyperus pedunculatus	Go	-	-	-	-	-	-
Cyperus planifolius	-	Gr	Gr	Gr	Gr	Gr	Gr
Cyperus polystachyus (R)	-	Gr	Gr	-	Gr	Gr	Gr
Cyperus surinamensis (R)	-	-	-	-	Gr	Gr	Gr
Dichanthelium aciculare (I)	-	Gr	Gr	-	-	-	-
Digitaria villosa (I)	-	Gr	Gr	-	-	-	-
Distichlis spicata	-	-	-	-	Go	Gf	-
Eleocharis albida	-	-	-	-	-	-	Go
Eleocharis geniculata	-	-	-	-	-	-	Go
Eragrostis ciliaris (R)	-	Gr	Gr	-	-	-	-
Eragrostis elliottii	-	Go	Go	-	-	-	Go
Eustachys petraea	Go	Go	Go	Gr	-	Gr	Go
Fimbristylis caroliniana (I)	-	-	-	-	-	Gr	-

[8] A species of well-drained siliceous sands.

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
Fimbristylis castanea	-	-	-	-	Gr	Go	-
Fimbristylis puberula (I)	-	-	-	-	-	-	Gr
Kyllinga brevifolius (R)	-	Gr	Gr	-	-	Gr	Gr
Muhlenbergia capillaris (I*)	-	Go	Go	-	-	-	Go
Panicum adspersum (R)	-	Gr	Gr	Gr	-	-	-
Panicum amarulum	Gr	Go	Gr	-	-	-	-
Panicum dichotomiflorum var. bartowense	-	Go	Go	-	-	-	Go
Panicum virgatum	-	Gr	Gr	-	-	-	Gr
Paspalum caespitosum s.str.	-	Go	Go	-	-	-	Gr
Paspalum setaceum var. ciliatifolium	-	Go	Go	-	-	-	Gr
Paspalum vaginatum	Gr	Gr	Gr	-	Gr	Go	Gr
Rhynchospora caduca (I)	-	-	-	-	-	-	Gr
Rhynchospora colorata	-	Gr	Gr	-	-	-	Go
Setaria geniculata	-	Go	Go	Gr	-	-	Gr
Setaria macrosperma	-	Gr	Gr	Gr	-	-	-
Spartina patens	Go	-	-	-	Gr	Go	-
Spartina spartinae (I+)	-	-	-	-	Sr	So	-
Sporobolus domingensis	-	-	-	-	Gr	Gf	-
Sporobolus virginicus	Gr	-	-	-	Gr	Go	-
Uniola paniculata	Gd	Go	Gr	-	-	-	-
FORBS & WOODY GROUNDCOVERS							
Abutilon permolle	Gr	Gr	Gr	-	-	-	-
Acalypha chamaedrifolia	-	Gr	Gr	-	-	-	-
Acrostichum aureum (I)	-	-	-	-	So	Sr	-
Acrostichum danaeifolium	-	-	-	-	Sr	Sr	Sf
Agalinis cf. fasciculata	-	Gr	Gr	-	-	-	Gr
Alternanthera flavescens	Go	Go	-	-	-	-	-

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
Alternanthera maritima	Gr	Gr	-	-	-	-	-
Ambrosia artemisiifolia (R)	-	Gr	Gr	-	-	-	-
Ambrosia hispida	Gr	-	-	-	-	-	-
Ammania latifolia	-	-	-	-	Gr	Gr	Gr
Anemia adiantifolia	-	Gr	Gr	-	-	-	-
Argemone mexicana (I,R)	-	-	-	-	-	-	-
Aster dumosus	-	Gr	Gr	-	-	-	Gr
Atriplex arenaria	Gr	Gr	-	-	-	-	-
Bacopa monnieri	-	Gr	Gr	-	-	-	Go
Bidens alba var. **radiata** (R)	-	Gr	Gr	-	-	-	-
Blechnum serrulatum (I)	-	-	-	-	-	-	Go
Blutaparon vermiculare	Gr	Gr	-	-	-	Gr	-
Boehmeria cylindrica var. **drummondiana**	-	Gr	Gr	Go	-	-	Go
Borrichia arborescens (I)	-	-	-	-	Gr	Go	-
Borrichia frutescens (+)	-	Gr	-	-	Gr	Go	-
Buchnera floridana (I)	-	Gr	Gr	-	-	-	Gr
Cakile lanceolata ssp. **fusiformis**	Gr	-	-	-	-	-	-
Capraria biflora (R)	-	Gr	Gr	Gr	-	-	Gr
Capsicum annuum var. **glabriusculum**	-	Sr	Sr	Sr	-	-	-
Cassia nictitans var. **aspera** (R)	-	Gr	Gr	-	-	-	-
Celosia nitida (I)	-	Gr	Gr	Gr	-	-	-
Centella asiatica	-	-	-	-	-	Gr	Go
Chamaesyce adenoptera ssp. **pergamena**	-	Gr	Gr	-	-	-	-
Chamaesyce blodgettii (R)	Gr	Gr	Gr	-	-	Gr	-
Chamaesyce bombensis	Gr	-	-	-	-	-	-
Chamaesyce hirta (R)	-	Gr	Gr	-	-	-	-

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
Chamaesyce hypericifolia (R)	-	Gr	Gr	-	-	-	Gr
Chamaesyce maculata (R)	-	Gr	Gr	-	-	-	Gr
Chamaesyce mesembryanthemifolia	Go	-	-	-	-	-	-
Chamaesyce porteriana var. **scoparia** (I)	-	Gr	Gr	-	-	-	-
Chiococca parvifolia	-	Go	Go	So	-	-	-
Cirsium horridulum (I)	-	Gr	Gr	-	-	-	Gr
Cnidoscolus stimulosus	Gr	Gr	Gr	-	-	-	-
Commelina erecta var. **angustifolia**	Gr	Go	Go	-	-	-	-
Commelina erecta var. **erecta**	-	Gr	Gr	-	-	-	-
Conyza canadensis var. **pusilla** (R)	-	Gr	Gr	-	-	-	-
Crotalaria pumila	Gr	Gr	Gr	-	-	-	-
Crotalaria rotundifolia var. **rotundifolia**	Gr	Gr	Gr	-	-	-	-
Croton glandulosus	Gr	Gr	Gr	-	-	-	-
Croton punctatus	Go	Gr	Gr	-	-	-	-
Dalea carnea (I)[9]	-	-	-	-	-	-	-
Desmanthus virgatus var. **depressus**	-	Gr	Gr	-	-	-	-
Desmodium incanum (R)	-	Gr	Gr	-	-	-	-
Dichondra caroliniensis (R)	-	Gr	Gr	Gr	-	-	Gr
Dicliptera sexangularis	-	Go	Go	Go	-	-	-
Diodia virginiana (I)	-	Gr	Gr	-	-	-	Gr
Eclipta prostrata (R)	-	Gr	Gr	-	-	-	Gr
Erechtites hieracifolia (R)	-	Gr	Gr	-	-	-	Gr
Erigeron quercifolius	-	Go	Go	-	-	-	-
Eriogonum longifolium var. **gnaphlifolium**[10]	-	-	-	-	-	-	-
Ernodea littoralis var. **littoralis**	Go	Go	Gr	-	-	-	-

[9] A species of siliceous sands.
[10] Recorded by MacAllister (1938). A central Florida scrub endemic; possibly a misidentification.

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
Eupatorium capillifolium (R)	-	Gr	Gr	-	-	-	Gr
Eupatorium coelestinum (I)	-	Gr	Gr	-	-	-	Gr
Eupatorium serotinum	-	Gr	Gr	-	-	-	Gr
Euphorbia polyphylla (I)[11]	-	-	-	-	-	-	-
Euphorbia trichotoma	Gr	-	-	-	-	-	-
Eustoma exaltatum	-	Gr	Gr	-	-	Gr	Go
Evolvulus sericeus (I)	-	Gr	Gr	-	-	-	Gr
Flaveria linearis	Gr	Gr	Gr	-	-	-	Gr
Galactia floridana	-	Gr	Gr	-	-	-	-
Galium hispidulum	-	Gr	Gr	Gr	-	-	-
Gamochaeta falcatum (R)	-	Gr	Gr	-	-	-	-
Gaura angustifolia var. angustifolia	-	Gr	Gr	-	-	-	-
Gaura angustifolia var. simulans	-	Gr	Gr	-	-	-	-
Glandularia maritima (I)	Gr	Gr	Gr	-	-	-	-
Habenaria odontopetala	-	Gr	Gr	Gr	-	-	-
Hedyotis procumbens	-	Gr	Gr	-	-	-	Gr
Helianthus debilis ssp. debilis	Gf	Go	Gr	-	-	-	-
Heliotropium angiospermum (R)	-	Gr	Gr	Gr	Gr	Gr	Gr
Heterotheca subaxillaris (I,R)	-	-	-	-	-	-	-
Hydrocotyle verticillata	Gr	Gr	Gr	-	-	Gr	Gr
Hymenocallis latifolia (+)	Go	Go	Gr	Gr	Gr	Gr	Gr
Hypericum tetrapetalum (I)	-	Gr	Gr	-	-	-	Gr
Iresine diffusa	-	Go	Go	Gr	-	-	-
Iva imbricata	Go	Gr	Gr	-	-	-	-
Jacquemontia reclinata (I)	Gr	Gr	-	-	-	-	-
Juncus megacephalus (I)	-	-	-	-	-	-	Go

[11] A species of siliceous sands.

cientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
Kosteletzkya althaeifolia	-	-	-	-	-	Gr	Gr
Lactuca graminifolia (I)	-	Gr	Gr	-	-	-	-
Lepidium virginicum (R)	-	Gr	Gr	-	-	-	-
Licania michauxii (I)	-	Gr	Gr	-	-	-	-
Limonium carolinianum (I)	-	-	-	-	-	Gr	-
Ludwigia lanceolata	-	-	-	-	-	Gr	Gr
Ludwigia microcarpa (I,R)	-	-	-	-	-	-	-
Ludwigia octovalvis (R)	-	Gr	Gr	-	-	Go	Gr
Ludwigia repens (I)	-	-	-	-	-	-	Gr
Lythrum lineare (I)	-	-	-	-	-	Gr	Gr
Malvastrum corchorifolium (R)	-	Gr	Gr	-	-	-	-
Melanthera angustifolia (I)	-	Gr	Gr	-	-	-	-
Melanthera parvifolia (I)	-	Gr	Gr	-	-	-	-
Melanthera aspera	-	Go	-	Gr	-	-	-
Mentzelia floridana (R)	Gr	Go	Go	-	-	-	-
Mitreola petiolata	-	Gr	Gr	-	-	-	Gr
Nephrolepis biserrata (I)	-	-	-	Gr	-	-	-
Neptunia pubescens	-	Gr	Gr	-	-	-	-
Oenothera laciniata	-	Gr	Gr	-	-	-	-
Oenothera humifusa	Gr	Gr	Gr	-	-	-	-
Okenia hypogaea	Go	Gr	Gr	-	-	-	-
Opuntia humifusa var. austrina (I)	Gr	Gr	Gr	-	-	-	-
Opuntia stricta	-	Sr	Sr	-	-	-	-
Osmunda regalis var. spectabilis (I)	-	-	-	-	-	-	Go
Parietaria floridana (R)	-	Gr	Gr	Gr	-	-	Gr
Pectis glaucescens (R)	-	Gr	Gr	-	-	-	-

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
Pectis prostrata (R)	-	Gr	Gr	-	-	-	-
Phyla nodiflora (R)	-	Gr	Gr	-	-	-	Gr
Phyllanthus abnormis	Gr	Gr	Gr	-	-	-	-
Phyllanthus amarus (R)	-	Gr	Gr	-	-	-	-
Phyllanthus caroliniensis ssp. saxicola	-	Gr	Gr	-	-	-	Gr
Physalis angulata var. angulata (R)	-	Gr	Gr	-	-	-	-
Physalis walteri	Gr	Gr	Gr	-	-	-	-
Phytolacca americana	-	Gr	Gr	Gr	-	-	Gr
Pilea herniarioides (R)	-	-	-	Gr	-	-	-
Piriqueta caroliniana var. caroliniana	-	Gr	Gr	-	-	-	-
Plantago virginica (R)	-	Gr	Gr	-	-	-	-
Pluchea odorata	-	Gr	Gr	-	Gr	Gf	Gf
Poinsettia cyathophora (R)	-	Gr	Gr	-	-	-	-
Poinsettia heterophylla (R)	-	Gr	Gr	-	-	-	-
Poinsettia pinetorum (I)	-	Gr	Gr	-	-	-	-
Polygala grandiflora	Gr	Gr	Gr	-	-	-	-
Polygala polygama (I)	-	Gr	Gr	-	-	-	-
Polygonum hydropiperoides (I)	-	-	-	-	-	-	Gr
Polypremum procumbens (R)	-	Gr	Gr	-	-	-	Gr
Portulaca rubricaulis (I)	Gr	Gr	Gr	Gr	-	-	-
Portulaca pilosa	Gr	Gr	Gr	-	-	-	Gr
Psilotum nudum	-	-	-	Gr	-	-	-
Pteridium aquilinum var. caudatum	-	Go	Go	-	-	-	-
Pteris bahamensis	-	Gr	Gr	-	-	-	-
Pterocaulon pycnostachyum (I)	-	Gr	Gr	-	-	-	-
Ptilimnium capillaceum (R)	-	-	-	Gr	-	-	Gr
Rivina humilis	-	Gr	Gr	Go	-	-	-

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
Salicornia bigelovii (I)	-	-	-	-	Gr	Go	-
Salicornia virginica (I)	-	-	-	-	Gr	Go	-
Salvia occidentalis (R)	-	Gr	Gr	Gr	-	-	-
Salvia serotina	-	Gr	Gr	Gr	-	-	-
Samolus ebracteatus	-	-	-	-	-	Gr	Gr
Samolus valerandi var. **parviflorus** (I)	-	-	-	-	-	-	Gr
Scaevola plumieri	Gr	-	-	-	-	-	-
Scoparia dulcis (R)	-	Gr	Gr	-	-	-	Gr
Scutellaria havanensis	-	Gr	Gr	-	-	-	-
Senna mexicana var. **chapmanii** (I+)	-	Gr	Gr	-	-	-	-
Sesuvium portulacastrum (+)	Go	Gr	-	-	-	Gr	-
Sida acuta (R)	-	Gr	Gr	-	-	-	-
Sida rhombifolia (R)	-	Gr	Gr	-	-	-	-
Sisyrinchium cf. **miamiense** (I)	-	Gr	Gr	-	-	-	-
Solanum americanum (R)	-	Gr	Gr	-	-	-	-
Solanum bahamense	-	Sr	Sr	Sr	-	-	-
Solanum capsicoides (I)	-	Gr	-	Gr	-	-	-
Solidago leavenworthii	-	Gr	Gr	Gr	-	-	Go
Solidago sempervirens var. **mexicana**	Gr	Gr	Gr	-	-	Gr	Go
Solidago stricta	-	Gr	Gr	-	-	-	Gr
Spermacoce assurgens (R)	-	Gr	Gr	-	-	-	-
Spermacoce tenuior	-	Gr	Gr	-	-	-	-
Stachytarpheta jamaicensis	-	Gr	Gr	-	-	-	-
Stillingia sylvatica ssp. **sylvatica** (I)	-	Gr	Gr	-	-	-	-
Stillingia sylvatica ssp. **tenuis** (I)	-	Gr	Gr	-	-	-	-

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
Strophostyles umbellata (I)[12]	-	-	-	-	-	-	-
Stylosanthes hamata (R)	-	Gr	Gr	-	-	-	-
Suaeda linearis	-	-	-	-	Gr	Go	-
Thelypteris interrupta	-	-	-	-	-	-	Go
Thelypteris kunthii	-	Gr	Gr	Gr	-	-	Gr
Trichostema suffrutescens	Gr	Gr	Gr	-	-	-	-
Triphora gentianoides	-	-	Gr	Gr	-	-	-
Typha latifolia (R)	-	-	-	-	-	-	So
Verbena scabra	-	-	-	-	-	Gr	Gr
Verbesina virginica var. laciniata	-	Gr	Gr	Gr	-	-	-
Verbesina virginica var. virginica	-	Gr	Gr	Gr	-	-	-
Vicia acutifolia (I)	-	-	-	-	-	-	Gr
Waltheria indica (R)	-	Gr	Gr	-	-	-	-
Zamia integrifolia (+)	-	Gr	Gr	Gr	-	-	-
MARINE AQUATICS							
Cymodocea filiformis	-	-	-	-	U	-	-
Halodule beaudettei	-	-	-	-	U	-	-
Halophila johnsonii	-	-	-	-	U	-	-
Najas marina	-	-	-	-	U	-	-
Thalassia testudinum	-	-	-	-	U	-	-
EPIPHYTES							
Cyrtopodium punctatum	-	-	-	-	Cr	-	-
Encyclia tampensis (I)	-	-	-	-	Cr	-	-
Phlebodium aureum (+)	-	Sr	Sr	Cr	Cr	-	Sr
Tillandsia balbisiana (I)	-	-	-	-	Sr	-	-
Tillandsia flexuosa (I)	-	-	-	-	Sr	-	-

[12] Recorded by MacAllister (1938). Not known from south Florida; possibly a misidentification.

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
Tillandsia usneoides (+)	-	-	-	Cr	Cr	-	-
Vittaria lineata (I*+)[13]	-	-	-	-	-	-	-

EXCLUDED TAXA: **Aceolorraphe wrightii, Pithecellobium unguis-cati, Savia bahamensis, Swietenia mahagoni**, and **Thrinax morrisii**. All of these taxa have been cultivated and are outside of their natural ranges at Cape Florida. They should be removed from the park.

Compiled by George Gann
The Institute for Regional Conservation
11/30/95

Updated by George Gann
The Institute for Regional Conservation
12/15/95

[13] Introduced to Cape Florida on **Sabal palmetto**. Not likely to persist.

4. INVASIVE SPECIES CONTROL

Like many fragmented natural areas in southeastern Florida, Cape Florida has been invaded by a plethora of exotic pest plant species. Thus far, 121 species of exotic plants[1] have been recorded within the park (Table 4a). In addition, 68 species of native plants which have weedy tendencies (ruderals) have been recorded for Cape Florida (Table 4b). Additional species of invasive plants will be discovered in the future as more biological inventories are completed and new species invade the park.

While exotic species are the traditional targets of control or eradication activities, invasive native species can have deleterious affects on fragmented natural communities. This is especially true of ruderal vines, which often shade out preferable native trees, shrubs, and herbs. Ruderal herbs may pose a significant threat to the restoration of coastal strand, mesic flatwoods, and isolated freshwater wetland areas by accumulating biomass and invading open spaces.

This section outlines the basic methods of invasive species control within the restoration context at Cape Florida. Central to this section is Table 4c which provides specialized control treatments for every invasive species taxon recorded at the site.

4.1 Priorities

Table 4a ranks exotic taxa using a modified version of the Florida Exotic Pest Plant Council system. In general, Priority I taxa should be eradicated whenever encountered. Special search-and-destroy programs may be initiated, if needed, to control certain Priority I taxa. Priority II taxa should be controlled during hand-clean sweeps and hand-clean transects. Priority III taxa should be ignored except when they pose a threat to the restoration process as described in Community Restoration Guidelines above. Ruderal taxa should be controlled when they interfere with the restoration process.

4.2 Basic invasive species control methods

The following describes the basic invasive species control methods which should be used as described in Community Restoration Plans above.

4.2.1 Garlon 4 transects

This technique is used early in the restoration process, or if an invasive species control program has not been initiated and exotic and/or ruderal vines have come to dominate an area. It involves the treatment of vine stems along evenly spaced line transects throughout a management area. It is employed where the cover of invasive vines is high (usually over 50%). Once initial vine die-off occurs, then hand-clean sweeps are initiated. Garlon 4 transects are not conducted in tidal swamp, tidal marsh,

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[1] Includes species of undetermined nativity.

or isolated wetlands as Garlon 4 is not labeled for use in wetlands.

4.2.2 Hand-clean sweeps

This technique involves the complete removal or treatment of all target species within a management area. It is primarily employed where invasive plant cover is low to moderate (5-50%) in the understory.

4.2.2.1 Hand-clean sweeps in maritime hammock and shell mound

In maritime hammock and shell mound communities, structural pruning is an important element of hand-clean sweeps. In these communities, structural pruning involves:

(1) the removal of vine stems between six feet and ground level;

(2) the cutting up of dead branches which may hinder movement throughout the restoration area and obscure invasive plants; and

(3) the trimming of lateral branches of trees and shrubs to a height no greater than six feet. No more than 30% of the total leaf area of any tree or shrub should be removed during any one trimming (with the exception of palms from which all fully emerged fronds may be cut).

Invasive species control activities are conducted in conjunction with structural pruning and involve:

(1) the hand-pulling (or grubbing out) of herbaceous invasive species;

(2) the hand-pulling of seedlings of woody invasive species; and

(3) the use of Garlon or other systemic herbicides to kill target woody invasive plant species. In many cases exotic "nurse" trees (such as papaya and other Priority II tree species) are left in maritime hammock and shell mound communities to create a temporary canopy. They are later removed as sufficient native canopy develops.

Debris created as a result of hand-clean sweeps should be placed in piles except for those species which readily re-sprout (identified in Table 4c). These species should be bagged and removed from the site.

4.2.2.2 Hand-clean sweeps in coastal strand and mesic flatwoods

In coastal strand and mesic flatwoods, hand-clean sweeps are conducted as in maritime hammocks except :

(1) structural pruning is normally not done;

(2) debris generated from hand-clean sweeps should be exported to a maritime hammock or shell mound restoration area;

(3) any remaining organic debris (other than pine needles) should be raked up and removed from the area; and

(4) native trees and shrubs (other than south Florida slash pine) which have reached a height greater than 12 feet should be relocated, cut down and/or treated with a systemic herbicide.

4.2.2.3 Hand-clean sweeps in tidal marsh and isolated wetlands

In tidal marsh and isolated wetland communities, hand-clean sweeps are conducted as in maritime hammocks except :

(1) structural pruning is normally not done;

(2) debris generated from hand-clean sweeps should be exported to a maritime hammock or shell mound restoration area; and

(3) native trees and shrubs (other than south Florida slash pine) which have reached a height greater than 12 feet should be relocated, cut down and/or treated with a systemic herbicide.

4.2.2.4 Hand-clean sweeps in tidal swamp

In the tidal swamp community, hand-clean sweeps are completed as in maritime hammocks except:

(1) structural pruning is normally not done due to the sensitivity of mangroves to trimming; and

(2) debris generated from hand-clean sweeps should be transported to a maritime hammock or shell mound restoration area.

4.2.3 Hand-clean transects

This technique is employed when invasive plant cover is very low (less than 5%) in the understory. It involves a moderate amount of structural pruning and the treatment of invasive plant species along evenly-spaced line transects throughout a management area. Structural pruning is conducted at the same time as invasive plant control activities. Debris piles may or may not be used depending on the amount of debris which is created.

During hand-clean transects, invasive plant species which readily re-sprout are bagged and removed from the site. Ruderal herbs are not normally treated in the maritime hammock, shell mound, and tidal swamp communities, but may be treated within beach dune, coastal strand, mesic hammock, tidal marsh, and freshwater wetland