

Cape Florida Project
VOLUNTEER RESTORATION
MANUAL

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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.

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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 of 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 a 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 known 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 is 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							
<i>Acacia pinetorum</i> (I)	-	Sr	Sr	-	-	-	-
<i>Agave decipiens</i>	-	Sr	-	Sr	-	-	-
<i>Annona glabra</i> (I+)	-	-	-	-	-	-	Co
<i>Ardisia escallonioides</i>	-	Sr	Sr	So	-	-	-
<i>Argusia gnaphalodes</i>	Sr	Sr	-	-	-	-	-
<i>Avicennia germinans</i> (+)	-	-	-	-	Cc	Sr	-
<i>Baccharis angustifolia</i> (I)	-	Sr	-	-	Sr	So	Sr
<i>Baccharis glomeruliflora</i>	-	Sr	Sr	Sr	Sr	-	Sr
<i>Baccharis halimifolia</i>	-	So	So	-	Sr	-	So
<i>Batis maritima</i> (I)	Gr	-	-	-	Go	Gf	-
<i>Bourreria ovata</i> (I+)	-	-	-	Sr	-	-	-
<i>Bursera simaruba</i> (+)	-	Sr	-	Cf	-	-	-
<i>Byrsonima lucida</i> (I)	-	Sr	Sr	Sr	-	-	-
<i>Callicarpa americana</i> (I+)	-	Sr	Sr	Sr	-	-	-
<i>Calyptanthes pallens</i> (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
<i>Chrysobalanus icaco</i> (+)	Gr	Sr	Sr	Cr	-	-	So
<i>Citharexylum fruticosum</i> (I+)	-	Sr	Sr	Cr	-	-	-
<i>Coccoloba diversifolia</i> (+)	-	Sr	-	Cf	-	-	-
<i>Coccoloba uvifera</i> (+)	Gr	So ³	So	Co	Sr	-	-
<i>Conocarpus erecta</i> (+)	-	Sr	Sr	Cr	Co	Sr	So
<i>Crossopetalum rhacoma</i> (I+)	-	Sr	Sr	-	-	-	-
<i>Dalea carthaginensis</i> ssp. <i>domingensis</i> (I)	-	Gr	Gr	-	-	-	-
<i>Diospyros virginiana</i> (I)	-	Sr	Sr	Cr	-	-	Sr
<i>Dodonaea viscosa</i> var. <i>viscosa</i>	Sr	Sr	Sr	Sr	-	-	-
<i>Erithalis fruticosa</i> (I+)	-	Sr	Sr	Sr	-	-	-
<i>Erythrina herbacea</i> (I+)	-	Sr	Sr	Sr	-	-	-
<i>Exothea paniculata</i> (I+)	-	-	-	Cr	-	-	-
<i>Eugenia axillaris</i> (+)	-	Sr	Sr	Co	-	-	-
<i>Eugenia foetida</i> (+)	-	So	Sr	So	Sr	-	-
<i>Ficus aurea</i> (+)	-	Sr	-	Cf	-	-	-
<i>Ficus citrifolia</i> (I+)	-	-	-	Cr	-	-	-
<i>Forestiera segregata</i> var. <i>segregata</i> (+)	-	Sr	Sr	So	-	-	-
<i>Genipa clusiifolia</i>	Sr	So	-	Sr	-	-	-
<i>Guapira discolor</i> var. <i>longifolia</i> (+)	-	So	Sr	So	-	-	-
<i>Gymnanthes lucida</i> (I)	-	-	-	Cr	-	-	-
<i>Hamelia patens</i> (I*+)	-	-	-	Sr	-	-	-
<i>Krugiodendron ferreum</i> (I+)	-	-	-	Cr	-	-	-
<i>Laguncularia racemosa</i> (+)	-	-	-	-	Cc	Sr	-
<i>Lantana depressa</i> var. <i>floridana</i>	-	Sr	Sr	-	-	-	-
<i>Lantana involucrata</i> (+)	-	Sr	Sr	Sr	-	-	-
<i>Lycium carolinianum</i> (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
<i>Lyonia fruticosa</i> (I) ⁴	-	-	-	-	-	-	-
<i>Metopium toxiferum</i>	-	Sr	Sr	Cr	Sr	-	-
<i>Morus rubra</i> (I)	-	Sr	Sr	Cr	-	-	Sr
<i>Myrica cerifera</i> (I+)	-	Sr	So	Sr	Sr	-	So
<i>Myrsine floridana</i> (I+)	-	So	So	Sr	-	-	Sr
<i>Ocotea coriacea</i>	-	-	-	Co	-	-	-
<i>Persea borbonia</i> (I+)	-	Sr	Sr	Cr	Sr	-	Sr
<i>Pinus elliotii</i> var. <i>densa</i> (I+)	-	-	Cd	-	-	-	-
<i>Piscidia piscipula</i> (I+)	-	-	-	Co	-	-	-
<i>Pithecellobium keyense</i> (+)	-	So	Sr	Sr	-	-	-
<i>Pluchea caroliniensis</i> (R)	-	Sr	Sr	So	-	-	-
<i>Psychotria ligustrifolia</i> (I)	-	Sr	-	Sr	-	-	-
<i>Psychotria nervosa</i> (+)	-	Sr	So	So	-	-	-
<i>Quercus virginiana</i> (I)	-	-	-	Cr	-	-	-
<i>Randia aculeata</i> (+)	-	So	Sr	Sr	So	-	-
<i>Reynoldsia septentrionalis</i> (I)	-	-	-	Sr	-	-	-
<i>Rhizophora mangle</i> (I+)	-	-	-	-	Cc	So	Sr
<i>Rhus copallina</i> var. <i>leucantha</i>	-	Sr	Sr	-	-	-	-
<i>Salix caroliniana</i> (+)	-	-	-	-	-	-	Sf
<i>Sambucus simpsonii</i>	-	-	-	-	-	-	So
<i>Sapindus saponaria</i>	-	Sr	-	Cr	-	-	-
<i>Schoepfia chrysophylloides</i> (I)	-	-	-	Sr	-	-	-
<i>Senna ligustrina</i> (I*+)	-	-	-	Sr	-	-	-
<i>Sideroxylon foetidissimum</i> (+)	-	Sr	-	Co	-	-	-
<i>Sideroxylon salicifolia</i> (+)	-	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
<i>Simarouba glauca</i> (+)	-	Sr	-	Co	-	-	-
<i>Solanum donianum</i> (I)	-	Sr	Sr	-	-	-	-
<i>Sophora tomentosa</i> var. <i>truncata</i> (+)	-	So	Sr	Sr	Sr	-	-
<i>Suriana maritima</i> (I)	Sr	Sr	Sr	-	-	-	-
<i>Trema micranthum</i>	-	Sr	Sr	Co	-	-	-
<i>Ximenia americana</i> (I)	-	Sr	Sr	Sr	-	-	-
<i>Zanthoxylum clava-herculis</i> (I)	-	Sr	Sr	Sr	-	-	-
<i>Zanthoxylum coriaceum</i> (I+)	-	Sr	-	-	-	-	-
<i>Zanthoxylum fagara</i> (I*+)	-	-	-	Cr	-	-	-
PALMS							
<i>Coccothrinax argentata</i>	-	Sr	Sr	-	-	-	-
<i>Sabal palmetto</i> (+)	So	So	So	Co	Cr	-	So
<i>Serenoa repens</i> (+)	-	Sd	Sd	-	-	-	So
VINES							
<i>Ampelopsis arborea</i> (I*+,R) ⁵	-	-	-	-	-	-	-
<i>Caesalpinia bonduc</i> (R)	-	So	So	Sr	-	-	-
<i>Caesalpinia major</i> (I)	-	-	-	Sr	-	-	-
<i>Canavalia rosea</i>	Go	Sr	Sr	-	-	-	-
<i>Cardiospermum halicacabum</i>	-	Sr	Sr	Sr	-	-	-
<i>Cardiospermum microcarpum</i>	-	Sr	Sr	Sr	-	-	-
<i>Cassytha filiformis</i> (I)	-	Sr	Sr	-	-	-	-
<i>Chiococca alba</i>	-	So	So	Sr	-	-	-
<i>Cissus sicyoides</i> (I*+,R) ⁶	-	-	-	-	-	-	-
<i>Cynanchum angustifolium</i> (I)	-	Sr	Sr	Sr	-	Sr	Sr
<i>Cynanchum northropiae</i> (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
<i>Cynanchum scoparium</i>	-	Sr	Sr	Sr	-	-	-
<i>Dalbergia ecastophyllum</i> (R)	Gr	So	So	Sr	Sr	-	-
<i>Echites umbellata</i>	-	Sr	So	-	-	-	-
<i>Eupatorium odoratum</i> (R)	-	Sr	Sr	-	-	-	-
<i>Galactia volubilis</i>	-	Sr	Sr	Sr	-	-	-
<i>Gouania lupuloides</i>	-	Sr	Sr	Cr	-	-	-
<i>Ipomoea alba</i> (R)	-	Sr	Sr	Cr	-	-	Sr
<i>Ipomoea hederifolia</i> (R)	-	Sr	Sr	Sr	-	-	Sr
<i>Ipomoea indica</i> (R)	-	Sr	Sr	Cr	-	-	Sr
<i>Ipomoea pes-capraea</i>	Gf	Go	Gr	Gr	-	-	-
<i>Ipomoea stolonifera</i>	Gr	-	-	-	-	-	-
<i>Ipomoea triloba</i> (R)	-	Sr	Sr	Sr	-	-	-
<i>Ipomoea violacea</i>	-	-	-	-	Co	Cr	-
<i>Melothria pendula</i> (R)	-	Sr	Sr	Sr	-	-	Sr
<i>Merremia dissecta</i> (I,R)	-	-	-	-	-	-	-
<i>Mikania batatifolia</i>	-	Sr	Sr	Sr	Sr	Sr	Sr
<i>Morinda royoc</i>	-	Gr	Gr	-	-	-	-
<i>Parthenocissus quinquefolia</i> (R)	-	Sr	Sr	Cr	-	-	Sr
<i>Passiflora suberosa</i>	Gr	Sr	Sr	Sr	-	-	-
<i>Pentalinon luteum</i> (I)	-	-	-	Sr	Sr	-	-
<i>Plumbago scandens</i> (R)	-	Sr	Sr	Sr	-	-	-
<i>Smilax auriculata</i>	-	Sr	Sr	Sr	-	-	Sr
<i>Smilax bona-nox</i> (I+)	-	Sr	Sr	Sr	-	-	Sr
<i>Smilax havanensis</i>	-	Sr	Sr	Sr	-	-	-
<i>Toxicodendron radicans</i> ssp. <i>radicans</i> (I*,R) ⁷	-	-	-	-	-	-	-
<i>Vigna luteola</i> (R)	Gr	Sr	Sr	Cr	Cr	Sr	Sr

⁷ Introduced accidentally.

Scientific Name	Beach Dune	Coastal Strand	Mesic ⁸ Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
<i>Vitis rotundifolia</i> (I+,R)	-	Sr	-	Sr	-	-	-
GRAMINOIDS							
<i>Andropogon glomeratus</i> var. <i>pumilus</i> (R)	Gr	Gr	Gr	Gr	Gr	Gr	Gr
<i>Cenchrus echinatus</i> (R)	Go	Go	Go	-	-	-	-
<i>Cenchrus incertus</i> (R)	Go	Go	Go	-	-	-	-
<i>Cladium jamaicense</i> (I)	-	-	-	-	-	-	Gf
<i>Cyperus compressus</i> (R)	-	Gr	Gr	-	-	-	Gr
<i>Cyperus croceus</i> (R)	-	Gr	Gr	Gr	-	Gr	Gr
<i>Cyperus floridanus</i>	-	Gr	Gr	-	-	-	-
<i>Cyperus ligularis</i> (R)	Gr	Gr	Gr	Gr	Gr	Gr	Gr
<i>Cyperus nashii</i> (I) ⁸	-	-	-	-	-	-	-
<i>Cyperus odoratus</i>	-	-	-	-	Gr	Go	Go
<i>Cyperus pedunculatus</i>	Go	-	-	-	-	-	-
<i>Cyperus planifolius</i>	-	Gr	Gr	Gr	Gr	Gr	Gr
<i>Cyperus polystachyus</i> (R)	-	Gr	Gr	-	Gr	Gr	Gr
<i>Cyperus surinamensis</i> (R)	-	-	-	-	Gr	Gr	Gr
<i>Dichanthelium aciculare</i> (I)	-	Gr	Gr	-	-	-	-
<i>Digitaria villosa</i> (I)	-	Gr	Gr	-	-	-	-
<i>Distichlis spicata</i>	-	-	-	-	Go	Gf	-
<i>Eleocharis albida</i>	-	-	-	-	-	-	Go
<i>Eleocharis geniculata</i>	-	-	-	-	-	-	Go
<i>Eragrostis ciliaris</i> (R)	-	Gr	Gr	-	-	-	-
<i>Eragrostis elliottii</i>	-	Go	Go	-	-	-	Go
<i>Eustachys petraea</i>	Go	Go	Go	Gr	-	Gr	Go
<i>Fimbristylis caroliniana</i> (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
<i>Fimbristylis castanea</i>	-	-	-	-	Gr	Go	-
<i>Fimbristylis puberula</i> (I)	-	-	-	-	-	-	Gr
<i>Kyllinga brevifolius</i> (R)	-	Gr	Gr	-	-	Gr	Gr
<i>Muhlenbergia capillaris</i> (I*)	-	Go	Go	-	-	-	Go
<i>Panicum adspersum</i> (R)	-	Gr	Gr	Gr	-	-	-
<i>Panicum amarulum</i>	Gr	Go	Gr	-	-	-	-
<i>Panicum dichotomiflorum</i> var. <i>bartowense</i>	-	Go	Go	-	-	-	Go
<i>Panicum virgatum</i>	-	Gr	Gr	-	-	-	Gr
<i>Paspalum caespitosum</i> s.str.	-	Go	Go	-	-	-	Gr
<i>Paspalum setaceum</i> var. <i>ciliatifolium</i>	-	Go	Go	-	-	-	Gr
<i>Paspalum vaginatum</i>	Gr	Gr	Gr	-	Gr	Go	Gr
<i>Rhynchospora caduca</i> (I)	-	-	-	-	-	-	Gr
<i>Rhynchospora colorata</i>	-	Gr	Gr	-	-	-	Go
<i>Setaria geniculata</i>	-	Go	Go	Gr	-	-	Gr
<i>Setaria macrosperma</i>	-	Gr	Gr	Gr	-	-	-
<i>Spartina patens</i>	Go	-	-	-	Gr	Go	-
<i>Spartina spartinae</i> (I+)	-	-	-	-	Sr	So	-
<i>Sporobolus domingensis</i>	-	-	-	-	Gr	Gf	-
<i>Sporobolus virginicus</i>	Gr	-	-	-	Gr	Go	-
<i>Uniola paniculata</i>	Gd	Go	Gr	-	-	-	-
FORBS & WOODY GROUNDCOVERS							
<i>Abutilon permolle</i>	Gr	Gr	Gr	-	-	-	-
<i>Acalypha chamaedrifolia</i>	-	Gr	Gr	-	-	-	-
<i>Acrostichum aureum</i> (I)	-	-	-	-	So	Sr	-
<i>Acrostichum danaeifolium</i>	-	-	-	-	Sr	Sr	Sf
<i>Agalinis</i> cf. <i>fasciculata</i>	-	Gr	Gr	-	-	-	Gr
<i>Alternanthera flavescens</i>	Go	Go	-	-	-	-	-

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

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
<i>Chamaesyce hypericifolia</i> (R)	-	Gr	Gr	-	-	-	Gr
<i>Chamaesyce maculata</i> (R)	-	Gr	Gr	-	-	-	Gr
<i>Chamaesyce mesembryanthemifolia</i>	Go	-	-	-	-	-	-
<i>Chamaesyce porteriana</i> var. <i>scoparia</i> (I)	-	Gr	Gr	-	-	-	-
<i>Chiococca parvifolia</i>	-	Go	Go	So	-	-	-
<i>Cirsium horridulum</i> (I)	-	Gr	Gr	-	-	-	Gr
<i>Cnidoscolus stimulosus</i>	Gr	Gr	Gr	-	-	-	-
<i>Commelina erecta</i> var. <i>angustifolia</i>	Gr	Go	Go	-	-	-	-
<i>Commelina erecta</i> var. <i>erecta</i>	-	Gr	Gr	-	-	-	-
<i>Conyza canadensis</i> var. <i>pusilla</i> (R)	-	Gr	Gr	-	-	-	-
<i>Crotalaria pumila</i>	Gr	Gr	Gr	-	-	-	-
<i>Crotalaria rotundifolia</i> var. <i>rotundifolia</i>	Gr	Gr	Gr	-	-	-	-
<i>Croton glandulosus</i>	Gr	Gr	Gr	-	-	-	-
<i>Croton punctatus</i>	Go	Gr	Gr	-	-	-	-
<i>Dalea carnea</i> (I) ⁹	-	-	-	-	-	-	-
<i>Desmanthus virgatus</i> var. <i>depressus</i>	-	Gr	Gr	-	-	-	-
<i>Desmodium incanum</i> (R)	-	Gr	Gr	-	-	-	-
<i>Dichondra caroliniensis</i> (R)	-	Gr	Gr	Gr	-	-	Gr
<i>Dicliptera sexangularis</i>	-	Go	Go	Go	-	-	-
<i>Diodia virginiana</i> (I)	-	Gr	Gr	-	-	-	Gr
<i>Eclipta prostrata</i> (R)	-	Gr	Gr	-	-	-	Gr
<i>Erechtites hieracifolia</i> (R)	-	Gr	Gr	-	-	-	Gr
<i>Erigeron quercifolius</i>	-	Go	Go	-	-	-	-
<i>Eriogonum longifolium</i> var. <i>gnaphlifolium</i> ¹⁰	-	-	-	-	-	-	-
<i>Ernodea littoralis</i> var. <i>littoralis</i>	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
<i>Eupatorium capillifolium</i> (R)	-	Gr	Gr	-	-	-	Gr
<i>Eupatorium coelestinum</i> (I)	-	Gr	Gr	-	-	-	Gr
<i>Eupatorium serotinum</i>	-	Gr	Gr	-	-	-	Gr
<i>Euphorbia polyphylla</i> (I) ¹¹	-	-	-	-	-	-	-
<i>Euphorbia trichotoma</i>	Gr	-	-	-	-	-	-
<i>Eustoma exaltatum</i>	-	Gr	Gr	-	-	Gr	Go
<i>Evolvulus sericeus</i> (I)	-	Gr	Gr	-	-	-	Gr
<i>Flaveria linearis</i>	Gr	Gr	Gr	-	-	-	Gr
<i>Galactia floridana</i>	-	Gr	Gr	-	-	-	-
<i>Galium hispidulum</i>	-	Gr	Gr	Gr	-	-	-
<i>Gamochaeta falcatum</i> (R)	-	Gr	Gr	-	-	-	-
<i>Gaura angustifolia</i> var. <i>angustifolia</i>	-	Gr	Gr	-	-	-	-
<i>Gaura angustifolia</i> var. <i>simulans</i>	-	Gr	Gr	-	-	-	-
<i>Glandularia maritima</i> (I)	Gr	Gr	Gr	-	-	-	-
<i>Habenaria odontopetala</i>	-	Gr	Gr	Gr	-	-	-
<i>Hedyotis procumbens</i>	-	Gr	Gr	-	-	-	Gr
<i>Helianthus debilis</i> ssp. <i>debilis</i>	Gf	Go	Gr	-	-	-	-
<i>Heliotropium angiospermum</i> (R)	-	Gr	Gr	Gr	Gr	Gr	Gr
<i>Heterotheca subaxillaris</i> (I,R)	-	-	-	-	-	-	-
<i>Hydrocotyle verticillata</i>	Gr	Gr	Gr	-	-	Gr	Gr
<i>Hymenocallis latifolia</i> (+)	Go	Go	Gr	Gr	Gr	Gr	Gr
<i>Hypericum tetrapetalum</i> (I)	-	Gr	Gr	-	-	-	Gr
<i>Iresine diffusa</i>	-	Go	Go	Gr	-	-	-
<i>Iva imbricata</i>	Go	Gr	Gr	-	-	-	-
<i>Jacquemontia reclinata</i> (I)	Gr	Gr	-	-	-	-	-
<i>Juncus megacephalus</i> (I)	-	-	-	-	-	-	Go

¹¹ A species of siliceous sands.

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

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

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

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetland
<i>Strophostyles umbellata</i> (I) ¹²	-	-	-	-	-	-	-
<i>Stylosanthes hamata</i> (R)	-	Gr	Gr	-	-	-	-
<i>Suaeda linearis</i>	-	-	-	-	Gr	Go	-
<i>Thelypteris interrupta</i>	-	-	-	-	-	-	Go
<i>Thelypteris kunthii</i>	-	Gr	Gr	Gr	-	-	Gr
<i>Trichostema suffrutescens</i>	Gr	Gr	Gr	-	-	-	-
<i>Triphora gentianoides</i>	-	-	Gr	Gr	-	-	-
<i>Typha latifolia</i> (R)	-	-	-	-	-	-	So
<i>Verbena scabra</i>	-	-	-	-	-	Gr	Gr
<i>Verbesina virginica</i> var. <i>laciniata</i>	-	Gr	Gr	Gr	-	-	-
<i>Verbesina virginica</i> var. <i>virginica</i>	-	Gr	Gr	Gr	-	-	-
<i>Vicia acutifolia</i> (I)	-	-	-	-	-	-	Gr
<i>Waltheria indica</i> (R)	-	Gr	Gr	-	-	-	-
<i>Zamia integrifolia</i> (+)	-	Gr	Gr	Gr	-	-	-
MARINE AQUATICS							
<i>Cymodocea filiformis</i>	-	-	-	-	U	-	-
<i>Halodule beaudettei</i>	-	-	-	-	U	-	-
<i>Halophila johnsonii</i>	-	-	-	-	U	-	-
<i>Najas marina</i>	-	-	-	-	U	-	-
<i>Thalassia testudinum</i>	-	-	-	-	U	-	-
EPIPHYTES							
<i>Cyrtopodium punctatum</i>	-	-	-	-	Cr	-	-
<i>Encyclia tampensis</i> (I)	-	-	-	-	Cr	-	-
<i>Phlebodium aureum</i> (+)	-	Sr	Sr	Cr	Cr	-	Sr
<i>Tillandsia balbisiana</i> (I)	-	-	-	-	Sr	-	-
<i>Tillandsia flexuosa</i> (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: *Accolorraphe 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 plants¹ 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 effects 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,

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

communities. Invasive “nurse” trees are normally eliminated in maritime hammocks at this time.

4.2.4 Search-and-destroy

This technique is used to eliminate populations of specific target species which cannot be controlled within a normal invasive species control program. Normally a single species, such as air-potato (*Dioscorea bulbifera*), is identified for removal using a specialized control treatment.

4.2.5 Broadcast glyphosate treatments

Broadcast treatments of glyphosate (Roundup and/or Rodeo) may be used along the edges of lawn areas to prevent the spread of lawn grasses and weeds into the adjacent natural communities.

In very special cases, broadcast glyphosate may be used to control small patches of low, dense invasive species such as Bermudagrass (*Cynodon dactylon*) or creeping wedelia (*Wedelia trilobata*).

4.3 **Control techniques by habit (life form)**

Table 4c lists the invasive plants recorded for Cape Florida by habit and indicates recommended control procedures for each taxon.

4.4 **Volunteer training and implementation**

Most volunteers can be trained to participate in search-and-destroy and hand-clean sweep operations which emphasize the hand-pulling and/or grubbing of one to a few taxa. Volunteers with significant experience and aptitude can be trained to conduct most hand-clean transects, although it must be recognized that hand-clean transect operations normally require significant plant identification skills.

Normally volunteers are not used to conduct Garlon transects, broadcast glyphosate treatments, or conduct herbicide treatments within search-and-destroy, hand-clean sweep, and hand-clean transect operations. These operations are normally conducted by one or more Park Biologist. However, volunteers can be trained to conduct these operations, and may be utilized if such training is received.

Following volunteer training, an invasive species control program should be implemented for each management unit as described herein and in Community Restoration Guidelines above.

4.5 **Record keeping**

An Exotic Control Data Sheet has been developed by American Littoral Society

and the Florida Park Service (Appendix D) and should be used to record volunteer invasive species control activities.

Table 4a. Exotic plant taxa recorded for Cape Florida ranked according to priority for control. (I) indicates that the taxon is ranked as a Category I species by the Florida Exotic Pest Plant Council (Florida EPPC) on their 1995 list of Florida's most invasive plant species (Florida EPPC 1995); (II) indicates that the taxon is ranked as a Category II species by Florida EPPC; (U) indicates a taxon of uncertain nativity.

Priority I. Taxa that are invading and disrupting native plant communities in south Florida. These taxa should be eradicated whenever encountered.

<i>Abrus precatorius</i> (I)	<i>Nephrolepis multiflora</i> (II)
<i>Casuarina litorea</i> (I)	<i>Neyraudia reynaudiana</i> (I)
<i>Calophyllum cf. calaba</i> (I)	<i>Panicum repens</i> (I,U)
<i>Cestrum diurnum</i> (I)	<i>Pennisetum purpureum</i> (I)
<i>Colubrina asiatica</i> (I)	<i>Psidium guajava</i> (I)
<i>Dioscorea bulbifera</i> (I)	<i>Pteris vittata</i>
<i>Epipremnum pinnatum</i> (II)	<i>Rhychelytrum repens</i> (II)
<i>Eugenia uniflora</i> (I)	<i>Ricinus communis</i>
<i>Ficus microcarpa</i> (I)	<i>Scaevola taccada</i> (I)
<i>Hibiscus tileaceus</i> (I)	<i>Schinus terebinthifolius</i> (I)
<i>Jasminum dichotomum</i> (I)	<i>Syngonium podophyllum</i> (II)
<i>Lantana camara</i> (I)	<i>Thespesia populnea</i> (I)
<i>Lantana camara</i> X <i>L. depressa</i> var. <i>floridana</i>	<i>Tradescantia spathacea</i> (I)
<i>Nephrolepis cordifolia</i> (I)	

Priority II. Taxa that have shown a potential to invade and disrupt native plant communities in south Florida, but which have not yet caused significant problems. These taxa should be controlled when conducting hand-clean transects or sweeps.

<i>Bauhinia</i> sp.	<i>Paspalum urvillei</i>
<i>Blechnum pyramidatum</i>	<i>Phoenix cf. reclinata</i>
<i>Bothriochloa pertusa</i> (U)	<i>Pithecellobium dulce</i>
<i>Brachiaria subquadriperpa</i>	<i>Pteris tripartita</i> (U)
<i>Carica papaya</i>	<i>Ptychosperma elegans</i>
<i>Citrus aurantifolia</i>	<i>Rottboellia cochinchinensis</i>
<i>Citrus aurantium</i>	<i>Russelia equisetiformis</i>
<i>Clusia rosea</i> (U)	<i>Sansevieria hyacinthoides</i> (II)
<i>Cocos nucifera</i>	<i>Sarcostemma clausum</i> (U)
<i>Crotalaria incana</i>	<i>Senna obtusifolia</i> (U)
<i>Cynodon dactylon</i>	<i>Senna occidentalis</i> (U)
<i>Dactyloctenium aegyptium</i>	<i>Solanum erianthum</i> (U)
<i>Eleusine indica</i>	<i>Solanum seafortianum</i>
<i>Gaillardia pulchella</i> (U)	<i>Sorghum halapense</i>
<i>Hylocereus undatus</i> (II)	<i>Sporobolus indicus</i> (U)
<i>Indigofera suffruticosa</i> (U)	<i>Sporobolus jacquemontii</i> (U)
<i>Kalanchoe cf. daigremontiana</i>	<i>Stenotaphrum secundatum</i> (U)
<i>Kalanchoe pinnata</i>	<i>Terminalia catappa</i> (II)
<i>Macroptilium lathyroides</i>	<i>Triumfetta semitriloba</i>
<i>Momordica charantia</i> (U)	<i>Urena lobata</i> (II)
<i>Morinda citrifolia</i>	<i>Wedelia trilobata</i> (II)
<i>Muntingia calabura</i>	<i>Xanthosoma</i> sp.
<i>Musa</i> X <i>paradisiaca</i>	
<i>Opuntia cochenillifera</i>	

Priority III. Taxa which primarily inhabit weedy areas or persist from cultivation. These taxa, however, may cause significant problems in coastal strand, and interdune swale restoration areas.

Acacia farnesiana (U)
Asclepias curassavica
Boehmeria diffusa (U)
Bucida bucerus X B. spinosa
Calyptracarpus vialis
Catharanthus roseus
Chamaesyce lasiocarpa (U)
Chamaesyce ophthalmica (U)
Chenopodium ambrosioides (U)
Commelina diffusa (U)
Cyperus esculentus
Cyperus rotundus
Desmodium tortuosum (U)
Desmodium triflorum (U)
Digitaria ciliaris (U)
Drymaria cordata (U)
Emilia fosbergii (U)
Emilia sonchifolia (U)
Euphorbia graminea
Fimbristylis cymosa ssp. spathacea (U)
Flaveria trinervia (U)
Helianthus annuus
Heliotropium curassavicum (U)
Heliotropium polyphyllum var.
leavenworthii (U)
Indigofera spicata
Kallstroemia maxima
Lolium perenne
Lycopersicon esculentum
Manilkara zapota
Melochia corchorifolium
Mirabilis jalapa
Oeceoclades maculata (I,U)
Oldenlandia corymbosa (U)
Oxalis corniculata (U)
Paspalum notatum (I)
Phyllanthus tenellus (U)
Portulaca oleracea (U)
Richardia grandiflora
Sonchus asper
Sonchus oleraceus
Spermacoce verticillata s.str.
Tribulus cistoides (II,U)
Tridax procumbens
Turnera ulmifolia
Verbena bonariensis
Yucca aloifolia (U)
Youngia japonica

Zeuxine strateumatica

Table 4b. Ruderal plant taxa recorded for Cape Florida.

<i>Andropogon glomeratus</i> var. <i>pumilus</i>	<i>Poinsettia heterophylla</i>
<i>Ambrosia artemisiifolia</i>	<i>Polypremum procumbens</i>
<i>Ampelopsis arborea</i>	<i>Ptilimnium capillaceum</i>
<i>Bidens alba</i> var. <i>radiata</i>	<i>Salvia occidentalis</i>
<i>Caesalpinia bonduc</i>	<i>Scoparia dulcis</i>
<i>Capraria biflora</i>	<i>Sida acuta</i>
<i>Cassia nictitans</i> var. <i>aspera</i>	<i>Sida rhombifolia</i>
<i>Cenchrus echinatus</i>	<i>Solanum americanum</i>
<i>Cenchrus incertus</i>	<i>Spermocoe assurgens</i>
<i>Chamaesyce blodgettii</i>	<i>Stylosanthes hamata</i>
<i>Chamaesyce hirta</i>	<i>Toxicodendron radicans</i>
<i>Chamaesyce hypericifolia</i>	<i>Typha latifolia</i>
<i>Chamaesyce maculata</i>	<i>Vigna luteola</i>
<i>Cissus sicyoides</i>	<i>Vitis rotundifolia</i>
<i>Conyza canadensis</i> var. <i>pusilla</i>	<i>Waltheria indica</i>
<i>Cyperus compressus</i>	
<i>Cyperus croceus</i>	
<i>Cyperus ligularis</i>	
<i>Cyperus polystachyos</i>	
<i>Cyperus surinamensis</i>	
<i>Dalbergia ecastophyllum</i>	
<i>Desmodium incanum</i>	
<i>Dichondra caroliniensis</i>	
<i>Eclipta prostrata</i>	
<i>Eragrostis ciliaris</i>	
<i>Erechtites hieracifolia</i>	
<i>Eupatorium capillifolium</i>	
<i>Eupatorium odoratum</i>	
<i>Gamochoeta falcata</i>	
<i>Heliotropium angiospermum</i>	
<i>Lepidium virginicum</i>	
<i>Ludwigia octovalvis</i>	
<i>Ipomoea alba</i>	
<i>Ipomoea hederifolia</i>	
<i>Ipomoea indica</i>	
<i>Ipomoea triloba</i>	
<i>Kyllinga brevifolia</i>	
<i>Malvastrum corchorifolium</i>	
<i>Melothria pendula</i>	
<i>Mentzelia floridana</i>	
<i>Panicum adpersum</i>	
<i>Parietaria floridana</i>	
<i>Parthenocissus quinquefolia</i>	
<i>Pectis glaucescens</i>	
<i>Pectis prostrata</i>	
<i>Phyla nodiflora</i>	
<i>Phyllanthus amarus</i>	
<i>Physalis angulata</i>	
<i>Pilea herniarioides</i>	
<i>Plantago virginica</i>	
<i>Pluchea caroliniensis</i>	
<i>Plumbago scandens</i>	
<i>Poinsettia cyathophora</i>	

Table 4c. Recommended control procedures for invasive plant taxa recorded for Cape Florida by habit.

Scientific Name ¹	Treatment Methods ²
TREES AND SHRUBS	
<i>Acacia farnesiana</i> (U)	G4b; Cu&G3As.
<i>Bauhinia</i> sp.	G4b; Cu&G3As.
<i>Bucida bucerus</i> X <i>B. spinosa</i>	Hp; Gr; G4b.
<i>Carica papaya</i>	Hp; G4b; Cu&G3As.
<i>Casuarina litorea</i>	Hp; G4b; Fr&G3A; Cu&G3As.
<i>Calophyllum</i> cf. <i>calaba</i>	Hp; G4b; Fr&G3A; Cu&G3As.
<i>Cestrum diurnum</i>	Hp; G4b; Cu&G3As.
<i>Citrus</i> spp.	Hp; G4b; Cu&G3As.
<i>Clusia rosea</i> (U)	Hp; G4b; Cu&G3As.
<i>Cocos nucifera</i>	Hp; Gr; Cu.
<i>Eugenia uniflora</i>	Hp; G4b; Cu&G3As.
<i>Ficus microcarpa</i>	Hp; G4b; Cu&G3As.
<i>Hibiscus tileaceus</i>	Hp; G4b; G3As.
<i>Lantana camara</i>	Hp; Gr; G4b; Cu&G3As.
<i>Lantana camara</i> X <i>L. depressa</i> var. <i>floridana</i>	Hp; Gr; G4b; Cu&G3As.
<i>Manilkara zapota</i>	Hp; G4b; Fr&G3A; Cu&G3As.
<i>Morinda citrifolia</i>	Hp; Gr.
<i>Muntingia calabura</i>	Hp; G4b; Cu&G3As.
<i>Musa</i> X <i>paradisiaca</i>	Gr; Cu&Ro.
<i>Opuntia cochenillifera</i>	Cu&Ba; Gr&Ba.
<i>Phoenix</i> spp.	Gr; Bu.
<i>Pithecellobium dulce</i>	Hp; G4b; Cu&G3As.
<i>Pluchea carolinensis</i> (R)	Hp; Gr; G4b; Cu&G4b; Cu&G3As.
<i>Psidium guajava</i>	Hp; G4b; Cu&G3As.
<i>Ptychosperma elegans</i>	Hp; Gr; Cu.
<i>Ricinus communis</i>	Hp; G4b; Cu&G3As.
<i>Scaevola taccada</i>	Hp; G4b; Cu&G3As.
<i>Senna obtusifolia</i> (U)	Hp; Gr.
<i>Senna occidentalis</i> (U)	Hp; Gr.
<i>Shinus terebinthifolius</i>	Hp; G4b; Cu&G3As.
<i>Solanum erianthum</i> (U)	Hp; Gr; G4b; Cu&G4As.
<i>Terminalia catappa</i>	Hp; G4b; Fr&G3A; Cu&G3As.
<i>Thespesia populnea</i>	Hp; G4b; Cu&G3As.

¹ (R) indicates a ruderal native taxon; (U) indicates a taxon of uncertain nativity.

² Bu=bud treatment with Garlon 3A or 4;

Cu=cut;

Cu&Ba=cut, bag and remove from site;

Cu&G3As=cut and Garlon 3A application to stump;

Cu&G4b=cut and Garlon 4 basal application;

Cu&Ro=cut and treat re-sprouts with broadcast glyphosate (Roundup ® or Rodeo ®).

Fr&G3A=frill (a technique similar to girdling) and G3A application to frilled area;

G4b=Garlon 4 basal application;

Gr=grub (dig up using a grubbing tool);

Hp=hand-pull;

Hp&Ba=hand-pull, bag, and remove from site;

Ro=broadcast glyphosate (Roundup ® or Rodeo ®).

VINES AND SCANDENT SHRUBS

<i>Abrus precatorius</i>	Hp; Cu&G4b; Cu&G3As.
<i>Ampelopsis arborea</i> (R)	Hp; Cu&G4b; Cu&G3As.
<i>Caesalpinia bonduc</i> (R)	Hp; Cu&G4b; Cu&G3As.
<i>Cissus sicyoides</i> (R)	Hp&Ba; Cu&Ba.
<i>Colubrina asiatica</i>	Hp; Cu&G4b; Cu&G3As.
<i>Dalbergia ecastophyllum</i> (R)	Cu&G4b; Cu&G3As.
<i>Dioscorea bulbifera</i>	Gr&Ba.
<i>Epipremnum pinnatum</i>	Hp&Ba; Cu&Ba.
<i>Hylocereus undatus</i>	Cu&Ba.
<i>Ipomoea alba</i> (R)	Hp; Cu&Hp; G4b; Cu&G3As.
<i>Ipomoea hederifolia</i> (R)	Hp; Cu&Hp.
<i>Ipomoea indica</i> (R)	Hp; Cu&Hp; G4b; Cu&G3As.
<i>Ipomoea triloba</i> (R)	Hp; Cu&Hp.
<i>Jasminum dichotomum</i>	Hp; Cu&G4b; Cu&G3As.
<i>Melothria pendula</i> (R)	Hp; Cu&Hp.
<i>Momordica charantia</i> (U)	Hp; Cu&Hp; Cu&Gr.
<i>Parthenocissus quinquefolia</i> (R)	Hp; G4b; Cu&G4b; Cu&G3As.
<i>Plumbago scandens</i> (R)	Hp; Gr; G4b; Cu&G4b; Cu&G3As.
<i>Sarcostemma clausum</i> (U)	Hp; Cu&Hp.
<i>Solanum seaforthianum</i>	Hp; Cu&Hp; Cu&Gr.
<i>Syngonium podophyllum</i>	Hp&Ba; Cu&Ba.
<i>Toxicodendron radicans</i> ssp. <i>radicans</i> (R)	G4b.
<i>Vigna luteola</i> (R)	Hp; Cu&Hp.
<i>Vitis rotundifolia</i> (R)	Hp; G4c&b; Cu&G3As.

GRAMINOIDS

<i>Andropogon glomeratus</i> var. <i>pumilis</i> (R)	Hp.
<i>Bothriochloa pertusa</i> (U)	Hp.
<i>Brachiaria subquadripara</i>	Hp.
<i>Cenchrus echinatus</i> (R)	Hp.
<i>Cenchrus incertus</i> (R)	Hp.
<i>Cynodon dactylon</i>	Ro.
<i>Cyperus compressus</i> (R)	Hp.
<i>Cyperus croceus</i> (R)	Hp.
<i>Cyperus esculentus</i>	Hp; Ro.
<i>Cyperus ligularis</i> (R)	Hp.
<i>Cyperus polystachyos</i> (R)	Hp.
<i>Cyperus rotundus</i>	Hp; Ro.
<i>Cyperus surinamensis</i> (R)	Hp.
<i>Dactyloctenium aegyptium</i>	Hp.
<i>Digitaria ciliaris</i> (U)	Hp.
<i>Eleusine indica</i>	Hp.
<i>Eragrostis ciliaris</i> (R)	Hp.
<i>Fimbristylis cymosa</i> ssp. <i>spathacea</i> (U)	Hp; Gr.
<i>Killingia brevifolia</i> (R)	Hp.
<i>Lolium perenne</i>	Hp.

<i>Neyraudia reynaudiana</i>	Hp; Gr; Cu&Ro.
<i>Panicum adspersum</i> (R)	Hp.
<i>Panicum dichotomiflorum</i> var. <i>bartowense</i> (R)	Hp.
<i>Panicum repens</i> (U)	Ro.
<i>Paspalum notatum</i>	Gr; Ro.
<i>Paspalum urvillei</i>	Hp; Gr.
<i>Pennisetum purpureum</i>	Hp; Gr; Cu&Ro.
<i>Rhynchelytrum repens</i>	Hp.
<i>Rottboellia cochinchinensis</i>	Hp.
<i>Sorghum halapense</i>	Hp.
<i>Sporobolus indicus</i> (U)	Hp; Gr.
<i>Sporobolus jacquemontii</i> (U)	Hp; Gr.
<i>Stenotaphrum secundatum</i> (U)	Hp; Ro.

FORBS

<i>Ambrosia artemisiifolia</i>	Hp.
<i>Ascepias curassavica</i>	Hp; Gr.
<i>Bidens alba</i> var. <i>radiata</i> (R)	Hp.
<i>Blechum pyramidatum</i>	Hp.
<i>Boehmeria diffusa</i> (U)	Hp.
<i>Calyptocarpus vialis</i>	Hp.
<i>Capraria biflora</i> (R)	Hp.
<i>Cassia nictitans</i> var. <i>aspera</i> (R)	Hp.
<i>Catharanthus roseus</i>	Hp.
<i>Chamaesyce blodgettii</i> (R)	Hp.
<i>Chamaesyce hirta</i> (R)	Hp.
<i>Chamaesyce hypericifolia</i> (R)	Hp.
<i>Chamaesyce lasiocarpa</i>	Hp.
<i>Chamaesyce maculata</i> (R)	Hp.
<i>Chamaesyce ophthalmica</i>	Hp.
<i>Commelina diffusa</i> (U)	Hp&Ba.
<i>Conyza canadensis</i> var. <i>pusilla</i>	Hp.
<i>Crotalaria incana</i>	Hp.
<i>Desmodium incanum</i> (R)	Hp.
<i>Desmodium tortuosum</i> (U)	Hp.
<i>Desmodium triflorum</i> (U)	Hp.
<i>Dichondra caroliniensis</i> (R)	Hp.
<i>Drymaria cordata</i> (U)	Hp.
<i>Eclipta prostrata</i> (R)	Hp.
<i>Emilia fosbergii</i> (U)	Hp.
<i>Emilia sonchifolia</i> (U)	Hp.
<i>Erechtites hieracifolia</i> (R)	Hp.
<i>Eupatorium capillifolium</i> (R)	Hp; Gr.
<i>Eupatorium odoratum</i> (R)	Hp; C&Gr.
<i>Euphorbia graminea</i>	Hp.
<i>Flaveria trinervia</i> (U)	Hp.
<i>Gaillardia pulchella</i> (U)	Hp&Ba.
<i>Gamochaeta falcata</i> (R)	Hp.
<i>Helianthus annuus</i>	Hp; Gr.
<i>Heliotropium angiospermum</i> (R)	Hp.
<i>Heliotropium curassavicum</i> (U)	Hp.

<i>Heliotropium polyphyllum</i>	Hp.
var. <i>leavenworthii</i> (U)	
<i>Indigofera spicata</i>	Gr.
<i>Indigofera suffruticosa</i> (U)	Hp; Gr.
<i>Kalanchoe</i> cf. <i>daigremontiana</i>	Hp&Ba.
<i>Kalanchoe pinnata</i>	Hp&Ba.
<i>Kallstroemia maxima</i>	Hp.
<i>Ludwigia octovalvis</i> (R)	Hp; Gr.
<i>Lycopersicon esculentum</i>	Hp.
<i>Macroptilium lathyroides</i>	Hp.
<i>Malvastrum corchorifolium</i> (R)	Hp.
<i>Melochia corchorifolium</i>	Hp.
<i>Mentzelia floridana</i> (R)	Hp.
<i>Mirabilis jalapa</i>	Hp.
<i>Nephrolepis cordifolia</i>	Hp&Ba.
<i>Nephrolepis multiflora</i>	Hp.
<i>Oeceoclades maculata</i> (U)	Hp&Ba.
<i>Oldenlandia corymbosa</i> (U)	Hp.
<i>Oxalis corniculata</i> (U)	Hp.
<i>Parietaria floridana</i> (R)	Hp.
<i>Pectis glaucescens</i> (R)	Hp.
<i>Pectis prostrata</i> (R)	Hp.
<i>Phyla nodiflora</i> (R)	Hp.
<i>Phyllanthus amarus</i> (R)	Hp.
<i>Phyllanthus tenellus</i>	Hp.
<i>Physalis angulata</i>	Hp.
var. <i>angulata</i> (R)	
<i>Pilea herniarioides</i> (R)	Hp.
<i>Plantago virginica</i> (R)	Hp.
<i>Poinsettia cyathophora</i> (R)	Hp.
<i>Poinsettia heterophylla</i> (R)	Hp.
<i>Polypremum procumbens</i> (R)	Hp.
<i>Portulaca oleracea</i> (U)	Hp&Ba.
<i>Pteris tripartita</i> (U)	Hp.
<i>Pteris vittata</i>	Hp.
<i>Ptilimnium capillaceum</i> (R)	Hp.
<i>Richardia grandiflora</i>	Hp.
<i>Russellia equisetiformis</i>	Hp&Ba.
<i>Salvia occidentalis</i> (R)	Hp.
<i>Sansevieria hyacinthoides</i>	Gr&Ba.
<i>Scoparia dulcis</i> (R)	Hp.
<i>Sida acuta</i> (R)	Hp.
<i>Sida rhombifolia</i> (R)	Hp.
<i>Solanum americanum</i> (R)	Hp.
<i>Sonchus asper</i>	Hp.
<i>Sonchus oleraceus</i>	Hp.
<i>Spermacoce assurgens</i> (R)	Hp.
<i>Spermacoce verticillata</i> s.str.	Hp.
<i>Stylosanthes hamata</i> (R)	Hp.
<i>Tradescantia spathacea</i>	Hp&Ba.
<i>Tribulus cistoides</i> (U)	Hp.
<i>Tridax procumbens</i>	Hp&Ba.

Turnera ulmifolia	Hp.
Typha latifolia (R)	Hp; Gr; Ro.
Urena lobata (U)	Hp.
Verbena bonariensis	Hp.
Waltheria indica (R)	Hp.
Wedelia trilobata	Hp; Ro.
Xanthosoma sp.	Gr&Ba.
Youngia japonica	Hp.
Yucca aloifolia (U)	Cu&Gr.
Zeuxine strateumatica	Ro.

5. NURSERY OPERATIONS

The Cape Florida native plant nursery is a critical component of the Cape Florida Project (Schroeder 1994; Anon. n.d.). Table 5a lists eighty-two species recommended for cultivation and provides propagation sources, propagation methods, and other information necessary for the successful cultivation of native plants to be used in the restoration program.

5.1 Identification of taxa to be cultivated

Table 5a lists all native plant taxa recommended for potential cultivation for the Cape Florida Project. All of these taxa have been previously recorded at Cape Florida, Key Biscayne, or the Upper Sandy Keys.

5.2 Collection of propagules

Propagules should be collected from Cape Florida or a nearby source in order to "protect local genetic diversity and utilize local adaptation" (The Nature Conservancy 1992). Care should be exercised to collect only those propagules necessary for the successful completion of the Cape Florida Project.

5.2.1 Identification of Collecting sites

Table 5a identifies potential collecting locations for each taxon. Before any collecting is done, it is critical to obtain written permission from the landowner. In the case of state-listed endangered or commercially exploited species, a permit from the Florida Department of Agriculture and Consumer Services will be required.

5.2.2 Collection of seeds

Seeds should only be collected when ripe. Some experience is required to be able to determine the ripeness of seeds. In general, it is best not to collect seeds from the ground. Dry seeds should be placed in paper bags; fleshy seeds should be placed in plastic bags. All seeds should be placed in a cool location for transportation back to the nursery.

5.2.3 Seed storage and preparation

In general, no fleshy seed should be stored more than one week after collection. Some seeds of temperate species, however, respond better if placed in cold storage for one to three months prior to planting; these taxa are identified in Table 5a.

In general, seeds must be separated from any surrounding material before planting. This can usually be accomplished by hand separation, by rubbing the fruit over a screen on a frame, by threshing, or with a food processor. Some species benefit from scarification in order to speed up or assist in germination.

5.2.4 Collection of cuttings

Cuttings should be collected in the morning, placed into a plastic bag, kept out of the sun in a cool place (preferably in a dry cooler), and transported back to the nursery for immediate planting. All cuttings should be made with a sharp, clean tool.

5.2.5 Collection of bare-root seedlings

Bare-root seedlings should be collected as young as possible, but after the development of a strong main stem. As with cuttings, they should be collected in the morning, placed in plastic bags, kept out of the sun in a cool place (preferably in a dry cooler), and transported back to the nursery for immediate planting.

5.3 Propagation

This section provides basic information on propagation methods. These methods, which are listed in Table 5a, vary depending on taxon type. While most taxa are relatively easy to propagate, others will require significant experience and skill.

5.3.1 Planting seeds

Seeds may be planted in community pots, and transplanted later, or planted directly into individual containers. Depth of the container should be sufficient enough to allow for proper development of the root system. This is usually deeper for trees and shrubs, and less so for graminoids and forbs. Soils should be similar to or the same as the substrate into which the propagule will be out-planted. In general, seeds should be planted at a depth of one to one and a half times the thickness of the seed. Seeded containers may need to be protected from predators such as birds, mice, etc.

5.3.2 Planting cuttings

Cuttings should be placed into appropriate containers and most should be placed into the shade house until rooted; other species, especially those susceptible to fungal attacks, should be started under a plastic cover in the shade house, or in full sun. As above, soils should be similar to or the same as the substrate into which the propagule will be out-planted. Some species benefit from treatment with a rooting hormone and are so indicated in Table 5a. When using a rooting hormone, make sure to use concentrations consistent with the label; too high a concentration of hormone can cause bark rot.

5.3.3 Planting bare-root seedlings

Bare-root seedlings should be placed one to three per container, hand watered with a breaker nozzle, and placed in the shade house until stabilized (usually 2-4 weeks). Sufficient water during the stabilization stage is crucial to the survival of bare-root seedlings. After stabilization, they should then be moved into the sun for further growth and development.

5.3.4 Other propagation methods

Other propagation methods such as air-layering and marcotting should be attempted only if both trained staff and proper facilities are available. Few species identified for cultivation, however, require these advanced procedures.

5.4 **Cultivation**

Cultivation is the process of caring for propagated plants within the nursery setting. Below, basic cultivation practices are discussed.

5.4.1 Irrigation

Irrigation is crucial to the successful cultivation of plants. However, plants require relatively specific quantities of water and may be damaged by too little, or too much irrigation. In general, very young plants and plants with crowded root systems are more susceptible to damage from improper irrigation. Very young plants are often damaged by over watering, and plants with crowded root systems are most often damaged by under watering.

Water need is determined by a variety of factors including: container size, type of leaf structure (succulent, hairy, etc), type of root system, amount of air movement between plants, air temperature, humidity, etc. In general, plants are damaged more frequently by over watering than by under watering. Over watering can lead to root rot, and fungal attacks, both of which can lead to rapid death.

Watering should be conducted during the late afternoon or early evening, or during the early morning. If fungal attacks are a problem, then early morning watering is recommended. Water should be applied daily until it runs out the bottom of the pots, and then stopped. Periodic inspections should be conducted to ensure that the holes in the bottom of containers are not plugged, thus allowing water to accumulate in the pots.

5.4.2 Weeding

All containers and the nursery grounds should be kept free of weeds. In general, tables should be hand weeded at least once per week. The remainder of the facility should be weeded at least once per month. Weeding requirements for one gallon and larger containers can be reduced through the use of pre-emergent herbicides.

5.4.3 Fertilizing

In general, native plants will respond favorably to fertilizers which have been formulated for local use on palms because they contain minor and secondary elements needed for proper plant growth. Fertilizer should be incorporated into the soil when transplanting occurs, or top-dressed after seeds, cuttings, and bare-root seedlings have

become established. Top dressing should follow as needed according to the manufacturer's specification. Fertilizer can be depleted at an excessive rate during hot, wet periods of weather. Fertilization through the irrigation system is not recommended due to its role in promoting excessive weed growth.

5.4.4 Transplanting

Plants should be transplanted from community pots or small containers to larger containers or out-planted as soon as the roots fill out the container and before they become restricted, twisted, or otherwise damaged. Special concern should be given to trees with well-developed tap roots; damage to tap roots can cause irreparable damage to the tree. Soils should be similar to or the same as the soils into which the plant will be out-planted.

5.4.5 Pest and Disease Control

Most native plants are fairly disease resistant so long as good cultural practices are followed. Most important of these are:

(1) keep plants well-spaced so that air can freely circulate around each individual plant; and,

(2) don't over water --- over watering causes a multiplicity of problems including fungal attacks.

Plants susceptible to fungal attacks should be grown in full sun and may benefit from irrigation with salt or brackish water.

Finally, An Integrated Pest Management (IPM) program should be developed as soon as possible to deal with disease and pest problems which may affect the nursery operation, including fungal attacks, snail herbivory, etc.

5.4.6 Spacing.

Plants should be spaced so that air can freely circulate between each individual plant. Plants are usually grouped together according to container size, as well as light and water requirements. In general, plants can be placed relatively close together when they are young, but must be spread apart as they mature.

5.5 **Preparing Plants for Out-planting**

Plants grown in a nursery need to be hardened off in preparation for out-planting. This can be accomplished by ensuring that plants are grown in the full sun for at least two weeks before out-planting.

5.6 Volunteer training and program implementation

Volunteers can be trained in virtually every aspect of nursery operations, from the collection of propagules, through propagation and cultivation.

5.7 Record keeping

Preliminary record keeping procedures have been developed (Anon., n.d.) and are being currently being re-designed by Florida Park Service staff (E. Carter, pers. comm.).

Scientific Name	Source	Type	Season	Treatment	Time	Propagation container size	Out-plant container size
<i>Bursera simaruba</i>	R	S ¹⁰	Sp,Su	C&S	3-6w	T	T
<i>Byrsonima lucida</i>	K	S	Su,F	C&S	4-8w	T	T,1g
<i>Callicarpa americana</i>	R	S	F	C&St ¹¹	3-6w	C,T	T,1g
<i>Chrysobalanus icaco</i>	K	C ¹²	Su,F	R	4-8w	3 ¹³	1g
<i>Citharexylum fruticosum</i> (d)	R	S	A	C&S	3-6w	T	T
<i>Coccoloba diversifolia</i> (d)	R	S	F,W	C&S	4-8w	T	T,3g
<i>Conocarpus erecta</i> cv. Green (d) ¹³	K	S	A	C&S	3-6w	T	T,3g
<i>Crossopetalum rhacoma</i>	R	S	A	C&S	4-8w	T	T,1g
<i>Diospyros virginiana</i> (d)	R	S	Su,F	?	?	T	T,3g
<i>Erithalis fruticosa</i>	R	S	A	C&Sf	2-4w	T	T,1g
<i>Erythrina herbacea</i>	R	S ¹⁴	Sp,Su	C&S ¹⁵	4-8w	T	T
<i>Eugenia axillaris</i>	R	S ¹⁶	Su,F	C&Ss	6-10w	T	T,1g

¹⁰ Although *Bursera simaruba* can be easily propagated by stem cuttings, this practice is discouraged due to poor root development.

¹¹ Store in refrigerator during the winter and sow in spring.

¹² There appear to be several ecotypes of this species, and lineage strongly influences survivorship and health of progeny. Cuttings should be taken from parent plants growing in the community into which the propagules will be translocated. Cuttings must be of semi-hard wood (intermediate between green and mature wood).

¹³ This species have been divided into two varieties based on the amount of hairs on the leaves. This characteristic, however, does not hold from seed.

Regardless, the plants from Key Biscayne and northward appear to be mostly those without hairs on the leaves. Seeds, therefore, should be collected from parent trees without hairs on the leaves.

¹⁴ Although *E. herbacea* can be propagated by cuttings, this practice should be discouraged due to poor root development.

¹⁵ Can be stored for years in a dry place.

Scientific Name	Source	Type	Season	Treatment	Time	Propagation container size	Out-plant container size
<i>Eugenia foetida</i>	R	S ¹⁷	Su,F	C&Ss	8-12w	T	T,1g
<i>Exothea paniculata</i> (d)	R	B ¹⁸	Sp-Su	-	4-8w	T	T
<i>Ficus aurea</i>	R	S	Su	C&S ¹⁹	3-6w	T	T
<i>Forestiera segregata</i> var. <i>segregata</i> (d)	K	S	W,Su	C&S	3-6w	T	T,1g
<i>Gymnanthes lucida</i>	K	S	Su-F	C&S	3-6w	T	T,1g,3g
<i>Krugiodendron ferreum</i>	K	S	Su,F	C&S	3-6w	T	T,1g
<i>Laguncularia racemosa</i> (d)	R	S	Su,F	S	2-4w	T	T
<i>Lycium carolinianum</i>	R	S	W	C&Sf	4-8w	T	T
<i>Morus rubra</i>	R	C ²⁰	S,F	R	8-12w	1g ²¹	1g
<i>Myrica cerifera</i> (d)	K	S	F,W	C&St ²²	4-8w	T	T
<i>Myrsine floridana</i>	R	S ²³	not W	C&S	4-8w	T	T,1g
<i>Ocotea coriacea</i>	R	S	F,W	C&S	4-8w	T	T,1g

¹⁶ Seeds of *E. axillaris* should be picked as soon as fully ripe. Avoid picking after dried on parent trees; however, the seed coat will harden if you wait until they are dry and this will make the process of cleaning the seeds more difficult.

¹⁷ Seeds of *E. foetida* should be treated the same as those of *E. axillaris*.

¹⁸ Collect bare-root seedlings and some leaf litter from underneath parent tree; mix leaf litter into soil bare root seedlings will be planted in.

¹⁹ Fruits of *Ficus aurea* should be placed in a blender with water. Grind and pour liquid off; the viable seeds will be on the bottom.

²⁰ Cuttings should be stem cuttings about 4-5" long from wood more than one year old; all leaves should be removed.

²¹ Six to a pot.

²² Clean and place in refrigerator. Plant in spring.

²³ Pick as soon as seeds are ripe; don't pick when dried on parent plant.

Scientific Name	Source	Type	Season	Treatment	Time	Propagation container size	Out-plant container size
<i>Pinus elliottii</i> var. <i>densa</i>	R	S	Sp	S	4-8w	T	T,3g
<i>Psychotria nervosa</i>	R	B	F,W	-	-	T	T,1g
<i>Randia aculeata</i>	R	S	not Sp	C&S	3-6w	T	T,1g
<i>Reynosa septentrionalis</i>	K	S	Sp,Su	C&S	6-12w	T	T,1g
<i>Rhizophora mangle</i>	R	S	Su,F	S	-	D	D
<i>Rhus copallina</i> var. <i>leucantha</i> (d)	K	S	F	C&Sf	3-6w	T	T,1g
<i>Sambucus simpsonii</i>	R	S	A	C&S	3-6w	T	T,1g
<i>Sapindus saponaria</i>	R	S	Su,F	C&S	6-12w	T	T
<i>Sideroxylon foetidissimum</i>	K	S	W,Sp	C&Ss	6-12w	T	T,3g
<i>Sideroxylon salicifolia</i>	R	B	F	-	-	T	T,3g
<i>Simarouba glauca</i> (d)	K	S	Sp,Su	C&S	3-6w	T	T
<i>Ximenea americana</i>	R	S	A	C&S	?	T	T,1g ²⁴
<i>Zanthoxylum clava-herculis</i>	K	S	F,W	C&S	4-8w	T	T,1g
<i>Zanthoxylum coriaccum</i>	K	S	Su,F	?	?	T	T,1g
PALMS							
<i>Coccothrinax argentata</i>	C	S	Su,F	C&S	8-14w	T	T,1g
<i>Serenoa repens</i>	R	S	F	C&S ²⁵	8-26w	T,D	T,D

²⁴ Parasitic on roots; should be out-planted as soon as possible.

Scientific Name	Source	Type	Season	Treatment	Time	Propagation container size	Out-plant container size
VINES AND SCANDENT SHRUBS							
<i>Echites umbellata</i>	K	S	A	C&Sf	?	T	T
<i>Pentalinon luteum</i>	K	S	Su,F	C&S	?	T	T
GRAMINOIDS							
<i>Cladium jamaicense</i>	N	S	Su,F	C&S	4-8w	T	T
<i>Dichantheium aciculare</i>	K	S	A	C&S	2-8w	T	T
<i>Distichlis spicata</i> (d)	K	S	Su-F	C&S	2-8w	3"	3"
<i>Eragrostis eliottii</i>	C	S	Su,F	C&S	2-8w	T	T
<i>Eustachys petraea</i>	C	S	A	C&S	4-8w	T	T
<i>Fimbristylis caroliniana</i>	K	S	F	C&S	2-8w	3"	3"
<i>Fimbristylis castanea</i>	K	S	Su-F	C&S	2-8w	3"	3"
<i>Muhlenbergia capillaris</i>	N	S	F,W	C&S	2-8w	T	T
<i>Panicum virgatum</i>	K	S	Su-F	C&S	2-8w	T	T
<i>Paspalum caespitosum</i> s.str.	C	S	Su,F	C&S	2-8w	T	T
<i>Paspalum setaceum</i> var. <i>ciliatifolia</i>	C	S	A	C&S	2-8w	T	T
<i>Paspalum vaginatum</i>	C	S	F	C&S	2-8w	3"	3"

²⁵ An alternate approach is to clean, dry for 3-4 weeks and then sow (Aron., n.d.).

Scientific Name	Source	Type	Season	Treatment	Time	Propagation container size	Out-plant container size
<i>Setaria geniculata</i>	C	S	A	C&S	2-8w	T	T
<i>Spartina patens</i>	C	S	Su,F	C&S	2-8w	3"	3"
<i>Spartina spartinae</i>	K	S	Su,F	C&S	2-8w	3"	3"
<i>Sporobolus virginicus</i>	K	S	A	C&S	2-8w	3"	3"
FORBS & WOODY GROUNDCOVERS							
<i>Acrostichum aureum</i>	K	Sp	A	S ²⁶	12-16w+	F	3",1g
<i>Acrostichum danacifolium</i>	K	Sp	A	S ²⁷	12-16w+	F	3",1g
<i>Blechnum serrulatum</i>	K	Sp	A	S ²⁸	12-16w+	F	3",1g
<i>Borrchia frutescens</i>	C	C	not W	-	4-8w	3"	3",1g
<i>Capsicum annuum</i> var. <i>glabriusculum</i>	R	S	A	C&Sf	3-6w	T	T
<i>Glandularia maritima</i>	N	C	not W	Rf	2-4w	3"	1g
<i>Hypericum tetrapetalum</i>	N	?	?	?	?	3"	3"
<i>Jacquemontia reclinata</i>	K	?	?	?	?	?	?
<i>Juncus megacephalus</i>	N	S	Su-F	C&S	2-8w	3"	3"
<i>Licania michauxii</i>	K	S	?	C&S	12-26w+	D	D

²⁶ Set a flat of soil on a table in the shade house in 30% shade; lay a mature fertile frond on soil, fertile side down; keep moist; wait. For more complete instructions on fern propagation see Hoshizaki (1975).

²⁷ Treat the same as *A. aureum*.

²⁸ Treat the same as *Acrostichum aureum*.

Scientific Name	Source	Type	Season	Treatment	Time	Propagation container size	Out-plant container size
<i>Nephrolepis biserrata</i>	K	R ²⁹	not W	-	4-6w	1g	1g
<i>Opuntia humifusa</i> var. <i>austrina</i>	K	P	not W	-	4-6w	D	D
<i>Osmunda regalis</i> var. <i>spectabilis</i>	N	Sp	A	S ³⁰	12-16w	F	1g
<i>Pteris bahamensis</i>	N	Sp	A	S ³¹	12-16w	F	1g
<i>Salicornia virginica</i>	N	C	not W	-	?	3"	3"
<i>Solidago sempervirens</i> var. <i>mexicana</i>	C	S	F,W	C&S	3-6w	T	T
<i>Solidago stricta</i>	C	S	F,W	C&S	3-6w	T	T
<i>Zamia integrifolia</i>	K	S	F,W	C&Ss	12-26w	D	D

²⁹ See Hoshizaki (1975) for methods of propagating ferns from rhizomes.

³⁰ Treat the same as *Acrostichum aureum*.

³¹ Treat the same as *Acrostichum aureum*.

6. OUT-PLANTING

The out-planting of native plants will be critical to the success of the Cape Florida Project. This is especially true for coastal strand and mesic flatwoods, which have received little attention during prior parts of the project.

Two tables have been written to help facilitate this effort. Table 6a provides maximum recommended out-planting densities by habit (life form) for each natural community. Table 6b provides a list of native plant taxa recommended for out-planting with the highest recommended planting densities for each taxon by community type.

6.1 Out-planting in uplands

The bulk of the out-planting will be conducted in upland natural communities. In these communities, it is essential to install plants properly, and to give them sufficient water. Below, the basics of out-planting are presented.

6.1.1 Site preparation

The preferred method of site preparation is to conduct an invasive species control treatment of the planting area immediately prior to out-planting. As stated in Invasive Species Control, any mulch or organic debris should be removed prior to out-planting in coastal strand and mesic flatwoods communities.

6.1.2 Preparing the planting hole

Planting holes may be dug with a mechanical auger or by hand. In either case, make sure that the plant will fit comfortably within the planting hole, and that the plant is nearly level with the surrounding ground surface. Plants grown in relatively small containers (less than a one gallon) are often planted just below the ground surface to help avoid desiccation. Regardless, the planting hole should not be significantly larger than the root ball of the plant to be installed. Material excavated from the planting hole should be used as back fill; no soil amendments should be placed in or around the planting hole.

6.1.3 Placing the plant

Once the plant is placed into the planting hole, place half of the back fill in the hole and use a garden hose to water in the back fill, thus eliminating air pockets under and around the plant. Once this water has drained away, place the remaining back fill in the hole and again use a garden hose to flush out any remaining air pockets. During this process, use a shovel (or your hands) to lightly (not firmly) pack in the back fill around the plant. Finally, level out the planting surface so that it grades smoothly into the surrounding terrain. Plants grown in relatively small containers (less than a one gallon) are usually planted in a single operation and then watered in.

If watering is not possible, plant only when the soils are moist, such as after a heavy rain.

6.1.4 Mulching

Mulching is recommended only in the maritime hammock community where a 3-6 inch top dressing of hardwood mulch or chips should be applied. When applying mulch, make sure not to cover the trunks of the installed plants as this can cause bark rot and kill or damage the tree.

In general, a second mulching will not be required. However, in some cases, the mulch may be too thin or may oxidize (decompose) relatively quickly and a complete or partial re-mulching may be required.

6.1.5 Irrigation

Long-term survivorship of installed plants will be significantly enhanced with irrigation. In general, each watering should be equivalent to one inch of rainfall. During the first two weeks after installation water once per day, during the next two weeks water every other day, during the next four weeks water twice per week, and during the next four weeks water once per week. If field grown materials are installed, water them at least once per month for the following year; additional watering may be necessary during hot, dry periods during the spring and summer.

6.2 **Out-planting in wetlands**

Out-planting in wetlands is a fairly straight forward procedure. If planting in tidal wetlands, organize the out-planting so that the plants can be installed during the low tide. If planting in isolated wetlands, out-planting should occur during the drier times of the year. It is better to install wetland plants in areas slightly drier than what they are adapted to, than to plant them in areas that are too wet. In either case, anchoring is the key to success. Make sure when installing the plant to bury the plant slightly below grade, so that the top of the root ball can be covered with mud or sand.

6.3 **Volunteer training and implementation**

Volunteers can be easily trained to participate in out-planting activities. A Park Biologist or highly trained volunteer should select the plant materials to be installed and to supervise layout. Trained volunteers can conduct most other activities.

6.4 **Record Keeping**

Currently, all plants installed at Cape Florida are being recorded with a GIS system, including GPS coordinated. It is unknown if this system will be used in the future at Cape Florida and an alternative approach may need to be developed.

Table 6a. Maximum out-planting densities (units/100 square feet) for each natural community type by habit.

Habit Type	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetlands
Trees and shrubs	-	-	1	4	12	-	4
Palms	-	6	5	-	-	-	4
Vines and scandent shrubs	-	-	-	-	-	-	-
Graminoids	-	45	45	-	25	45	45
Forbs	-	4	4	-	-	10	12
Total	-	45	45	4	37	45	45

Table 6b. Native plant taxa recommended for out-planting at Cape Florida with highest recommended planting densities (units/100 sq. ft.) for each natural community type. Dash indicates none; augment pop. indicates that additional plants may be added to an existing population; establish pop. indicates that a population may be established within an area which has been stabilized.

Scientific Name ¹	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetlands
TREES AND SHRUBS							
<i>Annona glabra</i>	-	-	-	-	-	-	1
<i>Ardisia escallonioides</i>	-	-	-	1	-	-	-
<i>Argusia gnaphalodes</i>	augment pop.	-	-	-	-	-	-
<i>Baccharis angustifolia</i>	-	-	-	-	-	1	1
<i>Batis maritima</i>	-	-	-	-	100	50	-
<i>Bourreria ovata</i>	-	-	-	1	-	-	-
<i>Bursera simaruba</i>	-	-	-	1	-	-	-
<i>Byrsonima lucida</i>	-	-	-	1	-	-	-
<i>Callicarpa americana</i>	-	-	-	1	-	-	-
<i>Chrysobalanus icaco</i>	-	-	-	1	-	-	4
<i>Citharexylum fruticosum</i>	-	-	-	1	-	-	-
<i>Coccoloba diversifolia</i>	-	-	-	1	-	-	-
<i>Conocarpus erecta</i> cv. Green	-	-	-	-	1	-	-
<i>Crossopetalum rhacoma</i>	-	establish pop.	-	1	-	-	-
<i>Diospyros virginiana</i>	-	-	-	1	-	-	-
<i>Erithalis fruticosa</i>	-	-	1	-	-	-	-
<i>Erythrina herbacea</i>	-	establish pop.	-	1	-	-	-
<i>Eugenia axillaris</i>	-	-	-	1	-	-	-
<i>Eugenia foetida</i>	-	-	-	1	-	-	-
<i>Exothea paniculata</i>	-	-	-	1	-	-	-

¹ (I) indicates a taxon which represent an introduction or re-introduction at Cape Florida. These taxa have been recorded for Key Biscayne or the Upper Sandy Keys (Key Biscayne and Virginia Key) but not for Cape Florida.

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetlands
<i>Ficus aurea</i>	-	-	-	1	-	-	-
<i>Forestiera segregata</i> var. <i>segregata</i>	-	-	-	1	-	-	-
<i>Gymnanthes lucida</i>	-	-	-	1	-	-	-
<i>Krugiodendron ferreum</i>	-	-	-	1	-	-	-
<i>Laguncularia racemosa</i>	-	-	-	-	10	-	-
<i>Lycium carolinianum</i>	-	-	-	-	-	1	-
<i>Morus rubra</i>	-	-	-	1	-	-	-
<i>Myrica cerifera</i>	-	-	-	1	-	-	1
<i>Myrsine floridana</i>	-	-	-	1	-	-	-
<i>Ocotea coriacea</i>	-	-	-	1	-	-	-
<i>Pinus elliottii</i> var. <i>densa</i>	-	-	1	-	-	-	-
<i>Psychotria nervosa</i>	-	-	-	1	-	-	-
<i>Randia aculeata</i>	-	-	-	1	-	-	-
<i>Reynosia septentrionalis</i>	-	-	-	establish pop.	-	-	-
<i>Rhizophora mangle</i>	-	-	-	-	50	-	-
<i>Rhus copallina</i> var. <i>leucantha</i>	-	-	1	-	-	-	-
<i>Sambucus simpsonii</i>	-	-	-	-	-	-	1
<i>Sapindus saponaria</i>	-	-	-	1	-	-	-
<i>Sideroxylon foetidissimum</i>	-	-	-	1	-	-	-
<i>Sideroxylon salicifolia</i>	-	-	-	1	-	-	-
<i>Simarouba glauca</i>	-	-	-	1	-	-	-
<i>Ximenia americana</i>	-	establ. pop.	-	-	-	-	-
<i>Zanthoxylum clava-herculis</i>	-	establ. pop.	-	-	-	-	-
<i>Zanthoxylum coriaceum</i>	-	establ. pop.	-	-	-	-	-

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetlands
PALMS							
<i>Coccothrinax argentata</i>	-	-	0.5	0.5	-	-	-
<i>Serenoa repens</i>	-	5	4	-	-	-	4 ²
VINES AND SCANDENT SHRUBS							
<i>Echites umbellata</i>	-	establ. pop.	establ. pop.	-	-	-	-
<i>Pentalinon luteum</i>	-	-	-	establ. pop.	establ. pop.	-	-
GRAMINOIDS							
<i>Cladium jamaicense</i>	-	-	-	-	-	-	100
<i>Dichantherium aciculare</i>	-	10	10	-	-	-	-
<i>Distichlis spicata</i>	-	-	-	-	-	50	-
<i>Eragrostis elliottii</i>	-	10	10	-	-	-	10
<i>Eustachys petraea</i>	-	10	10	-	-	-	10
<i>Fimbristylis caroliniana</i>	-	-	-	-	-	10	-
<i>Fimbristylis castanea</i>	-	-	-	-	-	10	-
<i>Muhlenbergia capillaris</i>							
<i>Panicum virgatum</i>	-	establ. pop.	establ. pop.	-	-	-	-
<i>Paspalum caespitosum s.str.</i>	-	10	10	-	-	-	-
<i>Paspalum setaceum var. ciliatifolia</i>	-	1	1	-	-	-	-
<i>Paspalum vaginatum</i>	-	-	-	-	-	10	-
<i>Setaria geniculata</i>	-	5	5	-	-	-	-
<i>Spartina patens</i>	-	-	-	-	-	10	-
<i>Spartina spartinae</i>	-	-	-	-	-	5	-
<i>Sporobolus virginicus</i>	-	-	-	-	-	5	-
FORBS & WOODY GROUNDCOVERS							

² Plant along upland edges, not in areas which are regularly inundated.

Scientific Name	Beach Dune	Coastal Strand	Mesic Flatwoods	Maritime Hammock	Tidal Swamp	Tidal Marsh	Isolated Wetlands
<i>Acrosticum aureum</i>	-	-	-	-	-	establ. pop.	-
<i>Acrostichum danaeifolium</i>	-	-	-	-	-	-	1
<i>Blechnum serrulatum</i>	-	-	-	-	-	-	10
<i>Borrichia frutescens</i>	-	-	-	-	-	5	-
<i>Capsicum annum var. glabriusculum</i>	-	-	-	establ. pop.	-	-	-
<i>Glandularia maritima</i>	-	-	1	1	-	-	-
<i>Hypericum tetrapetalum</i>	-	-	-	-	-	-	5
<i>Jacquemontia reclinata</i>	establ. pop.	establ. pop.	-	-	-	-	-
<i>Juncus megacephalus</i>	-	-	-	-	-	-	5
<i>Licania michauxii</i>	-	1	1	-	-	-	-
<i>Nephrolepis biserrata</i>	-	-	-	establ. pop.	-	-	-
<i>Opuntia humifusa var. austrina</i>	-	-	establ. pop.	-	-	-	-
<i>Osmunda regalis var. spectabilis</i>	-	-	-	-	-	-	establ. pop.
<i>Pteris bahamensis</i>	-	establ. pop.	establ. pop.	-	-	-	-
<i>Salicornia virginica</i>	-	-	-	-	-	5	-
<i>Solidago sempervirens var. mexicana</i>	-	1	1	-	-	-	1
<i>Solidago stricta</i>	-	1	1	-	-	-	1
<i>Zamia integrifolia</i>	-	1	1	-	-	-	-

7. PROTECTION AND ENHANCEMENT OF RARE PLANTS

Twenty-eight plant taxa recorded for Cape Florida are listed by the Florida Natural Areas Inventory (FNAI), the Florida Department of Agriculture and Consumer Services (FDACS), or the United States Fish and Wildlife Service (USFWS). An additional fifteen taxa which have been recorded for Key Biscayne or the Upper Sandy Keys are likewise listed. Listed plant taxa range from relatively common, commercially-exploited species, such as royal fern (*Osmunda regalis* var. *spectabilis*), to the extremely rare and globally imperiled east coast lantana (*Lantana depressa* var. *floridana*). This section has been written to facilitate the protection and enhancement of rare plants as part of the overall ecological restoration program.

The rare plant taxa known from Cape Florida, Key Biscayne and/or the Upper Sandy Keys are ranked below according to degree of rarity. Agency rankings for each taxon are listed below; rankings by FNAI are from a March 1994 computer printout; rankings from FDACS and USFWS are from Coile (1993). The following sections review and develop recommended procedures for the management of each taxon.

7.1 Priority A Taxa

Priority A taxa are taxa that are considered by FNAI to be imperiled or critically imperiled in the state. These taxa should receive the highest level of management concern. Under no circumstances should extirpations of natural populations of these taxa be allowed to occur. When needed and appropriate, efforts should be made to augment existing populations. Extirpated taxa should be strongly considered for re-introduction.

***Byrsonima lucida* (locustberry).**

This shrub was recorded for Key Biscayne by Goodwin (Goodwin in Schroeder 1995). In south Florida, locustberry is typically found in pinelands and in open hammocks or hammock edges in Dade County and the Florida Keys. It may have been present at Cape Florida prior to massive disturbance. Locustberry is listed as imperiled by FNAI; it is listed as endangered by FDACS; it is not listed by USFWS.

The restoration of coastal strand, mesic flatwoods, and maritime hammock will create new habitats for this species and its introduction should be considered. However, due to apparent genetic differences in populations, propagules should be collected only from Key Biscayne.

***Chamaesyce porteriana* var. *scoparia* (Porter's broom spurge).**

This endemic herb was recorded for Key Biscayne by MacAllister (1938). Other than one specimen assigned to this taxon from Big Cypress National Preserve, this taxon is known only from the Florida Keys (Avery & Loope 1980). This may represent a

misidentification. Porter's broom spurge is listed as imperiled by FNAI; the species taxon is listed as endangered by FDACS; it is not listed by USFWS.

No action should be taken concerning this taxon until material at the Duke University herbarium can be examined.

Coccothrinax argentata (silver palm).

This small palm grows in the coastal strand at Cape Florida. In south Florida, silver palm is typically found growing in open pinelands from Broward County to the Florida Keys, although it is occasionally found growing in coastal strand and in open maritime hammocks. Silver palm is listed as imperiled by FNAI; it is listed as commercially exploited by FDACS; it is not listed by USFWS.

The restoration of significant areas of coastal strand and mesic flatwoods will create additional habitats for this species, and an augmentation of this population should be considered.

Cordia sebestena (geiger tree).

This small tree is historically known from Key Biscayne (MacAllister 1938) and has been out-planted as part of the restoration process. However, the nativity of geiger tree is uncertain, and it appears to be introduced and naturalized (Little 1978). Geiger trees is listed as imperiled by FNAI; it is listed as endangered by FDACS; it is not listed by USFWS.

This taxon should be limited to the cultural area or removed from park.

Crossopetalum rhacoma (rhacoma).

This small shrub has been recently out-planted at Cape Florida as part of the restoration process. Previously, it had been unknown at the park, but had been recorded at Crandon Park (Fairchild Tropical Garden 1991). In southeastern Florida, rhacoma is found growing in open pinelands, on hammock edges, and in coastal strand. Rhacoma is listed as imperiled by FNAI; it is listed as endangered by FDACS; it is not listed by USFWS.

A small population of rhacoma should be established as part of the restoration process within coastal strand and mesic flatwoods communities.

Cyrtopodium punctatum (cowhorn orchid).

This epiphytic orchid was noted at Cape Florida growing in mangroves along Pines Canal (R. Hammer, pers. comm.). This population has not been seen since

Hurricane Andrew and it is thought to be extirpated within the park. Cowhorn orchid is listed as critically imperiled by FNAI; it is listed as endangered by FDACS; it is not listed by USFWS.

The restoration of significant areas of tidal swamp will provide an opportunity to re-introduce this orchid to the park and to establish a viable population.

Glandularia maritima (= *Verbena maritima*; beach verbena).

This prostrate herb was recorded for the Upper Sandy Keys by Small (1913) and for Key Biscayne by MacAllister (1938). It has not been recorded in recent years at either Cape Florida or Crandon Park and is now thought to be extirpated on Key Biscayne. In southeastern Florida, beach verbena is found growing in open pinelands, on beach dunes and in coastal strands. It was probably present at Cape Florida prior to massive disturbance. Beach verbena is listed as imperiled by FNAI; it is listed as endangered by FDA; it is not listed by USFWS.

The re-introduction of beach verbena on the beach dune at Cape Florida should be seriously considered. The restoration of significant areas of coastal strand and mesic flatwoods will also create new habitats for this species, and it should be considered for re-introduction there.

Jacquemontia reclinata (beach jacquemontia).

This endemic herb is presently unknown at Cape Florida, but has been recorded at Crandon Park (Fairchild Tropical Garden 1991). In southeastern Florida beach jacquemontia is found on the leeward side of beach dunes, and in open areas of coastal strand. It was probably present at Cape Florida prior to massive disturbance. Beach jacquemontia is listed as critically imperiled by FNAI; it is listed as endangered by FDACS; it is listed as endangered by USFWS.

The re-introduction of beach jacquemontia should be seriously considered. In addition, the restoration of coastal strand may provide additional habitat for this species and it may be appropriate to re-introduce it there.

Lantana depressa var. **floridana** (= *L. ovatifolia* auct., non Britt.; east coast lantana).

This endemic shrub is historically known from coastal strand at Cape Florida, but is in immediate danger of extirpation at Cape Florida due to hybridization with the exotic *L. camara*. During a recent site visit most plants referable to *L. depressa* var. *florida* appeared to be hybrids (G. Gann & K. Bradley, pers. obs., 1995). East coast lantana is listed as imperiled by FNAI; the species taxon is listed by FDACS; it is not listed by USFWS.

Immediate action needs to be taken if east coast lantana is to survive at Cape Florida. A survey should be conducted as soon as possible to determine exactly how many pure east coast lantanas still survive. Once this is complete, all *L. camara* and *L. camara* X *L. depressa* var. *floridana* within the park should be eliminated utilizing search-and-destroy methods described in Invasive Species Control above.

Melanthera parvifolia (Everglades black-anthers).

This endemic herb was recorded for the Upper Sandy Keys by Small (1913). It has not been recorded recently at either Cape Florida or Crandon Park and is thought to be extirpated on Key Biscayne. In south Florida, Everglades black-anthers is found growing primarily in open pine rocklands. Everglades black-anthers is listed as imperiled by FNAI; it is listed as endangered by FDACS; it is not listed by USFWS.

The restoration of significant areas of coastal strand and mesic flatwoods will create new habitat for Everglades black anthers and it should be considered for re-introduction.

Poinsettia pinetorum (pineland poinsettia).

This herb was recorded for Key Biscayne by MacAllister (1938). It has not been recorded recently at either Cape Florida or Crandon Park and is thought to be extirpated on Key Biscayne. In south Florida, pineland poinsettia is typically found in open pinelands in Dade County and the Florida Keys. It may have been present at Cape Florida prior to massive disturbance. Pineland poinsettia is listed as imperiled by FNAI; it is listed as endangered by FDACS; it is not listed by USFWS.

The restoration of coastal strand and mesic flatwoods will create new habitat for this species, and its re-introduction to Cape Florida should be seriously considered.

Savia bahamensis (maidenbush).

This shrub was cultivated and out-planted near the lighthouse (R. Hammer, pers. comm., 1995). Maidenbush is naturally found only in the lower Florida Keys (Little 1978) and is well outside its historic range at Cape Florida. Maidenbush is listed as critically imperiled by FNAI; it is listed as endangered by FDACS; it is not listed by USFWS.

Any remaining individuals of this species should be removed from the park.

Stillingia sylvatica ssp. *tenuis* (Everglades Queen's-delight).

This endemic herb was recorded for the Upper Sandy Keys by Small (1913). It has not been recorded recently at either Cape Florida or Crandon Park and is thought to

be extirpated on Key Biscayne. In south Florida, Everglades Queen's-delight is typically found in open pine rocklands. It may have been present at Cape Florida prior to massive disturbance. Everglades Queen's-delight is listed as imperiled by FNAI; it is not listed by FDACS; it is not listed by USFWS.

Although the restoration of coastal strand and mesic flatwoods will create new habitat for this taxon, its re-introduction should be approached cautiously. Considerable taxonomic confusion surrounds the *Stillingia sylvatica* complex and some exploration of these issues should be conducted prior to any introductions.

Zanthoxylum coriaceum (Biscayne prickly-ash).

A few plants of this shrub to small tree have been cultivated and out-planted near the lighthouse (E. Carter, pers. comm., 1995). In southeastern Florida, Biscayne prickly-ash is found exclusively on barrier islands from Palm Beach to Dade counties. It was probably present at Cape Florida prior to massive disturbance. Biscayne prickly-ash is listed as critically imperiled by FNAI; it is listed as endangered by FDACS; it is not listed by USFWS.

The population of Biscayne prickly-ash presently at Cape Florida should be protected. The restoration of significant areas of coastal strand will create additional habitat for this species, and the augmentation of the present population should be seriously considered.

7.2 Priority B Taxa

Priority B taxa are taxa that are considered by FNAI to be rare in the state. These taxa should receive significant management concern. Under no circumstances should extirpations of natural populations of these taxa be allowed to occur. If needed, population numbers should be increased, so long as this does not adversely impact natural community level restoration; extirpated taxa should be strongly considered for re-introduction.

Acrostichum aureum (golden leather fern).

This large fern is not presently known from Cape Florida, but has been recorded at Crandon Park (Fairchild Tropical Garden 1991). In southeastern Florida, golden leather fern is found in tidal swamps and marshes. It was probably present at Cape Florida prior to massive disturbance. Golden leather fern is listed as endangered by FDACS; it is not listed by USFWS.

The restoration of significant areas of tidal swamp and tidal marsh will provide new habitat for this rare fern, and it should be strongly considered for re-introduction.

Argusia gnaphalodes (sea-lavender).

This medium shrub grows in open sands on the front line of the coastal strand immediately adjacent to the beach dune. Only a few individuals are presently known from Cape Florida. Sea-lavender is listed as endangered by FDACS; it is not listed by USFWS.

Some consideration should be given to augmenting this population.

Cyperus pedunculatus (= *Remirea maritima*; beach-star).

This diminutive sedge grows in open sand on the beach dune at Cape Florida. The population is apparently secure, assuming no major beach erosion or significant damage due to foot or vehicular traffic. Beach-star is listed as endangered by FDACS; it is not listed by USFWS.

This population should be monitored to ensure that it is not damaged by human foot traffic or other types of human disturbances, and to determine if any special actions are required.

Eriogonum longifolium var. **gnaphalifolium** (= *E. floridanum*; scrub-buckwheat).

This herb was recorded for Key Biscayne by MacAllister (1938), but has not been recorded since. Otherwise, this taxon is known as an endemic to central Florida scrub and sandhills (Coile 1993). Scrub-buckwheat is listed as rare by FNAI; it is listed as endangered by FDA; it is listed as threatened by USFWS.

This record should be treated with some skepticism until material at the Duke University herbarium can be examined.

Halophila johnsoni (Johnson's sea-grass).

This marine submerged aquatic grows in shallow water on the Bay side of Cape Florida (R. Hammer, pers. comm., 1995). Johnson's sea-grass is not listed by FDACS; it is not listed by USFWS.

Some work should be done to determine the status of Johnson's sea-grass, as little is known about its abundance at Cape Florida, and what, if any, impact the restoration of the tidal swamp is having on its population.

Pteris bahamensis (Bahama brake).

This medium-sized fern was noted at Cape Florida by Hammer & Popenoe (1992). It was growing in the northern part of the park near what was apparently a perched water

table. It has not been seen since Hurricane Andrew and may be extirpated at Cape Florida. In southeastern Florida, Bahama brake is known from open pinelands from Palm Beach to Monroe counties. Bahama brake is not listed by FDACS; it is not listed by USFWS.

The restoration of significant areas of coastal strand and mesic flatwoods will provide new habitat for this fern and it should be considered for re-introduction. Before such a re-introduction is conducted, however, all China brake (*Pteris vittata*) should be eliminated from the park, as it will hybridize with Bahama brake.

***Sophora tomentosa* var. *truncata* (necklace-pod).**

This shrub grows in coastal strand at Cape Florida, which is its primary habitat in southeastern Florida. It has also been out-planted as part of the restoration process. Unfortunately, there are several distinct forms of this necklace-pod in south Florida; the one typically found on the barrier islands of southeastern Florida has leaves which are glabrous or sparingly pubescent. A form with very hairy leaves has been cultivated from material originally collected from southwestern Florida and is the form which has been out-planted at Cape Florida. Necklace-pod is not listed by FDACS; it is not listed by USFWS.

The hairy form of necklace-pod, which has been out-planted at Cape Florida, should be removed from the park. Follow-up surveys should be conducted to determine if the two forms have hybridized.

***Swietenia mahagoni* (West Indian mahogany).**

This tree has been cultivated and out-planted near the Cape Florida headquarters. It is native to the Florida Keys and the northern shores of Florida Bay (Little 1978) and is outside of its natural range at Cape Florida. West Indian mahogany is listed as endangered by FDACS; it is not listed by USFWS.

Any remaining individuals of West Indian mahogany should be removed from the park.

***Thrinax morrisii* (silver thatch palm).**

This small palm was cultivated near the Cape Florida Light House (R. Hammer, pers. comm, 1995). It is growing outside of its natural range at Cape Florida (see Little 1978). Silver thatch palm is listed as commercially exploited by FDACS; it is not listed by USFWS.

Any remaining individuals of silver thatch palm should be removed from the park.

***Tillandsia flexuosa* (banded wild-pine).**

This epiphytic bromeliad was historically noted for Key Biscayne by MacAllister (1938). It was not recorded in recent years at either Cape Florida or Crandon Park, and is now thought to be extirpated on Key Biscayne. In south Florida, banded wild pine typically grows in coastal hammocks and scrub (Wunderlin 1982; Gann, pers. obs.), and it was probably present at Cape Florida prior to massive disturbance. Banded wild-pine is listed as threatened by FDACS; it is not listed by USFWS.

The restoration of significant areas of tidal swamp and maritime hammock at Cape Florida will provide new habitat for this taxon, and it should be considered for re-introduction.

7.3 Priority C Taxa

Priority C taxa are taxa that are listed as endangered, threatened or commercially exploited by FDA, but which are not listed by FNAI or USFWS. These taxa should receive moderate management concern. At a minimum, extirpations of natural populations of these taxa should be prevented. Extirpated taxa should be considered for re-introduction.

***Acrostichum danaeifolium* (giant leather fern).**

This large fern grows in freshwater wetlands at Cape Florida. In southeastern Florida it is found in a variety of wetland situations. Giant leather fern is listed as threatened by FDACS.

The restoration of isolated wetlands at Cape Florida will provide additional habitat for this species, and its population can be augmented as part of the restoration process.

***Accolorrhaphe wrightii* (paurotis palm).**

This large clumping palm was cultivated and planted near the front entrance of the park. It is native to southwestern Florida (Little 1978) and is growing outside of its natural range at Cape Florida. Paurotis palm is listed as threatened by FDACS.

Any remaining plants of paurotis palm should be removed from the park.

***Anemia adiantifolia* (pine fern).**

This small fern has been recently found growing at Cape Florida by Carter (1995b) in disturbed coastal strand (E. Carter, pers. comm., 1995). Although it may represent a recent introduction, this seems unlikely since this species is rarely cultivated. In southeastern Florida, pine fern grows in open pinelands from Martin County to the Florida

Keys. Pine fern is listed as threatened by FDACS.

This population should be surveyed to determine if any special action is required.

***Clusia rosea* (pitch-apple).**

This hemi-epiphytic¹ tree has been cultivated and out-planted near the Cape Florida Lighthouse (Hammer 1995). It is doubtfully native to south Florida, but even if it is, then it is well outside of natural range at Cape Florida (see Little 1978). Pitch-apple is listed as endangered by FDACS.

Any remaining individuals of pitch-apple should be removed from the park.

***Encyclia tampensis* (butterfly orchid).**

This epiphytic orchid was historically noted on Key Biscayne by MacAllister (1938), and it has been recorded in recent years at Crandon Park (Fairchild Tropical Garden 1991). In southeastern Florida, butterfly orchid is found in tidal swamps and maritime hammocks (Wunderlin 1982; Gain, pers. obs.). It was probably present at Cape Florida prior to massive disturbance. Butterfly orchid is listed as threatened by FDACS.

The restoration of tidal swamp and maritime hammock will provide new habitat for this taxon at Cape Florida, and it should be considered for re-introduction.

***Ernodea littoralis* var. *littoralis* (beach golden creeper).**

This woody ground cover grows in open patches of sand on the leeward side of the beach dune and in the coastal strand at Cape Florida. Beach golden creeper is listed as threatened by FDACS.

This population should be monitored to determine if any special action is required.

***Habenaria odontopetala* (rein orchid).**

This terrestrial orchid grew in the understory of the Australian-pine forest prior to Hurricane Andrew (R. Hammer, pers. comm., 1995). Although it has not been seen recently, it is probably still present in the park. The habitat of rein orchid in south Florida is primarily moist, shaded environments. It is listed as threatened by FDACS.

The restoration of maritime hammock will re-create habitat for this orchid, and the

¹ A hemi-epiphyte starts its life cycle as an epiphyte (usually in the top of another tree) and sends roots down to the ground, thus ending its life cycle as a tree.

augmentation of any existing population or the re-introduction of a new population should be considered after the maritime hammock reaches an appropriate level of maturity.

Nephrolepis biserrata (sword fern).

This large fern is not presently known from Cape Florida, but it has been recorded at Crandon Park (Fairchild Tropical Garden 1991). In southeastern Florida sword fern is found primarily in hammocks. It may have been present at Cape Florida prior to massive disturbance. Sword fern is listed as threatened by FDACS.

The restoration of maritime hammock will provide new habitat for this taxon at Cape Florida, and it should be considered for re-introduction. Before such a re-introduction is conducted, however, all populations of other species of *Nephrolepis* should be eliminated from the park as they may hybridize with sword fern.

Okenia hypogaea (beach-peanut).

This annual herb grows in open sand in beach dune at Cape Florida, which is its typical habitat in southeastern Florida.

This population should be surveyed to determine if any special action is needed.

Opuntia stricta (a prickly-pear cactus).

This cactus grows in coastal strand at Cape Florida, which is one of its primary habitats in south Florida. It is listed as threatened by FDACS.

This population should be surveyed to determine if any special action is needed.

Osmunda regalis* var. *spectabilis (royal fern).

This medium-sized fern was historically noted on Key Biscayne by MacAllister (1938). It has not been recorded in recent years at either Cape Florida or Crandon Park, and is now thought to be extirpated on Key Biscayne. In southeastern Florida, royal fern typically grows in marshes and swamps (Gann, pers. obs.). It was probably present at Cape Florida prior to massive disturbance. Royal fern is listed as commercially exploited by FDACS.

The restoration of isolated wetlands at Cape Florida will provide new habitat for this taxon at Cape Florida, and it should be considered for re-introduction.

Psilotum nudum (whisk fern).

This small fern relative was observed growing on the bases of cabbage palms

(*Sabal palmetto*) prior to Hurricane Andrew (R. Hammer, pers. comm., 1995). Although it has not been recorded recently, it is probably still present at Cape Florida. Moist, shaded environments are the primary habitat for whisk fern in south Florida. Whisk fern is listed as threatened by FDACS.

The restoration of maritime forest will re-create new habitat for this fern, and the augmentation of any existing population, or the re-introduction of a new population should be considered after the maritime hammock reaches an appropriate level of maturity.

***Scaevola plumieri* (inkberry).**

This shrub grows primarily in the ecotone between beach dune and coastal strand at Cape Florida, which is its typical habitat in southeastern Florida. Inkberry is listed as threatened by FDACS.

This population should be surveyed to determine if any special action is needed.

***Suriana maritima* (bay-cedar).**

This shrub grows primarily in the ecotone between beach dune and coastal strand at Cape Florida, which is its typical habitat in southeastern Florida. It has also been out-planted as part of the restoration process. Bay-cedar is listed as endangered by FDACS.

This population should be surveyed to determine if any special action is needed.

***Tillandsia balbisiana* (reflexed wild-pine).**

This epiphytic bromeliad was historically recorded for Key Biscayne by MacAllister (1938). It has not been recorded in recent years for either Cape Florida or Crandon Park, and is now thought to be extirpated on Key Biscayne. In southeastern Florida, reflexed wild-pine grows in hammocks, pinelands, and scrub (Wunderlin 1982; Gann, pers. obs.). It was probably present at Cape Florida prior to massive disturbance. Reflexed wild-pine is listed as threatened by FDACS.

The restoration of tidal swamp and maritime hammock at Cape Florida will provide new habitat for this taxon, and it should be considered for re-introduction.

***Thelypteris interrupta* (a shield fern).**

This terrestrial fern is not presently known from Cape Florida, but has been recorded for Crandon Park (Fairchild Tropical Garden 1991). In southeastern Florida, interrupted shield fern is found growing in wet freshwater areas, primarily wet hammocks and cypress swamps (Wunderlin 1982; R. Hammer, pers. comm., 1995). It may have been present at Cape Florida prior to massive disturbance. Interrupted shield fern is listed

as threatened by FDA.

The restoration of isolated wetlands at Cape Florida will create new habitat for interrupted shield fern at Cape Florida, and it should be considered for re-introduction.

***Triphora gentianoides* (an orchid).**

This terrestrial orchid was recorded growing around trailers near park headquarters (R. Hammer, pers. comm., 1995). Although it has not been seen recently, it is probably still present in the park. In southeastern Florida, it is found growing in hammocks and surrounding lawns (R. Hammer, pers. comm., 1995). *Triphora gentianoides* is listed as threatened by FDACS.

The restoration of maritime hammock will re-create habitat for this species, and an augmentation of its population or the re-introduction of a new population should be considered after the maritime hammock reaches the appropriate level of maturity.

***Vittaria lineata* (shoestring fern).**

This epiphytic fern has been recently introduced to Cape Florida on cabbage palms (*Sabal palmetto*). In southeastern Florida it is typically found in moist to wet protected areas. It is listed as threatened by FDACS.

Shoestring fern should not be expected to persist at Cape Florida.

***Zamia integrifolia* (coontie).**

This small herbaceous gymnosperm grows in coastal strand at Cape Florida. It has also been cultivated and out-planted around the site. In south Florida, coontie typically grows in pinelands, hammock edges, and rarely on coastal dunes (Small 1933; G. Gann, pers. obs.). Coontie is listed as commercially exploited by FDA.

This population should be surveyed to determine if any special action should be taken.

7.4 Other Rare Plant Taxa

***Cyperus floridanus* (Florida sedge).**

This tiny sedge grows in disturbed coastal strand at Cape Florida, and is known from only three other stations in Florida, one each in Dade, Monroe, and Collier counties (K. Bradley, pers. comm., 1995). Very little is known about this species except for the fact that it grows in relatively open, disturbed coastal environments. In the Bahamas, the only other country it is native to, it grows "in sandy sinks" (Correll & Correll 1982, p.

218).

This population should be surveyed to determine if any special actions are needed.

8. ADDITIONAL CONSIDERATIONS

Additional considerations for the Cape Florida Project include fire management and wildlife.

8.1 Fire Management

The use of prescribed fire to restore and maintain mesic flatwoods and coastal strand should be seriously considered. Primary responsibility for prescribed burning should be assumed by the Florida Park Service. Assistance for such a program could be provided by Metro-Dade Fire and Rescue, Florida Division of Forestry, The Nature Conservancy, and trained volunteers.

A fire management plan for Cape Florida must be written as soon as possible. The plan must consider the surrounding land uses, safety issues in the event of wildfire, and the ecological consequences of specific fire management strategies. It should also address the role of fire in each of the natural communities on the site. A program of public education should be initiated concerning the pyrogenic histories of the natural communities at Cape Florida.

Both coastal strand and mesic flatwoods are probably dependent on fire for their long-term restoration and maintenance. Given the extensive alterations that have been made to the local landscape, lightning-induced fire can not be expected to fulfill the fire needs of these communities. Fire management units should be relatively large, so that fires can burn through ecotones and move in a more natural, spotty fashion across the landscape. The resulting patchwork of burned and unburned areas within a management unit would produce a mosaic of vegetation at various stages of maturity, thereby maximizing diversity within and among communities. This would provide habitats for individual species which favor, or may be restricted to, communities in a particular state of maturity.

The defensibility of management units, however, is another important consideration. They must not be so large that control of a prescribed fire and attendant smoke becomes difficult or tenuous. This is especially important at sites such as Cape Florida where public fear of fire, as well as restrictions on the production of smoke, may override preferable ecological fire design.

Active fire suppression measures that rely upon the use of heavy machinery and plowlines are extremely destructive to native vegetation and other natural features. In the event that such measures become necessary to control a fire, all plowlines should be backfilled and other disturbed areas rehabilitated to the greatest extent possible. Avoidance of active fire suppression measures of this type should be strongly emphasized.

To the extent possible, the seasonality and frequency of prescribed fires should

seek to mimic the natural incidence of fire in the site's natural communities. Generally, prescribed fires should be conducted during the growing season, which extends from early spring to late fall. The natural incidence of winter fire is presumed to have been quite low. Prescribed winter fires, therefore, should be similarly rare in occurrence to ensure that fire events are in synch with the fire-adapted life histories and phenologies of resident species.

8.2 Wildlife

A total of 13 species of invertebrates, 16 species of reptiles and amphibians, one species of fish, 79 species of birds, and 6 species of mammals have been recorded since June 1994 at Cape Florida (Appendix B). The effect of ecological restoration on wildlife at Cape Florida has not been investigated to any great extent and deserves a significant amount of attention. Any work on wildlife should include an investigation of the invertebrate fauna of Cape Florida (Huck 1993).

9. REFERENCES CITED

- Anon. n.d. Bill Baggs Cape Florida plant nursery plan. Unpublished manuscript.
- Avery, G.N., and L.L. Loope. 1980. Endemic taxa in the flora of south Florida. Report T-558, U.S. National Park Service, South Florida Research Center, Homestead, Florida.
- Carr, R.S. 1987. An archeological survey and investigations at Bill Baggs State Park, Key Biscayne. Report on file at the Metro-Dade Historic Preservation Division, Miami.
- Carr, R.S., R. Haiduven, J. Davis, and J. Zaminillo. 1994. A post-hurricane archeological survey and assessment of Bill Baggs State Park, Key Biscayne, Dade County, Florida. Archeological and Historical Conservancy Technical Report #91.
- Carter, E. 1995a. Cape Florida wildlife list (taxa observed since July 1994). Unpublished report, 8/95.
- Carter, E. 1995b. A checklist of vascular plants of Cape Florida S.R.A. (compiled from July 1994 through 1995). Unpublished report, 9/95.
- Carter, E. 1995c. Exotic plant list for Bill Baggs Cape Florida S.R.A.; list compiled from August 1994 through 1995. Unpublished report 8/94; updated 10/95.
- Coile, N.C. 1993. Florida's endangered and threatened plants. Florida Department of Agriculture and Consumer Services, Gainesville.
- Correll, D.S., and H.B. Correll. 1982. Flora of the Bahama Archipelago. Lubrecht & Cramer, Forestburg, New York.
- Davidson, H., and R. Mecklenburg. 1981. Nursery Management: Administration and Culture. Prentice-Hall, Inc., Englewood Cliffs, N.J.
- Davis, J.H. 1943. The natural features of southern Florida, especially the vegetation and the Everglades. Florida Geol. Surv. Bull. No. 25.
- Fairchild Tropical Garden. 1991. Vascular plant inventory: Crandon Park. Unpublished report, 8/14/91. Fairchild Tropical Garden, Miami.
- Florida Department of Natural Resources, Division of Recreation and Parks. 1989. Management of Florida's State Park Lands, brochure. Tallahassee.
- Florida Department of Natural Resources, Division of Recreation and Parks. 1991. Bill Baggs Cape Florida State Recreation Area Unit Management Plan. (Approved by the Board of Trustees of the Internal Improvement Trust Fund). Unpublished manuscript.

Florida Department of Natural Resources, Division of Recreation and Parks. 1993. Bill Baggs Cape Florida State Recreation Area Unit Management Plan, Addendum #9, Bill Baggs Cape Florida State Recreation Area, Hurricane Recovery and Restoration Plan. Approved by the Governor and Cabinet, July 21, 1993.

Federal Native Plant Conservation Committee. Native Plant Conservation Project Nominations Memorandum, July 29, 1994.

Florida Department of Natural Resources, Division of Recreation and Parks. 1993. Draft Hurricane Recovery and Restoration Plan, Bill Baggs Cape Florida State Recreation Area. Unpublished manuscript.

Florida Exotic Pest Plant Council (Florida EPPC). 1995. Florida Exotic Pest Plant Council's 1995 list of Florida's most invasive species. Unpublished manuscript.

Florida Natural Areas Inventory. 1990. Florida Natural Areas Inventory - special vertebrates list (04/12/90). Florida Natural Areas Inventory, Tallahassee.

Florida Natural Areas Inventory. 1994. Florida Natural Areas Inventory - special plants and lichens (March 1994). Florida Natural Areas Inventory, Tallahassee.

Florida Natural Areas Inventory and Florida Department of Natural Resources. 1990. Guide to the natural communities of Florida. Tallahassee.

Godfrey, R.K., and J.W. Wooten. 1979. Aquatic and Wetland Plant of Southeastern United States, Monocotyledons. University of Georgia Press, Athens.

Godfrey, R.K., and J.W. Wooten. 1981. Aquatic and Wetland Plants of Southeastern United States, Dicotyledons. University of Georgia Press, Athens.

Hammer, R.L., and J. Popenoe. 1992. Checklist of vascular plants: Bill Baggs Cape Florida State Recreation Area. Unpublished report. Original version September 1979; updated and emended by R.L. Hammer & D. Keller, May 1992.

Hoshizaki, B.J. 1975. Fern Growers Manual. A.A. Knopf, New York.

Huck, R.B. 1993. Restoration initiative for Cape Florida State Recreation Area following Hurricane Andrew. Unpublished manuscript.

Huck, R.B., and J.G. Blank. 1994. Historic native flora and early settlement agriculture of Cape Florida, Key Biscayne, Florida (abstract). In: Program of the 55th Annual Meeting of the Association of Southeastern Biologists, Orlando, Florida, April 14, 1994.

Little, E.L., Jr. 1978. Atlas of United States Trees: Volume 5. Florida. Misc. Publ. No. 1361, United States Department of Agriculture, Forest Service, Washington, D.C.

MacAllister, B. 1938. A study of the flora of Key Biscayne, Dade County, Florida. Unpublished master's thesis, Duke University, Durham, N.C.

National Fish and Wildlife Foundation. 1994. Annual Report. Washington, D.C.

Schroeder, P. 1994. Plant restoration plan for Cape Florida SRA (draft). Unpublished manuscript.

Schroeder, P. 1995. Plant restoration plan for Cape Florida SRA (second draft). Unpublished manuscript.

Small, J.K. 1913. Flora of the Florida Keys. J.K. Small, New York.

Small, J.K. 1931. Ferns of Florida. The Science Press, New York.

Small, J.K. 1933. Manual of the Southeastern Flora. University of North Carolina Press, Chapel Hill.

The Nature Conservancy. 1992. Policy and criteria for species translocations to preserves. Unpublished policy.

Tomlinson, P.B. 1980. The Biology of Trees Native to Tropical Florida. Harvard University Printing Office. Allston, Massachusetts.

Wood, D.A. 1994. Official lists of endangered and potentially endangered fauna and flora in Florida: 1 June, 1994. Florida Game and Fresh Water Fish Commission, Tallahassee.

Wunderlin, R.P. 1982. Guide to the Vascular Plants of Central Florida. University Presses of Florida, Gainesville.

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

Scientific Names ¹ [Synonyms]	Common Name	Cape Florida ²	Key Biscayne ³	Upper Sandy Keys ⁴
PTERIDOPHYTES (Ferns and Fern Allies)				
ADIANTACEAE				
<i>Acrostichum aureum</i>	golden leather fern	-	F	-
<i>Acrostichum danaeifolium</i>	giant leather fern	H,C,G	M,F	-
<i>Pteris bahamensis</i> [<i>P. longifolia</i> var. <i>bahamensis</i>]	Bahama brake	H	-	-
<i>Pteris tripartita</i> (U)	giant brake	H	F	-
<i>Pteris vittata</i> (E)	China brake	H,C,G	F	-
BLECHNACEAE				
<i>Blechnum serrulatum</i>	swamp fern	-	F	-
DAVALLIACEAE				
<i>Nephrolepis biserrata</i>	sword fern	-	F	-
<i>Nephrolepis cordifolia</i> (E)	tuberous Boston fern	H	-	-
<i>Nephrolepis exaltata</i> (U)	common Boston fern	-	F	-
<i>Nephrolepis multiflora</i> (E)	Asian Boston fern	H,G	-	-
<i>Nephrolepis X averyi</i> (U) [<i>N. biserrata</i> X <i>N. exaltata</i>]	Avery's Boston fern	-	F	-
DENNSTAEDTIACEAE				
<i>Pteridium aquilinum</i> ssp. <i>caudatum</i> [<i>P. aquilinum</i> var. <i>caudatum</i> ; <i>Pteris caudata</i>]	southern braken fern	H,C	-	-

¹ (C) indicates a taxon cultivated at Cape Florida;

(C+) indicates a taxon growing naturally at Cape Florida which has also been out-planted as part of the restoration process;

(C++) indicates a taxon which has been (re-)introduced at Cape Florida and for which a record exists for Key Biscayne and/or the Upper Sandy Keys;

(C+++) indicates a taxon which has been introduced at Cape Florida and for which no record exists for Key Biscayne and/or the Upper Sandy Keys, but has a range which could reasonably include Cape Florida;

(CX) indicates a taxon which has been introduced to Cape Florida, and which almost certainly represents an artificial range extension;

(CU+) indicates a taxon of uncertain nativity which is naturalized at Cape Florida, and which has been out-planted as part of the restoration process at Cape Florida;

(CU+++) indicates a taxon of uncertain nativity which has been introduced to Cape Florida as part of the restoration process and for which there is no record from Key Biscayne or the Upper Sandy Keys;

(E) indicates a taxon which is exotic in south Florida;

(U) indicates a taxon which is of uncertain nativity in south Florida.

² H=Hammer & Popenoe 1992;

C=Carter 1995b; Cc=Carter 1995c.

G=G. Gann & K. Bradley, personal observations, 10/19/95 and 11/03/95.

³ M=MacAllister 1938;

F=Fairchild Tropical Garden 1991;

G=Goodwin in Schroeder 1995.

⁴ S=Small 1913; the Upper Sandy Keys are Key Biscayne and Virginia Key.

Scientific Name [Common Name]	Common Name	Cape Florida	Key Biscayne	Upper Sandy Keys
OSMUNDACEAE				
<i>Osmunda regalis</i> var. <i>spectabilis</i>	royal fern	-	M	-
POLYPODIACEAE				
<i>Phlebodium aureum</i> (C+) [<i>Polypodium aureum</i>]	golden polypody	H,C,G	F	-
PSILOTACEAE				
<i>Psilotum nudum</i>	whisk fern	H	-	-
THELYPTERIDACEAE				
<i>Thelypteris interrupta</i> [<i>T. totta</i>]	interrupted maiden fern	-	F	-
<i>Thelypteris kunthii</i> [<i>T. normalis</i> , <i>Dryopteris normalis</i>]	wood fern	H,C,G	M,F	-
SCHIZAEACEAE				
<i>Anemia adiantifolia</i>	pine fern	C	-	-
VITTARIACEAE				
<i>Vittaria lineata</i> (C+++)	shoestring fern	G	-	-
GYMNOSPERMS (Cycads and Conifers)				
PINACEAE				
<i>Pinus elliottii</i> var. <i>densa</i> (C++) [<i>P. caribaea</i> of authors]	south Florida slash pine	C	M	-
ZAMIACEAE				
<i>Zamia integrifolia</i> (C+) [<i>Z. pumila</i> ssp. <i>pumila</i> in part]	coontie	H,C,G	M,F	-
MONOCOTS				
AGAVACEAE				
<i>Agave decipiens</i>	false sisal	H,C,G	-	-
<i>Sansevieria hyacinthoides</i> (E) [<i>S. thyrsiflora</i>]	bowstring-hemp	H,C	F	-
<i>Yucca aloifolia</i> (U)	Spanish-bayonet	H,C,G	M,F	S
AMARYLLIDACEAE				
<i>Hymenocallis latifolia</i> (C+) [<i>H. caymanensis</i> ; including <i>H. keyensis</i>]	spider-lily	H,C,G	M,F	S

Scientific Name [Common Name]	Common Name	Cape Florida	Key Biscayne	Upper Sandy Keys
ARACEAE				
<i>Epipremnum pinnatum</i> (E) [<i>E. pinnatum</i> cv. <i>Aureum</i>]	pothos	H,C	-	-
<i>Syngonium podophyllum</i> (E)	nephtytis	C	-	-
<i>Xanthosoma</i> sp. (E)	elephant-ear	G	-	-
ARECACEAE				
<i>Acoelorrhaphe wrightii</i> (CX)	paurotis palm	H,C	-	-
<i>Coccothrinax argentata</i>	silver palm	H,C	F	-
<i>Cocos nucifera</i> (E)	coconut palm	H,C,G	M,F	S
<i>Phoenix dactylifera</i> (E)	a date palm	-	F	-
<i>Phoenix</i> cf. <i>reclinata</i> (E)	Senegal date palm	H,C,G	-	-
<i>Ptychosperma elegans</i> (E)	solitaire palm	H	-	-
<i>Sabal palmetto</i> (C+)	cabbage palm	H,C,G	M,F	S
<i>Serenoa repens</i> (C+) [<i>Serenoa serrulata</i>]	saw palmetto	H,C,G	M,F	S
<i>Thrinax morrisii</i> (CX)	silver thatch palm	H	-	-
BROMELIACEAE				
<i>Tillandsia balbisiana</i>	a wild-pine	-	M	-
<i>Tillandsia flexuosa</i> [<i>T. aloifolia</i>]	banded wild-pine	-	M	-
<i>Tillandsia usneoides</i> (C+) [<i>Dendropogon usneoides</i> .]	Spanish-moss	H,G	M	S
COMMELINACEAE				
<i>Commelina diffusa</i> (U)	a dayflower	H,C	-	-
<i>Commelina erecta</i> var. <i>angustifolia</i>	narrow-leaved dayflower	H,C,G	M,F	S
<i>Commelina erecta</i> var. <i>erecta</i> [<i>C. elegans</i>]	a dayflower	-	-	S
<i>Tradescantia spathacea</i> (E) [<i>Rhoeo spathacea</i>]	oyster-plant	H,C	-	-
CYMODOCEACEAE				
<i>Cymodocea filiformis</i> [<i>C. manatorum</i> ; <i>Syringodium filiforme</i>]	manatee-grass	H	-	S
<i>Halodule beaudettei</i> [<i>H. wrightii</i>]	shoal-grass	H	-	-
CYPERACEAE				
<i>Cladium jamaicense</i> [<i>Mariscus jamaicensis</i>]	saw-grass	-	M	-
<i>Cyperus compressus</i>	a sedge	G	-	-
<i>Cyperus croceus</i> [<i>C. globulosus</i> of authors]	a sedge	H,G	-	-
<i>Cyperus esculentus</i> (E)	yellow nutsedge	G	M	-
<i>Cyperus floridanus</i>	Florida sedge	G	-	-

Scientific Name [Common Name]	Common Name	Cape Florida	Key Biscayne	Upper Sandy Keys
<i>Cyperus involucratus</i> (E) [<i>C. alternifolius</i> of authors]	umbrella sedge	-	M	-
<i>Cyperus ligularis</i> [<i>Mariscus ligularis</i>]	silver sedge	H,C,G	M,F	-
<i>Cyperus nashii</i> [<i>C. retrorsus</i> var. <i>nashii</i>]	Nash's sedge	-	M	-
<i>Cyperus odoratus</i>	a sedge	C,G	M	-
<i>Cyperus pedunculatus</i> [<i>Remirea maritima</i>]	beach-star	H,C	-	S
<i>Cyperus planifolius</i> [<i>C. brunneus</i>]	a sedge	H	M,F	S
<i>Cyperus polystachyos</i> [<i>Pycneus polystachyos</i>]	a sedge	C	M	-
<i>Cyperus rotundus</i> (E)	a nutsedge	H,C,G	-	-
<i>Cyperus surinamensis</i>	Surinam sedge	G	-	-
<i>Eleocharis albidia</i>	a spike-rush	G	-	-
<i>Eleocharis geniculata</i> [<i>E. atropurpurea</i> of authors; <i>E. caribaea</i> ; <i>E. flaccida</i> of authors; <i>E. flavescens</i> of authors]	a spike-rush	H,C,G	M,F	S
<i>Fimbristylis caroliniana</i> [Including <i>F. harperi</i>]	a sedge	-	F	S
<i>Fimbristylis castanea</i>	chestnut sedge	H	M,F	-
<i>Fimbristylis cymosa</i> ssp. <i>spathacea</i> (U) [<i>F. spathacea</i>]	hurricane sedge	H,C,G	F	-
<i>Fimbristylis puberula</i>	a sedge	-	M	-
<i>Kyllinga brevifolia</i> [<i>Cyperus brevifolius</i>]	a sedge	C,G	F	-
<i>Rhynchospora caduca</i>	a beak-rush	-	M	S
<i>Rhynchospora colorata</i> [<i>R. stellata</i> ; <i>Dichromena colorata</i>]	common white-top sedge	H,G	M,F	-
DIOSCOREACEAE				
<i>Dioscorea bulbifera</i> (E)	air-potato	C,G	-	-
HYDROCHARITACEAE				
<i>Halophila johnsonii</i> [<i>H. engelmannii</i> of authors]	Florida sea-grass	H	-	S
<i>Thalassia testudinum</i>	turtle-grass	H	-	S
IRIDACEAE				
<i>Sisyrinchium</i> cf. <i>miamiense</i> [<i>S. capillare</i> of authors; <i>S. atlanticum</i> of authors]	a blue-eyed-grass	-	M	-
JUNCACEAE				
<i>Juncus megacephalus</i>	a rush	-	M	-

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MUSACEAE				
<i>Musa X paradisiaca</i> (E)	banana	Ce	-	-
NAJADACEAE				
<i>Najas marina</i>	spiny naiad	H	-	-
ORCHIDACEAE				
<i>Cyrtopodium punctatum</i>	cowhorn orchid	H	F	-
<i>Encyclia tampensis</i>	butterfly orchid	-	M,F	-
<i>Habenaria odontopetala</i>	an orchid	H	-	-
<i>Oeceoclades maculata</i> (U)	African ground orchid	H,Ce	-	-
<i>Triphora gentianoides</i>	an orchid	H	-	-
<i>Zeuxine strateumatica</i> (E)	lawn orchid	H,C	-	-
POACEAE				
<i>Andropogon glomeratus</i> var. <i>pumilus</i> [<i>A. virginicus</i> of authors]	common broom-sedge	H,C,G	M,F	-
<i>Bothriochloa pertusa</i> (U)	two-hole grass	H	-	-
<i>Brachiaria subquadriflora</i> (E)	a grass	G	F	-
<i>Cenchrus echinatus</i>	southern sandspur	H,G	M,F	-
<i>Cenchrus incertus</i> [<i>C. pauciflorus</i>]	coast sandspur	H,G	M,F	-
<i>Cynodon dactylon</i> (E) [<i>Capriola dactylon</i>]	Bermudagrass	H,C,G	M,F	-
<i>Dactyloctenium aegyptium</i> (E)	crow'sfootgrass	H,C,G	F	-
<i>Dichanthelium aciculare</i>	a panicgrass	-	F	-
<i>Digitaria ciliaris</i> (U)	southern crabgrass	G	-	-
<i>Digitaria villosa</i>	a crabgrass	-	F	-
<i>Distichlis spicata</i>	saltgrass	C	F	S
<i>Echinochloa crus-galli</i> (U)	barnyardgrass	-	M	-
<i>Eleusine indica</i> (E)	goosegrass	C,G	F	-
<i>Eragrostis ciliaris</i>	ciliate lovegrass	G	M,F	-
<i>Eragrostis elliottii</i>	Elliott's lovegrass	G	-	-
<i>Eustachys petraea</i> [<i>Chloris petraea</i>]	a fingergrass	H,C,G	M,F	-
<i>Lolium perenne</i> (E)	ryegrass	C	-	-
<i>Melinis minutiflora</i> (E)	molassesgrass	-	F	-
<i>Muhlenbergia capillaris</i> (C++) [Including var. <i>filipes</i>]	muhlygrass	C	-	S
<i>Neyraudia reynaudiana</i> (E)	Burma-reed	H,C,G	F	-
<i>Panicum adspersum</i>	Dominican panicgrass	G	M	-
<i>Panicum amarum</i> [Including <i>P. amarulum</i>]	bitter panicgrass	H,C,G	F	S
<i>Panicum dichotomiflorum</i> var. <i>bartowense</i>	hairy fall panicgrass	G	F	-
<i>Panicum repens</i> (U)	torpedograss	C,G	-	-
<i>Panicum virgatum</i>	swtichgrass	H	-	-
<i>Paspalum caespitosum</i> s.str. [Not including <i>P. blodgettii</i>]	blue paspalum	G	-	-
<i>Paspalum notatum</i> (E)	Bahiagrass	C	-	-

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<i>Paspalum setaceum</i> var. <i>ciliatifolium</i> [<i>P. ciliatifolium</i>]	fringed thin paspalum	C,G	M,F	-
<i>Paspalum urvillei</i> (E)	Vaseygrass	H,G	M	-
<i>Paspalum vaginatum</i> [<i>P. distichum</i> of authors in part]	seashore paspalum	H,G	F	-
<i>Pennisetum purpureum</i> (E)	napiersgrass]	H,C,G	-	-
<i>Rhynchelytrum repens</i> (E) [<i>Tricholaena rosea</i> of authors]	Natalgrass	Cc,G	M,F	-
<i>Rottboellia cochinchinensis</i> (E)	ichgrass	Cc,G	-	-
<i>Setaria geniculata</i> [<i>S. gracilis</i> of authors; <i>Chaetochloa geniculata</i>]	knotroot foxtail	H,C,G	M,F	-
<i>Setaria macrosperma</i>	coastal foxtail	G	F	-
<i>Sorghum halepense</i> (E)	Johnsongrass	C,G	-	-
<i>Spartina patens</i>	saltmarsh cordgrass	H,G	F	-
<i>Spartina spartinae</i> (C++)	Gulf cordgrass	G	F	-
<i>Sporobolus domingensis</i>	coral dropseed	H,C,G	F	-
<i>Sporobolus indicus</i> (U) [<i>S. poiretii</i> of authors]	smutgrass	H,G	M,F	-
<i>Sporobolus jacquemontii</i> (U)	West Indian rush-grass	H,G	F	-
<i>Sporobolus virginicus</i>	seashore dropseed	-	F	-
<i>Stenotaphrum secundatum</i> (U)	St. Augustine grass	H,C,G	M,F	S
<i>Uniola paniculata</i>	sea-oats	H,C,G	M,F	S
<i>Zoysia matrella</i> var. <i>tenuifolia</i> (E)	Mascarenegrass	-	F	-
SMILACACEAE				
<i>Smilax auriculata</i> [<i>S. beyrichii</i>]	a greenbrier	H,C,G	M,F	S
<i>Smilax bona-nox</i> (C++)	a greenbrier	G	M	-
<i>Smilax havanensis</i> [<i>S. sp.</i> of MacAllister ?]	Havana greenbrier	H	M?	-
TYPHACEAE				
<i>Typha latifolia</i>	common cattail	C,G	M	-
DICOTS				
ACANTHACEAE				
<i>Blechum pyramidatum</i> (E) [<i>B. brownei</i>]	Fgreen shrimp-plant	H,C,G	-	-
<i>Dicliptera sexangularis</i> [<i>D. assurgens</i>]	false-mint	H	-	-
AIZOACEAE				
<i>Sesuvium portulacastrum</i> (C-)	sea purslane	H,C,G	M,F	S

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AMARANTHACEAE				
Alternanthera flavescens [<i>A. floridana</i> ; <i>A. ramosissima</i> of authors; <i>Achyranthes ramosissima</i> of authors]	a chaff flower	C,G	M,F	S
Alternanthera maritima	a chaff flower	H	F	-
Amaranthus blitum (U) [<i>A. lividus</i>]	an amaranth	-	F	-
Amaranthus spinosus (U)	spiny amaranth	-	M	-
Blutaparon verniculare [<i>Carexeron vermicularis</i> ; <i>Philoxeris vermicularis</i>]	samphire	H	M,F	S
Celosia nitida [<i>C. paniculata</i>]	cock's-comb	-	-	S
Iresine diffusa [<i>I. celosia</i> ; <i>I. paniculata</i>]	bloodleaf	H,C,G	M,F	S
ANACARDIACEAE				
Mangifera indica (E)	mango	-	M	-
Metopium toxiferum	poisonwood	H,C,G	M,F	S
Rhus copallina L. var. <i>leucantha</i>	southern sumac	C	M,F	-
Schinus terebinthifolius (E)	Brazilian-pepper	H,C,G	F	-
Toxicodendron radicans ssp. <i>radicans</i> (C+++)	poison-ivy	C	-	-
ANNONACEAE				
Annona glabra (C++)	pond-apple	C ⁵	-	S
APIACEAE				
Centella asiatica	coinwort	H,C,G	-	-
Hydrocotyle verticillata var. <i>triradiata</i> [<i>H. canbyi</i>]	wholred pennywort	H,C	M,F	-
Ptilimnium capillaceum	mock Bishop's-weed	H,C	-	-
APOCYNACEAE				
Catharanthus roseus (E)	Madagascar periwinkle	H,C,G	M,F	-
Carissa macrocarpa (E) [<i>C. grandiflora</i> ; <i>Cryptostegia grandiflora</i> of authors]	Natal-plum	-	M	-
Echites umbellata [<i>E. echites</i>]	Devil's-potato	H,C,G	M,F	-
Pentalinon luteum [<i>Urechites lutea</i>]	wild-allamanda	-	M,F	-
ASCEPIADACEAE				
Asclepias curassavica (E)	scarlet milkweed	H,C,G	M	-
Cynanchum angustifolium [<i>C. palustre</i> ; <i>Lyonia palustris</i>]	a vine milkweed	-	M	S

⁵Personal communication, December 8, 1995.

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Cynanchum northropiae [<i>Epicion northropiae</i> ; <i>E. bahamense</i> of authors]	a vine milkweed	-	-	S
Cynanchum scoparium	a vine milkweed	H	-	-
Sarcostemma clausum (U)	white vine	C,G	-	-
ASTERACEAE				
Ambrosia artemisiifolia [Including <i>A. elatior</i>]	common ragweed	H,C,G	M,F	S
Ambrosia hispida	coastal ragweed	H	-	S
Aster dumosus	an aster	C	-	-
Baccharis angustifolia	narrow-leaved groundsel	-	M,F	S
Baccharis glomeruliflora	a groundsel	G	F	-
Baccharis halimifolia	a groundsel	H,C,G	M,F	-
Bidens alba var. <i>radiata</i> [<i>B. leucantha</i> ; <i>B. pilosa</i>]	Spanish-needles	H,C,G	M,F	S
Borrichia arborescens	green sea-oxeye-daisy	-	-	S
Borrichia frutescens (C+)	silver sea-oxeye-daisy	H,C,G	M,F	S
Calyptocarpus vialis (E)		H,C,G	-	-
Cirsium horridulum	purple thistle	-	M	-
Conyza canadensis var. <i>pusilla</i> [<i>Leptilon canadensis</i>]	dwarf horseweed	H,C,G	M,F	-
Eclipta prostrata [<i>Eclipta alba</i>]		C,G	F	-
Emilia fosbergii (U) [<i>E. coccinea</i>]	a tassel-flower	H,C,G	M	-
Emilia sonchifolia (U)	a tassel-flower	C,G	-	-
Erechtites hieracifolia	fireweed	H,C,G	M	-
Erigeron quercifolius	daisy-fleabane	H,C	-	-
Eupatorium capillifolium [<i>E. leptophyllum</i> of authors]	dog-fennel	H,C,G	M,F	-
Eupatorium coelestinum [<i>Conoclinium coelestinum</i>]	mistflower	-	M	-
Eupatorium odoratum [<i>E. villosum</i> of authors]		C,G	F	-
Eupatorium serotinum		H,C,G	M,F	-
Flaveria linearis (C+)	yellowtop	H,C	M,F	S
Flaveria trinervia (U)	annual yellowtop	H,C,G	F	-
Gaillardia pulchella (CU+++)	blanket flower	C,G	-	-
Gnaphalium falcatum [<i>Gnaphalium falcatum</i>]	a cudweed	H	-	-
Helianthus annuus (E)	annual sunflower	C	-	-
Helianthus debilis ssp. <i>debilis</i>	dune sunflower	H,C,G	M,F	S
Heterotheca subaxillaris	camphorweed	-	F	-
Iva imbricata	beach-elder	H,C,G	M,F	S
Lactuca graminifolia	wild lettuce	-	F	-
Melanthera angustifolia [<i>Melanthera nivea</i> of authors in part]	narrow-leaved black-anthers	-	M	-
Melanthera aspera [<i>M. brevifolia</i> ; <i>M. deltoidea</i> ; <i>M. nivea</i> of authors in part]	coastal black-anthers	-	M,F	S
Melanthera parvifolia	Everglades black-anthers	-	-	S

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<i>Mikania batatifolia</i> [<i>M. scandens</i> of authors in part]	a climbing hempweed	H,C	M,F	-
<i>Pectis glaucescens</i> [<i>P. leptoccephala</i>]	tea-blinkum	H,G	M	-
<i>Pectis prostrata</i>		H,G	-	-
<i>Pluchea carolinensis</i> [<i>P. symphytifolia</i> ; <i>P. odorata</i> of authors]	shrub fleabane	H,C,G	M,F	-
<i>Pluchea odorata</i> [<i>P. petiolata</i> of authors; <i>P. camphorata</i> of authors]	saltmarsh fleabane	H,C,G	M,F	-
<i>Pterocaulon pycnostachyum</i> [<i>P. undulatum</i>]	rabbit-tobacco	-	M	-
<i>Solidago leavenworthii</i> [<i>S. gigantea</i> of authors in part]	a goldenrod	H,C,G	M	-
<i>Solidago sempervirens</i> var. <i>mexicana</i>	a goldenrod	H	F	-
<i>Solidago stricta</i>	narrow-leaved goldenrod	H	-	-
<i>Sonchus asper</i> (E)	spiny sow-thistle	H,C	-	-
<i>Sonchus oleraceus</i> (E)	common sow-thistle	H,C	F	S
<i>Tridax procumbens</i> (E)	brittleweed	H,C,G	-	-
<i>Verbesina encelioides</i> (E) [<i>Pterophyton helianthoides</i> of authors]	Western crownbeard	-	M	-
<i>Verbesina virginica</i> var. <i>laciniata</i> [<i>Phaethusa laciniata</i>]	a crownbeard	H,C	M,F	-
<i>Verbesina virginica</i> var. <i>virginica</i> [<i>Phaethusa virginica</i>]	a crownbeard	G	M	-
<i>Wedelia trilobata</i> (E)	wedelia	H,C,G	M,F	-
<i>Youngia japonica</i> (E)	rocketweed	C,G	-	-
AVICENNIACEAE				
<i>Avicennia germinans</i> (C+) [<i>Avicennia nitida</i>]	black mangrove	H,C,G	M,F	S
BATIDACEAE				
<i>Batis maritima</i>	saltwort	-	M,F	S
BORAGINACEAE				
<i>Argusia gnaphalodes</i> [<i>Mallatonia gnaphalodes</i>]	sea-lavender	H,C	M	S
<i>Bouyeria ovata</i> (C++)	Bahama strongbark	C	Go	-
<i>Cordia sebestena</i> (CU+) [<i>Sebestena sebestena</i>]	geiger tree	H,C,G	-	S
<i>Heliotropium angiospermum</i> [<i>H. parviflorum</i> ; <i>Schobera angiosperma</i>]	scorpion-tail	H,C,G	M,F	S
<i>Heliotropium curassavicum</i> (U)	seaside heliotrope	H,C,G	F	-
<i>Heliotropium polyphyllum</i> var. <i>leavenworthii</i> (U)	pineland heliotrope	H,C,G	M	-
BRASSICACEAE				
<i>Cakile lanceolata</i> ssp. <i>fusiformis</i> [<i>C. cakile</i> of authors]	sea-rocket	H,C	M,F	S

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<i>Lepidium virginicum</i>	pepper-grass	H,C,G	M,F	-
BURSERACEAE				
<i>Bursera simaruba</i> (C+)	gumbo-limbo	H,C,G	F	-
CACTACEAE				
<i>Hylocereus undatus</i> (E) [<i>Cereus undatus</i>]	night-blooming cereus	H,C,G	-	-
<i>Opuntia cochenillifera</i> (E)	cochineal cactus	C	-	-
<i>Opuntia humifusa</i> var. <i>austrina</i> [<i>O. austrina</i>]	a prickly-pear cactus	-	F	S
<i>Opuntia stricta</i>	a prickly-pear cactus	H,C	-	-
CAPRIFOLIACEAE				
<i>Sambucus simpsonii</i> [<i>S. canadensis</i> of authors in part]	southern elderberry	H,C,G	-	-
CARICACEAE				
<i>Carica papaya</i> (E)	papaya	H,C,G	M,F	S
CARYOPHYLLACEAE				
<i>Drymaria cordata</i> (U)	West Indian chickweed	G	-	-
CASUARINACEAE				
<i>Casuarina glauca</i> (E)	suckering Australian-pine	-	F	-
<i>Casuarina litorea</i> (E) [<i>C. equisetifolia</i>]	an Australian-pine	H,C,G	M	-
CELASTRACEAE				
<i>Crossopetalum rhamna</i> (C++)	rhamna	C	F	S
CHENOPODIACEAE				
<i>Atriplex arenaria</i> [<i>A. cristata</i> of authors in part; <i>A. pentandra</i> of authors in part]	beach orach	H	F	S
<i>Chenopodium ambrosioides</i> (U) [<i>C. anthelminticum</i> ; <i>Ambrina</i> <i>ambrosioides</i>]	Mexican-tea	H,G	M,F	S
<i>Salicornia bigelovii</i>	annual glasswort	-	-	S
<i>Salicornia virginica</i> [<i>Salicornis perennis</i>]	perennial glasswort	-	M,F	S
<i>Suaeda linearis</i> [<i>Dondea linearis</i>]	sea-blite	H	M,F	S

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CHRYSOBALANACEAE				
<i>Chrysobalanus icaco</i> (C+)	coco-plum	H,C	M,F	S
<i>Licania michauxii</i> [<i>Geobalanus oblongifolius</i>]	gopher-apple	-	M,F	S
COMBRETACEAE				
<i>Bucida bucerus</i> X <i>B. spinosa</i> (CE)	black-olive	C	-	-
<i>Conocarpus erecta</i> (C+)	buttonwood	H,C,G	M,F	S
<i>Laguncularia racemosa</i> (C+)	white mangrove	H,C,G	M,F	S
<i>Terminalia catappa</i> (E)	tropical-almond	C	M,F	-
CONVOLVULACEAE				
<i>Dichondra caroliniensis</i>	pony-foot	H,G	-	-
<i>Evolvulus sericeus</i>	creeping morning-glory	-	M	-
<i>Ipomoea alba</i>	common moonflowers	C,G	F	-
<i>Ipomoea hederifolia</i>	a morning-glory	C	-	-
<i>Ipomoea indica</i> [<i>I. acuminata</i> ; <i>Pharbitis cathartica</i>]	purple morning-glory	H,C,G	M,F	S
<i>Ipomoea pes-caprae</i> ssp. <i>brasiliensis</i>	railroad vine	H,C,G	M,F	S
<i>Ipomoea stolonifera</i>	beach morning-glory	C	-	S
<i>Ipomoea triloba</i>	three-lobed morning-glory	H,C	-	-
<i>Ipomoea violacea</i> [<i>I. macrantha</i> ; <i>I. tuba</i>]	coastal moonflowers	G	F	-
<i>Jacquemontia reclinata</i>	beach jacquemontia	-	F	S
<i>Merrenia dissecta</i> [<i>Operculina dissecta</i>]	baby wood-rose	-	M	-
CRASSULACEAE				
<i>Kalanchoe cf. daigremontiana</i> (E)	Devil's-backbone	Cc		-
<i>Kalanchoe pinnata</i> (E) [<i>Bryophyllum pinnatum</i> .]	common live-leaf	H,C	M,F	-
CUCURBITACEAE				
<i>Melothria pendula</i>	creeping cucumber	H,C	M,F	-
<i>Momordica charantia</i> (U)	wild balsam-apple	H,C,G	M,F	-
EBENACEAE				
<i>Diospyros virginiana</i>	persimmon	-	F	S
ELEOCARPACEAE				
<i>Muntigia calabura</i> (E)	strawberry-tree	C	-	-
ERICACEAE				
<i>Lyonia fruticosa</i> [<i>Xolisma fruticosa</i>]	staggerbush	-	M	-

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EUPHORBIACEAE				
<i>Acalypha chamaedrifolia</i>	three-seeded mercury	H	-	-
<i>Chamaesyce adenoptera</i> ssp. <i>pergamena</i>	a spurge	H	-	-
<i>Chamaesyce blodgettii</i>	a spurge	H,C,G	M,F	-
<i>Chamaesyce bombensis</i> [<i>C. ingallsii</i>]	sand dune spurge	H,G	F	S
<i>Chamaesyce hirta</i>		H,C,G	F	-
<i>Chamaesyce hypericifolia</i>	a spurge	C,G	M,F	-
<i>Chamaesyce lasiocarpa</i> (U)	a spurge	G	-	-
<i>Chamaesyce maculata</i> [<i>C. tymifolia</i> of authors]	milk-purslane	H,C	F	-
<i>Chamaesyce mesembryanthemifolia</i> [<i>C. buxifolia</i>]	seaside spurge	H,C,G	M	S
<i>Chamaesyce porteriana</i> var. <i>scoparia</i> [<i>C. scoparia</i>]	a spurge	-	M	-
<i>Chamaesyce ophthalmica</i> (U)	a spurge	H,G	-	-
<i>Cnidoscolus stimulosus</i> [<i>Bivonea stimolata</i>]	tread-softly	H,C,G	M,F	S
<i>Croton glandulosus</i> [Including <i>C. arenicola</i>]		H,C,G	M,F	S
<i>Croton punctatus</i>	beach croton	H,C,G	M,F	S
<i>Euphorbia graminea</i> (E)		G	-	-
<i>Euphorbia polyphylla</i> [<i>Tithymalopsis polyphylla</i>]	pineland euphorbia	-	M	-
<i>Euphorbia tirucalli</i> (E)	pencil-cactus	-	M	-
<i>Euphorbia trichotoma</i> [<i>Galarhoeus trichotomus</i>]		H	M,F	-
<i>Gymnanthes lucida</i> [<i>Ateramnus lucidus</i>]	crabwood	-	F,Go	-
<i>Phyllanthus abnormis</i> [<i>P. garberi</i>]		H,G	M,F	S
<i>Phyllanthus amarus</i>		H,G	F	-
<i>Phyllanthus caroliniensis</i> ssp. <i>saxicola</i>		G	-	-
<i>Phyllanthus tenellus</i> (U)		G	-	-
<i>Poinsettia cyathophora</i>	painted leaf	H,C,G	F	-
<i>Poinsettia heterophylla</i>	wild poinsettia	H,C,G	M	-
<i>Poinsettia pinetorum</i>	pineland poinsettia	-	M	-
<i>Ricinus communis</i> (E)	castor-bean	H,C,G	M,F	-
<i>Savia bahamensis</i> (CX)	maidenbush	H	-	-
<i>Stillingia sylvatica</i> ssp. <i>sylvatica</i> [<i>S. spathulata</i>]	a Queen's-delight	-	-	S
<i>Stillingia sylvatica</i> ssp. <i>tenuis</i> [<i>S. angustifolia</i>]	a Queen's-delight	-	-	S
FABACEAE				
<i>Abrus precatorius</i> (E)	rosary-pea	H,C	M,F	-
<i>Acacia pinetorum</i> [= <i>Vachellia peninsularis</i>]	pineland acacia	-	M	-
<i>Acacia farnesiana</i> (U)	sweet acacia	H,C	-	-
<i>Albizia lebbek</i> (E)	woman's-tongue	-	M	-
<i>Bauhinia</i> sp. (CE)	orchid-tree	H	-	-

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Caesalpinia bonduc [<i>C. crista</i> of authors; <i>Guilandina crista</i>]	gray nickerbean	H,C,G	M,F	S
Caesalpinia major [<i>Guilandina bonduc</i> of authors]	yellow nickerbean	-	M	-
Caesalpinia pulcherrima (E) [<i>Poinciana pulcherrima</i>]	dwarf poinciana	-	M	-
Cajanus cajan (E)	pigeon-pea	-	F	-
Canavalia rosea [<i>Canavali lineata</i>]	beach-bean	H,C,G	M,F	S
Chaemecrista nictitans var. <i>aspera</i> [<i>C. aspera</i> ; <i>Cassia aspera</i>]	a hairy partridge-pea	C,G	M,F	-
Crotalaria incana (E)	a rattlepod	H,C,G	M,F	S
Crotalaria pallida (E) [<i>C. mucronata</i> ; <i>C. striata</i>]	a rattlepod	-	M	-
Crotalaria pumila	dwarf rattlebox	H,C,G	M,F	S
Crotalaria rotundifolia var. <i>rotundifolia</i>	rabbit-bells	G	-	-
Dalbergia ecastophyllum [<i>Ecastophyllum ecastophyllum</i>]	coinvine	H,C	M,F	S
Dalea carnea [<i>Petalostemon carneus</i>]		-	M	S
Dalea carthaginensis ssp. <i>domingensis</i>		-	F	-
Delonix regia (E) [<i>Poinciana regia</i>]	royal poinciana	-	M	-
Desmanthus virgatus var. <i>depressus</i>		G	-	-
Desmodium incanum [<i>Desmodium canum</i>]	a beggar-ticks	H,C,G	F	-
Desmodium tortuosum (U) [<i>Meibomia purpurea</i>]		C	M,F	-
Desmodium triflorum (U)		G	-	-
Erythrina herbacea (C++)	coralbean	C,G	F	-
Galactia floridana [<i>G. regularis</i> of authors in part]	hairy milk-pea	H,C	M	-
Galactia volubilis [Including <i>G. parvifolia</i>]	a milk-pea	G	F	-
Indigofera spicata (E)	creeping indigo	H,G	-	-
Indigofera suffruticosa (U)	shrub indigo	H,C	-	-
Leucaena leucocephala (U) [<i>L. glauca</i>]	jumbie-bean	-	M,F	-
Macroptilium lathyroides (E)	wild-bean	H,C,G	-	-
Neptunia pubescens	neptunia	H	-	-
Piscidia piscipula (C++)	Jamaica-dogwood	C,G	Go	-
Pithecellobium dulce (E)	Manila-tamarind	C,G	M,F	-
Pithecellobium keyense (C+) [<i>P. guadelupense</i> of authors in part]	blackbead	H,C,G	M,F	S
Pithecellobium unguis-cati (CN)	cat's-claw	H	-	-
Rhynchosia minima (U)		-	F	-
Senna ligustrina (C+++) [<i>Cassia ligustrina</i>]	privet cassia	C,G	-	-
Senna mexicana var. <i>chapmanii</i> (C++) [<i>Cassia bahamensis</i> ; <i>Cassia chapmanii</i> ; <i>Peirania bahamensis</i>]	Bahama cassia	C,G	M	-
Senna obtusifolia (U) [<i>Cassia obtusifolia</i> ; <i>Emilista tora</i> of authors]	sickle-pod	H,C,G	M	-

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Senna occidentalis (U) [<i>Cassia occidentalis</i> ; <i>Ditremexa occidentalis</i>]	coffee senna	C,G	M	-
Senna pendula var. glabrata (E) [<i>Cassia coluteoides</i> ; <i>Adipera bicapsularis</i> of authors]		-	M	-
Sophora tomentosa var. truncata (C+)	necklace-pod	H,C,G	M,F	S
Strophostyles umbellata		-	M	-
Stylosanthes hamata	pencil-flower	H,G	-	-
Vicia acutifolia	sand vetch	-	M	-
Vigna luteola [<i>V. repens</i>]	cow-pea	H,C,G	M,F	-
FAGACEAE				
Quercus virginiana	live oak	-	F	-
FLACOURTIACEAE				
Flacourtia indica (E)	governor's-plum	-	F	-
GENTIANACEAE				
Eustoma exaltata	seaside gentian	H,C,G	M,F	-
GOODENIACEAE				
Scaevola plumieri	inkberry	H,C,G	M,F	S
Scaevola taccada (E)	beach naupaka	H,C,G	F	-
HYPERICACEAE				
Calophyllum cf. calaba (E) [<i>C. inophyllum</i> of authors]	beauty-leaf	H	F	-
Clusia rosea (CU+++)	pitch-apple	H,C	-	-
Hypericum tetrapetalum [<i>Ascyrum tetrapetalum</i>]	a St. John's-wort	-	M	-
LAMIACEAE				
Salvia occidentalis	West Indian sage	H,C,G	-	-
Salvia serotina	a sage	H,G	-	-
Scutellaria havanensis	a skullcap	H	-	-
Trichostema suffrutescens [<i>T. dichotomum</i> of authors in part]	a blue-curly	H,C	M,F	S
LAURACEAE				
Cassytha filiformis	love vine	-	M,F	S
Ocotea coriacea [<i>Nectandra coriacea</i>]	lancewood	H	F	-
Persea borbonia (C++) [<i>Tamala borbonia</i>]	red-bay	C	M,F	-

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LOASACEAE				
<i>Mentzelia floridana</i>	poor-man's-patch	H,C,G	M,F	-
LOGANIACEAE				
<i>Mitreola petiolata</i>	miterwort	-	M	-
<i>Polypremum procumbens</i>	rustweed	H,G	M,F	-
LYTHRACEAE				
<i>Ammannia latifolia</i>	tooth-cups	H,C	F	S
<i>Lythrum lineare</i>	a loosestrife	-	M	S
MALPIGHIACEAE				
<i>Byrsonima lucida</i>	locustberry	-	Go	-
MALVACEAE				
<i>Abutilon permolle</i>	Indian mallow	H	-	-
<i>Hibiscus tileaceus</i> (E)	sea mahoe	Cc	-	-
<i>Kosteletzkya althaeifolia</i> [<i>Kosteletzkya virginica</i> of authors in part]	a saltmarsh mallow	C,G	M	S
<i>Malvastrum corchorifolium</i>	false mallow	H,C	-	-
<i>Sida abutilifolia</i> (U) [<i>S. procumbens</i>]		-	M	-
<i>Sida acuta</i>	broomweed	H,C,G	F	-
<i>Sida rhombifolia</i>	teaweed	C	M	-
<i>Thespesia populnea</i> (E)	seaside mahoe	H,C	M,F	-
<i>Urena lobata</i> (U)	Ceasar's-weed	C	F	-
MELIACEAE				
<i>Swietenia mahagoni</i> (CX)	West Indian mahogany	H,C	-	-
MORACEAE				
<i>Ficus aurea</i> (C+)	strangler fig	H,C,G	F	-
<i>Ficus citrifolia</i> (C++)	short-leaf fig	C	Go	-
<i>Ficus microcarpa</i> (E) [<i>F. retusa</i> cv. <i>Nitida</i>]	laurel fig	H	-	-
<i>Ficus religiosa</i> (E)	bo tree	-	M	-
<i>Ficus sycamorus</i> (E)	sycamore fig	-	M	-
<i>Morus rubra</i>	red mulberry	-	M	-
MORINGACEAE				
<i>Moringa oleifera</i> (E) [<i>M. moringa</i>]	horseradish tree	-	M	-
MYRICACEAE				
<i>Myrica cerifera</i> (C++) [<i>Certhamnus ceriferus</i>]	wax-myrtle	C	M,F	S

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MYRSINACEAE				
<i>Ardisia escallonioides</i> [<i>Icacorea paniculata</i>]	marlberry	H	M,F	-
<i>Myrsine floridana</i> (C++) [<i>M. guaianensis</i> of authors; <i>Rapanea guaianensis</i> of authors]	myrsine	C	M,F	S
MYRTACEAE				
<i>Calyptranthes pallens</i> (C+++)	spicewood	C	-	-
<i>Eugenia axillaris</i> (C+)	white stopper	H,C	F,Go	-
<i>Eugenia foetida</i> (C+) [<i>E. buxifolia</i> ; <i>E. myrtoides</i>]	Spanish stopper	H,C,G	M,F	S
<i>Eugenia uniflora</i> (E)	Surinam-cherry	C	-	-
<i>Psidium guajava</i> (E)	guava	C	M	-
NYCTAGINACEAE				
<i>Boerhavia diffusa</i> (U) [<i>B. coccinea</i>]	red spiderling	H,G	M	-
<i>Guapira discolor</i> var. <i>longifolia</i> (C+) [<i>Torrubia longifolia</i>]	narrow-leaved blolly	H,C,G	F	S
<i>Mirabilis jalapa</i> (E)	four-o'clock	C,G	-	-
<i>Okenia hypogaea</i>	beach-peanut	H,C	M,F	S
OLACACEAE				
<i>Schoepfia schreberi</i> [<i>S. chrysophylloides</i>]	Gulf graytwig	-	-	S
<i>Ximenia americana</i>	tallowwood	-	-	S
OLEACEAE				
<i>Forestiera segregata</i> var. <i>segregata</i> (C+) [Including <i>F. porulosa</i>]	Florida-privet	H,C	F	S
<i>Jasminum dichotomum</i> (E)	Gold Coast jasmine	H	-	-
<i>Jasminum fluminense</i> (E)	corky-stemmed jasmine	-	F	-
ONAGRACEAE				
<i>Gaura angustifolia</i> var. <i>simulans</i> [<i>G. simulans</i>]		H,C,G	M,F	S
<i>Ludwigia lanceolata</i> [<i>L. alata</i> of authors]		-	M	-
<i>Ludwigia nurocarpa</i>		-	M	-
<i>Ludwigia octovalvis</i>	a primrose-willow	H,C	F	-
<i>Ludwigia repens</i> [<i>Isnardia intermedia</i>]		-	M	-
<i>Oenothera humifusa</i> [<i>Raimannia humifusa</i>]	seaside evening-primrose	H,G	M	S
<i>Oenothera laciniata</i>	cut-leaf evening-primrose	C	-	-

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OXALIDACEAE				
<i>Oxalis corniculata</i> (U)	creeping sour-grass	H,C,G	-	-
PAPAVERACEAE				
<i>Argemone mexicana</i>	Mexican poppy	H,C	M	-
PASSIFLORACEAE				
<i>Passiflora suberosa</i>	corky-stemmed passion-flower	H,C,G	F	-
PHYTOLACCACEAE				
<i>Phytolacca americana</i> [Including <i>P. rigida</i>]	pokeweed	H,C,G	F	-
<i>Rivina humilis</i>	rougeplant	H,C,G	M	S
PLANTAGINACEAE				
<i>Plantago virginica</i>	southern plantain	H	-	-
PLUMBAGINACEAE				
<i>Limonium carolinianum</i> [<i>L. brasiliense</i> of authors]	salt marsh-rosemary	-	F	S
<i>Plumbago scandens</i>	wild plumbago	H,C,G	-	-
POLYGALACEAE				
<i>Polygala grandiflora</i> [<i>Asemeia grandiflora</i> ; including <i>P. krugii</i>]	candyweed	H,C	M,F	S
<i>Polygala polygama</i>		-	F	-
POLYGONACEAE				
<i>Coccoloba diversifolia</i> (C+)	pigeon-plum	H,C	F	-
<i>Coccoloba uvifera</i> (C+)	sea-grape	H,C,G	M,F	S
<i>Eriogonum longifolium</i> var. <i>gnaphalifolium</i> [<i>E. floridanum</i>]	scrub-buckwheat	-	M	-
<i>Polygonum hydropiperoides</i> [<i>Persicaria opelousana</i> ; <i>P. persicaria</i> of authors]	water-pepper	-	M	-
PORTULACACEAE				
<i>Portulaca oleracea</i> (U)	purslane	H,C,G	F	S
<i>Portulaca pilosa</i>	pink purslane	H	-	-
<i>Portulaca rubricaulis</i> [<i>P. phaeosperma</i>]	a purslane	-	M	-
PRIMULACEAE				
<i>Samolus ebracteatus</i>	water pimpernel	H,C	-	-

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<i>Samolus valerandi</i> var. <i>parviflorus</i> [<i>S. floribundus</i>]	pineland pimpemel	-	M	-
PROTEACEAE				
<i>Grevillea robusta</i> (E)	silk-oak	-	M	-
RHAMNACEAE				
<i>Colubrina asiatica</i> (E)	latherleaf	H,C,G	F	-
<i>Gouania lupuloides</i>	chewstick	H	-	-
<i>Krugiodendron ferreum</i> (C++)	black ironwood	C	Go	-
<i>Reynosa septentrionalis</i>	darling-plum	-	F,Go	-
RHIZOPHORACEAE				
<i>Rhizophora mangle</i> (C+)	red mangrove	H,C,G	M,F	S
RUBIACEAE				
<i>Chiococca alba</i>	common snowberry	H,C	F	S
<i>Chiococca parvifolia</i>	pineland snowberry	H,C,G	F	-
<i>Diodia virginiana</i>	buttonweed	-	F	-
<i>Ernodea littoralis</i> var. <i>littoralis</i>	beach-creeper	H,G	M,F	S
<i>Erithalis fruticosa</i> (C+)	black-torch	C	-	S
<i>Galium hispidulum</i> [<i>G. bermudense</i> of authors]	a bedstraw	H	M,F	-
<i>Genipa clusiifolia</i> [<i>Casasia clusiifolia</i>]	seven-year-apple	H,C,G	M,F	S
<i>Hamelia patens</i> (C+++)	firebush	C	-	-
<i>Hedyotis procumbens</i>	innocence	H	-	-
<i>Oldenlandia corymbosa</i> (U)		G	-	-
<i>Morinda citrifolia</i> (E)		H,C	-	-
<i>Morinda royoc</i>	yellowroot	H,C	F	S
<i>Psychotria ligustrifolia</i> [<i>P. bahamensis</i>]	bahama-coffee	-	M	-
<i>Psychotria nervosa</i> (C+) [<i>P. undata</i>]	shiny-leaved wild coffee	H,C	M,F	S
<i>Randia aculeata</i> (C+)	white indigoberry	H,C	M,F	S
<i>Richardia grandiflora</i> (E)		H,G	-	-
<i>Spermacoce assurgens</i> (<i>Borreria laevis</i> of authors)		H,C,G	-	-
<i>Spermacoce verticillata</i> s.str. (E) [Not including <i>S. terminalis</i>]		H,C,G	F	-
<i>Spermacoce tenuior</i>		-	F	-
RUTACEAE				
<i>Citrus aurantifolia</i> (E)	Key lime	H	M	-
<i>Citrus aurantium</i> (E)	sour orange	H	-	-
<i>Zanthoxylum clava-herculis</i>	Hercules'-club	-	F	-
<i>Zanthoxylum coriaceum</i> (C+)	Biscayne prickly-ash	H,C	F	S
<i>Zanthoxylum fagara</i> (C+++)	wild-lime	C	-	-

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Solanum donianum [<i>S. blodgettii</i>]	Blodgett's-potato	-	M	-
Solanum erianthum (U)	potatowood	C	-	-
Solanum seforthianum (E)	West Indian nightshade	H,C	-	-
STERCULIACEAE				
Melochia corchorifolia (E)	chocolate-weed	H	-	-
Waltheria indica	waltheria	H,G	F	-
SURIANACEAE				
Suriana maritima (C+)	bay-ceder	H,C,G	M,F	S
TILIACEAE				
Triumfetta semitriloba (U)	burweed	G	-	-
TURNERACEAE				
Piriqueta caroliniana var. <i>caroliniana</i> [Including <i>P. tomentosa</i>]	hairy piriqueta	H,C	M	S
Turnera ulmifolia (E)		C,G	-	-
ULMACEAE				
Trema micranthum	Florida trema	H,C,G	F	-
URTICACEAE				
Boehmeria cylindrica var. <i>drummondiana</i> [<i>B. drummondiana</i>]	button-hemp	H,C	M,F	-
Parietaria floridana	pellitory	H	-	-
Pilea herniarioides	artillery-fern	H,C	-	-
VERBENACEAE				
Callicarpa americana (C++)	American beautyberry	C	M,F	-
Citharexylum fruticosum (C++)	fiddlewood	-	F	-
Glandularia maritima	beach verbena	-	M	S
Lantana camara (E)	shrub verbena	H,G	M,F	-
Lantana depressa var. <i>floridana</i> [<i>L. ovatifolia</i> of authors]	east coast lantana	H,C,G	M,F	S
Lantana involucrata (C+) [<i>L. odora</i> of authors]	wild-sage	H,C,G	M,F	S
Lantana camara X <i>L. depressa</i> var. <i>floridana</i> (E)		H,G	-	-
Phyla nodiflora [<i>Lippia nodiflora</i>]	creeping-charlie	H,G	M,F	-
Stachytarpheta jamaicensis [<i>Valerianoides jamaicensis</i>]	blue porterweed	H,C,G	M	S
Verbena bonariensis (E)		H	-	-
Verbena scabra	harsh verbena	H,G	-	-

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SALICACEAE				
<i>Salix caroliniana</i> (C+) [Including <i>S. amphibia</i>]	Coastal Plain willow	C,G	M,F	-
SAPINDACEAE				
<i>Cardiospermum microcarpum</i>	balloon-vine	G	-	-
<i>Cardiospermum halicacabum</i>	balloon-vine	H,C	-	-
<i>Dodonaea viscosa</i> var. <i>viscosa</i>	broad-leaved varnish-leaf	H,C,G	-	-
<i>Exothea paniculata</i> (C++)	inkwood	C,G	F,Go	-
<i>Sapindus saponaria</i>	soapberry	H,C	F	-
SAPOTACEAE				
<i>Manilkara zapota</i> (E) [<i>Sapota achras</i>]	sapodilla	C	M,F	-
<i>Sideroxylon foetidissimum</i> (C+) [<i>Masticodendron foetidissimum</i>]	wild mastic	H,C	Go	-
<i>Sideroxylon salicifolia</i> (C+) [<i>Bumelia salicifolia</i> ; <i>Dipholis salicifolia</i>]	willow-bustic	H,G	-	-
SCROPHULARIACEAE				
<i>Agalinis</i> cf. <i>fasciculata</i> ⁶ [Including <i>A. purpurea</i>]	a false-foxglove	-	M	S
<i>Bacopa monnieri</i>	water hyssop	H,C,G	F	-
<i>Buchnera floridana</i> [<i>B. elongata</i> of authors]	Florida bluehearts	-	-	S
<i>Capraria biflora</i>	goatweed	H,C,G	-	-
<i>Russellia equisetiformis</i> (E)	firecracker	C	-	-
<i>Scoparia dulcis</i>	sweet-broom	H	-	-
SIMAROUBACEAE				
<i>Simarouba glauca</i> (C+)	paradise tree	H,C,G	M	-
SOLANACEAE				
<i>Capsicum annuum</i> var. <i>glabriusculum</i>	a bird pepper	H	-	-
<i>Cestrum diurnum</i> (E)	day-jessamine	H,C,G	M	-
<i>Lycium carolinianum</i>	Christmas-berry	-	F	S
<i>Lycopersicon esculentum</i> (E)	tomatoe	H,C	-	-
<i>Physalis angulata</i> var. <i>angulata</i>	a ground-cherry	G	-	-
<i>Physalis walteri</i> [<i>P. viscosa</i> var. <i>maritima</i>]	a ground-cherry	H,G	F	S
<i>Solanum americanum</i> [<i>S. nigrum</i> of authors]	common nightshade	H,C,G	M,F	-
<i>Solanum bahamense</i>	cankerberry	H,C	M,F	S
<i>Solanum capsicoides</i> [<i>S. aculeatissimum</i> of authors]		-	M	-

⁶ Small recorded *A. purpurea* for the Upper Sandy Keys; MacAllister recorded *A. fasciculata*. Herbarium specimens should be examined to determine which taxon was actually there.

Scientific Name [Common Name]	Common Name	Cape Florida	Key Biscayne	Upper Sandy Keys
VITACEAE				
<i>Ampelopsis arborea</i> (C+++)		G	-	-
<i>Cissus sicyoides</i> (C+++)	possum-grape	C,G	-	-
<i>Parthenocissus quinquefolia</i>	Virginia creeper	H,C,G	M,F	S
<i>Vitis rotundifolia</i> (C++)	muscadine	G	M,F	-
[Including <i>V. munsoniana</i> = <i>Muscadina munsoniana</i>]				

ZYGOPHYLLACEAE

<i>Kallstroemia maxima</i> (E)	caltrop	C	-	-
<i>Tribulus cistoides</i> (U)	puncture-weed	H,C,G	F	-

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

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

APPENDIX B
CAPE FLORIDA WILDLIFE LIST
(taxa observed since July 1994)

Scientific Name	Common Name	GFC ²	USFWS ³	CITES ⁴
<u>VERTEBRATES</u>				
MAMMALS				
Procyon lotor	Raccoon			
Rattus rattus	Black rat			
Sciurus carolinensis	Eastern gray squirrel			
Sylvilagus transitionalis	Marsh rabbit			
Trichechus manatus	Manatee	E ⁵	E	I ⁶
Tursiops truncatus	Atlantic bottlenose dolphin			
BIRDS				
<u>Loons</u>				
Gavia immer	Common loon			
<u>Grebes</u>				
Podilymbos podiceps	Pied-billed grebe			
<u>Pelicans</u>				
Pelecanus occidentalis	Brown pelican	SSC ⁷		
<u>Comorants</u>				
Phalacrocorax auritus	Double-crested comorant			

² Florida Game and Freshwater Fish Commission

³ United States Fish and Wildlife Service

⁴ Convention on International Trade in Endangered Species of Wild Fauna and Flora

⁵ Endangered

⁶ Appendix I Species (CITES)

⁷ Species of Special Concern

Scientific Name	Common Name	GFC	USFWS	CITES
<u>Darters</u>				
Anhinga anhinga	Anhinga			
Scientific Name	Common Name			
<u>Frigatebirds</u>				
Fregata magnificens	Magnificent frigatebird			
<u>Hérons, bitterns</u>				
Ardea herodias	Great blue heron			
Bubulcus ibis	Cattle egret			
Butorides striatus	Green-backed heron			
Casmerodius albus	Great egret			
Egretta thula	Snowy egret		SSC	
Florida caerulea	Little blue heron		SSC	
Hydranassa tricolor	Tricolored heron		SSC	
<u>Ibises</u>				
Eudocimus albus	White ibis		SSC	
<u>Waterfowl</u>				
Anas discors	Blue-winged teal			
Mergus serrator	Red-breasted merganser			
<u>American vultures</u>				
Cathartes aura	Turkey vulture			
<u>Hawks, eagles, etc</u>				
Circus cyaneus	Northern harrier			II ⁸
Elanoides forficatus	American swallow-tailed kite			
<u>Ospreys</u>				
Pandion halaetus	Osprey			II
<u>Falcons</u>				
Falco columbarius	Merlin			II
Falco sparverius	American kestrel			II
Falco peregrinus	Peregrin falcon	E	T ⁹	I

⁸ Appendix II Species (CITES)

⁹ Threatened

Scientific Name	Common Name	GFC	USFWS	CITES
<u>Stilts, avocets</u>				
Himantopus mexicanus	Black-necked stilt			
<u>Plovers</u>				
Charadrius semipalmatus	Semipalmated plover			
Charadrius vociferus	Killdeer			
Pluvialis squatarola	Black-bellied plover			
<u>Sandpipers</u>				
Actitis macularia	Spotted sandpiper			
Arenaria interpres	Ruddy turnstone			
Calidris alba	Sanderling			
Calidris mauri	Western sandpiper			
Calidris minutilla	Least sandpiper			
Calidris pusilla	Semipalmated sandpiper			
Catoptrophorus semipalmatus	Willet			
Gallinago gallinago	Common snipe			
Numenius phaeopus	Whimbrel			
Tringa flavipes	Lesser yellowlegs			
Tringa melanoleuca	Greater yellowlegs			
<u>Gulls, terns</u>				
Larus argentatus	Herring gull			
Larus philadelphia	Bonaparte's gull			
Sterna albifrons	Least tern		T	
Sterna caspia	Caspian tern			
Sterna maxima	Royal tern			
<u>Pigeons, doves</u>				
Columba livia	Rock dove			
Columbina passerina	Ground dove			
Zenaidura macroura	Mourning dove			
<u>Parrots, parakeets</u>				
Aratinga holochlora	Green parakeet			
Myiopsitta monachus	Monk parakeet			
<u>Cucoos, etc.</u>				
Crotophaga ani	Smooth-billed ani			

Scientific Name	Common Name	GFC	USFWS	CITES
<u>Owls</u>				
Athene cunicularia	Burrowing owl			
Otus asio	Eastern screech owl			
<u>Goatsuckers</u>				
Caprimulgus carolinensis	Chuck-will's-widow			
Chordeiles minor	Common nighthawk			
<u>Kingfishers</u>				
Megaceryle alcyon	Belted kingfisher			
<u>Woodpeckers</u>				
Melanerpes carolinus	Red-bellied woodpecker			
<u>Flycatchers</u>				
Contopus virens	Eastern wood-pewee			
Tyrannus dominicensis	Gray kingbird			
<u>Swallows</u>				
Hirundo rustica	Barn swallow			
Stelgidopteryx serripennis	Northern rough-winged swallow			
<u>Jays, crows</u>				
Corvus ossifragus	Fish crow			
<u>Mimic thrushes</u>				
Dumetella carolinensis	Gray catbird			
Mimus polyglottos	Northern mockingbird			
<u>Thrushes</u>				
[Oenanthe oenanthe	Northern wheatear]			
<u>Kinglets</u>				
Polioptila caerulea	Blue-gray gnatcatcher			
<u>Shrikes</u>				
Lanius ludovicianus	Loggerhead shrike		C2 ¹⁰	

¹⁰ A candidate for federal listing for which there is enough substantial information on biological vulnerability, but for which not enough information exists to justify listing.

Scientific Name	Common Name	GFC	USFWS	CITES
<u>Starlings</u>				
<i>Sturnus vulgaris</i>	European starling			
<u>Vireos</u>				
<i>Vireo olivaceus</i>	Red-eyed vireo			
<u>Wood warblers</u>				
<i>Dendroica caerulescens</i>	Black-throated blue warbler			
<i>Dendroica dominica</i>	Yellow-throated warbler			
<i>Dendroica palmarum</i>	Palm warbler			
<i>Dendroica tigrina</i>	Cape May warbler			
<i>Geothlypis trichas</i>	Common yellowthroat			
<i>Mniotilta varia</i>	Black and White warbler			
<i>Parula americana</i>	Northern parula			
<i>Setophaga ruticilla</i>	American redstart			
<u>Blackbirds, orioles</u>				
<i>Agelaius phoeniceus</i>	Red-winged blackbird			
<i>Icterus galbula</i>	Baltimore oriole			
<i>Quiscalus major</i>	Boat-tailed grackle			
<u>Finches, sparrows, etc.</u>				
<i>Cardinalis cardinalis</i>	Northern cardinal			
REPTILES				
<u>Lizards</u>				
<i>Anolis sagrei</i>	Brown anole			
<i>Anolis carolinensis</i>	Green anole			
<i>Eumeces inexpectatus</i>	Southeastern five-lined skink			
<i>Sphaerodactylus notatus</i>	Reef gecko			
[<i>Varanus exanthematicus orbicularis</i>	Savannah monitor]			
<u>Tortoises and turtles</u>				
<i>Caretta caretta</i>	Loggerhead turtle	T	T	I
<i>Terrapene carolina bauri</i>	Florida box turtle			
<i>Trionyx ferox</i>	Florida softshell			
<u>Snakes</u>				
<i>Coluber constrictor paludicola</i>	Everglades racer			
<i>Diadophis punctatus edwardsi</i>	Southern ringneck snake			
<i>Elaphe guttata guttata</i>	Corn snake			

Scientific Name	Common Name	GFC	USFWS	CITES
<i>Elaphe obsoleta rossalleni</i>	Everglades rat snake			
<i>Storeria dekayi victa</i>	Florida brown snake			

AMPHIBIANS

<i>Eleutherodactylus planirostris planirostris</i>	Greenhouse frog			
<i>Hyla cinerea</i>	Green treefrog			
<i>Osteopilus septentrionalis</i>	Cuban treefrog			

FISHES

<i>Gambusia</i> sp.	Mosquito fish			
---------------------	---------------	--	--	--

INVERTEBRATES

INSECTS

Butterflies and moths

<i>Agraulis vanillae nigrior</i>	Gulf fritillary			
<i>Anartia iatrophe guantanamo</i>	White peacock			
<i>Ascia monuste phileta</i>	Great southern white			
<i>Danaus gilippus berenice</i>	Queen butterfly			
<i>Danaus plexippus plexippus</i>	Monarch butterfly			
<i>Heliconius charitonius tuckeri</i>	Zebra longwing			
<i>Papilio cresphontes</i>	Giant swallowtail			
<i>Pyrgus oileus oileus</i>	Tropical checkered skipper			
<i>Urbanus proteus</i>	Long-tailed skipper			
...	Push moth			
...	Sphinx moth species			

ARACHNIDS

Spiders

...	Brown widow			
...	Southern black widow			

Species status designations are from Official Lists of Endangered & Potentially Endangered Fauna and Flora in Florida: 1 June 1994 published by the Florida Game and Freshwater Fish Commission.

Compiled by Elizabeth Carter, 8/95.

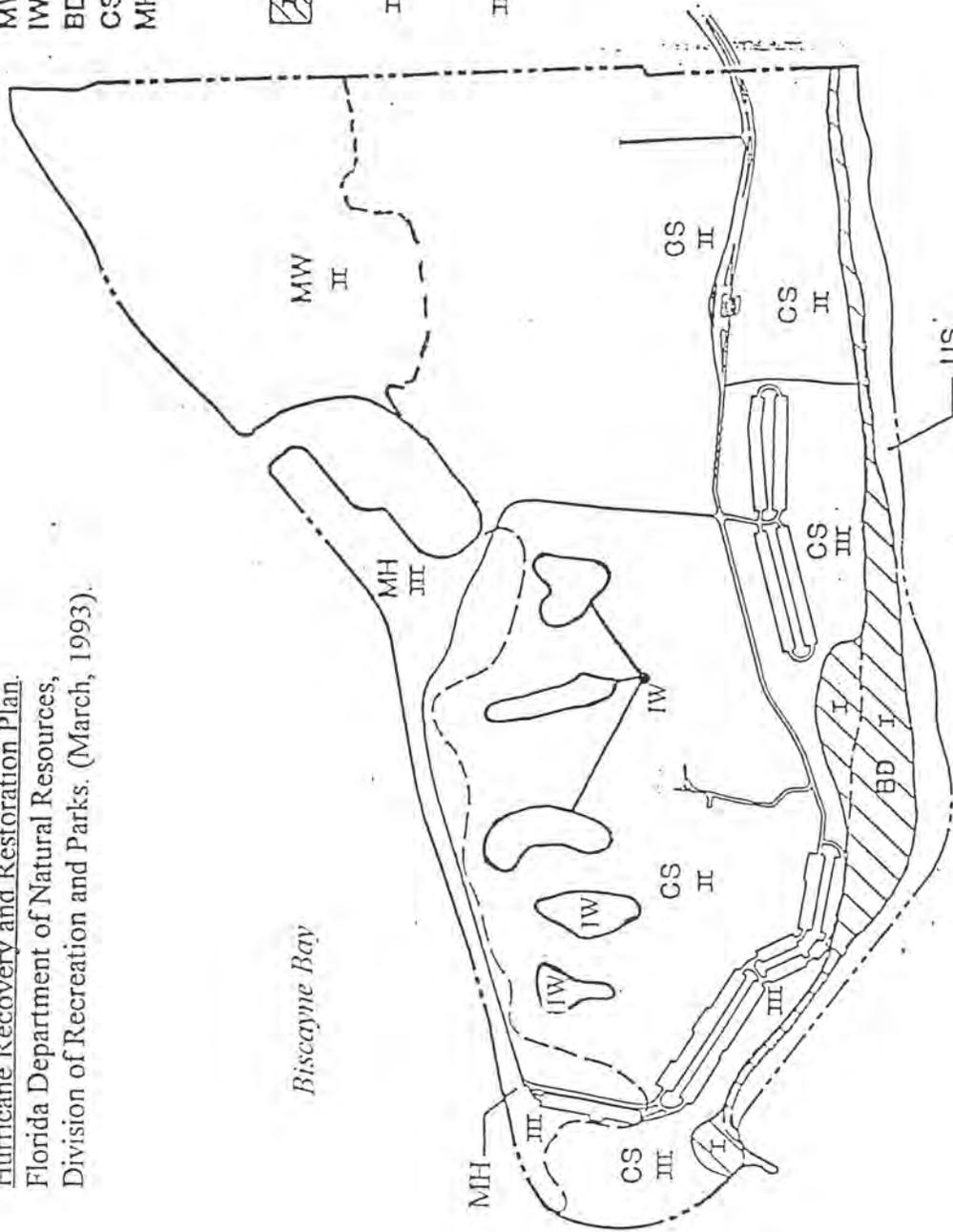
Reference: "Ecological Restoration Zoning Plan".
Hurricane Recovery and Restoration Plan.
Florida Department of Natural Resources,
Division of Recreation and Parks. (March, 1993).

LEGEND

- MW MANGROVE WETLANDS
- IW ISOLATED WETLANDS
- BD BEACH DUNE
- CS COASTAL STRAND
- MH MARITIME HAMMOCK

STRATEGIES

- II CONSERVATION AREA, MAXIMUM PROTECTION AND GENETIC INTEGRITY
 - III RESTORATION OF ORIGINAL FUNCTION, MODERATE LEVEL OF GENETIC INTEGRITY
- INTENSIVE PUBLIC USE AREA, NATIVE AND CULTURALLY SIGNIFICANT PLANTS, SELECTED FOR SAFETY, CONVENIENCE AND ENJOYMENT OF VISITORS



Atlantic Ocean

BILL BAGGS CAPE FLORIDA
STATE RECREATION AREA

**ECOLOGICAL RESTORATION
ZONING PLAN**

APPENDIX D

CAPE FLORIDA PROJECT
EXOTICS CONTROL DATA SHEET

Date: _____ Start time - end time: _____ Total person-hours: _____

Names: _____

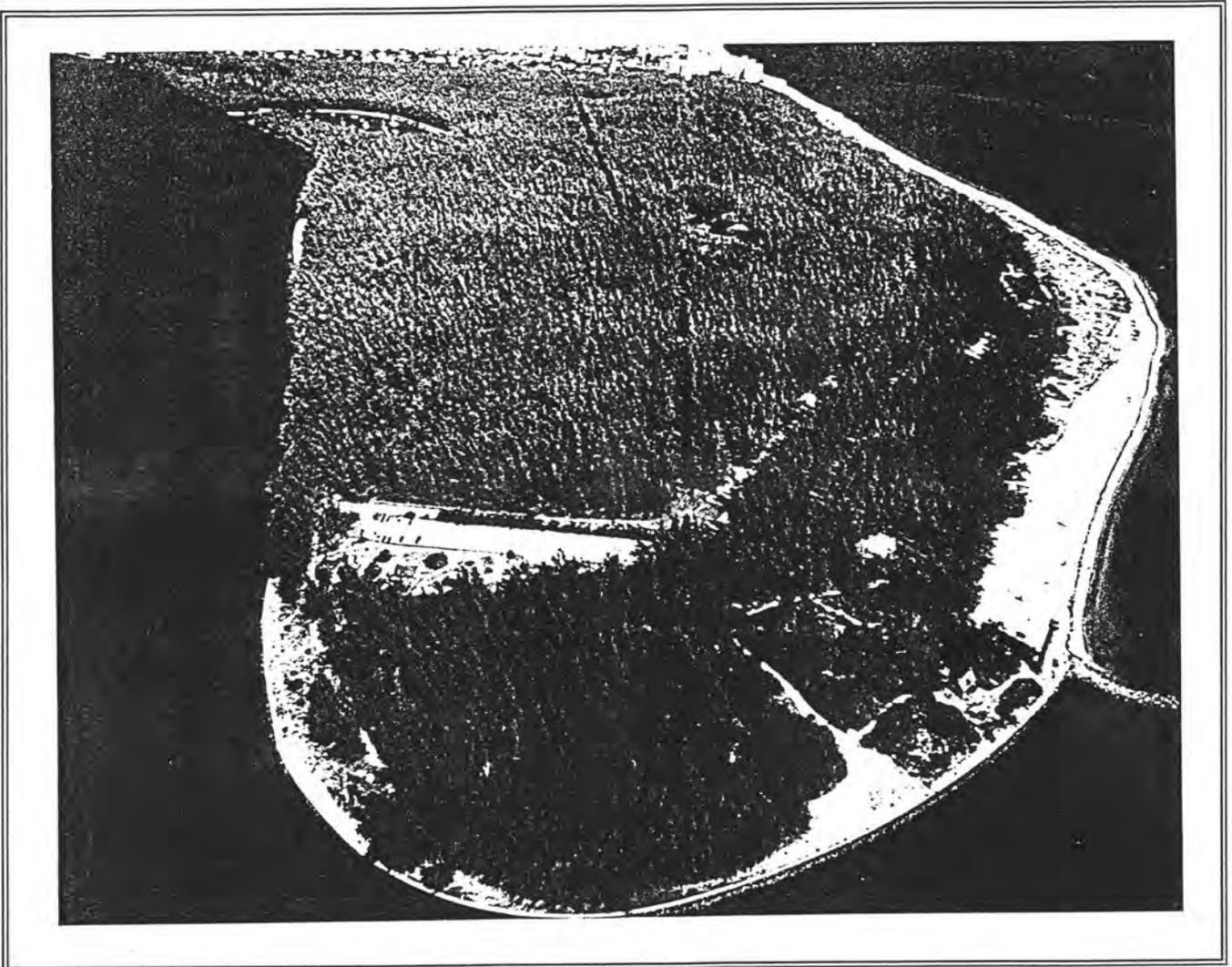
Removal location: _____

<u>Species</u>	<u>Age Class</u> *	<u>Number/Sq.Ft Removed</u>	<u>Removal Methods**</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
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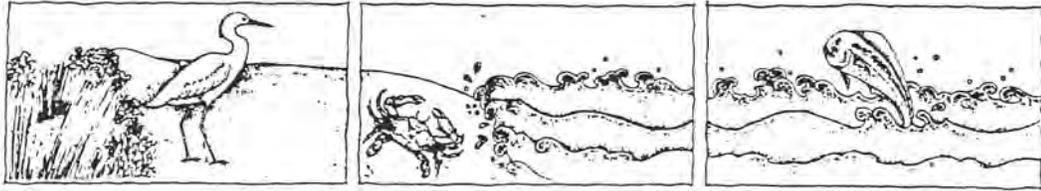
Comments/Weather Conditions: _____

*T = Tree/Mature (bearing flower, fruit or seed); Sp = Sapling/Immature (non-reproductive); Sd = Seedling
** P = Handpull; M = Mechanical removal; G3A = Garlon 3A; G4 = Garon 4; RU = Roundup; RO = Rodeo

APPENDIX E



Prior to Hurricane Andrew, the Cape Florida landscape was dominated by Australian-pines.



AMERICAN LITTORAL SOCIETY

CAPE FLORIDA PROJECT

September 29, 1996

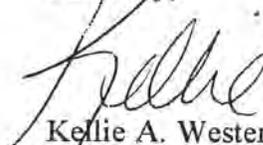
Mr. Richard Domroski
Florida Department of Environmental Protection
Division of Recreation and Parks
District 5 Administration
13798 SE Federal Highway
Hobe Sound, Florida 33455

Dear Dick:

Thank you forwarding your staff's comments on the Volunteer Restoration Manual. I have reviewed them and look forward to discussing the specific points that were raised at our meeting on October 7, 1996. Enclosed please find copies of comments from The Nature Conservancy, Society for Ecological Restoration, Fairchild Tropical Garden, South Florida Water Management District, and DERM. It may be helpful if those scheduled to attend the meeting had these ahead of time.

Thanks again.

Sincerely,


Kellie A. Westervelt
Project Director

RECEIVED

OCT 1 1996

DISTRICT V OFFICE

attachments

June 5, 1996

Kellie Westervelt
Cape Florida Project
P.O. Box 491228
Key Biscayne, Florida 33149-1228

Dear Kellie:

I have read the Cape Florida Project Volunteer Restoration Manual with interest. I really appreciate the attention to detail in the Manual and the documentation of our best understanding of the communities and the distribution of species. This Manual provides wonderful guidance for the continued restoration efforts at Cape Florida. Rarely do restoration projects have such detailed information. This documentation is critical since the project is so long-term and will be accomplished through the participation of so many people. I think that volunteers will be able to use this Manual, though I have a few suggestions for increased clarity. Further, the Manual provides an excellent example of a restoration plan for other projects to mimic.

I also think that this Manual is very true to the project goal described in your preface: "to restore Cape Florida as closely as possible to its original ecological condition" (ii). While the substrates have been altered, the intent to restore plant communities to their likely original composition is clear. This same type of restoration, with attention to indigenous species and local genotypes, is underway at The Nature Conservancy's Blowing Rocks Preserve. I recognize the challenge and appreciate the recommendations in the Manual. While I understand that it can be difficult to convince people that it is important to remove species that have been accidentally planted outside their native range, I agree with that approach. As a result, removal of species like *Swietenia mahagoni*, and *Thrinax morrisii* seems appropriate. I suggest that the plants be salvaged for another, more appropriate site close to the site of the propagule sources.

A few specific points:

Table 3a: I found this table to be confusing because of the notation. The addition of a note that explains the meaning if no symbol or letter appears after a species name would be helpful. Additionally, "which" should be switched to "that" in many of the places it appears in the table notes and throughout the document.

Table 4c: It's great to have the control methods for so many species summarized in one place. While I am unable to comment on the recommended methods, you should make sure that the methods in the table are consistent with the chemical label conditions in all locations of each taxon at Cape Florida. Label conditions (e.g., use over water) are discussed in the text but not in the table; it is likely that the table will be used independently of the text at Cape Florida and elsewhere, and greater clarification should be added to the table if appropriate.

Please use our new area code - 352

p. 5-1, 5.2.2: I would add that care be taken not to collect too many (not more than 20% by the CPC guidelines) seeds from a population at one time and to collect from as many individual parent plants within the population as possible. You might want to refer readers to the CPC Guidelines for the Management of Orthodox Seeds (Wieland, G.D. 1995. Center for Plant Conservation, St. Louis). This document contains information about seed collection and storage.

p. 7-1, 7.1: At the end of the paragraph, I would amend the existing sentence to read: "Extirpated taxa should be considered for re-introduction under FDACS permit requirements, and a clear management and monitoring plan. Any taxon listed by the US FWS should be introduced only if such introductions are specified within the recovery plan, and then only under the re-introduction specifications in the plan." In other words, I would be slightly more conservative about introductions of rare taxa than is this Manual.

p. 7-4 and elsewhere: Again, I agree with the recommendation to remove taxa that have been inadvertently introduced outside of their native ranges during or prior to the restoration effort.

In general, I think this Manual provides excellent guidance for the continued restoration work at Cape Florida. It stresses repeated removal of non-native and ruderal species as well as planting of the natives. Not only will Cape Florida be much improved over the pre-hurricane condition, but a great deal of public education will result from this carefully developed document. This project is made even more exciting given this scientific basis. The only addition that I wish were present is a monitoring component to assess the survival and natural recruitment of native species, the development of natural community structure, and the likely reduced effort in non-native species control over time as the native communities develop. While monitoring is costly, it may increase efficiency over the long-term. Perhaps students from one of the local colleges or universities could assist with a monitoring component.

Thank you for sharing this document with me. I hope these comments are helpful.

Regards,



Doria Gordon
Ecologist, Florida Program



Fairchild Tropical Garden

11935 Old Cutler Road • Miami, Florida 33156-4299

(305) 665-2844

Fax: (305) 665-8032

August 2, 1996

Kellie Westervelt
Project Director
American Littoral Society
Cape Florida Project
P.O. Box 491228
Key Biscayne, FL 33149-1228

Dear Kellie:

I've finally dedicated some time to putting my review comments of the Cape Florida Project's Volunteer Restoration Manual together for you. I feel fortunate to have the opportunity to contribute to the development of such an important document. Setting forth sound scientific and administrative methods for conducting ecological restoration activities is paramount to ensuring the success of such activities. I like the format of the work. I agree with you, it provides a step-by-step guide to conducting restoration activities. I see this document becoming a template for current and future restoration projects.

What follows are more specific comments. Please excuse the bullet-like format:

* The manual provides you with a solid background document for fund raising. I recommend you use the introduction to build a case justifying the allocation of resources for the project in perpetuity. Put the project's importance in context to what is happening to natural areas on a global, regional, and local scale. Identify 1) the unique opportunities this project affords us, 2) how a volunteer can play a significant role, and 3) the strategy that will be applied - what is going to be the first, second, third thing to be done.

* I recommend the document include a 5-year implementation plan. The plan would specify annual objectives for each fiscal year.

* The vegetation analysis and plant inventories and lists have been expertly conducted, compiled, reviewed, and presented. I recommend the addition of the Flora of South Florida (Long & Lakela) to the list of references cited. Will you develop a training program in taxonomy and identification? I recommend developing a glossary of botanical terms. I've enclosed a publication that could be added as an appendix.

* As a conservation horticulturist, I was particularly interested in sections 5 (Nursery Operations), 6 (Out-planting), and 7 (Protection and Enhancement of Rare Species). These sections have been well outlined. However, the topics have been treated too generally. I recommend sections 5-7 be significantly expanded. Technical guidelines and standards have



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been developed for collection of propagules and translocation of species. Listed below are the references for these guidelines and standards. I recommend developing a concise summary of relevant information and including it in the document. More technical information is also needed regarding germination, propagation, and seedling establishment. I've enclosed some sample publications. Your project seems inherently collaborative. I would welcome the opportunity to develop a collaborative project with you as, for example, the introduction of *Jacquemontia reclinata*.

References:

Falk, D.A. and K.E. Holsinger. 1991. Genetics and Conservation of Rare Plants. Oxford University Press, New York.

Falk, D.A., C.I. Millar, and M. Olwell (Eds.). 1996. Restoring Diversity: Strategies for Reintroduction of Endangered Plants. Island Press.
(Includes guidelines for developing a reintroduction plan.)

Guarino, L. V. Ramanatha Rao, and R. Reid. 1995. Collecting Plant Genetic Diversity: Technical Guidelines. CAB International. University Press, Cambridge.

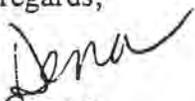
Hartmann, H.T. and D.E. Kester. Plant Propagation: Principles and Practices. Prentice-Hall, Inc.

* I recommend the document include a list of needed nursery, propagation, and cultivation supplies and tools for the on-site native plant nursery. This is necessary for developing an annual budget and for inventory purposes.

* I recommend the document include a section on species- and community-level monitoring. A monitoring program provides data from which one can evaluate restoration and management activities. TNC has developed a short course and manual (Vegetation Monitoring in a Management Context) on *in situ* monitoring. Perhaps you could seek their expertise in developing a monitoring program for the Cape Florida restoration project.

I hope you find my comments helpful. Please give me a call if you have any questions.

With regards,


Dena Garvue
Curator of Endangered Species

Enclosures:

- Field collection data sheet
- Plant accession data form
- Basic equipment for plant collection
- List of supplies for plant propagation
- Guidelines for caring for and planting container-grown plants
- USFWS - Controlled propagation policy

Enclosures continued:

Watering guide for B&B oak trees

Florida Cooperative Extension Service - Potting media

Seed propagation of woody ornamentals

Propagation of woody ornamentals by cuttings

Botany handbook for Florida

Society for Ecological Restoration

1207 Seminole Highway Madison, Wisconsin 53711 Phone: (608) 262-9547
Fax: (608) 262-9547

Andre F. Clewell • RT 7 Box 1195 • Quincy, FL 32351

clewell@gcn.scri.fsu.edu

July 2, 1996

Kellie A. Westervelt
American Littoral Society
P. O. Box 491228
Key Biscayne, FL 33149-1228

Dear Kellie,

Thank you for sending me a review copy dated December 15, 1995, of your draft *Volunteer Restoration Manual* for the Cape Florida Project. I was quite impressed with the Littoral Society's efforts when I visited your project site in 1994. I am equally impressed by the *Manual*. It is clear, concise in its instructional content, and amply detailed in its technical content. I found no errors in ecological content, in the proposed application of restoration principles, and in the conceptual design of the project. To the contrary, it was obvious to me that the Littoral Society knows what it is doing and knows how to go about doing it. In short, your project and this manual would serve well as models for similiar restoration projects nationally. I cheer you on.

Sincerely,



Andre F. Clewell
Past-President



South Florida Water Management District

Miami Service Center • Kendar Building: 1550 Madruga Ave., Suite 412, Coral Gables, FL 33146
(305) 663-3521 • Suncom 430-6940

PRO SWIM-BB

September 20, 1996

Ms. Kellie A. Westervelt, Project-Director
American Littoral Society, Cape Florida Project
Post Office Box 491228
Key Biscayne, FL 33149-1228

Dear Ms. Westervelt:

Subject: Review of Cape Florida Project Volunteer Restoration Manual

Thank you for the opportunity to review and comment on the above referenced document. The Cape Florida Project Volunteer Restoration Manual is organized, comprehensive, and provides an excellent framework for restoration activities. The manual provides a clear, ecologically sound direction towards your goal of restoring the natural communities that were historically found at Cape Florida.

Additionally, the technical expertise of your volunteers, and the number of hours they have already spent, is impressive. The restoration project can only benefit from such dedication.

Best of luck in your restoration and volunteer efforts. Please do not hesitate to call me at (305)669-6947 if I can be of any assistance.

Sincerely,

A handwritten signature in cursive script that reads "Deborah Drum-Duclos".

Deborah Drum-Duclos
Senior Environmental Scientist
Miami-Dade Regional Service Center

Governing Board:

Valerie Boyd, Chairman
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ENVIRONMENTAL RESOURCES MANAGEMENT
NATURAL RESOURCES DIVISION
33 S.W. 2nd AVENUE
MIAMI, FLORIDA 33130-1540
(305) 372-6789
FAX (305) 372-6630

Kellie A. Westervelt
American Littoral Society
Cape Florida Project
P.O. Box 491228
Key Biscayne, FL 33149-1228

August 5, 1996

Re: Volunteer Restoration Manual for the Cape Florida Project.

Dear Kellie:

I enjoyed reading the complete restoration manual, which Joy Klein here at DERM had passed along to me for review. I found it to be very thorough and detailed. The plant lists are quite comprehensive and will be useful as a reference source. It might be a good idea to insert keys into those tables (such as the one on page 3-5) where abbreviations are used for quick and easy reference.

One of my suggestions is that new volunteers learn a few species at a time so they do not become overwhelmed (according to the manual over 200 species of flora, both native and exotic, have been identified in the Park to date). Volunteers who engage in ruderal control work may want to learn the "good" plants first and remove everything else from designated plots.

I think that continuing to provide volunteers with a 2-3 page handout outlining specific activities for a given day is a good idea. This way they won't become overwhelmed. If you don't plan on providing everyone with a copy of the manual, volunteers who express an interest in making a long term commitment should get their own personal copy.

A good long term project for one or more motivated volunteers would be the development of a field guide to Cape Florida. In addition, a comprehensive series of herbarium mounts of both exotic and native species could be prepared by someone who knows the proper techniques. It could be a long-term project, expanding year by year, possibly enhanced with photographs or sketches. It would be a very valuable resource when completed, in essence a collection of type specimens for Cape Florida.

Feel free to call me if you have any questions, otherwise I'll see you in September!

Sincerely,

A handwritten signature in black ink that reads 'Ken Liddell'.

Ken Liddell, Biologist I
Coastal Resources Section

KL:2049

METROPOLITAN DADE COUNTY, FLORIDA



ENVIRONMENTAL RESOURCES MANAGEMENT
NATURAL RESOURCES DIVISION
33 S.W. 2nd AVENUE
MIAMI, FLORIDA 33130-1540
(305) 372-6789
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August 18, 1996

Kellie A. Westervelt
American Littoral Society
P.O. Box 491228
Key Biscayne, FL 33149-1228

Dear Ms. Westervelt:

Thank you for allowing me to review the Cape Florida Project's Volunteer Restoration Manual. I am please to see long term restoration goals defined in this manual as often these are not addressed and goals are lost over time and staff changes. I hope that Cape Florida is addressing the need for dedicated funding to implement and/or continue the restoration efforts. One item that will need continuous efforts is invasive/ruderal plant control.

Another area that I would like to stress the importance of is prescribed burning. This management tool could be vital in the restoration efforts. The Bear Cut Coastal Strand Preserve in Crandon Park was control burned after a wildfire on May 24, 1996. This site will be a interesting opportunity to observe recovery and dynamics following a burn in a coastal area.

Please contact me at (305)372-6586 if you have any questions or I can assist you in this endeavor.

Sincerely,

A handwritten signature in cursive script that reads "Joy D. Klein".

Joy D. Klein
Environmental Resources
Project Supervisor
Forest Resources Program