MANAGEMENT PLAN FOR

FRENCHMAN'S FOREST

NATURAL AREA

FCT PROJECT # 96-011-P7A

June 1998

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THE PALM BEACH COUNTY NATURAL AREAS SYSTEM

MANAGEMENT STATEMENT

The Palm Beach County Natural Areas System is comprised of those environmentally sensitive lands that are owned or leased by the County and managed as natural areas by the County's Department of Environmental Resources Management. These natural areas were selected on the basis of their biological characteristics and were acquired to preserve the rare and diverse native ecosystems present on these sites and the endangered, threatened, and rare species of plants and animals that live there.

Purpose and Goals of the Natural Areas System

- *The purpose of the Natural Areas System is to protect historic native ecosystems and their biological diversity throughout Palm Beach County. Examples of each ecosystem shall be acquired and managed to preserve in perpetuity the full complement of plants and animals characteristic of that ecosystem. The management of each natural area shall be coordinated with that of the other natural areas in the system to support existing populations and to reflect in perpetuity the subtropical biological diversity characteristic of Palm Beach County in pre-development times.*

- *The wilderness values of each natural area shall be preserved.*

- *Where a natural area currently is physically or biologically connected to another publicly- or privately-owned natural area, attempts shall be made to maintain that connection through additional land acquisitions, regulatory preserve set-asides, conservation easements, interlocal agreements, and other appropriate actions.*

Management Considerations

- *The natural areas in the system shall be available to the public for passive, resource-based recreation, environmental education, and scientific research. Public use shall not take precedence over ecosystem protection. Proposed public uses shall take into account the specific environmental conditions of each natural area, and may be modified in response to changing environmental conditions.*

- *Facilities for passive public use shall be provided on each site. These facilities shall be designed to have a minimal impact on native ecosystems and shall be located in previously disturbed areas as much as possible.*

- *Facilities, structures, or roads other than management or access roads that would cause fragmentation of a natural area shall not be permitted within an natural area. The establishment of compatible land uses and activities on lands adjacent to a natural area shall be encouraged.*

- *To the extent possible, fire-maintained native ecosystems shall be burned at the appropriate interval and season, as determined by historical data, to maintain those ecosystems. Burns shall be conducted by trained personnel, using a prescribed burn plan that addresses safety and smoke concerns. The seasonality of prescribed burns may be adjusted for initial fuel reduction burns and site safety constraints.*

- *Where ecosystems within a natural area have been impacted by invasive, non-native plant infestations, land-clearing activities, drainage, or flooding, attempts shall be made to restore those ecosystems to their previous condition or to a*

natural ecosystem best suited to the existing conditions on the natural area.

- *The special requirements of listed species shall be considered in developing management strategies for each natural area, but management for an individual species shall not take precedence over management of an entire ecosystem or be allowed to have a detrimental impact on that ecosystem's complement of species.*

Management Plan Development

- *A specific management plan, based on biological, hydrological, and historical information and interpretation of this information, shall be written for each natural area that takes into account the environmental conditions found on that natural area. Each management plan shall address the strategies and techniques that will be used to manage and restore native ecosystems, to protect listed species, to control the occurrence of invasive, non-native plants and animals, to allow for appropriate public access, and to prevent unauthorized access and activities. Each plan shall be reviewed by the Palm Beach County Natural Areas Management Advisory Committee (NAMAC), a citizens' advisory board, and the public shall be invited to comment on the plan at a public hearing held by NAMAC in the community in which the site is located. Following NAMAC review of the comments received, the plan shall be sent to the Board of County Commissioners for approval. Each approved plan shall be subsequently reviewed at least every five years by NAMAC.*

EXECUTIVE SUMMARY

The 149-acre Frenchman's Forest Natural Area is located within the City of Palm Beach Gardens in northeastern Palm Beach County, Florida. The site has been acquired as a natural area by Palm Beach County with funds from the Palm Beach County Environmentally Sensitive Lands Bond Referendum of March 12, 1991. Matching funds for the acquisition have been approved by the Florida Communities Trust through its Preservation 2000 Program. The City of Palm Beach Gardens was the County's partner in the grant application and will assist in the management of the site. The primary purpose of this acquisition is to preserve important remnants of mesic flatwoods, scrubby flatwoods, strand swamp, hydric hammock, depression marsh, wet flatwoods, and tidal marsh vegetation communities. The secondary purposes are to provide for passive recreation, environmental education, and scientific research. The acquisition and associated activities will assist the County and the City to implement several policies within their respective Comprehensive Plans.

Mesic flatwoods, scrubby flatwoods, strand swamp, depression marsh, and hydric hammock are the predominant natural communities present on the site. Smaller areas of disturbed hydric hammock, wet flatwoods, tidal marsh, and disturbed tidal swamp communities also are present. The acquisition and management of this site preserves important habitat for rare plant and animal species, including 10 plant and 2 animal species that have been listed by at least one government agency or nonprofit environmental organization.

Fire exclusion, cattle grazing, exotic pest plant invasions, hydrological alterations, construction of adjacent roads and buildings, and illegal dumping have impacted the site. In addition, managers face special challenges unique to fragmented natural communities located within urban and suburban environments. In recognition of the significance of the natural vegetation communities on the site, public use must remain limited to passive, non-consumptive recreation, environmental education, and scientific study. Footpaths, a handicapped-accessible nature trail, and an interpretive display will provide a valuable opportunity for the public to observe the site's distinctive natural communities and species, while also imparting an appreciation of their biological uniqueness. Scientific research will include monitoring of populations of rare and/or endemic species and evaluation of restoration and management activities. The City of Palm Beach Gardens may construct a nature center on a disturbed portion of the site, contingent upon the development and approval of an acceptable site plan.

This management plan has been developed to achieve two major goals: 1) to provide specific information required by the Florida Communities Trust's Preservation 2000 Program and 2) to provide additional information and management recommendations so that management activities can begin promptly. A stewardship report will be provided to the Florida Communities Trust each year. The management plan will be reviewed at least once every five years by the Palm Beach County Natural Areas Management Advisory Committee and revised as necessary on the basis of new information, improvements in management techniques, or other relevant factors.

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1. INTRODUCTION AND SITE HISTORY

This management plan is intended to provide guidance in the future use and management of the Frenchman's Forest Natural Area. The natural area was acquired in December 1995 by Palm Beach County (the County) with funds from the Palm Beach County Environmentally Sensitive Lands Bond Issue Referendum of March 12, 1991. Negotiations for the acquisition and other acquisition-related services were provided by the County's contractor, The Nature Conservancy (TNC). The City of Palm Beach Gardens (the City) served as the County's partner in an application for State matching funds for the acquisition. The Florida Communities Trust (FCT) has approved matching funds through its Preservation 2000 Program.

This acquisition represents part of a much larger effort to acquire the most important privately held natural areas left in Palm Beach County (Palm Beach

County Department of Environmental Resources Management [ERM] and the City 1996). Palm Beach County endorsed the concept of a Wilderness Islands Program, which included an inventory of the remaining high-quality natural areas (Iverson and Austin 1988). Based on the results of that study and the recommendations of citizens' advisory committees, the Frenchman's Forest Natural Area and 13 other sites were given high priority for acquisition by the County's Environmentally Sensitive Lands Acquisition Advisory Committee in 1990. On March 12, 1991, the voters of Palm Beach County approved a $100 million bond referendum to purchase environmentally sensitive lands.

The Frenchman's Forest Natural Area is located within the City of Palm Beach Gardens on the southern Atlantic coastal strip in Palm Beach County, approximately 0.75 miles north of PGA Boulevard (Figure 1) It is bordered on the east by Prosperity Farms Road, on the south by the Cabana Colony canal, on the west by undeveloped native vegetation and rough pasture, and on the north by the Frenchman's Landing development. A 120-foot-wide future road right-of-way strip containing approximately 7 acres cuts across the south-central portion of the site. This strip was retained by the previous owner, with a management easement given to the County. The total purchased area of this site is 149.09 acres.

Common names are used in the text and in Appendix A (Natural Resources Inventory and Assessment) for species recorded on the Natural Area. Scientific names of plants are listed in Appendix B; those of animals are listed in Appendix C. The scientific name is used when a unique common name does not exist for the taxon or if the species has not been recorded for the project site.

The Frenchman's Forest Natural Area is part of a broad coastal swale that was separated from the Atlantic Ocean by coastal sand ridges and from the Loxahatchee Slough by a broad pine flatwood ridge. It was part of the headwaters of the former Lake Worth Creek, a meandering blackwater creek that flowed northward to join the Loxahatchee River near its mouth at the Jupiter Inlet. The earliest accounts of the site date from the 1840s, and were from U.S. Army Topological Engineer reports made during the Second Seminole Indian War (Corbett 1993). Eighty men from Fort Jupiter moved up Lake Worth Creek in seventeen canoes. Approximately two miles north of the natural area, they reached the "rapids", a series of muck terraces that disappeared during periods of high water, but helped hold water at a higher level in the upstream sawgrass marshes. Another series of muck terraces may have been present 0.25 miles north of the natural area. After getting past these barriers, the troops entered a large sawgrass marsh, where they pulled the canoes for a mile to a haulover path over the sand ridge separating the marsh from Lake Worth. The southeastern portion of the natural area was part of the sawgrass marsh, and the soldiers may have crossed through the site. Once they reached Lake Worth, the soldiers raided Seminole Indian villages along its shores, capturing guns and canoes.

The soldiers had followed an old Indian route for traveling between Jupiter Inlet and Lake Worth. When the last Seminole Indian war ended in 1859, pioneers began to use this route for coastal travel. Charles Pierce (1970) described his family's travel to Lake Worth by small boat via this route in 1873. He noted his father's difficulty in finding the right channel through the sawgrass to the haulover. Pierce and his family were among the earliest permanent settlers on the shores of Lake Worth. Pierce also provided the first direct reference to the natural area, noting that the bird rookery on Pelican Island (present-day Munyon

Island) was the target of plume hunters in 1874 and that the rookery then moved to "the big cypress swamp west of the haulover" in 1875. This cypress swamp could only have been the strand swamp at the natural area. The rookery moved again the following year, after the plume hunters discovered its new location.

By the late 1870s, enough homesteaders had settled on the shores of Lake Worth to cause the inland boat route to become well-used and marked. A tram with iron rails was constructed over the haulover to carry tomatoes and pineapples to boats for shipment northward. An 1884 U.S. Coastal and Geodetic Survey map (USCGS 1884) shows the boat route clearly. It roughly followed the present course of the Atlantic Intracoastal Waterway southward from the Jupiter Inlet until it skirted the scrubby flatwoods in the northeastern corner of the natural area. The boat route then turned to the southwest, crossing into the present-day tidal marsh and heading southward along the eastern edge of the site. The boat route continued to the south and then turned back to the east to connect to the haulover.

Private and government engineers also visited this area in the 1880s to determine the feasibility of an inland transportation canal along the Atlantic coast. James E. Kreamer, who was employed by the Lake Okeechobee Land Company, noted that the water level in the sawgrass marshes was eight feet above sea level (Barbour 1964). Since nearly all of the site is below 10 feet in elevation, his statement indicates that the central and southeastern portions of the natural area probably were underwater most of the year. Even though the canal was determined to be feasible, the federal government declined to appropriate funds for the construction of the canal, citing the then-minimal population of south Florida. The State offered to provide thousands of acres of free swamp lands for each mile of canal constructed, inducing the Florida East Coast Canal Company to begin constructing the canal southward from Sand Point (present-day Titusville).

Design dimensions for this canal were 50 feet wide and 5 feet deep. Dredging began at the mouth of Lake Worth Creek in 1892, with the dredge moving up the channel of the creek at a rate of 75 to 100 feet a day (Corbett 1993). The dredged spoil was piled on both sides of the canal. The dredge slowed down once it hit the rapids and left the channel of the creek. From there, it had to cut a straight line through the sawgrass marsh, which was much higher in elevation. The dredge also cut a straight line across the sawgrass marsh east of the natural area, bypassing the bend in the boat route that crossed into the site. By 1896, the dredge had almost reached the haulover when the dredging ceased. Henry Flagler, who had gained control of the canal company, then decided that a completed canal would benefit his Palm Beach hotels. The canal company cut though the haulover ridge and entered Lake Worth in 1898 (Corbett 1993).

The dredging of a channel through the "rapids" and later through the haulover ridge eliminated the barriers that held water in the huge sawgrass marshes. Water levels fell to the level of Lake Worth and the Jupiter Inlet, which is several feet above sea level. A delta formed from the silt deposited by the water flow where the Florida East Coast Canal entered Lake Worth. Water also drained out of the cypress swamp, which previously had been at the same level as the sawgrass marsh, forming a channel that eventually would become the Archie's Creek canal. The draining of the sawgrass marsh exposed muck soils that were considered ideal for farming. As the Florida East Coast Canal dredging neared Lake Worth in 1897, a land company dug a ditch south of the haulover. The ditch

drained the sawgrass marsh that was more distant from the canal and then emptied into Lake Worth. Initially called Dimick's Ditch, this drainageway is now known as the C-17 Canal or the Earman River. It also created much erosion and the deposition of a small delta where it emptied into Lake Worth.

The land company named this area "Prosperity" and began to sell tracts of land. Flagler's Jacksonville, St. Augustine and Indian River Railroad (present-day Florida East Coast Railroad) had been constructed one mile west of the natural area in 1894. It skirted the western edge of the sawgrass marsh, crossed it at the narrowest point, and continued on the coastal ridge to West Palm Beach. A railroad station known as Prairie was established west of Prosperity, and Monet Road (present-day RCA Boulevard) was established to bring the farmers' produce to the station. In the 1910s, Old Dixie Highway was constructed next to the Florida East Coast Railway, which provided the farmers with road access to West Palm Beach and the large Palm Beach tourist hotels. The portion of this road which lies west of the natural area is known today as Alternate A1A. Shortly afterwards, Prosperity Farms Road was established to provide a direct connection to Old Dixie Highway from the Prosperity settlement.

In 1919, Harry Kelsey bought most of the land south of the natural area. He established Kelsey City (present-day Lake Park) on the scrub ridge, and encouraged farming in the muck lands surrounding the Prosperity settlement. In 1920, Peter Maheu, a Belgian immigrant, brought his family to the area and began farming. The Maheus had previously settled at Canal Point in 1917, but were driven out by repeated flooding. They were more successful at Prosperity, and Peter Maheu's sons began to establish their own farms. John Maheu's farm would eventually include all of the southern half of the natural area. It was accessed by Prosperity Farms Road, which terminated at that time in the vicinity of present-day Lone Pine Road, just south of the natural area. John Maheu initially grew vegetables for the Palm Beach hotels on the muck lands east of Prosperity Farms Road and east of the natural area (Gooding 1990).

The Florida land boom in the mid-1920s and the widespread use of automobiles caused a surge in road construction. U.S. Highway 1 was built one mile east of the natural area and Monet Road was extended east to meet it. A bridge was built across the East Coast CanaI for this extension. The canal had silted up in many places by this time and was partially blocked by fallen tree snags. It was being used primarily by small pleasure boats, and only generated minimal tolls (Gooding 1990). The canal company went bankrupt and was bought in 1925 by Harry Kelsey, who planned to improve it to handle large freight barges. A devastating hurricane struck Miami in 1926, ending the land boom and ruining Kelsey's finances. The Florida Inland Navigation District (FIND) was established in 1927 to buy the canal, and the canal was acquired in 1928. The canal was designated a federal project in 1929 and was incorporated into the Atlantic Intracoastal Waterway (ICW). The federal government removed the snags and restored the canal to its original five-foot depth. FIND obtained a 5.1-acre spoil disposal site from John Maheu next to the ICW, and placed dredged spoil material on it in 1932, when the ICW was widened by dredging to a width of 100 feet and a depth of 8 feet (Corbett 1993).

After the collapse of the land boom and the onset of the Depression, very little happened in the vicinity of the natural area. Prosperity Farms Road was extended northward as a federal Works Progress Administration project in the 1930s

(Gooding 1990), eventually reaching the ICW at the Paradise Point Area north of present-day Donald Ross Road in 1940 (USDI 1940). Paradise Point was the location where the ICW left the Lake Worth Creek channel and cut across the former sawgrass marsh. The undredged portion of Lake Worth Creek gave the appearance of a small stream flowing into the ICW. When the Hoyt family settled this area in the early 1940s, they put up a small sign with the name Frenchman's Creek on it where the creek entered the ICW. The name had nothing to do with persons of French origin, but was taken from the novel of the same name by Daphne du Maurier, because the Hoyts liked the book. When federal mapmakers preparing the Jupiter topographical quadrangle traveled up the ICW in 1948, they saw the sign and added the name to the quadrangle (Gooding 1990). The natural area and several developments in the vicinity have all taken their names from the Hoyts' sign.

World War II resulted in a spurt of development around the natural area. John Maheu expanded his farming operation to the west of Prosperity Farms Road, covering the areas classified today as disturbed hydric hammock, disturbed tidal swamp, and disturbed tidal marsh (Figure 2). The understory vegetation and shrubs were removed from this area, but the scattered cabbage palms, live oaks and pond cypresses were left. Although some vegetable farming may have occurred briefly in this area, the main use appears to have been pasture. A 1953 aerial photograph (USDI 1953) shows the area as improved pasture, and remnants of a fence and a corral have been found on site. The remainder of the natural area and the land to the west was also used as rough native pasture at this time.

This farm expansion area contained wet prairie and former sawgrass marsh during the 1940s. The existing ditch system in the natural area was dug at this time to drain this area into the Archie's Creek canal under Prosperity Farms Road. These ditches have not been maintained since 1960, but still drain portions of the natural area, especially after a heavy rainfall. Other ditches were dug west of the natural area at about the same time to drain wetlands next to Alternate A1A for tomato farming. These ditches emptied into the cypress swamp, which drained into the farm ditch system and out the Archie's Creek canal. These drainage systems accelerated the drawdown of surface water on the site, eliminating the wet prairie and causing woody shrubs and vines to invade the depression marsh. The cypress swamp's hydroperiod was reduced, causing oxidation and loss of the accumulated peat and the toppling of many of the pond cypress trees.

After World War II, people began to establish residences along the ICW north of the natural area. Dorothy B. Gooding was one of these persons. She recounted her experiences, including a 1949 wildfire on the natural area, in her book (Gooding 1990). The Monet Road bridge over the ICW was destroyed in the 1947 hurricane. Another bridge was built at Donald Ross Road when this road was constructed in 1956. In the late 1950s, John Maheu ceased farming, and began to develop his property. The loss of the muck soil through oxidation, and an inability to compete with the large corporate farms south of Lake Okeechobee may have influenced this decision. Maheu platted the higher elevation portions of his property, including the developed inset within the natural area west of Prosperity Farms Road, and began to sell off lots. He formed the Maheu Excavating Company and began to dredge finger canals from the ICW in the lower portion of his land east of Prosperity Farms Road. He also constructed bulkhead walls to retain the fill. This area was later platted as Maheu Estates and sold as waterfront lots. Maheu Excavating stored its equipment and materials west of

Prosperity Farms Road, just north of the developed inset. This area required extensive cleanup to remove engines, pilings, and concrete rubble prior to the County's acquisition of the natural area.

The development of the Cabana Colony subdivision southwest of the natural area by John D. MacArthur began in 1960 with the filing of a plat. This plat dedicated a proposed drainage canal to the County. Construction of this canal, which forms the southern border of the site, began shortly thereafter. A new bridge was constructed over the canal at Prosperity Farms Road . This canal connected directly to the ICW and excessively drained its basin, so a weir was constructed at the southwest corner of the natural area to hold the canal at a higher level than the ICW. A sewer plant was built just west of the natural area in 1962 to serve this development. Treatment tanks were built, and a spur canal was dug northward from the Cabana Colony canal along the west boundary of the natural area, either to drain the plant area or to dispose of treated effluent. Cabana Colony developed rapidly and was nearly built out by 1968. The lands east of the natural area along the ICW were rapidly being developed at this time, often with dredged finger canals. The ICW was expanded to 125 feet wide and 10 feet deep in 1962. The spoil appears to have been dumped to the east of the waterway. In the early 1960s, PGA Boulevard was built a half-mile north of Monet Road and 3/4 mile south of the natural area. This east-west state road also had a bridge across the ICW. Lone Pine Road, which is just south of the natural area, was also built in the early 1960s.

John Maheu needed additional fill for Maheu Estates. In the early 1960s, he dredged a small depression that had been bisected by the Cabana Colony canal, creating a lagoon that is today's disturbed tidal swamp (Figure 2). He also widened the Archie's Creek canal west of Prosperity Farms Road at about the same time, for the same reason. When he completed his development activities, he sold the remainder of his land to the MacArthur interests. Because the property's fences were not maintained and the land was not patrolled, off-road vehicles trails were created and dumping of tires, junk cars, appliances, and construction debris became common, especially adjacent to Prosperity Farms Road. The abandoned farm lands began to revegetate, with oaks and cabbage palms next to existing clumps of trees, and with Brazilian pepper in treeless areas. A 1973 property appraiser's aerial photograph shows that most of the previously-farmed area had become covered with brushy vegetation .

Development activities continued in the 1970s. The various Maheu subdivisions were nearly built out and construction had begun on the Maranatha Church of God property next to the southeast corner of the natural area. Dwight D. Eisenhower Elementary School was constructed near the southwest corner of the natural area in the early 1970s. In 1978, percolation ponds were dug at the Cabana Colony sewer plant, and utility lines extended northward in an easement next to the western border of the site. These changes may have been caused by the construction of the Frenchman's Creek development to the northwest of the natural area. Also in 1978, a winding drainage canal was dug to drain the lands north and south of PGA Boulevard that were south of the natural area. This canal emptied into the Cabana Colony canal west of the Maranatha Church of God, and also had a weir installed near its mouth to prevent overdrainage of its basin.

In 1981, construction began on the Frenchman's Landing development north of the natural area. This development was nearly built out by the mid-1980s. The tract

between the natural area and Dwight D. Eisenhower Elementary School was partially cleared, and a baseball field established on a portion of it, in the early 1980s. Dumping increased on the natural area in the 1980s and became a major problem. The regrowth on the previously-farmed areas became a closed canopy forest, approximately 50% native hydric hammock vegetation and 50% Brazilian pepper, with a clumped distribution. In 1986, a 100-foot wide strip of mostly Brazilian pepper was cleared west of Prosperity Farms Road between the Cabana Colony Canal and the developed inset. This clearing apparently was done to facilitate the installation of a water main, and the cleared vegetation was pushed westward into the natural area. Construction began on the Gardens Mall south of the natural area in the mid-1980s. The mall and its associated development drained into the Cabana Colony canal through the existing canal dug in 1978. In the late 1980s, development approval was sought for the natural area and the lands west of it for the Wynfield residential development. The developers were unable to get financing for their project, and its approvals expired. The project was abandoned in the early 1990s.

In 1991, the perimeter of the natural area was cleared and fenced by the John D. and Catherine T. MacArthur Foundation, which was now in control of the property. The fencing was installed 15 to 25 feet inside the property line, and the cleared vegetation was pushed into the natural area. The setback of the fencing encouraged adjacent residential property owners to encroach into the natural area with landscaping, play sets, and wood privacy fences. The Foundation removed most of the obvious dump piles along Prosperity Farms Road at this time. More extensive cleanups were done in 1994 and 1995. In 1992, the County reserved a right-of-way for the extension of Hood Road to Prosperity Farms Road. This right-of-way ran northwest to southeast, bisecting the site and separating the northern three-quarters of the site from the southern quarter (Figure 1). Also in 1992, the Cabana Colony sewer plant was demolished and the percolation ponds filled in. Cattle corrals and feeders were constructed, and the property west of the natural area was leased as rough native pasture land. In May 1995, a wildfire burned several acres of pine flatwoods in the northeastern corner of the site. In December 1995, the County purchased 149.09 acres of the natural area from the MacArthur Foundation for $5,676,987. The Foundation retained ownership of the Hood Road extension right-of-way, but gave the County a management easement over it. The Foundation also retained a 25-foot-wide strip next to Prosperity Farms Road, and gave the County access rights across this strip. In August 1996, the County and the City submitted a joint application to the Florida Communities Trust (FCT) for matching funds for this purchase through FCT's Preservation 2000 Program. In January 1997, the FCT Governing Board gave conceptual approval for $2,868,282 in matching funds for this acquisition.

2. PURPOSE

The primary purpose of the Frenchman's Forest Natural Area acquisition is to ensure the preservation of high-quality mesic flatwoods, scrubby flatwoods, depression marsh, wet flatwoods, hydric hammock, and strand swamp communities, together with their component rare plant and animal species. Ten plant and two animal species recorded for the site have been listed by at least one government agency or nonprofit environmental organization (Table 1).

The natural area will be developed as a publicly-owned and operated, natural resource-based, passive outdoor recreational site. The site also will be used for environmental education and scientific research. Existing perimeter trails will be maintained for access, and appropriate signs will be placed along the nature trail to be constructed. The signs will identify the site resources and their significance. The preservation of the Frenchman's Forest Natural Area also will help to protect the quality and quantity of groundwater resources. Both the preservation and recreation components of this project will help Palm Beach County and the City of Palm Beach Gardens to comply with portions of their respective Comprehensive Plans. All signs, literature, and advertising will identify the project site as being publicly owned and operated as a natural area and passive outdoor recreational site. The Frenchman's Forest Natural Area will be assigned a land use designation of Conservation by the City.

The Frenchman’s Forest Natural Area consists largely of scrubby flatwoods, strand swamp, and mesic flatwoods natural communities. These communities, which can be considered high-quality within the context of urbanized southeastern Florida, are in a somewhat degraded condition as a result of previous agricultural use and grazing, fire exclusion, pest plant invasions, hydrologic alterations, construction of adjacent roads and buildings, illegal dumping, and other human-related disturbances. Maintaining and improving the ecological quality of these communities will be included in the future management of the preserve. These management efforts will include implementing invasive vegetation control programs throughout the entire site and prescribed burning in the mesic flatwoods and scrubby flatwoods habitats. The disturbed Brazilian pepper areas will be restored to hydric hammock. The disturbed tidal swamp will be enhanced by the creation of a littoral shelf and flushing channels.

Management activities will be coordinated under the direction of ERM, in cooperation with the City. In addition to County and City personnel, volunteers from the community will assist in maintaining trails, removing invasive vegetation, and performing other site management activities that may be needed. The Frenchman’s Forest Natural Area will be managed under the "single-use" concept, which means that it will be managed to preserve and restore natural resource values. Scientific research, environmental education, and passive resource-based recreation will be encouraged as long as they do not jeopardize the protection of natural resources. In general, passive recreation will include such activities as nature appreciation and study, hiking, and photography. The City may construct a nature center on a disturbed portion of the site, contingent upon the development and approval of an acceptable site plan.

The acquisition and associated activities will assist the County and the City to

implement several policies within their respective Comprehensive Plans. This project will further the following City Comprehensive Plan directives: 1) to preserve or manage the natural resources of the City of Palm Beach Gardens in a manner which maximizes their protection, function, and values (Conservation Element Goal 6.1); 2) to ensure that all ecological communities, wildlife, and marine life, especially endangered and rare species, are identified, managed, and protected (Conservation Element Objective 6.1.5); 3) to encourage the inclusion of significant natural communities in a Pedestrian/Nature Trailway System in order to ensure both public access and the
preservation of these communities (Conservation Element Objective 6.1.8); 4) to ensure the protection and preservation of native habitats, and maximize the provision of open space for this purpose (Conservation Element Objective 6.1.9); 5) to provide adequate open space and recreational facilities, including passive recreational facilities, in a timely manner to all citizens (Recreation and Open Space Element Goal 7.1);. 6) to establish effective coordination measures among all pertinent public and quasi-public entities so to best maintain Palm Beach Gardens' quality of life and efficient use of resources (Intergovernmental Coordination Element Goal 8.1); 7) to increase groundwater recharge where practicable (Infrastructure Element Goal 4.E.1); and 8) to ensure that the marine habitat in and the water quality of the Intracoastal Waterway, including the associated estuarine system, are enhanced (Coastal Management Element Objective 5.1.3).

The County's Conservation Element directs the County to preserve native upland habitats, with priority given to environmentally sensitive land (Objective 2) and habitat of significant value to existing populations of listed species (Objective 3), and calls specifically for the acquisition and management of parcels identified as environmentally sensitive (Policy 2-e).

The Frenchman's Forest Natural Area will be managed to protect and maintain native biological diversity and ecosystem functions in perpetuity. The management of this site will be coordinated with the management of other County-managed sites as part of a countywide system of natural areas. The following objectives will guide the formulation of management policies:

8) Maintenance of ecological integrity by ensuring the long-term viability of native wetland and upland biological communities and the protection of listed plant and animal species on the natural area.

2) Provision of viable habitat for other non-listed wildlife species that use, or could potentially use, the natural area.

3) Restoration of disturbed natural communities, and restoration of highly disturbed areas (including areas dominated by Brazilian-pepper) to hydric hammock.

4) Implementation of a prescribed burn regime that maintains fire-dependent vegetative communities, assists in the restoration of disturbed areas, and adequately addresses safety and smoke concerns.

5) Provision of facilities and development of policies for public use that

allow for passive, resource-based recreational uses, scientific research, and environmental education activities that do not have a detrimental effect on the natural area.

6) Adoption of appropriate security and access control measures to prevent unauthorized activities, such as use by off-road vehicles, illegal dumping, collection of plants, poaching, and harassment of animals.

7) Reduction of exotic pest plant vegetation cover to no more than 1% of the total vegetation coverage, exclusion and/or removal of exotic non-native animals having a detrimental effect, and reduction of the coverage of invasive native vines.

3. STRUCTURES AND IMPROVEMENTS

3.1 EXISTING AND PROPOSED PHYSICAL IMPROVEMENTS

There are no structures or improvements currently on the Frenchman's Forest Natural Area. A large disturbed area that was created by previous agricultural activity exists in the southeast corner of the site, northwest of the intersection of Prosperity Farms Road and Carib Circle. This area presently is covered by two species of exotic pest plants, Brazilian pepper and air potato. Many of the proposed improvements, including a kiosk, signs, the trailhead, and a parking area, will be sited within this disturbed area. Although listed species have not been observed within this disturbed area, these improvements will be sited to minimize impact to any listed species if one is subsequently observed in this area. Listed plants will be relocated on the site as necessary.

The major proposed structures and improvements are described in the following sections and shown on the master site plan (Figure 3). Responsibilities for funding and constructing these improvements are identified in an interlocal agreement between the City and the County (Appendix E). Only structures and improvements that will help to achieve the goals of preserving and restoring the natural resources of the Frenchman's Forest Natural Area and providing for compatible public uses are proposed. No restroom facilities are planned for the site at this time, but would be provided if the proposed nature center is built.

Proposed public-use facilities (i.e., the handicapped-accessible nature trail and the parking area) will fulfill Americans with Disabilities Act (ADA) requirements. Written approval from FCT will be requested prior to the construction or installation of any buildings, structures, improvements, or signs or any removal of native vegetation or major land alteration not discussed in this management plan. All improvements and major land alterations will comply with applicable local, state, regional and federal laws and regulations. Evidence will be provided to FCT that all required licenses and permits have been obtained prior to the commencement of any construction or major land alterations. A building permit is needed for construction of the public use facilities. A environmental resource permit from the South Florida Water Management District will be necessary if wetlands are impacted by hydrological restoration and estuarine enhancement activities, and construction of the proposed hiking trail boardwalk and any docks or boardwalks associated with the proposed nature center.

3.1.1 Fencing and Gates

Due to the high incidence of illegal dumping prior to site acquisition, as well as the potential for poaching of native plants and wildlife, the majority of the natural area, except for the southern border and the border south and west of the developed inset, has been fenced. Existing canals along these borders are deep enough to prevent vehicular access and deter unauthorized pedestrian access. The fencing should help control the dumping of debris onto the site.

Two types of fencing are currently present (Figure 3). Six-foot green vinyl

chain-link fence was installed where the site abuts the Frenchman's Landing development along the natural area's northern boundary and also along the northern boundary of the developed inset. Pre-existing barbed-wire fencing is present along most of the western boundary of the site and on the eastern boundary of the site, along Prosperity Farms Road. The fencing along Prosperity Farms Road will be replaced with post-and-rail fencing after Prosperity Farms Road is widened to four lanes. A 1,000-foot gap occurs in the field fencing along the western boundary. This area does not presently require fencing, because it is inaccessible due to fencing of the adjacent site. It may require fencing in the future if the adjacent land is developed. It also is possible that the County may purchase a portion of the adjacent land for inclusion into the natural area, or receive a management lease on a preserve set-aside. Installation of additional fencing in this area will be deferred until these decisions have been made. Additional fencing will be located within disturbed perimeter areas whenever possible, in order to minimize impacts to intact natural communities.

Three gates are proposed (Figure 3). A pair of steel swing gates will be installed on the entrance road opposite Carib Circle near the southeast corner of the site, and will serve as the parking lot entry and exit gates. Public access to the natural area will be through this gated entrance. A steel farm gate was installed in the northeastern portion of the site to allow maintenance vehicle access to the northern portion of the site. Another maintenance vehicle access gate will be installed where the management road exits from the parking area, to prevent unauthorized motorized traffic from using the management roads.

3.1.2 Signs

Six types of signs are proposed for the Frenchman's Forest Natural Area. All will identify the site as being publicly owned and operated as a natural area and passive outdoor recreation site. Temporary signs identifying the site as a natural area were installed on each corner of the property one month after acquisition. A large dedication sign will be placed at the entrance to the parking area to identify the site as a natural area open to the public, as having been purchased with funds from FCT and the County, and as being managed by the County with assistance from the City. A main gate sign will be installed to specify visiting hours and provide general information about the site. Perimeter signs have been placed along the boundary fence at intervals of no greater than 500 feet; these signs state that the Frenchman's Forest Natural Area is a protected natural area and cite appropriate County and City ordinances. Signs will be installed along the nature trail, with station numbers corresponding to an interpretive guide. Sign installations will not significantly disturb any natural communities on the site.

3.1.3 Interpretive Facilities

An educational kiosk will be constructed adjacent to the public parking area, near the head of the nature trail (Figure 3). This kiosk will provide general information about the Frenchman's Forest Natural Area, including the geologic origins of the site, its topographic features, aquifer recharge significance, natural communities, listed species, and other natural features of interpretive

value. The kiosk will be constructed within the disturbed area, and thus will not impact any intact natural communities.

The City has proposed to construct and pay for a small nature center on a disturbed portion of the natural area next to the disturbed tidal swamp lagoon. The City has placed the planning for the nature center on hold, and it is not known if the nature center will be built. The County has identified a potential location for the nature center (Figure 3). Any site plan for a nature center will be brought before the County's Natural Areas Management Advisory Committee for review, and the management plan will be amended to include the nature center, if the center is approved by the Board of County Commissioners. If the City decides to build the nature center, construction will not commence until the City has received approval from the FCT. Any potential nature center will be sited to minimize potential impacts to natural resources on site and to comply with all applicable federal, state and local regulations.

3.1.4 Boundary and Management Roads and Firebreaks

A boundary/management road and firebreak system will be established on the perimeter of each of the three fire-maintained management units (Figure 3). These roads will be accessed from the two maintenance access gates. Burn Units 1 and 2 will be separated from Burn Unit 3 by Management Unit 4, which is a No Burn Zone that contains fire-intolerant hydric hammock and strand swamp. Firebreaks will be established in the transition zone separating the fire-intolerant natural communities from surrounding burn units (Figure 3). Firebreaks also will be established to separate Burn Units 1 and 2, and Subunits 3a and 3b. All boundary/management roads and firebreaks will be located in disturbed areas or on existing trails as much as possible. Prior to construction, all boundary/management/road/firebreak locations will be surveyed for listed species. Based upon a map of gopher tortoise burrow locations prepared by ERM in 1994 (ERM and the City 1996), it seems likely that some gopher tortoise burrows will be encountered. The locations of boundary/management/road/firebreaks will be adjusted to avoid gopher tortoise burrows as much as possible, but individual tortoises may need to be relocated on site if it is necessary. Any other listed species present within the proposed road/firebreak area will be avoided if possible, or relocated on the site if necessary.

Boundary/management roads/firebreaks will provide numerous benefits, including more rapid access in the event of a wildfire, protection of adjacent areas from wildfire, and facilitation of the monitoring of dumping and other illegal activities along the preserve edge. These roads/firebreaks will be unimproved sand roads and will be no more than 15 feet wide, which is the standard width of boundary firebreaks used by the Florida Department of Environmental Protection on state lands. The firebreak/management roads are to be used primarily for resource management and onsite monitoring. Prior to a prescribed burn, the roads will be widened beyond a minimum 10-foot maintenance width to serve as firebreaks. After the prescribed burn, these firebreaks will be allowed to regenerate and the roads will be maintained at the minimum width. The existing mowed utility easement on the western border of the site also will be utilized

for management access.

3.1.5 Trails

The primary interpretive feature for public access will be a 2,000-foot-long handicapped-accessible nature trail, which will terminate with a small loop in the mesic flatwoods community and will have an observation platform on the tidal swamp lagoon at its midpoint (Figure 3). The nature trail will pass by the proposed nature center site. The management roads/firebreaks will be used to form a 1.9-mile hiking trail system that loops off the handicapped-accessible nature trail. The trail system will have a 1.3-mile main trail and a 0.6-mile side loop (Figure 3). A 600-foot elevated boardwalk will be constructed on the side loop to allow hikers to cross the strand swamp with minimal impacts to wetlands.

The nature trail and the hiking trail will be constructed on existing paths, trails, and disturbed areas on the site as much as possible. Public use of existing secondary trails leading off the nature trail, the footpath, and management roads will be discouraged. Prior to construction, all trail locations will be surveyed for listed species. If listed species would be impacted by the construction of the trails, the trails will be rerouted or the listed species relocated on the site.

The nature trail will originate at the parking area and will extend in an westerly direction. This trail will be 4-inch-thick poured and formed concrete with a non-slip finish, and will be approximately 5 feet wide to accommodate wheelchairs. Signs will be installed along the trail indicating station numbers corresponding to a trail guide with interpretive information. Handicapped-access interpretive facilities will be developed to fulfill federal requirements.

The hiking trail will have a natural soil base and will be maintained at a width of at least 10 feet, where the trail coincides with a firebreak. The boardwalk segment and any non-firebreak sections of the hiking trail will be maintained at a width of 3 feet. The hiking trail is available for public use, but will not be improved or marked for interpretive purposes. All other firebreak/management roads also will be available for public use, but will not be improved or marked for interpretive purposes.

The portions of the hiking trail that lie immediately north of the right-of-way reserved for the proposed Hood Road extension have been designed so that they can be incorporated into the City's Pedestrian/Nature Trailway system. The implementation of this system is currently dependent upon the construction of the Hood Road extension. The only action taken to date on the Hood Road extension is to reserve a future right-of-way. Construction of this extension is not on the County's five-year road plan, and ERM and the City are looking at alternative locations for this extension that would not cross the natural area. The Hood Road extension will likely be constructed only if the undeveloped land west of the natural area is developed. The City will have input into any development plans for this land through its development review process. The City also can implement the Trailway system if it obtains an easement across the undeveloped land to connect to the present terminus of Hood Road. If the Pedestrian/Nature

Trailway system is implemented across the natural area, ERM will coordinate with the City in the development and implementation of a management strategy for protecting and managing the Trailway system.

3.2 EASEMENTS AND CONCESSIONS

Seacoast Utility Authority holds a franchise license to supply water and sewer service to the natural area, and has the rights to lay water lines in county road right-of-ways. Seacoast also has a six-foot-wide water and sewer line easement that is adjacent to the western border of the Prosperity Farms Road right-of-way. This easement expands to 34 feet in a bow-shaped segment west of the right-of-way where the easement crosses the Cabana Colony Canal. Nearly all of this easement is within the 25-foot strip retained by the MacArthur Foundation. A small portion of this easement lies within the natural area in the southeast corner, just north of the Cabana Colony Canal, and is part of the bow in the easement. A water line valve is located within the natural area at this point. There is a 25-foot-wide drainage easement on both the southern and western sides of the developed inset (the unrecorded Maheu subdivision). Most of the easement is occupied by the existing Archie's Creek canal.

No additional easements, concessions, or leases are anticipated. If the Frenchman's Forest Natural Area is to be subject to any of the following activities or interests, the County will provide FCT with at least 60 days prior written notice and will provide information to FCT on reasonable request in order to evaluate the legal and tax consequences of the activity:

1. any lease or sale of any interest in, or operation of any concession on, the Frenchman's Forest Natural Area by a non-governmental person or organization;

2. any sales contract or option to buy things attached to the Frenchman's Forest Natural Area to be severed from the site, with a non-governmental person or organization;

3. any use of the Frenchman's Forest Natural Area by non-governmental persons other than in such person's capacity as a member of the general public;

4. a management contract for the Frenchman's Forest Natural Area with a non-governmental person or organization; and

5. such other activity or interest as may be specified from time to time in writing by FCT.

These activities or interests may not be permitted because they may have negative legal and tax consequences under Florida law and federal income tax law.

3.3 PUBLIC ACCESS

Public access to the natural area will be provided via Prosperity Farms Road to an onsite parking lot. A bicycle rack will be provided to encourage the use of

alternative transportation to the site. An existing sidewalk on the west side of Prosperity Farms will provide pedestrian access to the site. The natural area will be open to the public during daylight hours. The hours of operation will be posted at the site. Handicapped-access parking and a handicapped-accessible nature trail will be provided. Access to the tidal swamp lagoon will be provided by the observation platform on the nature trail, and by the proposed nature center, if it is built. There are no plans to provide boat ramp access to the Cabana Colony and Archie's Creek canals, although boaters can access them from the Intracoastal Waterway.

A 10-car, 2-bus parking area will be constructed off of Prosperity Farms Road. If the nature center is built, the parking area will be expanded by adding 20 additional spaces. The area to be impacted by the parking area has been previously cleared and used as an agricultural area, and is almost exclusively exotic vegetation dominated by Brazilian pepper and air potato. A survey will be conducted within the proposed parking area to verify that its construction would not impact any listed species. If any listed species are present within the proposed parking area, the parking area location will be adjusted to avoid impacts. If impacts are unavoidable, then these species will be relocated on the site.

4. KEY MANAGEMENT ACTIVITIES

4.1 MAINTENANCE

ERM will assume primary responsibility for site management. Responsibilities for the management of the natural area are outlined in the interlocal agreement between the City and the County (Appendix E). Maintenance activities include litter cleanup, trail maintenance, and facilities maintenance (i.e., fences, gates, kiosk, and parking area). Volunteers from environmental groups, schools, and citizens organizations will assist in trail maintenance and litter pickup activities under the direction of ERM staff. If the proposed nature center is constructed, some of the site maintenance activities will be taken over by the City.

In the unlikely event that any unforeseen event, either natural or human-caused, severely alters the natural values of the Frenchman's Forest Natural Area, ERM staff will assess the nature of the alteration and will take remedial action to secure and/or stabilize the site if necessary. Natural events such as fires, floods and hurricanes may shift the ecology of the site from its present condition and cause damage to human-made structures (i.e., kiosk, signs and fencing), but in no way would severely limit or eliminate the natural values of the site. The first priority following a natural or human-caused event will be to secure the site with fencing to prevent dumping and vandalism. The natural area may be closed for public use until the site is stabilized and repairs are made to the structures. The native communities on the natural area will be managed to naturally regenerate following such an event. If the natural values of the site are severely limited or eliminated, the County, the City, and the State will discuss future plans for the site. All major events affecting the natural communities of the natural area will be discussed in the next annual report to FCT. Management practices will be modified for the new condition of the site, and the management plan will be updated to reflect these changes.

4.1.1 Removal of Debris and Litter

All significant debris located within the natural area was removed by the previous property owner prior to acquisition by the County. Any remaining debris will be removed in a timely manner, unless such removal would cause undesirable damage to natural communities or listed species. A mounted trash can will be installed adjacent to the parking area and will be serviced by the City. The perimeter fence will function to prevent the dumping of trash and hazardous material on the site. Periodic site cleanups to remove litter will be conducted by County and/or City staff with volunteers.

4.1.2 Trail Maintenance

Periodic trail maintenance will be performed by County and/or City staff and community volunteers. All trails which are not necessary for site management will not be maintained, to discourage access from public-use trails, and allowed to regenerate with native vegetation.

4.1.3 Facilities Maintenance

County staff will be responsible for the maintenance of the fences, gates, interpretive facilities, parking area, and signs. If the nature center is built, the City will be responsible for its maintenance and may assume other facility maintenance responsibilities from the County.

4.2 SECURITY

The City will assume primary responsibility for public safety and law enforcement at the Frenchman's Forest Natural Area. This includes routine patrols of the boundaries and using the City's best efforts to prevent vandalism, vehicular trespass, dumping, and damage to property and natural resources. No onsite manager or security guard currently is proposed for this site. The County will attempt to recruit a local steward for the site or organize a neighborhood watch group. If the City builds the proposed nature center, it is likely that the City will provide a full-time staff presence at the center.

The County has adopted a Natural Areas Ordinance (No. 94-13) that regulates public use of the Frenchman's Forest Natural Area. The ordinance provides for passive recreational activities such as hiking, nature study, and photography; for environmental education; and for scientific research. It prohibits destructive uses such as off-road vehicle use, dumping, and poaching of plants and animals. The ordinance gives law enforcement personnel the authority to arrest persons damaging a natural area. Section 34-122 of the Palm Beach Gardens Code prohibits the throwing of any litter, debris, rubbish, trash, tin cans, or papers on property in the city except in designated areas and containers for collection. No dogs, cats or other pets will be permitted on the Frenchman’s Forest Natural Area. No vehicles (e.g., ORVs and bicycles) will be permitted beyond the parking area, except during staff maintenance and prescribed burning activities.

The Frenchman's Forest Natural Area will be open to the public during daylight hours only. Access hours will be posted at the main entrance. Either the City or a local steward or stewardship group will be responsible for opening and closing the main gate. Only the County, the City or the local stewards will have keys for these gates.

4.3 STAFFING

Because of the relatively small size of the Frenchman's Forest Natural Area, there will be no on-site staffing. However, ERM will create a roving management team that will assume responsibility for management at this site and other County-owned natural areas. This management team will be trained to conduct all levels of management activities, including invasive vegetation control, prescribed burning, and monitoring. City staff and volunteers from local citizens' organizations will provide additional support where feasible and necessary. There has been interest in the natural area from individuals in the surrounding community, who have indicated that they wish to be involved in management activities. It is anticipated that these individuals will form the basis of a local stewardship group that will assist in the protection and

management of the site. Individuals from the community and local environmental groups will be trained by County staff to lead nature walks on the site. If the City builds the proposed nature center, it is likely that they will provide a full-time staff presence at the center.

4.4 NATURAL RESOURCE PROTECTION

The primary goals of site management are to enhance and maintain the hydric hammock, scrubby flatwoods, mesic flatwoods, strand swamp, wet flatwoods, depression marsh, tidal marsh, and tidal swamp natural communities, as well as their component species, as described in Appendix A. Particular care will be exercised to prevent the extirpation of listed species from the site. Habitats for listed species will be managed for the needs of individual species when such management would be compatible with the overall management of the ecosystems on the natural area.

Long-term resource management of the site will begin with the baseline inventory and assessment of natural communities and listed species (Appendix A). In addition to work done by ERM, the Institute For Regional Conservation (IRC) has done two day-long surveys in July 1996. This assessment has been used as the basis for determining the management activities necessary to protect, restore, and preserve the natural resources of the site and for determining the location and type of passive public recreation use facilities. Information on all listed species described in the assessment and all new listed species observed will be reported to the Florida Natural Areas Inventory (FNAI) on the forms provided in Appendix J. Because the historical hydrology of the site has been altered by on-site drainage systems, hydrological management and restoration measures will be undertaken.

4.4.1 Management of Natural Communities

The Frenchman's Forest Natural Area will be managed under the "single use" concept, which means that it will be managed to perpetuate natural resource values. Nine vegetation communities are present on the site (Figure 2): scrubby flatwoods, strand swamp, mesic flatwoods, depression marsh, hydric hammock, wet flatwoods, disturbed tidal marsh, disturbed tidal swamp, and disturbed hydric hammock. Where past human activities have caused the degradation of natural communities, efforts will be made to restore these communities so that they resemble undisturbed natural communities. Prescribed burning, invasive vegetation control, estuarine enhancement, and hydrological restoration will be the primary management techniques used. These management activities are discussed in Section 5.1.2, Resource Enhancement, and Section 5.1.3, Invasive Species Control. The specific types of management and enhancement activities recommended for each vegetation community on the Frenchman's Forest Natural Area are described in the following sections.

4.4.1.1 Mesic Flatwoods

The mesic flatwoods will be enhanced and maintained through the implementation of prescribed burning and invasive vegetation control programs. The specific fire management plan for this community is provided in Appendix H. The mesic

flatwoods are incorporated into three management units. The mesic flatwoods in the extreme northwest corner of the site will not be burned, but will be allowed to succeed into hydric hammock. The mesic flatwoods in the southern and western portions of the site will be divided into two management units by a firebreak. The mesic flatwoods in the northeast corner will be incorporated into a management unit that includes the scrubby flatwoods community. One of the two mesic flatwoods burn units will be burned within two years of approval of this plan. The other burn unit will be burned within six years of the approval of this plan. After the initial management burn, each mesic flatwoods burn unit will be burned every seven years.

The invasive vegetation control program will involve hand-pulling, selective pruning, and/or selective herbicide treatments, as described in Section 5.1.3, Invasive Species Control. Of primary concern are non-native invasive trees, shrubs, and vines, which may out-compete shade-intolerant native species.

4.4.1.2 Strand Swamp

The strand swamp will be enhanced and maintained through the implementation of an invasive vegetation control program and hydrological restoration measures. This invasive vegetation control program will involve hand-pulling, selective pruning, and/or selective herbicide treatments, as described in Section 5.1.3, Invasive Species Control. Of primary concern are non-native invasive trees, shrubs, and vines, which may out-compete native plant species and cause the mortality of those species.
Hydrological restoration measures will include the plugging of existing drainage ditches that carry water out of the strand swamp into the Archie's Creek canal, and the investigation of restoring the historic water flows into the swamp from the undeveloped property to the west of the natural area.

4.4.1.3 Scrubby Flatwoods

The scrubby flatwoods will be enhanced and maintained through the implementation of prescribed burning and invasive vegetation control programs. The specific fire management plan for this community is provided in Appendix H. The scrubby flatwoods are incorporated into a single management units with two subunits. The southern subunit (3b) will be burned within four years of approval of this plan. The other subunit will be burned within eleven years of the approval of this plan. After the initial management burn, each scrubby flatwoods burn unit will be burned every 15 years.

The invasive vegetation control program will involve hand-pulling, selective pruning, and/or selective herbicide treatments, as described in Section 5.1.3, Invasive Species Control. Of primary concern are non-native herbs and grasses, which may out-compete native understory plants.

4.4.1.4 Depression Marsh

The depression marsh will be enhanced and maintained through the implementation of an invasive vegetation control program and hydrological restoration measures. This invasive vegetation control program will involve hand-pulling, selective pruning, and/or selective herbicide treatments, as described in Section 5.1.3,

Invasive Species Control. Of primary concern are non-native invasive trees, shrubs, and vines, which may out-compete native plant species and cause the mortality of those species.

Hydrological restoration measures will include the plugging of existing drainage ditches that carry water out of the depression marsh into the Archie's Creek canal, and the investigation of restoring the historic water flows into the strand swamp from the undeveloped property to the west of the natural area. Additional water inflows into the strand swamp will raise the water levels in the adjacent depression marsh.

4.4.1.5 Wet Flatwoods

The wet flatwoods will be enhanced and maintained through the implementation of prescribed burning, invasive vegetation control, and hydrological restoration programs. The specific fire management plan for this community is provided in Appendix H. The wet flatwoods community is included within management units that are predominantly mesic flatwoods, and will be burned at the same time and frequency as the mesic flatwoods.

The invasive vegetation control program will involve hand-pulling, selective pruning, and/or selective herbicide treatments, as described in Section 5.1.3, Invasive Species Control. Of primary concern are non-native invasive trees, shrubs, and vines, which may out-compete shade-intolerant native species.

Hydrological restoration measures will include plugging of existing drainage ditches that carry water out of the wet flatwoods into the Archie's Creek canal, and investigation of placing a weir in the Cabana Colony canal just west of its junction with the Gardens Mall drainage canal. This weir would raise water levels in the Cabana Colony canal on the southern border of the site, cutting seepage water losses to the canal and raising the water table. A raised water table would allow a longer hydroperiod in the wet flatwoods.

4.4.1.6 Hydric Hammock

The hydric hammock will be enhanced and maintained through the implementation of an invasive vegetation control program. This invasive vegetation control program will involve hand-pulling, selective pruning, and/or selective herbicide treatments, as described in Section 5.1.3, Invasive Species Control. Of primary concern are non-native invasive trees, shrubs, and vines, which may out-compete native plant species and cause the mortality of those species.

The hydric hammock community has expanded into the adjacent strand swamp as a result of drainage. It can be expected that some portions of this community may be negatively affected by hydrological restoration efforts that raise water levels in the strand swamp.

4.4.1.7 Disturbed Hydric Hammock

The disturbed hydric hammock will be enhanced and maintained through the implementation of an invasive vegetation control program. This invasive vegetation control program will involve hand-pulling, selective pruning,

mechanical removal, and/or selective herbicide treatments, as described in Section 5.1.3, Invasive Species Control. Of primary concern are non-native invasive trees, shrubs, and vines, which may out-compete native plants species and cause the mortality of those species. Restoration planting of appropriate native species in areas that are dominated by exotic plants will be considered if funds from outside sources are available.

4.4.1.8 Disturbed Tidal Marsh

The disturbed tidal marsh will be enhanced and maintained through the implementation of invasive vegetation control and estuarine enhancement programs. This invasive vegetation control program will involve hand-pulling, selective pruning, and/or selective herbicide treatments, as described in Section 5.1.3, Invasive Species Control. Of primary concern are non-native herbs and grasses which may out compete native plant taxa. The creation of a flushing channel from the Archie's Creek canal will be investigated to see if it would improve the functioning of this natural community.

4.4.1.9 Disturbed Tidal Swamp

The disturbed tidal swamp will be enhanced and maintained through the implementation of invasive vegetation control and estuarine enhancement programs. This invasive vegetation control program will involve hand-pulling, selective pruning, and/or selective herbicide treatments, as described in Section 5.1.3, Invasive Species Control. Of primary concern are non-native invasive trees, shrubs, and vines, which may out-compete native plant species and cause the mortality of those species. An estuarine enhancement project will be undertaken on the east side of the tidal swamp lagoon. The east bank will be scraped down to create a littoral shelf, and a flushing channel and will be replanted with mangroves and cordgrass. If funding is available, additional enhancement work may be done on the west bank of the lagoon, the north bank of the Cabana Colony canal, and the south bank of the Archie's Creek canal.

4.4.2 Protection and Enhancement of Listed Species - Flora

Ten plant species recorded at the Frenchman's Forest Natural Area have been listed by at least one of the following governmental agencies or nonprofit environmental organizations: United States Department of the Interior, Fish and Wildlife Service (USFWS); Florida Game and Fresh Water Fish Commission (FGFWFC); Florida Department of Agriculture and Consumer Affairs (FDACS); and Florida Natural Areas Inventory (FNAI). These species are listed in Table 1 and are ranked and discussed in Appendix A. Definitions of the listing classifications are provided in Appendix D. The following sections contain a summary of the recommended procedures for management of these species.

4.4.2.1 Priority A

Priority A taxa are taxa which are considered by FNAI to be imperiled or critically imperiled in the state. These taxa should receive the highest level of management attention. Under no circumstances should extirpations of these taxa be allowed to occur at the Frenchman's Forest Natural Area. When needed and

appropriate, efforts should be made to augment existing populations.

Florida Threeawn (*Aristida rhizomophora*)

This coarse, rhizomatous grass was recorded at Frenchman's Forest Natural Area in the mesic flatwoods south and west of the strand swamp. It occurs at low densities throughout this area. This species will be protected by enhancing and maintaining the mesic flatwoods vegetative community on the site.

Hand Fern (*Ophioglossum palmatum*)

This epiphytic fern was recorded at Frenchman's Forest Natural Area in the strand swamp and hydric hammock communities on cabbage palms. It is rare in this community, and occurs in at least three sub-populations. This species will be protected by enhancing and maintaining the strand swamp and hydric hammock vegetative communities on the site and by protecting this site from plant collection, prescribed burns, and wildfires.

4.4.2.2 Priority B

Priority B taxa are taxa which are considered by FNAI to be rare in the state. These taxa should receive significant management attention. Under no circumstances should extirpations of these taxa be allowed to occur at the Frenchman’s Forest Natural Area. If needed, population numbers should be increased, so long as this does not adversely impact community-level management.

Banded Wild Pine (*Tillandsia flexuosa*)

This epiphytic bromeliad was recorded at the Frenchman's Forest Natural Area in the strand swamp and in the hydric hammock between the strand swamp and the scrubby flatwoods. It has a very small and localized population that can be difficult to detect. This species will be protected by enhancing and maintaining the hydric hammock vegetative community and by preventing plant collection at this site. It is not fire-tolerant. Its hydric hammock habitat will be protected from prescribed burns and wildfires.

4.4.2.3 Priority C

Priority C taxa are taxa which are listed as Endangered, Threatened or Commercially Exploited by FDA, but which are not listed by FNAI. These taxa should receive moderate management attention. At a minimum, extirpations of these taxa should be prevented at the Frenchman’s Forest Natural Area.
Butterfly Orchid (*Encyclia tampensis*)

This epiphytic orchid was recorded at the Frenchman's Forest Natural Area in the scrubby flatwoods and hydric hammock vegetation communities. Several plants were seen. It will be protected on this site from plant collection and by enhancing and maintaining the scrubby flatwoods vegetation community on the site.

Common Wild Pine (*Tillandsia fasciculata*)

This epiphytic bromeliad was recorded at the Frenchman's Forest Natural Area in the hydric hammock and strand swamp communities, and will be protected from plant collection. It is endangered by the feeding activities of an imported bromeliad weevil that burrows through the central growing point of the plant, causing the growing point to die and the eventual death of the entire plant. This species is not fire-tolerant. Its hydric hammock and strand swamp habitat will be protected from prescribed burns and wildfires, and the mortality caused by the bromeliad weevil will be monitored.

Giant Leather Fern (*Acrostichum danaeifolium*)

This large terrestrial fern was recorded at Frenchman's Forest Natural Area in the depression marsh and strand swamp communities. Only a small localized population exists on the site. This species will be protected by enhancing and maintaining the depression marsh and strand swamp vegetative communities on the site and by protecting this site from plant collection.

Giant Wild Pine (*Tillandsia utriculata*)

This epiphytic bromeliad was recorded at the Frenchman's Forest Natural Area throughout the site. It is endangered by the feeding activities of an imported bromeliad weevil that burrows through the central growing point of the plant, causing the growing point to die and the eventual death of the entire plant. This species will be protected by enhancing and maintaining the hydric hammock, mesic flatwoods, scrubby flatwoods, and strand swamp vegetation communities on the site and protecting this site from plant collection.

Prickly Pear Cactus (*Opuntia stricta*)

This small cactus was recorded growing in the mesic flatwoods and at the edge of the disturbed hydric hammock communities at the Frenchman's Forest Natural Area and along the southern edge of the site. Only small populations were found. This species will be protected on this site by enhancing and maintaining the mesic flatwoods vegetation community.

Queen’s Delight (*Stillingia sylvatica* ssp. *tenuis*)

This terrestrial forb was recorded at Frenchman's Forest Natural Area in the mesic flatwoods northwest and southwest of the strand swamp. This species will be protected by enhancing and maintaining the mesic flatwoods community on site.

Reflexed Wild Pine (*Tillandsia balbisiana*)

This epiphytic bromeliad was recorded at the Frenchman's Forest Natural Area in the scrubby flatwoods. Although individual plants will be killed by prescribed burning, it is expected that regenerating shrubs will be recolonized by airborne seeds drifting in from the unburned portion of the scrubby flatwoods vegetative community. This species will be protected by only burning a portion of the

scrubby flatwoods community at one time and maintaining a seed source population in the unburned portion.

4.4.3 Protection and Enhancement of Listed Species - Fauna

Two animal species recorded at the Frenchman's Forest Natural Area have been listed by at least one of the following governmental agencies or nonprofit environmental organizations: FNAI, FGFWFC, and USFWS (Table 1). These species are ranked and discussed in Appendix A. Recommended procedures for management of these species are described in the following sections. ERM will coordinate with FGFWFC for appropriate guidance, recommendations, and necessary permits to avoid impacts to listed animal species on the project site.

4.4.3.1 Priority A

Priority A taxa are taxa which are considered by FNAI to be critically imperiled, imperiled, or rare in Florida and are known to occur in viable numbers at the Frenchman's Forest Natural Area. These taxa should receive the highest level of management attention. Under no circumstances should extirpations of these taxa be allowed to occur at the Frenchman’s Forest Natural Area. When needed and appropriate, efforts should be made to augment existing populations.

Gopher Tortoise (*Gopherus polyphemus*)

A population of this medium-sized tortoise has been documented within the Frenchman's Forest Natural Area. Thirty-five active burrows and twenty-two inactive burrows were recorded on the site in a July 1994 survey, giving an estimated population of 35 tortoises (ERM and the City 1996). The gopher tortoise is considered to be a keystone species in upland natural communities in Florida. Many other species of animals depend upon gopher tortoise burrows for critical habitat.

A new survey for the gopher tortoise will be conducted within 18 months of the approval of this management plan. Gopher tortoise burrows (active, inactive and abandoned) will be counted and mapped, and the population of tortoises will be estimated. Additional gopher tortoise surveys will be conducted periodically to monitor changes in population size and density.

Based upon estimates in Cox et al. (1987), a long-term, viable gopher tortoise population should contain a minimum of 40-50 tortoises and at least 25 acres of appropriate habitat. Appropriate habitat must have well-drained sands, a herbaceous ground cover, and an open canopy and shrub layer. An approximately 84.7-acre area that includes 66.2-acres of mesic flatwoods, 15.9-acres of scrubby flatwoods, and 2.6-acres of wet flatwoods fits this description, and will be managed to maintain these conditions. The implementation of a prescribed burn program should increase food supplies and provide better nesting conditions for the tortoises, and allow the population to increase to a long-term viable level.

The current gopher tortoise population will be protected through the enhancement and maintenance of the mesic flatwoods and scrubby flatwoods vegetation communities and by the prevention of illegal removal and poaching.

4.4.3.2 Priority B

Priority B taxa are taxa which are considered by FNAI to be critically imperiled,

imperiled, or rare in Florida, but for which a viable population is not known to occur at the Frenchman's Forest Natural Area, or the taxa are transitory on the site. These taxa, if present, should receive significant management attention. If needed, population numbers of resident taxa should be increased, so long as this does not adversely impact natural community level management. Efforts also should be made to provide suitable habitat for transitory taxa, so long as this does not adversely impact community-level management.

Common Snook (*Centropomus undecimalis)*

This carnivorous game fish has been recorded in the Archie's Creek canal and probably also occurs in the Cabana Colony canal and the tidal swamp lagoon. This species is relatively common in Palm Beach County, but is valued for food and is under heavy fishing pressure. There are no indications that the common snook breeds on the project site. This species will be protected by making sure that state regulations governing fish size, bag limits, and fishing season are enforced in the Archie's Creek and Cabana Creek canals, and by the maintenance and enhancement of the tidal swamp and tidal marsh natural communities.

4.4.3.3 Priority C

Priority C taxa are other taxa which are considered by FNAI to be rare in Florida, but whose occurrence at the Frenchman's Forest Natural Area should be considered accidental. Management for these taxa at the Frenchman's Forest Natural Area would serve no meaningful purpose.

No accidental occurrences of listed species have been recorded at the site.

4.5 ARCHAEOLOGICAL AND HISTORICAL RESOURCES

No archaeological or historic resources are currently known to be present on the Frenchman's Forest Natural Area. If any archaeological or historic sites are discovered on the site, the County will comply with Chapter 267, Florida Statutes, specifically Sections 267.061(2)(a) and (b). The collection of artifacts or disturbance of any archaeological or historical site on the Frenchman's Forest Natural Area is prohibited unless prior authorization has been obtained from the Department of State, Division of Historical Resources.

4.6 COORDINATION WITH ADJACENT LAND USERS

The successful ongoing management of the Frenchman's Forest Natural Area will require the cooperation of the neighborhood residents. Many aspects of maintaining the site (e.g., security and opening and closing the main gate) could be simplified by utilizing a neighborhood watch or volunteer steward. ERM will attempt to recruit a local steward or organize a neighborhood watch.

Within 24 months of approval of this plan, ERM will begin a public education campaign to educate the community on the benefits of managed natural areas and the necessity of invasive plant control and prescribed burns in maintaining the native habitat. As part of the outreach program, local schools will be invited to use the Frenchman's Forest Natural Area for nature study, environmental

education, and community service projects.
The City has agreed to consult with the County during the review of any proposed land use changes or development orders on property adjacent to the natural area to ensure the protection of biological communities and to avoid adverse impacts to listed species.

4.7 NATURAL AREAS MANAGEMENT ADVISORY COMMITTEE REVIEW

On August 16, 1994, the Palm Beach County Board of County Commissioners adopted Resolution 94-1051, which established a seven-member Natural Areas Management Advisory Committee (NAMAC) to review and comment on management plans developed by staff for natural areas acquired and/or managed by the County and to hold public hearings on these plans prior to their review and adoption by the Board. The members of NAMAC were appointed on November 1, 1994. The membership categories are: a member with experience in the management of natural areas, a biological scientist, a professional educator with knowledge of South Florida ecosystems, a representative of a local municipal government public recreation program, a member of the Palm Beach County Parks & Recreation Department staff, a citizen having an interest in natural areas, and a member of the County's Environmentally Sensitive Lands Acquisition Selection Committee (ESLASC). Upon sunset of ESLASC, this position will be filled by a citizen with an interest in natural areas.

As part of their responsibilities, the members of NAMAC will hold a public hearing on the proposed management plan for the Frenchman's Forest Natural Area. The public hearing will be held in the evening in a location close to the site, and will follow an afternoon open house at which the public will be able to review the management plan and a display of the plan for the public use facilities and discuss these with County staff. Copies of the plan will be available at public facilities such as libraries for several weeks prior to the open house and public hearing. Members of the public who cannot attend the hearing will be allowed to submit written comments to the County during the week following the hearing.

NAMAC members will take those comments into consideration prior to their approval of the plan for forwarding to the Board of County Commissioners. Members of the public also may comment on the plan at the time it is considered by the Board. After adoption of the plan by the Board, the plan will be reviewed at least every five years by NAMAC and revised as necessary on the basis of new information, research data, improvements in management techniques, or other relevant factors.

4.8 ENVIRONMENTAL EDUCATION AND SCIENTIFIC RESEARCH

In conjunction with the construction of the nature trail, ERM staff will prepare interpretive signage. The printed nature trail guide and a recorded nature trail guide on tape for the visually-handicapped will be developed by February 2000. The interpretive signage for the nature trail will be installed when nature trail construction is completed in March 2000. Also by March 2000, ERM staff will train local volunteers to give monthly guided tours of the project site as part of the development of a site stewardship group. ERM also will develop an educational slide show program by April 1999 which describes the entire Frenchman’s Forest Natural Area and its resources. This slide show will be

presented by ERM staff or local volunteers on a request basis. ERM staff will also be available to assist the faculty of local schools in developing educational programs for school use of the natural area. The timing and frequency of the educational programs will depend on the interest shown in the natural area by the faculty of local schools. In particular, ERM will cooperate with William T. Dwyer Community High School's Science Department, which will incorporate the site into its environmental education and use it for onsite learning on a continuous basis when the site is available for public use. If the City constructs the proposed nature center on the natural area, environmental education opportunities will be expanded for the local community and schools. The City is currently utilizing the site for environmental workshops.

ERM does not anticipate performing any scientific research other than compiling and interpreting the data from monitoring activities, but will allow researchers affiliated with local institutes of higher learning to conduct scientific research on a permit basis. Resource enhancement will be required in all management units at the Frenchman's Forest Natural Area.

4.9 GREENWAY/HOOD ROAD EXTENSION MANAGEMENT

The City has proposed an extension of its Pedestrian/Nature Trailway system which would cross the natural area from east to west just north of the proposed Hood Road extension(Figures 6 and 7). The portions of the natural area's hiking trail that lie immediately north of the right-of-way reserved for the proposed extension have been designed so that they can be incorporated into the City's trailway system. The Pedestrian/Nature Trailway system consists of hard-surfaced trails screened by native plant landscape plantings that are located adjacent to major roads in an expanded road right-of-way. The implementation of this system on the natural area is currently dependent upon the construction of the Hood Road extension. The only action taken to date on the Hood Road extension is to reserve a future right-of-way. Construction of this extension is not on the County's five-year road plan, and ERM and the City are looking at alternative locations for this extension that would not cross the natural area. The Hood Road extension will likely be constructed only if the undeveloped land west of the natural area is developed. The City will have input into any development plans for this land through its development review process. The City also can implement the Trailway system if it obtains an easement across the undeveloped land to connect to the present terminus of Hood Road. If the Pedestrian/Nature Trailway system is implemented across the natural area, ERM will coordinate with the City in the development and implementation of a management strategy for protecting and managing the Trailway system.

If the proposed Hood Road extension is slated for construction across the project site, ERM will become involved in the design and engineering of the road extension to minimize the water quality and wildlife impacts, and will request that a pedestrian crossing and buffer plantings are included in the project design. Stormwater runoff from the road will not be allowed to discharge to the natural area unless it has been sufficiently pre-treated to remove sediments, petroleum products and other pollutants, and otherwise meets water quality standards. The treated stormwater runoff should also assist with the hydrological restoration of the project site. If the runoff does not meet these

criteria, it will be required to discharge to either the Archie's Creek Canal or the Cabana Colony Canal. In order to minimize road kill of wildlife, ERM will request that a wildlife underpass with appropriate fencing be constructed so that the movement of wildlife is directed to a safe crossing point.

5. RESOURCE ENHANCEMENT

Resource enhancement will be required in all management units at the Frenchman's Forest Natural Area. The principal enhancement activities will include invasive species control, hydrological restoration, estuarine enhancement, and the reintroduction of fire. Active restoration (including direct seeding and out-planting) could be necessary in some areas. The goal of these activities is to restore all native vegetation communities to a maintenance condition.

5.1 RESTORATION MEASURES

The goal of fragmented vegetation communities management in southeastern Florida should be to restore and maintain as many of the functions and values of the original natural communities that historically occupied the site as possible. It should be recognized that even the largest and least disturbed sites have experienced significant impact from changes in the regional water table, air pollution, the loss of large predators, and species extinctions. These types of disturbances are mostly irreversible, given the current political and social realities of southeastern Florida. Almost all sites also have been affected by reversible changes such as the exclusion of fire and exotic pest plant invasions.

Certain disturbances that are the products of fragmentation are permanent, but can be mitigated by human intervention. The classic example of this in south Florida is natural fire, which cannot be expected to travel between natural area fragments. Prescribed burning is a management tool that can partially substitute for this interrupted natural ecological function, but which must be conducted by natural areas managers in perpetuity.

5.1.1 Management Unit Design

Successful management of small fragmented ecosystems, such as those at the Frenchman's Forest Natural Area, depends heavily upon management unit design. The Frenchman's Forest Natural Area is composed of a mosaic of historic natural vegetation communities that have been modified by previous agricultural uses and grazing, fire exclusion, pest plant invasions, hydrological alterations, construction of adjacent roads and buildings, illegal dumping, and other human-related disturbances. Each of the represented natural communities historically would have been part of a greater regional mosaic of upland and wetland ecosystems. Today, the Frenchman's Forest Natural Area is partially isolated from nearby remnants of natural vegetation communities and is continuously affected by human and human-induced disturbances. These disturbances include fire exclusion, onsite and offsite drainage systems, the dissemination of invasive species from nearby residential areas, and predation by domestic pets.

The site has been subdivided into four macro-management units, using firebreaks as boundaries (Figure 4). Each macro-management unit encompasses at least two vegetation communities, together with transition zones between these two communities and adjacent communities (ecotones). Macro-management units have been designed to facilitate different management objectives for adjacent portions of the site. Macro-management units may be further subdivided into micro-management units, which represent distinct natural communities and\or seral

stages within the macro-management unit.

5.1.2 Fire Management

Mesic flatwoods, scrubby flatwoods, and wet flatwoods are dependent upon fire for long-term restoration and maintenance. Given the extensive alterations that have been made to the local landscape, natural lightning-induced fires cannot be expected to fulfill the fire needs of this community. In addition, given the proximity of the site to adjoining residential properties, major roads, and other forms of urban and suburban development, the risk of damage to these developments from wildfire is high. As such, the use of a combination of controlled, prescribed fire, together with firebreaks and other safety precautions, will be necessary to fully achieve the stated management objectives.

The primary responsibility for prescribed burning will be assumed by ERM. Assistance will be provided by the City, including the provision of fire-fighting staff and equipment to prevent surrounding homes from damage. Additional assistance may be provided by the Florida Division of Forestry (DOF), FGFWFC, TNC, and trained volunteers. Fire-related safety training will be required of all County staff and others participating in a prescribed burn. All prescribed burns will comply with the legal mandates stated in the Prescribed Burn Act, Chapter 590.026 of the Florida Administrative Code. The overall goal of the prescribed burn program is to introduce a fire regime (i.e., a repeatable pattern of fire with predictable results) onto the natural area that will sustain mesic, scrubby, and wet flatwoods vegetation communities on the site. General objectives are:

- To ensure the long-term existence and viability of mesic flatwoods, scrubby flatwoods, and wet flatwoods, and the listed plant and animal species that use that habitat.

- To control the regrowth and regeneration of invasive vegetation following treatment or removal activities, assisting in the restoration of disturbed areas.

- To provide viable wildlife habitat for wildlife species that use, or could potentially use, mesic flatwoods, scrubby flatwoods, or wet flatwoods on the site.

- To reduce the danger of wildfire by reducing the buildup of fuels that has resulted from the limited occurrence of fire in recent years.

A permanent firebreak/management road will be established between the scrubby flatwoods and the hydric hammock in the northeast corner of the site, in order to prevent potentially destructive wildfires and adequately control prescribed fires. A similar firebreak/management road will be established on the western border of the strand swamp, depression marsh and disturbed hydric hammock communities to prevent fire from moving into these communities from the mesic

flatwoods to the west. These firebreaks/management roads will serve as the boundaries of the fire-managed macro-management unit and will provide vehicle access for conducting controlled burns (Figures 3 and 4). Existing trails will be used when possible. New firebreaks/management roads will be constructed where existing trails are not sufficient. Firebreaks will be at least 15 feet wide at the time of a prescribed burn. Vegetation may be cut along the edges of specific firebreaks, if necessary, to widen them further prior to a controlled burn. After the burn, the vegetation will be allowed to regenerate naturally.

Prior to the construction of a firebreak/management road, the area will be surveyed for listed species. If listed species are present, the location of the firebreak will be adjusted where possible to avoid affecting that species, or the listed species present within the proposed firebreak location will be relocated on the site. Some firebreaks or portions of firebreaks may be used for other management activities, such as exotic pest plant control. They also may be contiguous with a portion of the hiking trail, or as part of the nature trail.

The management units range in size from 19.3 to 69.5 acres. They are relatively large, so that fires can burn through ecotones (transition zones between vegetation communities) and move in a more natural, spotty fashion across the landscape. The resulting patchwork of burned and unburned stands within a management unit will produce a mosaic of vegetation at various stages of maturity, thereby maximizing diversity within and among communities. This will provide habitat for individual species which typically use, or may even be restricted to, communities in a particular state of maturity. Burn units must not be so large that control of prescribed fire and attendant smoke becomes difficult or uncertain. Burn Unit 3 will be divided into two subunits (3a and 3b) that will be burned 7 to 8 years apart, in order to avoid burning all of the scrubby flatwoods habitat on site at the same time.

Active fire suppression measures that rely upon the use of heavy machinery and plowlines are extremely destructive to vegetation and other natural features. Active fire suppression measures are to be avoided as much as possible, but will be used to safeguard adjacent residences if necessary. If such measures are undertaken to control a fire, all plowlines will be backfilled after the fire has been extinguished, and other disturbed areas will be rehabilitated to the greatest extent possible.

A flexible fire management program will be initiated within one year following the adoption of this management plan. The burn units and subunits will be burned in rotation, at an average rate of one every two to three years. Prior to burning a unit, a survey will be done for fire-intolerant listed plant species. If necessary, individual plants will be relocated outside the burn area. Fire management will begin with the prescribed burn of Unit 1 in 1999, and will follow with burns of Subunit 3b in 2001, Unit 2 in 2003, and Subunit 3a in 2008. The first repeat burn in the cycle will be Unit 1 in 2006.

The seasonality and frequency of prescribed fires should seek to approximate the natural incidence of fire in the site's communities. Generally, prescribed fires should be conducted during the early growing season, which extends from March to July. Natural lightning-induced fires normally occur during the growing season,

and the natural incidence of winter fires is believed to have been quite low. Prescribed winter fires should be similarly rare in occurrence, to ensure that fire events are in synch with the fire-adapted life histories and reproductive cycles of resident species. However, where fire has been suppressed for a long period of time and fuel loads have become heavy, prescribed winter fires may be used to begin restoration of a natural fire regime. Winter fires are generally cooler fires that can reduce accumulations of excess fuel while limiting the undesirable destruction of vegetation. In areas such as the Frenchman's Forest Natural Area, where safety is of the utmost concern, winter fuel reduction fires may be more appropriate, at least in the short term. Backing fires and other techniques will be used for prescribed burns in the mesic flatwoods, scrubby flatwoods, and wet flatwoods in order to reduce fire intensity and decrease smoke generation. If a wildfire occurs, the appropriate actions will be taken by the authorized fire emergency response agency.

A public education campaign will be developed that will include informing residents of areas surrounding the site of the necessity and benefits of fire, the safety features of prescribed burning versus wildfires, and the strategies that will be developed to minimize the impacts of smoke on nearby communities. The County will coordinate with the City prior to conducting a controlled burn. County staff will meet with local community groups such as homeowners' associations before each burn to coordinate with residents, to provide information on the necessity of conducting prescribed burns, and to describe the safety precautions that will be taken to protect adjacent lands.
ERM will write a fire management plan for the Frenchman's Forest Natural Area within two years of acquisition. The development of this plan will be coordinated with DOF and FGFWFC. The plan will consider the surrounding land uses, safety issues in the event of a wildfire, and the ecological consequences of specific fire management strategies. A prescribed burn program will be implemented within two years following the approval of this management plan.

A specific burn plan will be prepared for each unit or subunit prior to conducting a prescribed burn. A summary of key information on prescribed burning and a pre-burn checklist will be provided in Appendix H.

5.1.3 Invasive Species Control

Like many fragmented natural areas in southeastern Florida, the Frenchman's Forest Natural Area has been invaded by many invasive pest plant species. Ninety-nine species of exotic plants have been recorded within the natural area (Appendix B), and many of these exhibit invasive tendencies. Exotic plant species therefore represent approximately 22% of the plant taxa recorded for the site. This percentage is typical for a small habitat preserve surrounded by urban and suburban development, and should not be inferred to indicate that the site is of low quality. However, additional species of invasive plants may be found during the early management phases, and new species will continue to colonize the site as long as sexually reproducing exotic plant species are present in the surrounding urban and suburban areas. A visual estimate of the site’s vegetation determined that approximately 16% of the vegetation, or the equivalent of 24 acres, consisted of exotic species. The exotic plants are concentrated in the disturbed hydric hammock.

Most of the invasive pest plant species at the Frenchman's Forest Natural Area site can be considered minor, or at worst moderate, problems. Many have originated from vegetation dumping piles within the site or have grown in from the back yards of adjacent residences. The control of some exotic species, which do not have the capacity to invade functioning natural communities, should be given a low priority. These include species such as Madagascar periwinkle, which prefer open, disturbed sites. They will be controlled through good management practices such as prescribed burning and the elimination of unnecessary disturbances such as off-road vehicle traffic.

Two invasive species, air potato and Brazilian pepper, constitute the major problem at present, although many others, including Old World climbing fern, have the capability to cause major problems on the site.

For purposes of this management plan, the phrase "invasive species" includes three groups of plants: exotic species, species of uncertain origin, and ruderal species (species which are probably native but are found almost exclusively in disturbed areas).

Rather than discuss invasive plants on a species-by-species basis, it is usually preferable to group them by their habit (life form), preferred habitat, degree of invasiveness, and potential (or real) impacts on natural communities. Although this method is functional for strategic and operational planning purposes, each invasive plant species is unique, and control measures may need to be tailored on a species-by-species basis. Invasive vegetation species have been grouped into the following categories: (1) vines; (2) shade-tolerant trees; (3) shade-intolerant trees; (4) shade-tolerant shrubs; (5) shade-intolerant shrubs (6) grasses; (7) perennial forbs; and (8) annual and short-lived forbs. Some invasive species do not fall easily into these categories, and specific priorities may have to be developed for these species.

A three-year, six-phase invasive species control program has been initiated. Each of the six phases will be conducted approximately six months apart. If the treatments are thorough, then the treated natural vegetation communities should be in maintenance condition by the end of the three-year period. A management unit will be considered to be in a maintenance condition (in regard to invasive species) when the cover of invasive species does not exceed one percent of the canopy or understory layers within any management year. Once a maintenance condition is reached, follow-up treatments of invasive vegetation will be conducted periodically as needed. Preliminary management priorities and techniques for each of the categories are described in the following sections.

5.1.3.1 Vines

This category includes exotic species as well as aggressive ruderal vines. If possible, exotic vines will be eradicated from the Frenchman’s Forest Natural Area. Aggressive ruderal vines will be treated as invasive species until each management unit reaches a maintenance condition. After this time, aggressive native vines will be allowed to regenerate until they reach historically accurate

densities and cover.

Vines pose a significant threat to the natural communities at the Frenchman's Forest Natural Area because they cover the leaves of shrubs and trees and cause death through reduction of photosynthetic food production. Invasive exotic vines recorded at the Frenchman's Forest Natural Area include air potato, climbing cassia, Old World climbing fern, Ganges primrose, passion-fruit, hunter's robe, star jasmine, coral vine, nephthytis, night-blooming cereus, rosary pea, snake cactus, and wild balsam apple. White vine is an invasive vine of uncertain origin. Native ruderal invasive species include muscadine grape and cowpea.

During invasive vegetation control treatments, most species of vines will be cut at a height of six feet and again near ground level if they are growing into canopy trees. The bases of the vines will be hand-pulled or treated with a systemic herbicide such as Garlon 4 or Rodeo. The vine stems remaining in the canopy may be left to decompose in the trees. Vines growing on shrubs or saplings under six feet in height will be cut near ground level and removed from the supporting plant. The bases of the vines will be hand-pulled or treated with a systemic herbicide. Lateral stems of vines growing along the ground surface will be cut, hand-pulled and/or treated with a systemic herbicide. These methods should be effective in controlling Old World climbing fern, climbing cassia, Ganges primrose, passion-fruit, muscadine grape, coral vine, rosary pea, star jasmine, white vine, and wild balsam apple.

Hunter's robe, nephthytis, night-blooming cereus, and snake cactus all sprout easily from cuttings and must be pulled, bagged and removed from the site. Air potato has an underground tuber that must be dug up and aerial bulbils that must be collected, bagged, and removed from the site. Cowpea is a short-lived annual vine and generally requires no treatment.

5.1.3.2 Shade-tolerant Trees

This category includes woody plants that typically grow over 12 feet in height. In the past, shade-tolerant trees were not a major threat to natural communities in southeastern Florida. However, several species of shade-tolerant trees have become established in natural vegetation communities within the last ten years. These trees, which have the ability to invade undisturbed, intact systems, are especially dangerous to hammocks, drained wetlands, and fire-excluded pyric communities. Shade-tolerant trees recorded at the Frenchman's Forest Natural Area include areca palm, bishopwood, carrotwood, Java plum, grapefruit, orange jessamine, podocarpus, avocado, laurel fig, loquat, queen palm, schefflera, and tangerine.

During invasive vegetation control treatments, seedlings of shade-tolerant trees will be hand-pulled. In general, saplings and mature trees will be left standing and treated with a systemic herbicide such as Garlon 4. This method is effective in controlling most dicotyledons. Schefflera, however, is known to be highly resistant to basal treatments of Garlon 4. This species has been most successfully controlled by cutting down the tree and applying Garlon 3A or Rodeo to the stump. Relatively mature areca and queen palms are easily killed with bud treatments of Garlon 4.

5.1.3.3 Shade-intolerant Trees

Shade-intolerant trees typically need sunny, often nutrient-poor soils for germination. They generally are located in disturbed areas, and often fix nitrogen. These species are most problematic in disturbed or fire-excluded pyric communities, although they may also invade disturbed hammocks and wetlands. Shade-intolerant trees at the Frenchman's Forest Natural Area include Australian pine, Brazilian pepper, common guava, earleaf acacia, woman's-tongue, bishop cactus, weeping fig, melaleuca, banana, traveler's tree, tropical almond, *Terminalia muelleri, Vitex trifoliata*, Indian rosewood, and chinaberry.

Seedlings of shade-intolerant trees will be hand-pulled. Most mature trees can be killed with systemic herbicides such as Garlon while still standing. Because Brazilian-pepper is a sprawling, shrub-like tree, special treatments such as cutting and removal may be necessary in especially dense stands. Melaleuca can be killed by cutting and treating stumps with Garlon 4A, or by hack-and-squirt trunk treatments. *Vitex* is herbicide-tolerant; only one plant exists on the site and it should probably be dug up. Bishop cactus should be dug up and removed from the site. Banana and traveler-tree should be cut and treated with Garlon 3A.

5.1.3.4 Shade-tolerant Shrubs

Shade-tolerant shrubs are similar to shade-tolerant trees, except that they generally affect a smaller area in the subcanopy and understory. Shade-tolerant exotic shrubs that have been recorded at the Frenchman's Forest Natural Area include copperleaf, Chinese evergreen, corn plant, lobster claw, *Dracaena* sp., queen sago, dumbcane, dwarf schefflera, *Ixora* sp., shoebutton ardisia, spineless yucca, spiral flag, split-leaf philodendron, Surinam cherry, ti plant, roselle, Java glorybower, and Turk's cap. Species of unknown origin include papaya and burweed. Ruderal species include bitter eupatorium. During invasive vegetation control treatments, seedlings of shade-tolerant shrubs will be hand-pulled. In general, saplings and adults will be cut near ground level and the bases treated with a systemic herbicide such as Garlon. Where they occur in low densities, shade-tolerant shrubs may be killed while still standing. Spiral flag and lobster claw, which are shrub-like herbs, have underground stems that must be dug up. The entire plant should be bagged and removed from the site. Chinese evergreen, corn plant, *Dracaena*, dumbcane, spineless yucca, split-leaf philodendron, and ti plant should be dug up and removed from the site.

5.1.3.5 Shade-intolerant Shrubs

Shade-intolerant shrubs are similar to shade-intolerant trees, except that they generally affect a smaller area in the subcanopy and understory. Shade-intolerant shrubs recorded at the Frenchman's Forest Natural Area site include Caesar weed, hairy indigo, Indian mallow, azalia, oleander, physic nut, hibiscus, *Indigofera suffruticosa*, four o'clock, elephant ear, aralia, twinleaf nightshade, cardboard zamia, tropical soda apple, and shrub verbena.

Seedlings of shade-intolerant shrubs will be hand-pulled. In general, saplings and mature plants will be left standing and killed with a systemic herbicide such

as Garlon. Indian mallow, which is a woody-stemmed perennial, seems to decline and disappear without active disturbance. Elephant ear and cardboard palm should be dug up and removed from the site.

5.1.3.6 Grasses and Sedges (Graminoids)

Exotic grasses and sedges can become a significant problem in pyric communities. Exotic graminoids recorded at the Frenchman's Forest Natural Area include goose grass, Guinea grass, paragrass, Natal grass, St. Augustine grass, bahia grass, grain sorghum, small-flowered Alexander grass, Bermuda grass, and yellow nut-sedge. American sedge, globe sedge, thalia lovegrass, gophertail lovegrass, sour paspalum, *Cyperus tenuifolius*, hurricane sedge, southern crabgrass, big carpetgrass, and torpedo grass are invasive graminoids of uncertain origin. Coast sandspur, *Bulbostylis stenophylla, Cyperus flavescens, C. polystachyos, C. surinamensis,* flat sedge, slender fimbristylis, and thin paspalum are ruderal graminoids.

During invasive vegetation control treatments, small concentrations of exotic grasses will be hand-pulled. The use of herbicides such as Roundup will be necessary on larger concentrations, but alternative treatment methods will be sought where gopher tortoises are foraging on these grasses. There are a few clumps of Guinea grass, which is best controlled by cutting the plant down and treating the resprouts with Roundup or Rodeo. These clumps will be eradicated as soon as possible, so that no further use of herbicides will be necessary. Ruderal grasses and grasses of uncertain origin will be treated as necessary. Of most concern in this group are torpedo grass and St. Augustine grass, both of which have shown themselves capable of invading and disturbing natural community fragments. These two species are best controlled through careful applications of Rodeo or Roundup.

5.1.3.7 Perennial Forbs

Invasive perennial forbs can become a problem in all types of natural communities. Exotic perennial forbs recorded at the Frenchman's Forest Natural Area include African bowstring hemp, aloe, Asian sword fern, Avery's sword fern, basket plant, broadleaf purslane, caladium, *Callisia* sp., common canna, *Cassia pilosa*, milk-and-wine-lily, impatiens, inch plant, devil's-backbone, life plant, chandelier plant, *Laportea aestuans*, *Pouzolzia zeylanica*, Brazil pusley, Florida pusley, large-flowered pusley, *Ruellia ciliatiflora,* firecracker plant, whitehead broom, walking iris, wild bean, jimson-weed, creeping indigo, *Opuntia* cf. *ficus-indica*, fishtail fern, creeping oxeye, green shrimp plant, *Euphorbia graminea,* common asparagus fern, oyster plant, Sprenger's asparagus fern, tuberous Boston fern, violet wood sorrel, wandering Jew, and dayflower. African ground orchid, West Indian chickweed, Indian chickweed, *Pectis prostrata* and Boston fern are invasive forbs of uncertain origin. Carpetweed is a native ruderal species.

All of these species require special treatment because they sprout easily from cuttings, and many of them have underground stems. All should be bagged and removed from the site. Species with underground rhizomes or tubers include African bowstring hemp, creeping indigo, common asparagus fern, violet wood

sorrel, Sprenger's asparagus fern, and tuberous Boston fern. A combination of hand pulling, digging, and the careful application of systemic herbicides should be successful with any of these species. The remainder can all be hand-pulled, but most break easily, and care must be used to remove the entire plant, roots and all.

5.1.3.8 Annual and Short-lived Forbs

In general, annual or short-lived forbs cause temporary problems and are difficult to eradicate. Most respond to disturbance; therefore, their populations will drop in numbers as the restoration process proceeds. Exotic annual and short-lived forbs recorded at the Frenchman's Forest Natural Area site include long-stalked phyllanthus, Madagascar periwinkle, sweet broom, Florida beggar weed, globe amaranth, common pigweed, spiny amaranth, slender amaranth, rattlebox, showy rattlebox, tassleflowers (*Emilia* spp.), and rocketweed. Beggar's-ticks, *Hedyotis corymbosa*, lady's sorrel, Mexican tea, fiddler's spurge, milk spurge, rustweed, burnut, and common purslane are annual and short-lived forbs of uncertain origin. Ruderals in this category include Blodgett's spurge, common nightshade, common ragweed, dog fennel, dwarf horseweed, eyebane, fireweed, broom spurge, hairy spurge, peppergrass, southern broomweed, Spanish needles, Indian hemp, cottonweed, blue toadflax, pink purslane, bushy buttonweed, poor Joe, and painted-leaf.

Control measures, when necessary, usually involve hand-pulling of each individual. Invasive forbs may be an important source of food for gopher tortoises at the Frenchman's Forest Natural Area. Therefore, control measures may be limited until alternative sources of food are available.

5.1.3.9 Exotic Animals

Exotic animals also may be a problem within sites like the Frenchman's Forest Natural Area. Thus far, two exotic animals (Cuban tree frog and brown anole) have been found at the site. Domestic cats and dogs may occasionally use the site. Eradication of the exotic frog and lizard may not be possible, given their established populations in the surrounding residential areas. These animals are not having a discernable impact on native plants or animals, and control will not be undertaken unless a significant impact is observed in the future. Control of domestic cats and dogs will focus on educating the surrounding community, with selective live-trapping, if necessary.

5.1.4 Hydrological Enhancement

Attempts will be made to restore a more-natural hydroperiod to the Frenchman's Forest Natural Area. This will involve a two-tiered process: 1) restoration of water flow into the site, and 2) restriction of drainage away from the site.

Two options exist for the restoration of water flow onto the site. One is through the strand swamp community from the north edge from Frenchman's Landing development. This development currently sends its stormwater runoff to the Intracoastal Waterway via a pipe under Prosperity Farms Road. This water could

be rerouted into the strand swamp preserve in the development and then flow into the adjacent natural area. Water quality could be a problem, as there are limited opportunities to clean up the stormwater before it enters the strand swamp system.

The second option is to restore the natural flow into the strand swamp from continuation of this community in the currently undeveloped tract lying to the west of the natural area. This tract is mostly native vegetation that is used as rough cattle pasture, and may soon be developed. The strand swamp connection has been severed by a low berm associated with a utility easement, but during heavy rainfall events, surface water builds up in the property to the west and flows across the berm into the natural area. As the property to the west is both higher in elevation and in need of a drainage outlet, it may be possible during the development approval process to design a stormwater retention area/native vegetation preserve system that cleans up the stormwater runoff and slowly discharges it to the natural area. This stormwater should be accepted if it meets water quality standards. The County may be required to accept this stormwater, because the property to the west historically drained into the natural area.

The restriction of drainage from the site can largely be accomplished by plugging the ditches and canals that empty into the Archie's Creek canal, which borders the developed inset on the south and west sides. A weir is proposed in the Cabana Colony canal just west of its junction with the tidal lagoon. This weir would still allow the canal to drain the properties to the west and the south, but would hold the canal above tide level, which would cut down on seepage on the southern edge of the property and raise groundwater levels. The proposed weir and ditch plug locations are shown on Figure 3.

5.2 COORDINATION WITH ADJACENT LAND USERS

Both direct and indirect impacts from adjacent land uses are to be expected. Direct impacts include the invasion of exotic plant species into the Frenchman's Forest Natural Area and the possible predation of wildlife by dogs and cats. The cattle-grazing operation on the land west of the natural area has caused the introduction of exotic pest plants like the tropical soda apple. So far, these plants have not spread beyond the border of the natural area. These types of impacts will be mitigated through interpretive programs, public outreach, an aggressive invasive vegetation control program, and the enforcement of Natural Areas Ordinance provisions concerning the prohibition of pets.

Perhaps the greatest off-site threats to the long-term management of the Frenchman's Forest Natural Area are public fear of fire and the general dislike of attendant smoke. Smoke management will be one of the key issues addressed in the fire management plan (Appendix H). An active public education campaign will be developed that will describe the necessity of fire, the safety features of prescribed burning versus wildfires, and the strategies that will be developed to minimize the impacts of smoke on nearby communities. If public pressures are sufficient to reduce or prohibit the use of prescribed fire at the Frenchman's Forest Natural Area site, then the indirect impacts of fire exclusion may prevent the attainment of several management goals. Alternatives to prescribed burns

will then be considered to best attain the management goals for this natural area.

5.3 ENHANCEMENT PROJECTS

The County will restore approximately 2 acres of tidal swamp and lagoonal shoreline by removing exotics and replanting with native species. This restoration area is shown on Figure 3. The tidal lagoon occupied by the disturbed tidal swamp was created by the removal of soil for fill elsewhere. This excavated lagoon has steep banks with very little littoral shelf. A narrow ring of white mangroves has colonized the lagoon at the average high water line, but otherwise the banks of the lagoon are mostly covered with exotic or disturbed vegetation. An estuarine enhancement project will be undertaken on the east side of the lagoon. The east bank will be scraped down to create a littoral shelf and a flushing channel and will be replanted with red mangroves, cordgrass, and other estuarine species. If the soil removed from the bank area is of high enough quality to be used as fill dirt, it will be used to raise the elevation of the proposed parking area. If funding is available, additional enhancement work may be done on the west bank of the lagoon, the north bank of the Cabana Colony canal, and the south bank of the Archie's Creek canal.

6. COST ESTIMATES AND FUNDING SOURCES

Cost estimates for initial site development and long-term management are provided in Tables 2 and 3, respectively. The primary funding source for site development will be funds from the $100 million Palm Beach County Environmentally Sensitive Lands Bond Referendum approved by the voters on March 12, 1991. Responsibility for site development and management is described in the interlocal agreement between the City and the County (Appendix E). Staffing for habitat management and facility maintenance will be accomplished with existing County and City personnel, with assistance from community volunteers.

6.1 DEVELOPMENT COSTS

Initial site development is estimated to cost approximately $572,569 (Table 2). Exotic vegetation removal, construction of the boardwalk and observation platform, estuarine enhancement, and hydrological restoration will account for over half of this projected cost. Other major expenditures include fencing, signs and gates; a parking area; a handicapped-accessible nature trail; and a kiosk with interpretive displays. Funding for initial site development will be provided from the Palm Beach County Environmentally Sensitive Lands bond funds, although grant monies may be sought to fund construction of the nature trail and kiosk. The County will not apply for funds from any grant program whose requirements conflict with the terms and conditions of the FCT award. The City of Palm Beach Gardens has proposed to build a nature center on the site. If the nature center is built, the City will provide the funding. The cost of the proposed nature center is not included in the initial site development estimate.

6.2 KEY MANAGEMENT ACTIVITIES AND RESOURCE ENHANCEMENT COSTS

Costs of management will be minimized through the cooperation of local citizens' organizations and by coordinating the management of natural areas on a countywide basis. The Audubon Society of the Everglades, the Coalition for Wilderness Islands, the Palm Beach County Chapter of the Florida Native Plant Society, the Florida Trail Association, the Royal Palm Audubon Society, and the Sierra Club - Loxahatchee Group have all committed to providing volunteer services for the management of environmentally sensitive lands acquired by the County. However, it is recognized by the County that the management of the Frenchman's Forest Natural Area will require more than volunteer assistance. Some activities, such as prescribed burning, herbicide applications, chainsaw work, and other hazardous or technical operations are not generally suited to volunteers. County staff will provide such services, or assistance from contractors will be obtained where necessary.

The County has established a Natural Areas Stewardship Endowment Fund. Funds received from restricted gifts and other sources will be invested and the interest earned used to provide operating funds for management of County-owned and County-leased natural areas. The County also will apply for funds available from the State for management purposes, including the Pollution Recovery Trust Fund administered by DEP. In addition, funds will be available via Section 7.5 (Vegetation Preservation and Protection) of the Palm Beach County Unified Land Development Code. Monies from penalties for violations of the provisions of

these Sections will be deposited into a Natural Areas Fund. These monies in the Natural Areas Fund will be available for the management of lands acquired by the County as natural areas. Monies from the sale of development rights on lands purchased by the County as natural areas also could be used for management purposes.

7. PRIORITY SCHEDULE

Initial site development activities will focus on securing the site against unauthorized use. Fencing, signs and gates were purchased and installed within six months of acquisition. A fire management plan (Appendix H) will be prepared and invasive vegetation removal begun within one year of acquisition. The nature trail and parking area will be constructed, management roads will be cleared, and interpretive facilities and materials such as a kiosk, slide show, and nature trail guide will be developed within the third year following site acquisition. The City of Palm Beach Gardens may construct a nature center on a disturbed portion of the property. The timing of the construction of the center will depend on the City and the development and approval of an acceptable site plan. A priority schedule for site development activities is provided in Table 4.

8. MONITORING

A monitoring program will be initiated in 1998 to measure whether the management objectives for natural communities and listed species are being achieved. The monitoring program will be designed to evaluate the success of prescribed fires and invasive vegetation control activities within the Frenchman's Forest Natural Area. Management practices will be adjusted if an analysis of the monitoring data reveals that objectives are not being met.

Permanent photographic stations will be established and photographs taken annually for comparison purposes. Permanent transects will be established to monitor changes in vegetation that would be revealed by data collection surveys made at two-year intervals. Periodic surveys of listed species populations will be undertaken to determine population trends. Assistance will be sought from institutions of higher education and volunteers in carrying out the monitoring program and in analysis and interpretation of the data collected. The monitoring data will be used as the basis for future revisions of the management plan.

8.1 Photomonitoring

Photopoint sites will be selected to provide a visual record of changes in vegetative composition over time, including the effects of planned management activities. The method for photomonitoring is the same as that developed for use by the South Florida Water Management District (Van Horn 1993). A photomonitoring point will be established at one end of each vegetation monitoring transect. Photopoint posts will be 6 feet long and stand 4.5 feet above ground level. A removable platform that fits over the photopoint will be used as a camera mount. An additional permanent stake will be placed in the ground 30 feet from the photopoint as a reference point in each photograph. Three color slides will be taken at each photopoint, and will be combined to produce a 180-degree panorama. A 35mm camera with a 28mm lens and 100 ASA color slide film will be used.

Slides will be taken annually during the wet season (June-October). When a management unit or subunit is burned, changes in vegetation will be measured with photos taken pre-burn, immediate post-burn, three months post-burn, six months post-burn, and one year post-burn. During second and subsequent years, photos will be taken during the wet season only.

At each reference point, quantitative density measurements will be collected using a 30 cm x 2.5 cm density board as described by Nudds (1977). The density board also will allow visual comparisons of vegetation density for each slide at each photopoint from year to year. Additional information that will be collected includes the height and species name of the predominant tree, shrub and/or herbaceous vegetation located between the photo and reference points and the water depth at each reference point. One set of slides will be taken at each reference point in a one-year period. A reference collection of all slides taken will be maintained by ERM and used when the management plan is periodically reviewed.

8.2 Permanent Transects

Following the method described in Schemnitz (1980), permanent transects will be established in each management unit to monitor changes in vegetation, with data collection surveys made at two-year intervals. The location of each transect will be recorded on a map and numbered, with transect ends permanently marked with metal stakes in the ground. The starting and ending points of each transect, the bearing, and

the distance from some easily-located point, found either on the ground or on an adjacent tree, also will be recorded. The starting point and the course of the transect will be marked.

Each transect will be 150 feet long, and will be aligned to pass through at least two different natural communities, or two different subtypes within a single community. At least one of the transects will pass through each of the four natural communities found on the site. Data will be recorded at 3-foot intervals along the transect and will include the predominant plants, presence of any listed species, and any other plants of management interest. If an analysis of transect data indicates a change in the natural community additional transects may be established in the affected management unit to determine if the change is localized or widespread.

8.3 Wildlife Surveys

Wildlife surveys will be performed annually. Two surveys will be undertaken each year - one when migratory species are present, and the other when only year-round residents are expected. The surveys will consist of random walk-throughs of representative areas and/or transects or quadrants described by Schemnitz (1980). These will be two half-day surveys, one from early to mid-morning and one from late afternoon to dusk, to observe animals active at different times. Survey information is anticipated to include qualitative and quantitative observations of animals, tracks, burrows/nests, or other signs.

8.4 Water-Level Measurement

One water-level staff gauge will be permanently installed in the strand swamp to permit the measurement of changes in the hydroperiod. Readings from this gauge will be recorded monthly. The exact location of this gauge will be determined prior to its installation. Readings will be plotted against rainfall data obtained from the South Florida Water Management District at the S-44 station on the C-17 Canal, or from the Seacoast Utilities water plant one mile west of the site. The data will be used to determine the relationship between rainfall and surface water levels. Readings also will be analyzed to determine the degree of success of any hydrological restoration measures.

8.5 Listed Animal Species Surveys

Annual population counts will be made for all endangered and threatened animal species, in order to track population trends. Animal species of special concern will have their populations surveyed every two years to determine whether they are experiencing any unusual population declines. Locations of nests or burrows

may be pinpointed and mapped by use of a global positioning system (GPS) receiver, which uses satellite signals to determine the longitude and latitude of a particular spot to an accuracy that can approach three to six feet. Surveys will be scheduled at the time of year when the target species is most visible, and may be conducted in coordination with other activities. Specific surveys will be developed for specific species. Qualitative evaluations of individual species will be made in conjunction with all quantitative surveys.

8.6 Listed Plant Species Surveys

Annual population counts will be made for all endangered plant species, in order to track population trends. Locations of individual plants or groups of plants may be pinpointed and mapped by use of a GPS receiver. Annual population counts also will be made of threatened plants with extremely limited populations. GPS receivers and mapping will be used for these species as necessary.
Threatened plants with large populations and commercially-exploited plants will have their populations surveyed every two years to determine whether they are experiencing any unusual population declines. Surveys for specific plants will be undertaken at the time of year when those plants are most visible. Qualitative evaluations of individual species will be made in conjunction with all quantitative surveys.

8.7 Annual Report

ERM will prepare an annual stewardship report to FCT. Major structural improvements and management activities conducted during the management year will be discussed, and the degree of success described. The annual report also will include information on any density credits purchased from the Frenchman's Forest Natural Area as a part of the County's Transfer of Development Rights Program and any changes to the monitoring plan. A general review of management efforts related to natural vegetation communities and the status of listed species also will be completed at the end of each management year.

9. GLOSSARY

Burn unit - an area of predetermined size and shape that remains fixed for monitoring purposes throughout a course of fire management

Corridor - a route that permits the direct travel or spread of animals or plants from one area or region to another, either by the gradual spread of a population of a species along the route or by actual movement of animals, seeds, pollen, spores, or microbes

Density - the number of individual plants or animals per unit of habitable area

Diversity - the number of species that live together in an ecosystem; a measure of the variety of species in an ecosystem that takes into account the relative abundance of each species

Dominant - the characteristic species in a particular plant community, contributing most to the general appearance and influencing which other plants and animals live there; typically the largest plant species or the one with the greatest areal coverage

Ecosystem - an assemblage of living organisms (plants, animals, microorganisms, etc.) and nonliving components (soil, water, air, etc.) that functions as a dynamic whole through organized energy flows

Ecosystem management - an integrated, flexible approach to management of Florida's biological and physical environments -- conducted through the use of tools such as planning, land acquisition, environmental education, regulation, and pollution prevention -- designed to maintain, protect and improve the state's natural, managed, and human communities

Ecotone - a zone of transition between two ecosystems that has characteristics of both

Endemic - a species or other biological grouping whose distribution is restricted to a particular region or locality

Enhancement - an action taken to introduce, reintroduce or restore vegetation and associated animals into an area where the native ecosystem has been disturbed

Feral - an animal that has reverted to a wild or untamed state from a domesticated state

Firebreak - a strip of land where the vegetation has been cut or removed to stop the spread of a fire; it typically does not exceed 15 feet in width and may be used as a management road and/or a hiking trail

Fire regime - a prevailing condition in which ecosystems have evolved under periodic exposure to natural fires such that the vegetative communities have adapted to, are dependent upon, and are reproductively enhanced by this exposure

Footpath - a narrow trail with a natural soil base that is intended for foot traffic only and does not have interpretive signage

Forb - a broad-leaved herbaceous plant that is not a grass

Habitat - the area or type of environment in which a specific kind of organism normally lives

Hiking trail - an unpaved footpath with a natural soil base and directional signage only; may be combined with a management road

Hydroperiod - the average length of time that soil is saturated during a given year

Hydric - an environment that contains an abundance of moisture

Inbreeding depression - A state in which a geographically isolated population becomes vulnerable to extirpation and weakened genetically due to the accumulation of deleterious recessive genes

Kiosk - a small structure used to shelter informational displays

Listed species - a species that is considered to be endangered or threatened with extinction, or a species of special concern, or a species that has been designated in some way by a jurisdictional governmental agency as meriting special protection or consideration

Macro-management unit - a large management unit that contains two or more ecosystems

Management road - an unimproved, single-lane dirt or sand road that is designated for vehicular management activities; it does not exceed 15 feet in width and may be used as a firebreak and/or hiking trail

Mesic - a moist environment that is drier than a hydric environment, and seldom contains standing water

Micro-management unit - a small management unit that contains only one ecosystem

Mitigation - an action taken to lessen the severity or intensity of a human impact on a native ecosystem or offset the impact, either on the site where the impact occurs or at another location

Mosaic - a pattern of vegetation in which two or more different plant communities are interspersed in patches

Natural area - an area containing one or more aquatic, terrestrial, or transitional ecosystems or a combination of ecosystems that has essentially retained its primitive conditions; an area that is a least-disturbed known example of a type of natural ecosystem

Nature trail - a hard-surfaced, handicapped-accessible walking trail with interpretive signage

Off-road vehicle - a vehicle capable of traveling in roadless areas

Outstanding Florida Water - a water body designated by the State of Florida Environmental Regulation Commission as worthy of special protection because of its natural attributes

Passive recreation - any recreational activity which has minimal or no impact on natural resources or ecosystems, such as trail-walking, photography, and plant and wildlife observation

Physiographic region - a region delineated by a specific topography

Pyric community - a community resulting from, induced by, or associated with burning

Relict population - a remnant population of a species that once was widespread

Restoration - the process of repairing damage caused by human activity or a natural disaster to the diversity and dynamics of a native system

Ruderal - a species which generally is considered to be native, but often grows in disturbed areas

Saltwater intrusion - the introduction of saltwater into a previously fresh water aquifer as a consequence of disturbance of the water pressure in the aquifer; saltwater intrusion often is associated with excessive pumping of wells

Saprophyte - a fungus or plant living on dead or decaying organic matter

Seed rain - a sudden dispersal of seeds, which can be triggered by fire or another extreme environmental event

Seral stage - one of the stages in a series of more or less predictable changes in vegetation and animal life as one kind of ecosystem is replaced by another

Soil phase - a subdivision of a soil type that deviates from the typical character of the soil type

Sovereign lands or sovereignty lands - those lands including, but not limited to, tidal lands, islands, sandbars, shallow banks, and lands waterward of the ordinary or mean high water line, to which the State of Florida acquired title on March 3, 1845, by virtue of statehood, and of which it has not since divested its title interest

Subcanopy - the layer of shrubs or trees that is below the canopy, or uppermost layer of vegetation in a forest or woodland

Systemic herbicide - a chemical agent used to destroy or inhibit plant growth that is absorbed into and is effective throughout the entire organism

Taxon (plural - taxa) - a general term for any taxonomic category (for example, a species, genus, family, or order)

Transect - a long, narrow area used for sampling vegetation or counting animals; transects are used for the collection and analysis of data such as frequency of occurrence, size, or number of organisms or kinds of organisms

Transitory taxon (plural - taxa) - a species that is present on a site only for a brief period, often as a response to changing environmental conditions

Vegetative community - the plant component of an ecosystem

Viability - the capability of a seed or organism to grow and develop, or the capability of a population of a species or a biological community to reproduce and maintain itself indefinitely

Water table - the level below which soil is saturated with water; the surface of the zone of saturation

Xeric - an environment or habitat that is low or deficient in moisture

10. ACRONYMS

ADA - Americans with Disabilities Act

DEP - Florida Department of Environmental Protection

DOF - Florida Department of Agricultural and Consumer Services, Division of Forestry

ERM - Palm Beach County Department of Environmental Resources Management

ESLASC - Palm Beach County Environmentally Sensitive Lands Acquisition Selection Committee

FCT - Florida Communities Trust

FDACS - Florida Department of Agricultural and Consumer Services

FGFWFC - Florida Game and Fresh Water Fish Commission

FIND - Florida Inland Navigation District

ICW - Intracoastal Waterway

IRC - Institute for Regional Conservation

NAMAC - Palm Beach County Natural Areas Management Advisory Committee

ORV - Off-road Vehicle

SFWMD - South Florida Water Management District

SOR - Save Our Rivers

USFWS - United States Department of the Interior, Fish and Wildlife Service

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