



**MANAGEMENT PLAN FOR
SEACREST SCRUB
NATURAL AREA**

FCT PROJECT NO. 91-022-P1A

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THE PALM BEACH COUNTY NATURAL AREAS SYSTEM MANAGEMENT STATEMENT

The Palm Beach County Natural Areas System is composed 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 a 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, nonnative 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 and Revision

- *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, control the occurrence of invasive, nonnative 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 53.4-acre Seacrest Scrub Natural Area is located in the southeastern portion of the City of Boynton Beach. The site was acquired in May 1994 by Palm Beach County with funds from the Palm Beach County Environmentally Sensitive Lands Bond Issue Referendum of March 12, 1991 and from the City of Boynton Beach. State matching funds were received from the Preservation 2000 Program of the Florida Communities Trust.

The primary purpose of this acquisition is to preserve important remnants of high-quality scrub and scrubby flatwoods vegetation communities. The secondary purposes are to provide for passive recreation, environmental education, and scientific research. The acquisition and associated activities will assist Palm Beach County and the City of Boynton Beach to implement several policies within their respective Comprehensive Plans.

Scrub and scrubby flatwoods are the predominant natural communities found on the site. Florida scrub is one of the rarest natural communities in the state of Florida. Scrubby flatwoods are also considered to be very rare in the state. The acquisition and management of this site preserves important habitat for rare and/or endemic plant and animal species, including 11 plant and 11 animal species that have been listed by at least one government agency or nonprofit environmental organization.

Fire exclusion, off-road vehicle trespassing, exotic pest plant invasions, agricultural alteration, illegal dumping, and construction of adjacent roads and buildings have all 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. An accessible nature trail, a hiking trail, a footpath and an interpretive display provide opportunities for the public to observe the site's distinctive scrub and scrubby flatwoods communities and species and to appreciate their biological uniqueness. Scientific research includes monitoring of populations of rare and/or endemic species and evaluation of restoration and management technologies.

This management plan was developed in 1996 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 be conducted at the natural area. A stewardship report is provided to the Florida Communities Trust each year, and the management plan is 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. Based on a review of these reports for the years 1996 through 2001, listed species populations have remained stable within a normal range of fluctuation, the prescribed burn program is on schedule, and the initial exotic plant control work has taken longer and been more expensive than anticipated. Public use facilities have worked well with a minimum of complaints. However, there have been incidents of dumping of vegetative debris and feeding of wild animals by adjacent homeowners and one wildfire that was started by a juvenile. These issues are addressed in the revised management plan, along with the actions that have been taken to deal with them.

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1. INTRODUCTION

This management plan is intended to provide guidance in the future use and management of the Seacrest Scrub Natural Area. This 53.4-acre site was once part of a large ridge of Florida scrub habitat that formerly was present in the eastern part of Palm Beach County. Now it is an isolated remnant, surrounded primarily by residential developments.

This site was acquired as part of a much larger effort to acquire the most important privately-held natural areas left in Palm Beach County. On March 12, 1991, the voters of Palm Beach County approved at \$100 million bond referendum to purchase environmentally sensitive lands. The Seacrest Scrub Natural Area was acquired in May 1994 with funds from these bonds and funds from the City of Boynton Beach. State matching funds for the acquisition were provided through the Preservation 2000 Program of the Florida Communities Trust (FCT). Negotiations for the acquisition and other acquisition-related services were provided by the County's contractor, The Nature Conservancy (TNC). The initial management plan was prepared by Ecohorizons, Inc., a subcontractor to TNC, and modified by staff in the Palm Beach County Department of Environmental Resources Management (ERM). Assistance in management of the site is provided by the City of Boynton Beach.

Common names are used in the text of this plan 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 of a species is used in the text of this plan if a unique common name does not exist for the species, or if the species has not been recorded on the project site.

1.1 SITE LOCATION

The natural area is located within the City of Boynton Beach on the southern Atlantic coastal strip in Palm Beach County (Figure 1). It is bounded on the north by residences south of S.E. 31st Avenue, on the west by the two-lane Seacrest Boulevard, on the south by residences north of S.E. 34th Avenue, and on the east by the Florida East Coast (FEC) Railway. Preserves and parks within a 5-mile radius of the natural area, listed from north to south, include the Hypoluxo Scrub Natural Area in Hypoluxo; the High Ridge Scrub Natural Area in unincorporated Palm Beach County, the Rosemary Scrub Natural Area, Ezell Hester, Jr. Park and Boat Club Park in the City of Boynton Beach; Ocean Ridge Hammock Park and the Boynton Municipal Beach in the Town of Ocean Ridge; the City of Boynton Beach Mangrove Park and Caloosa District Park in the City of Boynton Beach; and Lake Ida Park, Atlantic Dunes Park, and the Delray Oaks Natural Area in the City of Delray Beach. Because the natural area is separated from these other public lands by significant barriers such as major roads and large developed areas, there are no potential ecological or recreational linkages to those sites other than pedestrian pathways or bicycle lanes.

1.2 SITE HISTORY

The natural area is a fragment of a large ridge of predominantly scrub habitat that ran north-south between a freshwater swale that is the present-day Atlantic Intracoastal Waterway and an inland lake/marsh system dominated by Lake Ida and the former Lake Louise. The first road in this area was a 8-foot-wide sand road that was cleared in 1892 between Hypoluxo in present-day Palm Beach County and Lemon City at the north end of Biscayne Bay in present-day Dade County (Linehan 1981). The area that is now Palm Beach County was at that time part of Dade County, and the road was needed to link the northern and southern portions

of the county. Records of this road's location are fragmentary. The best source is a coastal map compiled by the U. S. Coastal and Geodetic Survey (USCGS) in 1930 from 1927 and 1928 aerial photographs taken by a U.S. Army blimp (United States Coastal and Geodetic Survey 1930). These photographs are no longer in the public domain and were not available to ERM. A sand road is shown on this map running north-south through the area in which the 1892 road would have been located, although in many locations other roads had been built on top of the sand road. Based on this map, the 1892 sand road was built 0.25 miles east of the natural area site and was incorporated into U.S. Highway 1 in the late 1920s. Stagecoach service began on the sand road in 1893, with a \$10 dollar one-way fare and a \$16 round-trip fare (Linehan 1980).

The first major disturbance on the ridge of scrub habitat was the construction of Henry Flagler's FEC Railroad around 1895. This railroad was built on the eastern border of the site, and the site was among the lands given to Flagler as an incentive to build the railroad. Remnants of old "lighter" pine stumps indicate that large slash pines were logged near the railroad tracks not long after the railroad was constructed. In 1911, Palm Beach County had been newly formed and the County Commission authorized construction of a shellrock "main line county road" that would run north-south through the county in the vicinity of the railroad. This road was built just east of the FEC tracks on the east side of the natural area and is the present-day Old Dixie Highway. In some locations, the main line county road was built on top of the 1892 sand road. In locations where the sand road was more than 1/4 mile away from the railroad, such as the natural area site, a new route was constructed for the road.

In 1915, a private organization known as the Dixie Highway Association was formed in Chattanooga, Tennessee. It was the brainchild of Carl Fisher, a backer of the Lincoln Highway and the Indianapolis Motor Speedway. The association promoted highways to connect the Midwest and the South. Two north-south main lines were established with numerous cross-connections. The State of Florida joined the association and soon was busy establishing the Dixie Highway East from Jacksonville to Miami and the Dixie Highway West from Tallahassee through central Florida to Arcadia, where the road swung west to Fort Myers and then back southeast to Miami. Existing roads, like the Palm Beach County main line road, were incorporated into the Dixie Highway system. It is not known what the county road was called prior to 1915, but after 1915 it was known as the Dixie Highway.

According to Linehan (1980), the State was widening and improving Dixie Highway in the vicinity of the natural area in 1916. The Dixie Highway system was completed in 1927 and the association was disbanded. Most of the roads were designated as parts of the U.S. Highway system established in the mid-1920s, such as U.S. Highway 1. In areas where the U.S. Highways were constructed on different routes from the Dixie Highway, the segments of the Dixie Highway retained their identity. This happened at the natural area, and at many other locations in Palm Beach County and in other states.

The Florida East Coast Canal was dredged one-half mile east of the site in the early 1900s to a width of 50 feet and a depth of 5 feet. It was taken over by the federal government and renamed the Atlantic Intracoastal Waterway in 1929, and dredged to 100 feet wide and 8 feet deep in the 1930s. In 1915, the Lake Worth Drainage District (LWDD) was formed and began to dig a network of canals to drain the area west of the coastal ridge and east of State Road 7/U.S. Highway 441. LWDD only dug canals on the land lying between Okeechobee Boulevard to the north and the Hillsboro Canal to the south. Sometime in the late 1910s and the early 1920s, LWDD dug the E-4 Canal through the lake/marsh system one-half mile west of the site, draining Lake Louise and lowering water levels in Lake Ida. The federal government constructed U.S. Highway 1 in the late 1920s. From the project site southward to Boca Raton, this road appears to have

been built on top of the 1892 sand road. The FEC Railroad constructed another set of railroad tracks in 1925. The second set of tracks was removed in 1977, reducing the railroad back to the original single set of tracks (Linehan 1980).

Prior to 1940, very little development occurred in the vicinity of the site. Gulf Stream Estates was platted south of the site in 1927, and Gulfstream Boulevard was built west across the FEC railroad tracks from Old Dixie Highway. The Florida land boom collapsed in the late 1920s, and no houses were built in this subdivision until the 1950s. The 1930 USCGS map based on 1927 photographs shows a hard-surfaced Gulfstream Boulevard extending from Old Dixie Highway to Seacrest Boulevard. Seacrest Boulevard is shown as being a hard-surfaced road for approximately 0.4 miles south of Gulfstream Boulevard, where it jogged west and joined Swinton Boulevard. North of Gulfstream Boulevard, a sand road extended northwards along the current route of Seacrest Boulevard for 0.75 miles. The map shows a grid work of sand roads in Gulfstream Estates. These roads largely correspond to the existing roads in this subdivision, although some roads have disappeared, and others have been added.

Within the natural area, the 1930 map shows the western half of the site as being cleared, and the east central-portion of the site as being cultivated. Only the eastern 1/4 of the site is shown as being in native vegetation and is coded with the symbols for "short leaf pine" which is what the map labels scrub vegetation. The map shows a finger of fruit tree grove (presumably mango) extending southward into the northwest corner of the site. This appears to be a mapping error since subsequent aerial photographs do not confirm its presence. Jeep trails extend southward from the cultivated area to the end of a sand road in Gulfstream Estates, and northwestward to the fruit orchard. Because the natural area is on the highest portion of the coastal ridge, and the clearings are on the higher portions of the site, it is likely that they were made for the growing of pineapple plants. Florida's pineapple industry boomed in the early 1900s, but was dealt heavy blows by the red wilt fungal disease in 1910 and from competition with less-expensive Cuban-grown pineapples when the completion of FEC Railroad to Key West in 1912 solved Cuban transportation problems. A severe freeze in 1917-8 essentially killed the industry (Linehan 1980). If pineapples were still being grown at the site in 1927, they would be phased out within a few years. Farming activities likely ended before the site was acquired by the Trygdeer Corporation at a bankruptcy auction in 1939.

The earliest available aerial photographs are from the U.S. Geological Survey (USGS) and were taken in 1940. They confirm many of the same features shown on the 1930 map. A sand road is present extending north along the present route of Seacrest Boulevard from the end of Gulfstream Boulevard. This sand road was probably used for access for farming activities on the western half of the site. The 1940 USGS photo shows that the western half and the middle of the eastern half as being cleared, with large areas of bare sand. The eastern cleared area corresponds with the cultivated area in the 1930 map, and was accessed by another sand road running north from Gulfstream Boulevard. The cleared areas occupied two-thirds of the site and the scrub along the FEC railroad tracks remained intact. The 1940 aerial photograph differs from the 1930 map in that it shows the scrubby flatwoods in the center of the site as being present and the fruit tree grove in the northwest portion of the site as being absent. It is believed that the 1940 aerial photograph is more reliable than the 1930 map and the differences come from misinterpreting the 1927 aerial photographs that the 1930 map was based upon. The cleared areas in the 1940 aerial photograph remained visible on aerial photographs into the 1970s.

The cleared areas were located on scrub soils, so they very likely contained scrub vegetation. A small area of scrubby flatwoods may have existed just east of Seacrest Boulevard, where a large slash pine is present.

The eastern cleared area has revegetated better than the western cleared area, since it had seed sources on both sides. The western cleared area, isolated from the remaining scrub by scrubby flatwoods, was colonized initially by slash pines, with sand pines regenerating slowly from distant seed sources in the absence of fire. Dumping and off-road vehicle (ORV) traffic coming from Seacrest Boulevard may have contributed to Brazilian pepper invasion along the western edge of the site.

After World War II, development accelerated. New subdivisions crept closer to the site as Delray Beach expanded to the north and Boynton Beach expanded to the south. In 1949, Seacrest High School, later renamed Atlantic Community High School, was built south of Gulfstream Boulevard. In 1950, the County Commission obtained an 80-foot road right-of-way to extend Seacrest Boulevard from Gulfstream Boulevard northward to meet Green Street at Woolbright Avenue. The Seacrest Boulevard extension was built shortly thereafter.

In the 1950s, residential development growth continued. By 1952, portions of Gulfstream Estates were being replatted and houses built. A 1953 USGS aerial photo shows houses present north of Gulfstream Boulevard and the reclearing of the pineapple/fruit tree grove land north of the site. In 1954, the Chapel Hill subdivision was platted 1/4 mile west of the site, and in 1955, the Mission Hill subdivision was platted on the west side of Seacrest Boulevard. Chapel Hill developed quickly and was built out by the early 1960s; Mission Hill developed more slowly, with vacant lots remaining into the early 1970s.

On the land to the north of the site, Seacrest Estates was platted on the eastern half, with the first house built in 1957. This subdivision was essentially built out by 1965. On the western half, the former pineapple/fruit tree grove land was platted as Sky Ranch Estates in 1959. This subdivision developed slowly, with the first house built in 1961 and vacant lots remaining into the mid-1970s. On the south side of the site, approximately half of the lots in Gulfstream Estates and its replatted subdivisions had been built by 1965. It would be the late 1970s before all the houses on the south side of the site had been built.

A 1965 Palm Beach County Property Appraiser's aerial photograph clearly shows the perimeter mowed areas as wide or wider than their present width on the north, west, and southwest borders of the site. These areas were presumably established when the adjacent subdivisions were built. The southwest mowed strip was not contained within the natural area, but was on the land lying immediately south of the site. The southern perimeter mowed strip was not present until the 1980s, when it was established in response to pressure from adjacent homeowners.

In 1974, a 10-foot utility easement was granted to the City of Boynton Beach that crossed the site from north to south through the scrubby flatwoods. Water and sewer lines were installed shortly thereafter. A cleared strip for these lines is visible in the 1977 Property Appraiser's aerial photographs, as are a series of 10 to 12 east-west parallel cuts in the site's vegetation. These cuts may have been made for surveying purposes. The vegetation cuts and cleared utility strip opened the site to illegal dumping, and off-road vehicle (ORV) use of the site increased, with many ORV trails becoming visible by the early 1980s. In 1979, the Josephine Latino subdivision was platted at the extreme northeast corner of the site along the FEC railroad tracks. Duplexes were built in the subdivision in the early 1980s.

In 1983 the Royal Palm Audubon Society, a Boca Raton-based chapter of the National Audubon Society, developed a citizens' initiative to protect in perpetuity examples of each type of historic ecosystem that was present in Palm Beach County in pre-development times. These ecosystems were called "wilderness

islands" because many were isolated by urban and agricultural development. The best examples of these ecosystems were proposed to be identified throughout the county, and purchased for preservation. These "wilderness islands" were to be used and enjoyed without harm by present and future generations. In 1984 other conservation groups and individuals joined with the Royal Palm Audubon Society to form the Coalition for Wilderness Islands (CWI), and to present the Wilderness Islands proposal to the Palm Beach County Board of County Commissioners (BCC). The BCC accepted this proposal in concept and commissioned an inventory of the remaining high-quality natural areas by two Florida Atlantic University professors and their students (Iverson and Austin 1988). Fernald (1989) recommended the establishment of a Regional Scrub Preserve System throughout the Treasure Coast Region and included the Seacrest Scrub as a component of the proposed system.

In 1990, a wildfire burned several acres of scrubby flatwoods in the southern portion of the site. In 1992, the owners of the Seacrest Scrub, Cedar Grove Investments, made an unsuccessful attempt to increase the number of residential units allowed to be built on the site. This increase was strongly opposed by area residents and environmentalists. After a series of heated public hearings spanning several years, the request was denied. In 1992, the County successfully applied to the Florida Communities Trust (FCT) for State matching funds from FCT's Preservation 2000 Program, and entered into an interlocal agreement with the City for acquisition and management of the site in 1993. In May 1994, the site was purchased by the County and the City for \$2,050,000. State matching funds for the acquisition were provided in October 1994 by FCT. The amount contributed by each partner was: Palm Beach County - \$1,081,295, the City of Boynton Beach - \$80,000, and the Florida Communities Trust - \$888,705. Also in 1994, the County passed the Natural Areas Ordinance (Appendix F), which prohibited the operation of ORVs on natural areas, dumping, hunting and other detrimental activities. The natural area was posted with regulatory signs to facilitate law enforcement activity to enforce these regulations.

In 1995 Brazilian pepper was mechanically removed along the eastern and southern borders of the site, and chain-link fencing installed on the northern, eastern and southern borders. Post-and-rail fencing was installed on the west side of the site along Seacrest Boulevard. In early 1995, a draft management plan was prepared for the natural area, and was reviewed by the County's Natural Areas Management Advisory Committee (NAMAC). The Committee held a public hearing on the plan at the Boynton Beach Public Library in July 1995 and the final plan was approved by the Board of County Commissioners in February 1996.

The initial invasive exotic control program was initiated 1995 and completed by 1997. The natural area presently is in a maintenance mode. The prescribed burning program started in June 1996 with an 18-acre burn that included all of Unit 1 and the eastern 1/4 of Unit 3. The public use facilities were constructed in 1998. Native vegetation in the area in which the parking lot was constructed was relocated wherever possible. The facilities were opened to the public in October 1998. There were minimal instances of vandalism. In 2000, after public complaints about gopher tortoises being hit by cars on Seacrest Boulevard, wire mesh was added to the post-and-rail fencing along this road to prevent tortoises from getting onto the road. A wire gate was installed across the nature trail entrance in 2001 for similar reasons. One-way tortoise gates were installed on the western boundary to allow tortoises to enter the site but not to leave it. This gate was removed in 2001 and replaced with wire mesh after it was determined that there was no evidence that tortoises were using it.

In March 2001, on a dry, windy day with an extremely high fire-danger rating, a juvenile was playing with matches in the north-central portion of the site. He started a fast-moving wildfire that burned 9.14 acres in

Unit 1 and a small portion of Unit 2. The fire was put out by Fire-Rescue personnel from the City and assisting agencies just before it reached the eastern border of the site. The juvenile was arrested and charged with arson by the City's police department. This fast-moving wildfire re-burned a large portion of Unit 1 approximately 35 years ahead of the next scheduled prescription burn and killed most of the regenerating sand pines. It also triggered a surge in growth of the native muscadine grapevine, which began to exhibit invasive tendencies and was treated with herbicides to retard its growth. Significant amounts of vehicle tracks were left throughout the burned area by firefighting equipment.

This management plan was revised in 2002 by County staff as part of the required five-year review of the plan. The next scheduled review of the plan will be in 2007.

2. PURPOSE

The primary purpose for acquisition of the natural area was to ensure the preservation of high-quality scrub and scrubby flatwoods communities, together with their component rare plant and animal species. It has been estimated by ERM that more than 98% of the scrub located in Palm Beach County has already been converted to other land uses. Scrub has been listed as G2/S2 by the Florida Natural Areas Inventory (FNAI). This designates that this natural community is imperiled both globally and in the state (Florida Natural Areas Inventory 2002). Eleven plant and eleven animal species recorded on the site have been listed by at least one government agency or nonprofit environmental organization (Tables 1 and 2).

The natural area has been developed as a publicly-owned and operated, natural resource-based, passive outdoor recreational site. The site also is used for environmental education, and scientific research. Hiking trails and management roads have been constructed, using existing trails where appropriate. Interpretive markers have been placed along the constructed nature trail to identify the site's resources and their significance. Both the preservation and recreation components of this project have helped Palm Beach County and the City of Boynton Beach comply with portions of their respective comprehensive plans. Preservation of the natural area also helps protect the quality and quantity of groundwater resources. All signs, literature, and advertising have identified the project site as being publicly owned and operated as a natural area and passive outdoor recreational site, and as having been purchased with funds from the Environmentally Sensitive Lands Bond Referendum of March 1991 and from the Florida Communities Trust's Preservation 2000 Program. The City of Boynton Beach has changed the land use designation for the site from Low Density Residential and Medium Density Residential to Recreation and is in the process of assigning a zoning designation of Conservation to the site.

The natural area consists largely of scrub and scrubby 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 fire exclusion, pest plant invasion, agricultural alteration, construction of adjacent roads and buildings, off-road vehicle traffic, and other human-related disturbances. Maintaining the ecological quality of these communities and improving that quality where possible are part of the current management efforts. These efforts have included implementation of invasive vegetation control programs throughout the entire site and prescribed burning of each management unit on a rotating basis. The majority of the mowed areas are being managed to allow these areas to succeed to scrub and/or scrubby flatwoods communities.

Management activities are coordinated under the direction of ERM, in cooperation with the City. Volunteers from the community assist in maintaining trails, removing invasive vegetation, and performing other site management activities. The natural area will continue to 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 so long as they do not jeopardize the protection of natural resources. In general, passive recreation includes such activities as nature appreciation and study, hiking, and photography.

The acquisition and associated activities have assisted the County and the City to implement several policies within their respective comprehensive plans. The Conservation Element of the City's Comprehensive Plan directs the City to: develop and maintain a high-quality natural environment based on the preservation of local natural resources (Goal 4.0); preserve 75% of all high-quality sites identified on the Conservation

Overlay, which includes the Seacrest Scrub (Objective 4.3); protect the natural habitats for listed species (Objective 4.5); and request assistance and financial support from state and county agencies to preserve high-quality ecosystems (Policy 4.3.4). Other related directives include to participate in, and support where feasible, the efforts of the County to acquire and preserve native habitats within the City (Conservation Element Policy 5.8.4); to participate in the land acquisition efforts of the County and the State (Intergovernmental Coordination Element Policy 5.8.4); and to achieve levels of services for recreation, as established in its Comprehensive Plan (Recreation and Open Space Element, support document). 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 natural area will continue to 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 continue to guide the formulation of management policies:

- 1) Maintenance of ecological integrity by ensuring the long-term viability of native 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 scrub areas back to the original vegetative community and restoration of currently mowed areas to natural scrub and/or scrubby flatwoods communities so that they do not act as conduits for exotic species to penetrate the natural area
- 4) Continuation 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) Maintenance of exotic pest plant vegetation cover to no more than 1% of the total vegetation coverage, exclusion and/or removal of exotic nonnative animals having a detrimental effect, and reduction of the coverage of invasive native vines
- 6) 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
- 7) Maintenance 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.

3. STRUCTURES AND IMPROVEMENTS

3.1 EXISTING AND PROPOSED PHYSICAL IMPROVEMENTS

The major structures and improvements are described in the following sections and shown on the master site plan (Figure 3). These structures and improvements help to achieve the goals of preserving and restoring the natural resources of the natural area and providing for compatible public uses. The public-use facilities (i.e., the accessible nature trail and the parking area) comply with Americans with Disabilities Act (ADA) requirements. These facilities occupy approximately 0.42 acres (approximately 0.8% of the site).

At the time of acquisition, a mowed area that varied in width from approximately 50 to 90 feet was present on the perimeter of the site adjacent to the residential communities. The City maintained this area as a firebreak with regular mowing. The width of the area that is mowed area has been reduced to approximately 15 feet, and native vegetation is recolonizing the area that is no longer mowed. Many of the structures and improvements, including fencing, signs, management roads, and the parking area, were placed within this disturbed area. The parking area was constructed on the western edge of the natural area, mostly within a disturbed area, and is accessed from Seacrest Boulevard. An accessible nature trail is connected to the parking area. A portion of the management road that serves as a hiking trail is connected to the accessible trail. A narrow footpath loops from the eastern end of the hiking trail south and then west to connect to the north-south segment of the hiking trail. The management roads and the hiking trail were placed within the disturbed area on the perimeter of the site and on two existing north-south and east-west ORV trails within the site to avoid impacts on native vegetation. A sanitary sewer line is located beneath the north-south management road. The City requires that the area over the line be kept clear of vegetation for access by maintenance equipment. Improvements within the mowed area were located to avoid tortoise burrows and minimize impacts on other listed species. Listed plants were relocated on the site as necessary.

Construction of the structures and improvements was done in compliance with all applicable state, regional and federal laws and regulations. A building permit was obtained from the City and a copy of the permit was provided to FCT. No restroom facilities were provided on the site because of its relatively small size and urban location. 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. 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.

3.1.1 Fencing and Gates

Due to the high incidence of illegal dumping and some ORV access before site acquisition, the entire natural area has been fenced. This fencing will need to be maintained and periodically repaired in order to prevent illegal dumping and poaching of native plants and wildlife on the site.

Two types of fencing are present (Figure 3). Six-foot galvanized chain-link fence was installed along the northern, eastern and southern boundaries in 1994. Post-and-rail fencing was installed along the boundary with Seacrest Boulevard in 1995 and around the perimeter of the parking area in 1998. Fencing was installed within the mowed area whenever possible, to minimize impacts on intact natural communities.

Six gates were installed (Figure 3). Two gates were installed in the chain-link fence, one on the northern boundary and one on the southern boundary, to allow vehicle access to the north-south utility corridor and maintenance road. Two pairs of steel swing gates were installed in the split-rail fence to provide public access to the natural area, one at the southwest corner of the parking lot for vehicle entrance and one on the northwest corner for vehicle exit. Two steel farm gates were installed, one on the north side of the parking lot and one on the south side, for maintenance vehicle access.

3.1.2 Signs

A permanent dedication sign will be maintained in the parking area that identifies the site as a natural area and passive outdoor recreation site open to the public, as having been purchased with funds from the County, the City, and FCT, and as being managed by the County with assistance from the City. An entrance sign was erected at the entrance to the parking area and a sign with the hours of operation was placed on the side of the entrance road. A natural areas rules sign was installed at the head of the accessible nature trail. Perimeter signs were placed along the boundary at intervals of no more than 500 feet. These signs state that the site is a protected natural area and cite appropriate County and City ordinances. Markers were placed along the nature trail and footpath, with station numbers corresponding to an interpretive guide. A new interpretive trail guide was developed in 2002, and the markers along the hiking trail were replaced. A minimal number of additional signs may be placed along the trails to facilitate species identification and educational activities.

The installation of these signs has not significantly disturbed any natural communities on the site. Temporary signs may be installed to provide information on areas in which prescribed burn or exotic plant control activities have been conducted. All signs will be maintained. If the entrance sign needs to be replaced, the County will consider using a smaller, less expensive sign.

3.1.3 Interpretive Facilities

A kiosk was constructed adjacent to the public parking area near the entrance to the nature trail (Figure 3). The kiosk contains educational exhibits that provide general information about the 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 was constructed within the disturbed area, and thus did not impact any intact natural communities.

3.1.4 Boundary and Management Roads and Firebreaks

A boundary management road/firebreak system was established on the perimeter of each of the four management units (Figures 3 and 4). The City requires that a firebreak be maintained where the natural area abuts residential areas and that the north-south utility corridor be maintained free of significant vegetation for access by maintenance equipment. The County maintains the north-south management road above the utility corridor. The existing perimeter mowed area has been reduced to a width of 15 feet and is maintained as a boundary/management road and firebreak by the City (Figure 3). Five hundred linear feet of disturbed oak scrub (7,500 square feet) was cleared to create a 15-foot-wide firebreak along the southwest corner of the project site. Prior to construction, the boundary road/firebreak location was surveyed for listed species. Any listed species present within the proposed road/firebreak area were avoided if possible, or relocated on the site as necessary.

Boundary/management roads/firebreaks 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 are unimproved sand roads and are maintained at a width of no more than 15 feet, which is the standard width of boundary firebreaks used by the Florida Department of Environmental Protection (FDEP) on state lands. The firebreak/management roads are 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 through periodic mowing. Perimeter firebreaks may be disked around a management unit when a prescribed burn is planned in the near future.

Two other management roads/firebreaks have been constructed. One road was placed along the existing utility corridor on the property and did not further impact natural communities on the site. The other road crosses the middle of the site, running from east to west, and separates the northern management units from the southern units. This road/firebreak was located in disturbed areas or on existing trails as much as possible. Any listed species present within these proposed road areas were relocated on the site. The purpose of these roads are to separate the preserve into four major management blocks. These roads provide access into the interior of the preserve and function as firebreaks in the event of a wildfire. This will reduce the chance that the entire preserve would burn during one wildfire event.

3.1.5 Trails

The primary interpretive feature for public access is a looped accessible nature trail approximately 964 feet in length (Figure 3). The two management roads/firebreaks also are available for use as hiking trails (Figure 3). A sand footpath, approximately 1,381 feet in length, connects the eastern end of the east-west interior management road with the southern end of the north-south interior management road (Figure 3). This connection forms a hiking trail loop with these interior management roads. The hiking trails were constructed on existing paths, trails, and disturbed areas on the site. Public use of existing secondary trails leading off the nature trail, footpath, and management roads has been discouraged by placement of brush and dead vegetation to close off access to those trails. The trails are being allowed to revegetate naturally. All trail locations were surveyed for listed species prior to trail construction. The trails were rerouted or the listed species relocated on the site to avoid impacts on these species.

The nature trail originates at the parking area and extends in a northeasterly direction. The trail is 4-inch-thick poured and formed concrete with a non-slip finish and is 5 feet wide to accommodate wheelchairs. Signs were installed along the trail indicating station numbers corresponding to a trail guide with interpretive information. The accessible interpretive facilities fulfill ADA requirements.

The footpath has a natural soil base and is maintained at a width of at least 3 feet. This trail is used for foot traffic only; it is not intended for vehicle access or use as a firebreak. The footpath is available for public use as a hiking trail, but will not be improved.

The interior management roads are used primarily for resource management and on-site monitoring. These management roads also function as firebreaks. Prior to a prescribed burn, the management 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 trails will be maintained at the specified width. All

management roads will be available for public use, but will not be improved or marked for interpretive purposes.

3.2 EASEMENTS AND CONCESSIONS

A utility easement oriented in a north-south direction extends through the center of the site. Gates were installed in the perimeter fence at both ends of this corridor to provide access. No additional easements, concessions, or leases are anticipated. If the 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 natural area by a non-governmental person or organization;
2. any sales contract or option to buy things attached to the natural area to be severed from the site, with a non-governmental person or organization;
3. any use of the 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 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 is provided via Seacrest Boulevard to the on-site parking lot. A bicycle rack has been provided to encourage the use of alternative transportation to the site. The natural area is open to the public during daylight hours. The hours of operation are posted at the site. Accessible parking and an accessible nature trail have been provided. There are no permanent waterbodies on or adjacent to the site, so no waterbody access has been provided.

A 6,500-square-foot parking area has been constructed adjacent to Seacrest Boulevard that provides parking for 10 cars and 2 school buses. The location of the parking area was adjusted to avoid impacts on listed species and to line up with the intersection of Mission Hill Road. Any listed species present within the area in which the parking lot was constructed were relocated on the site prior to the start of construction activities.

4. KEY MANAGEMENT ACTIVITIES

4.1 MAINTENANCE

ERM has assumed primary responsibility for site management. Responsibilities for 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 assist in trail maintenance and litter pickup.

In the unlikely event that any unforeseen event, either natural or human-caused, severely alters the natural values of the 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. The County will inform the City of the altered condition of the site and future management plans and objectives. If the natural values of the site are severely limited or eliminated, the City, County, and 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 site was removed by the County prior to the receipt of state matching funds for the property. Any remaining debris was subsequently removed, unless such removal would have caused undesirable damage to natural communities or listed species. A mounted trash can was installed adjacent to the parking area and is serviced by the City. The perimeter fence will function to prevent the dumping of trash and hazardous material on the site. Periodic site clean-ups to remove litter will be conducted by City and/or County staff with volunteers.

4.1.2 Trail Maintenance

Periodic trail maintenance will be performed by City and/or County 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. Off-road vehicle traffic has damaged some portions of the natural area. In some cases, this use has created deep ruts and elevated areas. Rutted areas are being allowed to return to the historic topography through natural leveling processes.

4.1.3 Facilities Maintenance

County staff are responsible for the maintenance of fences, gates, interpretive facilities, parking area, and signs. City staff periodically mow the perimeter firebreak/boundary road.

4.2 SECURITY

The City has assumed primary responsibility for public safety and law enforcement at the natural area. This includes routine patrols of the boundaries and the prevention of vandalism, vehicular trespass, dumping, and damage to property and natural resources. No on-site manager or security guard is currently proposed for this site. The County has recruited and trained local stewards for the site. Members of the Wildlands Task Force of the Palm Beach County Sheriff's Office (PBSO) may patrol the site as needed. The County has contracted with the PBSO for extra patrols of natural areas when needed. The Wildlands Task Force is a specially-trained and equipped unit that was formed to prevent illegal ORV use and related activities on the natural areas managed by the County.

The County has adopted a Natural Areas Ordinance (No. 94-13) that regulates public use of the 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. City Ordinance 10-26(e) also prohibits dumping. No dogs, cats or other pets will be permitted on the 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 natural area is open to the public during daylight hours only. Access hours are posted at the main entrance. Either the City or a steward will be responsible for opening and closing the main gate. Access gates for the utility corridor will remain locked when not in use. Only the City and the County will have keys for these gates.

4.3 STAFFING

Because of the relatively small size of the natural area, there will be no on-site staffing. However, ERM has created a roving management team that has assumed responsibility for management at this site and other County-owned natural areas. This management team has been trained to conduct all levels of management activities, including invasive vegetation control, prescribed burning, and monitoring. City staff and volunteers from local citizens' organizations provide additional support where feasible and necessary. There is strong support for the protection of the natural area from homeowners in the neighborhood adjacent to the site, who have indicated that they wish to be involved in management activities. Students and teachers at Atlantic High School in Delray Beach and at St. Joseph's Episcopal School, located across Seacrest Boulevard from the natural area, have indicated their interest in helping protect and manage the site and use it as an environmental education resource. It is anticipated that site stewards and individuals from the community and local environmental organizations will be trained by County staff to lead nature walks on the site.

4.4 NATURAL RESOURCE PROTECTION

The primary goals of site management are to enhance and maintain the scrub and scrubby flatwoods 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. This site will be managed in conjunction with other

publicly-owned conservation lands in south Palm Beach County in order to provide synergistic benefits for resource conservation and to promote the recovery and maintenance of listed animal species.

Long-term resource management of the site began with the baseline inventory and assessment of natural communities and listed species in 1995 (Appendix A). Additional species identification and community assessment was performed during the establishment of a permanent photomonitoring transect in each management unit in May 1996, at which time baseline photographs were taken. The first listed plant species monitoring survey was done in 1999. Information on all listed species recorded for the site will continue to be reported to FNAI on the forms provided in Appendix L. The protection of the geologic features of the site (the Pamlico dune ridge) will be ensured through the preservation of this site. Because of the upland character of the site, no hydroperiod management is proposed.

4.4.1 Management of Natural Communities

The natural area is managed under the "single use" concept, which means that it is managed to perpetuate natural resource values. Four vegetation communities are present on the site (Figure 2): sand pine scrub, scrubby flatwoods, disturbed scrub, and mowed areas. Where past human activities have caused the degradation of natural communities, efforts will be made to restore these communities to a pre-disturbance condition. Prescribed burning and invasive vegetation control will be the primary management techniques used. These management activities are discussed in Sections 5.1.2, Resource Enhancement and 5.1.3, Invasive Species Control. The specific types of management and enhancement activities recommended for each vegetation community present on the natural area are described in the following sections.

4.4.1.1 Sand Pine Scrub

The sand pine scrub community will be enhanced and maintained through the implementation of prescribed burning and invasive vegetation control programs. The fire management plan for this area is provided in Appendix G. The northeastern management unit that contains portions of this community was prescribed burned in June 1996. Most of this unit was burned again in a wildfire in 2001. The other management units containing this community will be burned at a rate of one unit approximately every 10 years, with future management burns in each unit following at approximately 40-year intervals. As with most scrub areas, it can be expected that individual management units may burn in a patchy manner, and that a complete burn of all vegetation within a management unit may not be achieved. Special care will be taken with regard to listed species associated with scrub that may be adversely impacted by prescribed burning. Nonnative and native invasive trees, shrubs, and vines may out-compete shade-intolerant scrub species, and control of these invasive species in the scrub community is a management priority. An invasive vegetation control program was instituted following acquisition that involved hand-pulling, selective pruning, and/or selective herbicide treatments, as described in Section 5.1.3, Invasive Species Control. That program has been completed and follow-up treatments are conducted annually.

4.4.1.2 Scrubby Flatwoods

The scrubby flatwoods community will be maintained through the implementation of the prescribed burning and invasive vegetation control programs. The fire management plan for this area is provided in Appendix G. The northern half of this community was prescribed burned in 1996. The southern half will be burned approximately 10 years after the northern half is burned. Future management burns of this community will

follow at approximately 20-year intervals. Portions of this natural community will be connected with portions of the scrub and disturbed scrub communities to form management units (Figure 4). Because scrubby flatwoods communities are more flammable than scrub or disturbed scrub, this connection should facilitate the effectiveness of prescribed fire in these communities. In order to achieve an approximately 20-year fire frequency in this community, it will be burned each time the natural community lying east or west of it is burned. Special care will be taken with regard to listed species associated with scrubby flatwoods that may be adversely impacted by prescribed burning. Invasive trees, shrubs, and vines may out-compete shade-intolerant species in the scrubby flatwoods community, and control of these invasive species in the scrubby flatwoods community is a management priority. The invasive vegetation control program instituted following acquisition involved hand-pulling, selective pruning, and/or selective herbicide treatments as described in Section 5.1.3, Invasive Species Control. That program has been completed and follow-up treatments are conducted annually.

4.4.1.3 Disturbed Scrub

The disturbed scrub community on the west side of the natural area presents the most difficult management challenge. This community also includes the open areas along the northern and southern perimeters of the natural area, which formerly were maintained at a 50-foot width through mowing by the City. Mowing is now done only in a 15-foot strip adjacent to the perimeter of the site. The unmowed area is being managed to restore the area to a pre-disturbance scrub community through natural regeneration and the implementation of a prescribed burn program to help control invasive vegetation. The disturbed scrub community is relatively large, and the invasive vegetation in this community has the capacity to spread into other natural communities within a relatively short period of time. The fire management plan for this area is provided in Appendix G. Half of this community will be burned within 23 years of acquisition. The other half of this community will be burned approximately 10 years later. Prescribed burning of the disturbed scrub community in the western portion of the site is being delayed to allow sufficient growth to carry a fire and to allow maturation of seed sources for post-burn regeneration. The formerly mowed areas will be burned along with the management units of which they are a part. Prescribed burning in the formerly mowed areas may require frequent ignition points and the use of spot fires because they contain patches of open sand or vegetation that will not support fire. After the initial management burns, the disturbed scrub areas will be treated as scrub, with subsequent management burns scheduled approximately 40 years after the previous burn. The invasive vegetation control program initiated following acquisition has been completed, and follow-up treatments are conducted annually. These include mechanical and/or chemical treatments and hand-pulling of selected species by volunteers.

4.4.2 Protection and Enhancement of Listed Species - Flora

Eleven plant species recorded at the natural area have been listed by at least one of the following: United States Department of the Interior, Fish and Wildlife Service (USFWS); Florida Department of Agriculture and Consumer Services (FDACS); and FNAI. These species are listed in Table 1 and discussed in Appendix A. Definitions of the legal status and rank designations used 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 species are species considered by FNAI to be imperiled or critically imperiled in Florida. These species should receive the highest level of management attention. Under no circumstances should extirpation of these species from the natural area be allowed to occur. When possible and appropriate, efforts should be made to increase the sizes of existing populations.

Drysand pinweed (*Lechea divaricata*)

This perennial forb was recorded at a number of locations of past disturbance in the north-central portion of the natural area (Richardson 1992), but no individuals have been observed since 1998. It is endemic to peninsular Florida in scrub and scrubby flatwoods (Chafin 2000). Drysand pinweed is a pioneer, open-sand scrub plant that requires full sunlight and a lack of competition from other scrub herbs. This species will be protected by maintaining a mosaic of seral stages within scrub and scrubby flatwoods vegetation communities on the site.

Burrowing four-o'clock (*Okenia hypogaea*)

This annual vining herb was observed in open sandy areas in Management Unit 1 after the first prescribed burn of the unit in 1996.. It is a pioneer species that is present during the growing season but may disappear during the winter (Austin et al. 1991). The fruit develops below the surface. Burrowing four-o'clock colonies may persist for several years, but then are replaced by other species. This species will be protected by continuing to maintaining a mosaic of seral stages within scrub and scrubby flatwoods vegetation communities on the site.

4.4.2.2 Priority B

Priority B species are species considered by FNAI to be rare in Florida. These species should receive significant management attention. Under no circumstances should extirpation of these species from the natural area be allowed to occur. When possible and appropriate, efforts should be made to increase the sizes of existing populations, so long as this does not adversely impact natural community-level management.

Erect pricklypear (*Opuntia stricta*)

This scrubby cactus was recorded in several locations at the natural area. It is typically found on shell middens, dunes, and coastal hammocks. It will be protected by maintaining a mosaic of seral stages within the scrub and scrubby flatwoods vegetation communities on the site.

Largeflower false rosemary (*Conradina grandiflora*)

This short-lived, low shrub was recorded at the natural area in numerous locations, primarily in the eastern and east-central portions of the site. It appears to be most common in scrub and scrubby flatwoods, and occurs within stands of scrub oak (*Quercus* spp.) or on the margins in full sunlight (Richardson 1992). This shrubby mint lives for three to four years and produces large quantities of seed when it grows in an open sunny location. This species will be protected by implementing a prescribed burning program that maintains

a portion of the scrub community on the site at any given time in the early successional stage needed by the species.

Nodding pinweed (*Lechea cernua*)

Several populations of this perennial forb have been recorded at the natural area, primarily in open sandy areas in the central portion of the site. It appears to be most common in scrubby flatwoods. It is a pioneer, open-sand scrub species that requires full sunlight and a lack of competition from other scrub herbs and tends to be located in areas of past disturbance (Richardson 1992). This species will be protected by implementing a prescribed burning program that maintains a portion of the scrub and scrubby flatwoods communities on the site in the early successional stage favored by the species, and also by routing access roads and foot trails away from known locations.

Twisted airplant (*Tillandsia flexuosa*)

This epiphytic bromeliad has been observed in several locations on the natural area, particularly in the southwestern part of the site. It will be protected by maintaining a mosaic of seral stages within scrub and scrubby flatwoods communities on the site. It is not fire-tolerant, but quickly recolonizes burned areas. Plants present within a management unit scheduled for a prescribed burn may be relocated. This was done for several individuals prior to the first prescribed burn in 1996. This species is threatened because of habitat loss and its historically limited range in Florida (Ward 1978). It also may be susceptible to attack by an imported bromeliad weevil (Frank 1999). It will be protected by enhancing and maintaining the natural communities it grows in, by mapping known populations, by monitoring any mortality caused by the bromeliad weevil, and by protecting the site from plant collectors.

4.4.2.3 Priority C

Priority C species are those listed as endangered or threatened by FDACS, but not listed by FNAI. These species should receive moderate management attention. At a minimum, extirpation of these species from the natural area should be prevented. When possible and appropriate, efforts should be made to increase the sizes of existing populations, so long as this does not adversely impact natural community-level management.

Cardinal airplant (*Tillandsia fasciculata*)

Giant airplant (*Tillandsia utriculata*)

Northern needleleaf (*Tillandsia balbisiana*)

These epiphytic bromeliads were recorded in scattered locations throughout the natural area in both scrub and scrubby flatwoods communities. They are not fire-tolerant, but can quickly recolonize burned areas. They are endangered (*T. fasciculata* and *T. utriculata*) and threatened (*T. balbisiana*) because of attack by the bromeliad weevil. These species will be protected by enhancing and maintaining the scrub and scrubby flatwoods communities on the site, by monitoring the mortality caused by the bromeliad weevil, and by protecting the site from plant collectors.

Curtiss' Milkweed (*Asclepias curtissii*)

One population of this perennial forb has been observed on the natural area. Because of the small size and inconspicuous appearance of the plant when not in bloom, individuals in sandy trails often are the only ones spotted, even though more plants may be presented in vegetated areas. This species will be protected by maintaining a mosaic of seral stages within scrub and scrubby flatwoods vegetation communities on the site and by control of exotic species that may cause shading of the plants.

Triangle cactus (*Acanthocereus tetragonus*) [*A. pentagonus* on FDACS list]

This creeping, sometimes erect succulent was recorded in the disturbed scrub community on the site. It typically is present in disturbed, dry coastal hammocks. It will be protected by enhancing and maintaining the natural communities on the site.

4.4.2.4 Priority D

Priority D species are species listed by FDACS as commercially exploited. These species should receive some management attention. At a minimum, extirpation of these species should be prevented. No Priority D species have been recorded at the natural area.

4.4.3 Protection and Enhancement of Listed Species - Fauna

Eleven animal species recorded at the natural area have been listed by at least one of the following: FNAI, FFWCC, and USFWS (Table 2). These species are discussed in Appendix A. Recommended procedures for management of these species are described in the following sections. County staff will coordinate with FFWCC for appropriate guidance, recommendations, and necessary permits to avoid impacts on listed animal species on the natural area.

4.4.3.1 Priority A

Priority A species are species considered by FNAI to be critically imperiled, imperiled, or rare in Florida and/or are known to occur in viable numbers with a resident or breeding population at the natural area. These species should receive the highest level of management attention. Under no circumstances should extirpation of these species from the natural area be allowed to occur. When possible and appropriate, efforts should be made to increase the sizes of existing populations.

Gopher Tortoise (*Gopherus polyphemus*)

A population of approximately 102 gopher tortoises was estimated to be present on the natural area in November 2001, when a full-site survey was conducted by ERM staff. Most of these probably were mature individuals, based on the size of the burrow openings observed. Population estimates of 90 and 107 tortoises were made by ERM staff after similar surveys in 1996 and 1997, respectively.

Based upon estimates in Cox et al. (1987), active management for gopher tortoise habitat will be required on at least 25 acres of land if the long-term maintenance of this species is to be achieved. Therefore, at least 25 acres of the site must have well-drained sands, a herbaceous ground cover, and an open canopy

and shrub layer. Currently, less than 25 acres of the natural area meet all three criteria. After Management Unit 4 was prescribed burned in June 1996, an increase in the number of tortoise burrows was noted in this unit. However, no increase in the gopher tortoise population was observed in this unit in the 1997 survey. The 25-acre habitat target should be met after the next prescribed burn, which is scheduled to occur in 2006. 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, its burrowing habits return leached nutrients to the surface, and it serves as a seed dispersal agent for native grasses and forbs (Moler 1992). The distribution of this species in southern Florida is limited and fragmented by unsuitable habitat and habitat loss due to urbanization, and tortoise populations are continuing to decline (Moler 1992). This species will be protected through the management and maintenance of suitable scrub and scrubby flatwoods communities on the site and the implementation of a prescribed burning program. No relocation of additional tortoises to this site will be allowed because of the size of the existing tortoise population.

4.4.3.2 Priority B

Priority B species are species considered by FNAI to be rare in Florida that do not have a viable resident population at the natural area, or those species that are transitory in southern Palm Beach County. These species should receive significant management attention. Under no circumstances should extirpation of these species from the natural area be allowed to occur. When possible and appropriate, efforts should be made to increase the sizes of existing populations, as long as this does not adversely impact natural community level management. Efforts also should be made to provide suitable habitat for transitory species, as long as this does not adversely impact community-level management. If viable numbers of a Priority B species are recorded at the natural area, or the species becomes established at the natural area, then this species should be elevated to Priority A.

American Redstart (*Setophaga ruticilla*)

This migratory songbird was recorded at the natural area by Richardson (1992). Kale and Maehr (1990) listed its habitats in Florida as pine scrub, mangrove, hardwood swamp, cypress swamp, mesic hammock, mixed pine and hardwood forest, pine flatwoods, urban and agricultural environments, and sandhill. It is listed as transitory in coastal scrubs in the Treasure Coast Region by Fernald (1989). Stevenson and Anderson (1994) noted that this species more common in southern Florida during the fall migratory period than in the spring, and that the largest numbers in the spring are on the east coast. Habitat for this species will be enhanced through the maintenance of scrub and scrubby flatwoods communities on site by implementation of a prescribed burning program.

Cooper's Hawk (*Accipiter cooperii*)

This migratory hawk was recorded flying over the natural area by ERM staff in 2001. Kale and Maehr (1990) listed its habitats in Florida as pine scrub, mesic hammocks, mixed pine and hardwood forest, pine flatwoods, sandhills, and agricultural environments. It is a common winter resident in much of Florida but is not known to breed in Palm Beach County (Stevenson and Anderson 1994). The Cooper's hawk is a major predator of the Florida scrub-jay. Any attempt to encourage this bird to become a permanent resident of the site could have negative consequences if scrub-jays recolonize this site after prescribed burning has improved habitat conditions for the jays. No special management actions will be undertaken for this species, and no action will be taken to encourage the Cooper's hawk to use the site.

Florida Mouse (*Podomys floridanus*)

A single individual of this endemic mouse was recorded at the natural area by Richardson in 1987 (Richardson 1992), but none has been observed since then. Populations of this species are declining due to habitat loss and predation by a variety of species, including raccoons and domestic cats (Humphrey 1992). Its habitats are xeric upland communities with sandy soils, such as scrub, sandhill, and ruderal sites (Hipes et al. 2001). Habitat for this species will be enhanced through the maintenance of scrub and scrubby flatwoods communities on the site by implementation of a prescribed burning program.

Florida Scrub-jay (*Aphelocoma coerulescens*)

One family of this endemic bird was recorded at the natural area by ERM (Palm Beach County Department of Environmental Resources Management and City of Boynton Beach 1991) and by Richardson (1992), who conducted a search for this species in both 1987 and 1992. A single individual was observed on the site in 1992, but none have been recorded since then. Habitat for this species will be enhanced through the management and maintenance of suitable scrub and scrubby flatwoods communities on the site by implementation of a prescribed burning program.

Florida Scrub Lizard (*Sceloporus woodi*)

This small, spiny-scaled lizard was recorded at the natural area by ERM (Palm Beach County Department of Environmental Resources Management and City of Boynton Beach 1991), but was not recorded by Richardson (1992). Efforts will be made to identify any populations of this species at the site. Coastal populations of this species are declining rapidly due to habitat destruction (Moler 1992). Habitat for this species will be enhanced through the maintenance of scrub and scrubby flatwoods communities on the site by implementation of a prescribed burning program.

Osprey (*Pandion haliaeetus*)

This bird of prey was recorded at the natural area perching in the tops of large slash pines and eating fish caught in nearby lakes and the Atlantic Intracoastal Waterway. It feeds primarily on fish. The species is not known to nest at the natural area. If an osprey nest is observed, visitor uses will be discouraged in the vicinity of the nest. No special needs for this species have been identified on this site. This species will be protected by enhancing and maintaining the scrubby flatwoods community on the site.

Painted Bunting (*Passerina ciris*)

This migratory songbird was recorded at the natural area by ERM staff in 1997. Kale and Maehr (1990) listed its habitats in Florida as dense, brushy vegetation along roads and woodland edges. It feeds primarily on seeds, but also eats small fruits and insects. According to Sibley (2001), there are two disjunct breeding populations of this species: an eastern population that breeds along the Atlantic Coast from southern North Carolina to north-central Florida and a western population that breeds from southern Missouri south to southeastern Louisiana, west through Texas and south into northern Mexico. Birds from the eastern population winter in southern Florida, the Caribbean, and southern Central America; birds from the western population winter in southern Mexico. Sibley (2001) noted that both breeding populations are declining significantly, that the eastern population uses coastal and riparian areas that are under significant

development pressure and that the eastern population also suffers more from brood parasitism by the brown-headed cowbird, which has expanded its range into southeastern scrub habitat.

Worm-eating Warbler (*Helmitheros vermivorus*)

This migratory species typically is present in Florida during spring and autumn migration periods. A few individuals may overwinter in south Florida, but the species is known to breed only in the Panhandle (Kale and Maehr 1990). It feeds primarily on insects (especially caterpillars, hence the name worm-eating) and spiders in clusters of dead leaves and typically is found in wooded areas with dense vegetation. Sibley (2001) stated that the loss of tropical forests and woodlands in the Caribbean is reducing the winter habitat for this species. No special needs for this species have been identified on this site. It will be protected by enhancing and maintaining the natural communities on the site.

4.4.3.3 Priority C

Priority C species are species considered by FNAI to be rare in Florida but whose occurrence at the natural area should be considered accidental. Management specifically for these species at this site would therefore serve no meaningful purpose.

Brown Pelican (*Pelecanus occidentalis*)

ERM staff observed this large waterbird flying over the natural area in 1998. Its habitats in Florida are primarily coastal, such as shallow estuaries, small islands, and mangrove areas. No specific management actions will be taken for this species on the site.

Magnificent Frigatebird (*Fregata magnificens*)

This long-winged seabird typically is seen along the coast of Florida, but may occasionally be observed inland, especially after a storm (National Geographic Society 1999). It feeds by snatching food from the surface of the sea and by forcing birds of other species to regurgitate food. Its typical habitats are mangroves and saltwater areas. Magnificent frigatebirds are colonial nesters; they breed in the Dry Tortugas islands off of the southwest coast of Florida and in parts of the Caribbean in mangrove areas with low trees and shrubs. The small population in North America is stable, but populations in the Caribbean are declining (Sibley 2001). Two magnificent frigatebirds were observed by ERM staff flying over the natural area in 2001.

4.5 ARCHAEOLOGICAL AND HISTORICAL RESOURCES

No archaeological or historic resources are known to be present on the natural area. County staff will consult with the Florida Department of State, Division of Historic Resources (DHR) prior to any ground-disturbing activities on the project site. The County will comply with Chapter 267, Florida Statutes, specifically Sections 267.061(2)(a) and (b), in its management of any archaeological or historic site discovered on the natural area. The collection of artifacts or disturbance of any archaeological or historical site on the natural area is prohibited unless prior authorization has been obtained from DHR.

4.6 COORDINATION WITH ADJACENT LAND USERS

The successful ongoing management of the natural area will require the cooperation of the neighborhood residents. The City of Boynton Beach provides site security and is responsible for opening and closing the entrance and exit gates to the parking lot. Several local residents currently serve as site stewards and assist in the management of the site. The City may delegate opening and/or closing of the gates to the parking lot to one or more of the stewards.

County staff periodically educate the surrounding community on the benefits of managed natural areas and the necessity of invasive plant control and prescribed burns in maintaining the native habitat through press releases, newspaper articles, and other means. The County will review any proposed land use changes or development orders on property adjacent to the site and will participate in the development and review process to ensure the protection of biological communities and to avoid adverse impacts on listed species.

4.7 NATURAL AREAS MANAGEMENT ADVISORY COMMITTEE REVIEW

On August 16, 1994, the BCC 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 BCC. The members of NAMAC were first 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 Conservation Land Acquisition Selection Committee (CLASC). Upon sunset of CLASC, this position will be filled by a citizen with an interest in natural areas.

As part of their responsibilities, the members of NAMAC held a public hearing on the proposed management plan for the natural area in July 1995. The public hearing was held in the evening at the City of Boynton Beach Arts Center, following an afternoon open house at which the public was 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 were available at public facilities such as libraries for two weeks prior to the open house and public hearing. Members of the public who could not attend the hearing were encouraged to submit written comments to the County during the week following the hearing.

NAMAC members took those comments into consideration prior to their approval of the plan and then recommended that the plan be forwarded to the BCC. Members of the public also were able to comment on the plan at the time it was considered and adopted by the Board in February 1996. 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. NAMAC will review the revised plan at one or more publicly-noticed meetings. The public can comment on the revised plan at these meetings and also provide written comments to County staff during this review period. The City of Boynton Beach, as a management partner with the County, will be invited to provide recommendations for revision of the plan and to participate in the NAMAC meetings.

4.8 ENVIRONMENTAL EDUCATION AND SCIENTIFIC RESEARCH

In conjunction with the construction of the nature trail, County staff prepared and installed interpretive markers keyed to a printed trail guide. County staff have recruited and trained site stewards and will train interested stewards and local volunteers to give guided tours of the natural area. Staff also developed an educational audiovisual presentation on the natural area and its resources. This audiovisual presentation will be presented by County staff or local volunteers on request. County staff also are 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 site by the faculty of local schools. Faculty members at St. Joseph Episcopal School, Atlantic High School, and Palm Beach Community College have incorporated the natural area into their programs and use it for onsite learning. A half-hour video on the natural area has been filmed and is periodically shown on the County's public access channel. The video also is available in the main County library for use by schools. County staff also will cooperate with FFWCC if that agency is interested in using the site for watchable wildlife and bird watching programs. ERM staff do not anticipate performing any scientific research other than compiling and interpreting the data from monitoring activities. Researchers affiliated with local institutes of higher learning will be allowed to conduct scientific research on a permit basis.

4.9 ROAD EXPANSION

The present two-lane Seacrest Boulevard has been proposed for expansion to a four-lane road in the past, but no expansion project is included in the County's current five-year road plan. The present right-of-way may not be sufficient for construction of a four-lane road, especially if bicycle lanes are desired. The surrounding neighborhood is built out. Although daily traffic on this road presently exceeds capacity, the traffic count is expected to be reduced after a new campus is constructed for Atlantic Community High School further west in Delray Beach and the school is relocated to that site. However, a new middle school may be constructed on the old high school site, and traffic may still exceed capacity in the future. ERM will review any proposed expansion of Seacrest Boulevard to determine any negative effects that such an expansion would have on the natural area. If Seacrest Boulevard is widened at some point in the future, ERM will be involved in the design and engineering of this road to minimize the water quality and wildlife impacts, and will request that natural vegetation buffers be included in the project design.

5. RESOURCE ENHANCEMENT

Resource enhancement is ongoing through most of the natural area. The principal enhancement activities undertaken at this site include invasive vegetation eradication and the reintroduction of fire. Active restoration (including direct seeding and out-planting) should not be necessary. The goal of these activities is to restore all upland vegetation communities to a maintenance condition. The Florida scrub and scrubby flatwoods communities occurring on the site will be preserved and properly maintained to ensure the long-term viability of these vegetative communities.

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 in southeastern Florida 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 invasion by exotic pest plants.

Natural fire cannot be expected to travel between natural area fragments. However, this interrupted natural ecological function may be partially mitigated for through the use of prescribed burning as a management tool. Prescribed burning must be conducted by natural area managers in perpetuity in order to be an effective management tool. In addition to prescribed fire, management techniques such as mechanical removal, herbicide treatments, hydrological restoration/enhancement, and planting native species, when appropriate, can help to minimize adverse impacts related to invasive exotic plants and to restore a more natural plant community.

All of the natural communities at the natural area have been impacted by human disturbances. Based upon historic aerial photographs, soil surveys, and reviews of the literature, it seems probable that the site was previously dominated by scrub and scrubby flatwoods. Therefore, the restoration and management activities at the site will focus on the restoration and maintenance of these two communities.

5.1.1 Management Unit Design

The natural area is composed of a mosaic of historic natural vegetation communities that have been modified by fire exclusion, exotic pest plant invasions, agricultural alteration, construction of adjacent roads and buildings, and off-road vehicle traffic. Each of the represented natural communities historically would have been part of a greater regional mosaic of upland and wetland ecosystems. The natural area is now completely isolated from nearby remnants of native vegetation, and is continuously affected by human and human-induced disturbances such as the dissemination of invasive species from nearby residential areas and predation by domestic pets.

Successful management of small fragmented ecosystems depends heavily upon management unit design. The site has been divided into four management units, using management roads as boundaries (Figure 4). Each management unit includes at least two vegetation communities, together with transition zones between these communities and adjacent communities. The management units range in size from about 11 to 16

acres, averaging about 13 acres per unit. These units have been designed to maximize the diversity of natural vegetation communities and plant and animal species on the site.

5.1.2 Fire Management

Florida scrub and scrubby flatwoods are fire-dependent communities that need fire for their long-term restoration and maintenance. However, 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 these communities. In addition, the risk of damage from wildfire is considerable due to the proximity of adjacent residences. 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 has been assumed by ERM. Assistance in the form of fire-fighting staff and equipment will be requested from the City and/or Palm Beach County Fire-Rescue during prescribed burns. Additional assistance may be provided by the Florida Department of Agriculture and Consumer Services, Division of Forestry (DOF), FFWCC, 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 590.125 of the Florida Statutes, Open Burning Authorized by the Division, Section (3), Certified Prescribed Burning.

A flexible fire management plan for the natural area is provided in Appendix G. The fire management plan is based on the information about natural vegetation communities and listed species provided in Appendix A. It includes consideration of the surrounding land uses, safety issues in the event of a wildfire, and the ecological consequences of specific fire management strategies. The overall goal of the fire management plan is to introduce a fire regime (i.e., a repeatable pattern of fire with predictable results) onto the natural area that will sustain the fire-dependent communities on the site. The plan includes the following general objectives:

- o To ensure the long-term existence and viability of the Florida scrub and scrubby flatwoods natural communities present on the site, and the listed plant and animal species present in these habitats
- o To provide viable wildlife habitat for wildlife species that use, or potentially could use, the Florida scrub and scrubby flatwoods natural communities on the site
- o To control the regrowth and regeneration of invasive vegetation following treatment or removal activities, thereby assisting in the restoration of disturbed areas
- o To reduce the danger of wildfire by reducing the buildup of fuels that has resulted from the limited occurrence of fire in recent years.

The fire management plan contains specific tools and management practices designed to minimize adverse impacts on native vegetation and wildlife while maximizing the beneficial effects of prescribed burns. One of these tools is the use of firebreaks. Permanent firebreaks/management roads have been established along of the perimeter of the natural area. Similar firebreaks/management roads have been established between the four management units (Figure 4). Existing trails were used to help create the

firebreak/management road system. New portions of firebreaks/management roads were constructed where existing trails were not sufficient to meet the goal of the fire management plan. Firebreaks will at least 15 feet wide at the time of a prescribed burn. Vegetation may be cut along the shoulders of specific management roads, if necessary, to widen them further prior to a controlled burn. After the burn, this cut vegetation will be allowed to regenerate naturally, and management roads will be maintained at a width of 10 feet to allow for maintenance vehicle access.

These firebreaks/management roads help to control the spread of potentially destructive wildfires and adequately control the prescribed fires. They serve as the boundaries of the management units and provide vehicular access for conducting controlled burns. Some firebreaks or portions of firebreaks also are used for other management activities, such as exotic pest plant control, and as part of the hiking trail system. Prior to the construction of a management road, the area was surveyed for listed species. If a listed species was found, the location of the road was adjusted where possible to avoid affecting that species, or the listed species was relocated to another onsite location prior to construction of the firebreak/management road.

The management units are relatively large, so that fires can burn through ecotones and move in a more natural, spotty fashion across the landscape. The resulting patchwork of burned and unburned 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. Management units must not be so large that control of a prescribed fire and attendant smoke becomes difficult or uncertain. Depending on the specific conditions and objectives of a burn, a management unit may be further subdivided into smaller units for conducting the prescribed burn.

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 was developed and initiated within one year following the initial adoption of this management plan. The four management units will be burned in rotation, at an average rate of one unit every ten 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 began with the prescribed burn of Management Unit 1 in 1996, and will continue according to the following schedule: Unit 2 in 2006, Unit 3 in 2016, and Unit 4 in 2026. The cycle will start again with Unit 1 in 2036, Unit 2 in 2047, Unit 3 in 2056, and Unit 4 in 2067.

To the extent possible, the seasonality and frequency of prescribed fires should seek to approximate the natural incidence of fire in the site's communities. Generally, prescribed fires in all communities 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 natural incidence of winter fires is projected to have been quite low. Prescribed winter fires, therefore, should be similarly rare in occurrence to ensure that fire events are in synch with the fire-adapted life histories and 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 Seacrest Scrub site, where safety is of the utmost concern, winter fuel reduction fires may be more appropriate, at least in the short term.

Prescribed burning in the disturbed scrub natural community is complicated by the presence of large numbers of slash pines, a tree that is not tolerant of the intense fires typically associated with the burning of scrub habitats. The slash pines are a result of previous human-caused alterations and fire suppression at this site, and are not typical of the scrub natural community. Disturbed scrub areas will be burned in the same way as undisturbed scrub habitats, and no attempt will be made to manipulate prescribed burn intensity to reduce slash pine mortality. Some of the large, tall slash pines will survive a typical scrub burn. Most of the slash pines will not, and the end result will be a reduction in slash pine numbers to a level more typical of the scrub natural community.

Backing fires, cutting of dense understory vegetation, and other techniques will be used for prescribed burns in the scrubby flatwoods natural community to reduce fire intensity and slash pine mortality and to decrease smoke generation. Slash pines are a natural component of the scrubby flatwoods community, and their population levels will be maintained in this habitat.

If a wildfire occurs, the appropriate actions will be taken by the authorized fire emergency response agency. Active fire suppression measures will be avoided as much as possible, but will be used if deemed necessary by that agency. These suppression measures rely on the use of heavy machinery and plowlines, and are destructive to vegetation and other natural features. If such measures are undertaken to control a fire, all plowlines will be backfilled after the fire has been extinguished, and disturbed areas will be rehabilitated as appropriate or allowed to revegetate naturally.

A specific burn plan will be prepared for each management unit prior to conducting a prescribed burn. Where fire-intolerant listed plant species are known to be present in a burn unit, a survey will be performed for these species prior to the prescribed burn. If necessary, individual plants will be relocated outside the burn area. A summary of key information on prescribed burning and a pre-burn checklist are provided in Appendix G.

The ongoing public education campaign includes 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. If requested, 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.

5.1.3 Invasive Species Control

Many species of exotic plants have been recorded within the natural area, some of which are invasive. These species are included in Appendix B. The presence of numerous exotic plant species is typical for a small habitat preserve surrounded by urban and suburban development, and is not an indication that the site is of low quality. These species and additional exotic species will continue to colonize the site as long as sexually reproducing exotic plant species are present in the surrounding urban and suburban areas.

Most of the invasive pest plant species at the natural area constitute minor or moderate problems. Many have originated from vegetation dumping piles on the site's perimeter or have spread onto the site from the back yards of adjacent residences. Eighteen of the exotic plant species recorded for the site have been identified by the Florida Exotic Pest Plant Council (FLEPPC) as Category I, or those considered to be most invasive: Asian sword fern, Australian umbrella tree, Brazilian pepper, carrotwood, earleaf acacia, elephantgrass, guava, Indian laurel, Javanese bishopwood, lantana, Moses-in-the-cradle, rosary pea, shoebutton, Sprenger's asparagus fern, Surinam cherry, torpedograss, tuberous Boston fern, and woman's tongue. Control of the Category I plants will continue to be the primary focus of the invasive plant control activities.

Ten of the exotic plant species have been identified by FLEPPC as Category II, or potentially invasive - Alexander palm, basketplant, bowstring hemp, burrnut, castorbean, creeping oxeye, Chinese violet, council tree, rose natalgrass and Senegal date palm. For the most part, these species prefer open, disturbed sites, and normally do not invade and disrupt functioning native plant communities. The control of exotic species that are normally not invasive will be given a low priority. They will be controlled through good management practices such as prescribed burning. Some exotic species, such as Madagascar periwinkle, typically are present in open, disturbed sites and do not have the capacity to invade functioning natural communities. They will be controlled through good management practices such as prescribed burning and the elimination of unnecessary disturbances.

In this management plan, the phrase "invasive species" includes those plants listed as Category I by FLEPPC and the following 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). Although exotic species are the traditional targets of eradication activities, invasive native species also can have adverse impacts on fragmented natural vegetative communities. This is especially true of aggressive native vines, which, with the exclusion of fire, often shade out preferable native trees, shrubs, and herbs. Ruderal species usually are not problematic, but in some cases they can slow down or arrest restoration processes.

The invasive vegetation control program initiated following acquisition has been completed. Each of the four phases was conducted approximately six months apart, and the treated natural vegetation communities are now in a maintenance condition. Follow-up control activities are conducted on an annual basis. A management unit is considered to be in a maintenance condition (with regard to invasive species) when the cover of invasive tree and shrub species does not exceed one percent of the canopy or understory layers within any management year.

In this plan, invasive vegetation species are not discussed on a species-by-species basis, but are 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. Management priorities and techniques for each of these categories are described in the following sections.

5.1.3.1 Vines

This category includes exotic species as well as aggressive native vines. If possible, exotic vines will be eradicated from the 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 natural area because they cover the leaves of shrubs and trees and cause death through reduction of photosynthetic food production. Invasive vines recorded at the natural area include balsampear, bougainvillea, Chinese violet, love vine, muscadine, ocanblue morningglory, rosary pea, and watermelon. 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 are effective in controlling Chinese violet, rosary pea and muscadine. Love vine is a parasitic native vine that may become abundant in fire-maintained natural vegetation communities in the absence of fire. It is difficult to control without fire. The prescribed burning program should keep love vine and muscadine within acceptable levels.

5.1.3.2 Shade-tolerant Trees

This category includes woody plants that typically grow over 12 feet in height. In the past, invasive shade-tolerant trees were not a major threat to natural communities in southeastern Florida. However, several species of exotic shade-tolerant trees have become established in natural vegetation communities. These trees, which have the ability to invade undisturbed, intact systems, are especially dangerous to hammocks, drained wetlands, and unburned fire-maintained communities. Invasive shade-tolerant trees found at the natural area include Alexander palm, areca palm, Australian umbrella tree, carrotwood, council tree, Indian laurel, Javanese bishopwood, mango, queen palm, Senegal date palm, and yew plumpine. During invasive vegetation control treatments, seedlings of invasive 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. Australian umbrella tree 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. Areca palm, which has short underground rhizomes, has only been successfully treated by digging up the individual plant. Stems will be cut and the re-sprouts treated with a foliar, systemic herbicide such as Roundup.

5.1.3.3 Shade-intolerant Trees

Shade-intolerant trees typically need sunny locations, and often are successful in germinating in nutrient-poor soils. They generally grow in disturbed areas, and often fix nitrogen. These species are most problematic in disturbed or unburned fire-maintained communities, although they also may invade disturbed hammocks and wetlands. Invasive shade-intolerant trees recorded at the natural area include Brazilian pepper, guava, earleaf acacia, loquat, royal poinciana, and woman's tongue. 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 areas.

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. Invasive shade-tolerant shrubs that have been recorded at the natural area include corn plant, glorybower, nutmeg plant, shoebuttan, Surinam cherry, and ti plant. During invasive vegetation control treatments, any seedlings of invasive shade-tolerant shrubs will be hand-pulled, clumps of seedlings will be treated with herbicides, and 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.

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. Invasive shade-intolerant shrubs recorded at the natural area include apple cactus, Cape honeysuckle, castorbean, cochineal cactus, lantana, and simpleleaf chastetree. Seedlings of invasive shade-intolerant shrubs will be hand-pulled at low densities and spot-treated with herbicides at high densities. In general, saplings and mature plants will be left standing and killed with a systemic herbicide such as Garlon.

5.1.3.6 Grasses

Exotic grasses can become a significant problem in fire-maintained communities. Invasive exotic grasses recorded at the natural area include Bermudagrass, Durban crowfootgrass, gophertail lovegrass, guineagrass, elephantgrass, rose natalgrass, smutgrass, torpedograss, and tropical signalgrass. St. Augustinegrass is an invasive grass of uncertain origin. During invasive vegetation control treatments, most grasses will be hand-pulled. It is possible that gopher tortoises are foraging on these grasses, so the use of herbicides such as Roundup will be used only when necessary. However, there are a few clumps of elephantgrass and guineagrass on the natural area. These large grasses will be controlled by cutting the plant down and treating the re-sprouts with Roundup.

5.1.3.7 Perennial Forbs

Perennial forbs can become a problem in all types of natural communities. Invasive perennial forbs recorded at the natural area include aloe, Asian sword fern, basketplant, bowstring hemp, cathedralbells, Ceylon swampily, chandelier plant, creeping oxeye, fishtail sword fern, Mexican false heather, Moses-in-the-cradle, purplequeen, rosepink zephyrily, Sprenger's asparagus fern, tuberous Boston fern, and wandering-jew. These species require special treatment. Because they have thick, succulent leaves that prevent herbicides from adhering or being absorbed, hand-pulling may be the only way to eliminate them. They have underground "tubers" and rhizomes that can break off and form new plants. Care should be taken to collect as many of these tubers and rhizomes as possible during invasive vegetation control treatments and remove them from the site. Bowstring hemp is difficult to eradicate, but can be successfully eliminated with selective herbicide use in conjunction with repeated excavation of untreated or resprouting underground rhizomes.

5.1.3.8 Annual and Short-lived Forbs

In general, annual or short-lived forbs cause temporary problems and are difficult to eradicate due to their high seed production. Most respond to disturbance; therefore, their populations will drop in numbers as the restoration process proceeds. Exotic forbs recorded at the natural area are burrnut, coatbuttons, Florida tassleflower, hairy sensitive pea, Dixie ticktrefoil, lilac tassleflower, lima, Madagascar periwinkle, Muscarene Island leafflower, Paraguayan purslane, rough Mexican clover, shrubby false buttonweed, smooth rattlebox, and tropical Mexican clover. Ruderals in this category include beggarticks, Canada toadflax, common ragweed, common wireweed, grassleaf lettuce, lesser Florida spurge, Indian chickweed, and southern beeblossom. None of these forbs are considered to be a major problem at the natural area at this time. All will be monitored to determine what (if any) actions should be taken in the future. Control measures, when necessary, usually involve hand-pulling of each individual and spot-treatment with herbicides. Lima, which is a woody-stemmed, short-lived forb, seems to decline and disappear without the disturbance of periodic mowing.

5.1.3.9. Exotic Animals

One species of invertebrate (the imported fire ant) and seven species of vertebrates (northern curly-tailed lizard, Cuban brown anole, Eurasian collared dove, house sparrow, monk parakeet, rock dove, starling) recorded at the natural area are not indigenous to the south Florida mainland. Domestic dogs and cats may use the site occasionally, and feral cats have been noted on the site. The imported fire ant has been recorded in the disturbed area. This aggressive ant has nearly eliminated the native fire ant from all native habitats except for intact scrub, and poses a threat to the young of ground-nesting birds. There are no effective and acceptable methods to control the ant at this time, but a control strategy may be implemented in the future.

The northern curly-tailed lizard was first introduced from the Bahamas in the 1930s to control insect pests in sugarcane fields. It also is a popular species in the pet trade and is now common in a variety of habitats in its limited range, which includes Miami-Dade, Broward, and Palm Beach counties (Bartlett and Bartlett 1999). No specific control strategy will be used for this species. According to Bartlett and Bartlett (1999), the brown anole was introduced into Florida in the early 1900s through shipments from the West Indies and is now common to abundant in the southern four-fifths of the peninsula. Although two subspecies, the Bahamian brown anole (*Anolis sagrei ordinatus*) and the Cuban brown anole (*Anolis sagrei sagrei*) originally were introduced, these have intergraded and are no longer considered to be subspecies (Bartlett and Bartlett 1999). They are considered by some authorities to compete with and reduce the population size of the native green anole, but will not be subject to population control methods unless a significant impact is observed in the future.

The starling often competes with native bird species for food. Potential control efforts for this species will be explored in the future. Eurasian collared doves and rock doves have been observed flying overhead throughout the site. These species were introduced from Europe and now are common in urban areas of southern Florida. It is not expected that they use or affect the natural area in any significant way. Monk parakeets also were observed flying overhead and may nest in nearby residential areas. These parakeets compete with native birds for nesting cavities and are vectors for the spread of large-seeded exotic plants. Potential control efforts for this species will be explored 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 RESTORATION/ENHANCEMENT

There are no plans to actively reintroduce Florida scrub-jays to the natural area. It is anticipated that the use of prescribed fire and other appropriate management techniques will create favorable conditions for this species to recolonize the site without human intervention. A separate scrub-jay population currently exists within five miles of the site. No specific restoration plantings are planned for the site at this time.

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 natural area and the predation of wildlife by dogs and cats. These types of impacts will be mitigated through interpretive programs, public outreach, an aggressive exotic plant control program, and the enforcement of Natural Areas Ordinance (Appendix F) provisions concerning the prohibition of pets.

Perhaps the greatest off-site threats to the long-term management of the natural area are public fear of fire and the general dislike of attendant smoke. Smoke management is one of the key issues addressed in the fire management plan (Appendix G). The ongoing public education campaign will convey to the public 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 natural area, 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.

6. COST ESTIMATES AND FUNDING SOURCES

Actual costs for initial site development and cost estimates for long-term management are provided in Tables 3 and 4, respectively. The primary funding source for site development was the \$100 million Palm Beach County Environmentally Sensitive Lands Bond Referendum approved by the voters on March 12, 1991. The County has the primary responsibility for site development and management on the natural area. The City is responsible for site security, opening and closing the gates to the parking lot, periodic mowing of the perimeter firebreak, and assistance with prescribed burns and volunteer events. Staffing for habitat management and facility maintenance will be accomplished with existing County personnel, with assistance from City staff and community volunteers.

6.1 DEVELOPMENT COSTS

Major expenditures for initial site development and restoration included exotic vegetation removal; fencing, signs, and gates; the parking area; an accessible nature trail; a kiosk with interpretive displays; an initial fuel reduction burn; and design, engineering, and permit fees. A grant application was submitted to obtain state matching funds for construction of the nature trail and kiosk, but the application was not approved.

6.2 KEY MANAGEMENT ACTIVITIES AND RESOURCE ENHANCEMENT COSTS

Management costs have been minimized through the cooperation of local citizens' organizations and by coordinating the management of natural areas on a county-wide basis. The Audubon Society of the Everglades, the Palm Beach County Chapter of the Florida Native Plant Society, the Loxahatchee Chapter of the Florida Trail Association, and the Sierra Club - Loxahatchee Group and various school, business, and civic groups have provided volunteer services for the management of natural areas acquired by the County. However, it is recognized by both the County and the City that the management of this natural area requires more than volunteer assistance. Some activities, such as prescribed burning, herbicide applications, chainsaw work, and other hazardous or extremely technical operations are not generally suited to volunteers. County staff have provided such services, or obtained assistance from contractors where necessary.

The County has established a Natural Areas Stewardship Endowment Fund. Monies from restricted gifts, donations from individuals and businesses, and other sources are invested and the interest earned is used to provide operating funds for management of County-owned and County-leased natural areas. The County also has applied for, and will continue to apply for, funds that may be available from the State for control of exotic species and other management purposes. In addition, funds are available via Section 9.5 (Vegetation Preservation and Protection) of the Palm Beach County Unified Land Development Code. Monies from penalties for violations of the provisions of this section are deposited into a Natural Areas Fund, and can be used 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 and from leases of County-owned land in the Agricultural Reserve also can be used for management purposes.

7. PRIORITY SCHEDULE

Initial site development activities focused on securing the site against unauthorized uses. Fencing, signs and gates were purchased and installed within six months of acquisition. A gopher tortoise survey was conducted within 18 months of the closing date. A fire management plan (Appendix G) was prepared, a prescribed burning program started, and initial invasive vegetation removal completed. The nature trail and parking area were constructed, management roads cleared, a kiosk with interpretive displays installed, an audiovisual program and a nature trail guide prepared, and site stewards recruited and trained. Management for this site has now shifted into the maintenance mode. A priority schedule for the remaining key management activities is provided in Table 5.

8. MONITORING

A monitoring program was initiated in 1996 to measure whether the management objectives for natural communities and listed species are being achieved. The monitoring program was designed to evaluate the success of prescribed fires, invasive vegetation control activities and disturbed scrub restoration and to determine significant changes in population size or distribution of listed species. Management practices have been adjusted when an evaluation of the monitoring data revealed that these objectives were not being met.

A detailed monitoring protocol is being developed to ensure consistency in monitoring activities on all natural areas managed by ERM. A general description of the types of monitoring to be conducted is provided in the following paragraphs. Assistance will be sought from institutions of higher education and volunteers in carrying out the monitoring program and in the evaluation and interpretation of the data collected. Monitoring data were used as the basis for this revision of the management plan.

8.1 PHOTOMONITORING

The objective of photomonitoring is to obtain a qualitative, long-term visual record of changes in vegetative composition and/or structure over time, including the effects of planned management activities. Permanent photopoints were established in areas in which planned management activities are anticipated to occur and in areas in which natural vegetative succession of management interest is expected to occur. At a minimum, each management unit contains at least one photopoint within a vegetation community that is expected to carry fire during a wildfire or a prescribed burn. The permanent photopoints have been located with a global positioning system (GPS) unit and their locations clearly described on a photopoint monitoring record form. Additional reference points (such as trees, structures, or other unique features) can be described on the form for easier location of the photopoint.

One set of images will be taken at each photopoint annually or every two years, as appropriate. The images will be combined into a panoramic photograph, using digital imaging software, and stored electronically with the name of the site, the management unit number, and the photopoint number. When a management unit is burned, changes in vegetation will be measured with images taken pre-burn and immediately post-burn. Additional post-burn images will be taken periodically. A reference collection of all images taken will be maintained by ERM and used when the management plan is periodically reviewed. Additional information that may be collected includes the height and species name of the predominant tree, shrub and/or herbaceous plant located at the photopoint.

8.2 WILDLIFE SURVEYS

Wildlife surveys will be performed annually. Systematic surveys will be undertaken each year when listed resident breeding species are present. Opportunistic surveys also will be conducted during other monitoring events and when migratory species are expected. The systematic surveys will consist of random walk-throughs of representative habitats and/or transects, point counts, or quadrants described by Elzinga et al. (2001). Survey information will include qualitative and quantitative observations of animals, tracks, burrows/nests, or other signs.

8.3 LISTED ANIMAL SPECIES SURVEYS

Periodic population surveys will be made for all endangered and threatened animal species recorded for the natural area. Populations or portions of populations of animal species of special concern recorded for the site will be surveyed periodically to determine whether these species are experiencing any unusual population declines. Locations of nests or burrows may be pinpointed and mapped with a global positioning system (GPS) receiver with sub-meter accuracy. 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.

8.4 LISTED PLANT SPECIES SURVEYS

Periodic population surveys will be made for all endangered plant species recorded for the natural area. If the population of an endangered plant species is too large to practically count individual plants, only a representative portion of the population may be surveyed or occurrence estimates will be made using a logarithmic scale system (for example, 1-10, 11-100, 101-1,000, etc.). Locations of individual plants or groups of plants may be pinpointed and mapped with a GPS receiver. Annual population counts also will be made of threatened plants with extremely limited populations recorded for this site. GPS receivers and mapping will be used for these species as necessary.

Periodic surveys will be conducted of threatened plant species with large populations (greater than 200 individuals) and commercially-exploited species to determine whether these species are experiencing any unusual population declines. If the population of a threatened or commercially-exploited species is too large to practically count individual plants, only a representative portion of the population may be surveyed or occurrence estimates will be made using a logarithmic scale system. 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.

8.5 SALTWATER INTRUSION MONITORING

A 250-foot-deep groundwater monitoring well was installed in a disturbed area in the northeastern corner of the natural area in January 2000 by a consultant on behalf of USGS and the South Florida Water Management District (SFWMD). The well is used to monitor saltwater intrusion into the groundwater. Although ERM staff do not collect the monitoring data, any significant increase in the salinity of the groundwater at the site will be included in the next update of this management plan.

8.6 ANNUAL REPORT

ERM will prepare and submit an annual stewardship report to FCT that will include information on major structural improvements, management activities, restoration plans and activities, and the degree of success of these activities. The annual report also will include any changes to the monitoring plan and information on any density credits purchased from the natural area as a part of the County's Transfer of Development Rights (TDR) Program. 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 and included in the annual stewardship report. If an annual stewardship report is no longer required by FCT during the

next five years after this revision of the management plan, a general review of management efforts and the status of listed species will continue to be performed on an annual basis.

9. GLOSSARY

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

Commensal species - one species that benefits from another species, while the second species apparently is neither benefitted or harmed by the relationship

Corridor - a route that permits the direct travel or spread of animals or plants from one area or region to another

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

Ecological restoration - the process of repairing damage caused by human activity or a natural disaster to the diversity and dynamics of a native ecosystem

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

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

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

Enhancement - an action taken to introduce, reintroduce or restore vegetation or a vegetative community into an area where the native ecosystem has been disturbed

Extirpate - to eliminate from a given area or region

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 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 traits

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 or nonprofit environmental organization as meriting special protection or consideration

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

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

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

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, accessible walking trail with interpretive signage

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

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

Physiographic region - a region delineated by a specific topography

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

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

Ruderal - a species that 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 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 kind

Serotinous - cones that remain closed and on the tree or plants that retain seeds in pods long after maturity, until the heat from a fire or some other event causes the seeds to be released

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

Subcanopy - the layer of shrubs or trees that is below the canopy (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

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

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 to which ground water rises; 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

ATV - all-terrain vehicle

CLASC - Palm Beach County Conservation Land Acquisition Selection Committee

DHR - Florida Department of State, Division of Historic Resources

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

FDEP - Florida Department of Environmental Protection

FEC - Florida East Coast Railroad

FFWCC - Florida Fish and Wildlife Conservation Commission

FLEPPC - Florida Exotic Pest Plant Council

FNAI - Florida Natural Areas Inventory

GPS - Global Positioning System

IC - incident commander

LWDD - Lake Worth Drainage District

NAMAC - Palm Beach County Natural Areas Management Advisory Committee

NGVD - National Geodetic Vertical Datum

ORV - off-road vehicle

PBSO - Palm Beach County Sheriff's Office

SCS - U. S. Department of Agriculture, Soil Conservation Service

SFWMD - South Florida Water Management District

TDR - Transfer of Development Rights

TNC - The Nature Conservancy

USFWS - United States Fish and Wildlife Service

USGS - United States Geological Survey

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