



**MANAGEMENT PLAN FOR
LIMESTONE CREEK NATURAL AREA**

FCT PROJECT # 02-100-FF2

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THE PALM BEACH COUNTY NATURAL AREAS SYSTEM MANAGEMENT STATEMENT

The Palm Beach County Natural Areas System is comprised of those environmentally sensitive lands that are owned or leased by the County and managed as natural areas by the County's Department of Environmental Resources Management. These natural areas were selected and 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, restore and manage remnant native ecosystems, and the plants and animals characteristic of those ecosystems, in perpetuity, throughout Palm Beach County. The management of each natural area shall be coordinated with that of the other natural areas in the system.*
- *Attempts shall be made to maintain physical and/or biological connections with other publicly- or privately-owned natural areas through additional land acquisitions, conservation easements, interlocal agreements, greenway/trail connections and other appropriate actions.*

Management Considerations

- *County natural areas shall be open to the public for non-consumptive/non-destructive, resource-based recreation, environmental education and scientific research. Public use shall not take precedence over ecosystem protection. Public uses shall be limited to those that are compatible with the perpetual preservation and management of the native ecosystems, plants and animals found on the natural area.*
- *All public use facilities shall be chosen, designed and located to have minimal impact on the rare and imperiled plants, animals and natural communities found on the natural area. Facilities, structures or roads (other than management accessways/firebreaks or access roads) that would cause fragmentation of a natural area shall not be permitted.*
- *To the extent practicable, fire-maintained native ecosystems shall be burned at the fire interval necessary to maintain those ecosystems. Burns shall be conducted by trained personnel, using a prescribed burn plan that addresses safety and smoke concerns.*
- *Native ecosystems that have been impacted by invasive/nonnative plant infestations, land-clearing activities, drainage and/or other man-made disturbances shall be restored to their previous condition, if practicable, or to a native ecosystem that is better suited to current environmental conditions.*

- *The special requirements of listed species shall be considered in developing management strategies for each natural area, but an individual species' needs 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 management plan shall be written for each natural area that: 1) describes the natural and cultural resources; 2) identifies any constraints associated with managing the natural area in an urbanized environment; and 3) identifies the strategies and techniques that will be used to preserve, restore and manage the native ecosystems, preserve the cultural resources; protect listed species, control invasive/non-native plants and animals, provide for appropriate public access, and 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's review of any 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 ten years by the County.*

EXECUTIVE SUMMARY

The 53.7-acre Limestone Creek Natural Area (natural area) is located in the northeastern portion of Palm Beach County (County). The County purchased 22.4 acres of the site in July 2002. The remaining 31.3 acres, within the C-18 Canal right-of-way, are owned by the South Florida Water Management District and managed by the County under a District Occupancy/Linear Park Permit. Funding for the natural area came from the Palm Beach County Lands for Conservation Purposes Bond Issue Referendum of March 9, 1999, and matching funds from the Florida Communities Trust.

The natural area contains blackwater stream, hydric hammock, mesic flatwoods, mesic hammock, scrubby flatwoods, tidal swamp, and wet flatwoods native vegetation communities. Thus far, 272 species of plants and 167 species of animals have been recorded on the site, including 11 plant and 19 animal species that have been designated as having some degree of endangerment by at least one governmental agency or have been ranked by the Florida Natural Areas Inventory.

The primary purpose for the acquisition of this natural area was to preserve, restore/enhance and manage the site's ecological resources, including the existing natural communities, their component plant and animal species, and local groundwater resources. Acquisition, development and management of the site as a natural area have provided members of the public with opportunities for recreational activities, environmental education and scientific research that are consistent with the primary purpose of the site's acquisition. It also has helped the County comply with portions of its comprehensive plan.

Public use facilities have been constructed; the site opened to the public in May 2009. An accessible nature trail, multi-use trails, hiking trails, boardwalk, wildlife observation platform with benches, memorial bench, fishing pier, canoe/kayak launch, and kiosks with interpretive displays provide valuable opportunities for the public to observe and learn about the site's biologically unique plant communities and associated animals. The main public access, including parking facilities, a bicycle rack and pedestrian entrance, is located on Church street. Access is also available via two additional parking lots; one located on the southern bank of the C-18 Canal off Central Blvd and the other behind the Jupiter West shopping plaza off Island Way Blvd. Additional pedestrian access to the site is via pedestrian gates located just south of 1st street and along Central and Island Way Blvd.

Limestone Creek_Natural Area is 1 of 35 conservation lands and parks that lie within the Jeaga Wildways system (Jeaga). Jeaga is a special place in northern Palm Beach County and southern Martin County that contains more than 165,000 acres of publicly owned conservation lands and activity/education centers that are, and will be, connected through a system of greenways and trails. These sites provide a wide range of nature-based outdoor recreation activities.

This updated management plan: 1) identifies the existing natural resources, including rare and imperiled species and vegetation communities; 2) identifies factors that affect the preservation,

restoration and long-term management of the existing resources; 3) addresses the site-specific goals, strategies and techniques that will be used to preserve, restore/enhance, manage and monitor the existing resources; 4) ensures that the natural area is managed in accordance with all applicable grant restrictions, lease conditions and management agreement conditions; and 5) identifies public recreational uses that may be accommodated without adversely affecting the site's natural resources. This management plan also includes information related to the site's connectivity with other conservation areas, estimated capital costs, estimated annual management and maintenance costs, and any other issues identified by staff.

The County will review and update this management plan at least once every ten years as necessary based on new information, improvements in management techniques or other relevant factors.

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1. INTRODUCTION

1.1 LOCATION AND DESCRIPTION

Limestone Creek Natural Area (natural area) is located in the northeastern portion of Palm Beach County (County) (Figure 1). The 53.7-acre natural area is located within an unincorporated portion of the County. The natural area is bordered to the north by Abyssina Park neighborhood, (also known as Limestone Creek neighborhood) and Church Street; to the east by Central Blvd and Shores Pointe residential community; to the south by Jupiter West Shopping Plaza and Palm Beach County Fire-Rescue Station #19; and to the west by Island Way and a stormwater retention pond. The south fork of the Loxahatchee River bisects the natural area with water flowing to the east into the Loxahatchee River estuary from the S-46 structure in the C-18 Canal. The site is fully acquired.

The nearest federal- or state-owned land is the South Florida Water Management District's Cypress Creek and Loxahatchee River Management Area which is located approximately 1.6 miles west of the natural area (Figure 1). The nearest significant waterbody is the Loxahatchee River which is located approximately 0.7 miles east of the natural area. County-owned natural areas within a 3-mile radius include North Jupiter Flatwoods Natural Area, 0.64 miles to the north, Jackson Riverfront Pines Natural Area, 2.5 miles to the northeast, Delaware Scrub, Jupiter Mangroves and Jupiter Inlet Lighthouse Outstanding Natural Area, 1 mile, 2.8 miles and 3 miles to the east, respectively, Loxahatchee Slough Natural Area, 2.7 miles to the south, Sandhill Crane Wetlands Natural Area, 1.7 miles to the southwest, and Cypress Creek Natural Area, 2.2 miles to the west.

Larger, developed county parks within a 3-mile radius of the natural area, listed from north to south, are Fullerton Island and Waterway Property Park (Figure 1). The closest regional county park to the natural area is Riverbend/Loxahatchee River Battlefield Park, approximately 1.6 miles to the west. There also are 3 municipal parks adjacent to or in the immediate vicinity of the natural area - Jupiter Community Park, Kennedy Estates Park and Limestone Creek Park.

The natural area is composed of a variety of landforms. In general, lands within the site – blackwater stream, hydric hammock, mesic flatwoods, scrubby flatwoods and tidal swamp - exhibit a fair amount of relief. Ground elevations within the natural area generally range from 0 feet to 17 feet North American Vertical Datum [NAVD] (South Florida Water Management District [SFWMD] 2008).

Blackwater stream, hydric hammock, mesic flatwoods, scrubby flatwoods and tidal swamp are the only natural communities present on the site. Florida Natural Areas Inventory (FNAI) has ranked two of the intact natural communities present on the natural area as very rare (blackwater stream) or imperiled (scrubby flatwoods) in Florida (FNAI 2018). These natural communities provide important habitat for many rare plant and animal species. Thus far, 270 species of plants and 145 species of animals have been recorded on the site, including 9 plant and 11 animal species that have been designated as having some degree of endangerment (listed) by at least one governmental

agency or have been ranked by FNAI. A list of plant species recorded at the site is provided in Appendix A and a list of animal species recorded at the site is provided in Appendix B. The listed and ranked plant and animal species recorded at the site are identified in Tables 1 and 2, respectively. Definitions for the designations used by the agencies are provided in Appendix C.

1.2 PAST USES

The Limestone Creek Natural Area contains a portion of the buffer lands along the Loxahatchee River. Limestone Creek was a small blackwater stream that emptied into the Southwest Fork of the Loxahatchee River. The creek itself was relatively small, but lay within a larger forested floodplain. In 1956, the Central and Southern Florida Flood Control District obtained a 600-foot wide right-of-way from the property owners in Section 3, Township 41 South, Range 42 East. Construction of the C-18 Canal began in late 1956, and a 200-foot-wide canal was dug through the creekbed following the path of the Limestone Creek; this was the single largest human impact to the site.

In the early 1950s, the Limestone Creek neighborhood was created south of Church Street (USDA 1940, 1953). In 1956, the Florida's Turnpike was constructed 0.7 miles west of the natural area. The S-46 control structure was constructed in 1958, just west of the natural area, to regulate how much water was dumped into the Southwest Fork of the Loxahatchee River via the C-18 Canal. By 1971, Limestone Creek Road had been paved, with the paved section extending from Indiantown Road to Church Street (Palm Beach County Property Appraiser 1971). Deep ditches were dug on either side of the road to provide drainage, but they did not connect to an outfall. When water levels in these ditches became high enough, water flowed eastwards across the area occupied by the present-day stormwater retention area and into the western tributary that flows through the natural area.

In 1985, the Loxahatchee River was designated a State and Federal Wild and Scenic River. Limestone Creek Elementary School, which is located on the north side of Church Street across from the natural area, was under construction in 1988 and was completed by 1989. In the late 1980s, Interstate 95 was constructed just east and adjacent to the Florida's Turnpike in the vicinity of the natural area; construction was completed in 1988. Construction of the West Jupiter Shopping Center south of the natural area began in 1989 and was completed in 1990. Palm Beach County Fire-Rescue Station #19 was constructed adjacent to the southeast corner of the natural area in 1998. In August 2004, the County applied for a right-of-way permit to SFWMD to manage a linear park on the 29.3 acres of canal right-of-way located within the natural area. The permit was granted in January 2005 and runs indefinitely, but can be revoked at will by SFWMD upon reasonable written notice. Construction of Island Way Road began in early 2004. This road forms the western border of the natural area and was completed in early 2005. The contractor building the road strayed outside the road right-of-way and construction easements, and unnecessarily excavated a portion of the natural area just north of the C-18 Canal for construction of stormwater control structure. The contractor was fined and had to pay for site restoration.

Dumping on the natural area began between 1940 and 1953 (USDA 1940, 1953) with the creation of the Limestone Creek neighborhood. To help prevent unauthorized use, the County installed fencing around the perimeter of the natural area between 2004 and 2005. The fence, combined with security patrols conducted by the Palm Beach County Sheriff's Office (Sheriff's Office), ended nearly all unauthorized activities at the site. Perimeter disturbances associated with development of adjacent residential, school and recreational properties began in the mid-1970s (Palm Beach County Property Appraiser 1973) and continue today.

1.3 ADJACENT LAND USES

Part of the natural area and the lands immediately north of the site are within an unincorporated portion of the County. The remaining lands surrounding the natural area, as well as the canal and the canal right-of-way within the site, are within the municipal boundaries of the Town of Jupiter. The Charnock, Gamot and Viens Tracts are designated as "Conservation" on the County's Future Land Use Atlas (Palm Beach County 2015). The intent of the "Conservation" designation is to protect important natural environmental features, including endangered and threatened species. Since the County's Unified Land Development Code (ULDC) allows natural areas with Future Land Use designations of "Conservation" to exist in all zoning categories, the County will not seek to change the zoning designation for this portion of the site.

Both localized and large-scale impacts from adjacent roads, the County's drainage system, and adjacent and nearby commercial, residential, recreational, educational and vacant properties are expected at the natural area. Things that have impacted and continue to impact all or most of the natural area include invasion of the site by nonnative plant species via seeds produced by nonnative plants growing within adjacent road rights of ways and within adjacent and nearby properties; disruption of historic surface water flow patterns into and out of the site by adjacent canals/berms and roads; access to the site by OHVs; dumping; animal mortality from vehicular traffic; and noise, light and litter issues related to use of the adjacent properties. Additionally, the adjoining Southwest Fork of the Loxahatchee River frequently contains seeds from nonnative plants and may facilitate nonnative plant invasions at the natural area.

Domestic cats (*Felis catus*) and/or dogs (*Canis lupus familiaris*) that originate from adjacent and nearby properties also may cause localized to large-scale impacts at the natural area. Feral/free-roaming cats and stray dogs can cause wildlife mortality. Efforts to mitigate for these impacts include an aggressive nonnative/nuisance animal control program; public outreach, volunteer and interpretive programs; and enforcement of the provisions of the Palm Beach County Natural Areas Ordinance, as amended, (Chapter 11, Article XI of the Palm Beach County Code; <http://discover.pbcgov.org/erm/Publications/PBCNaturalAreasOrdinance.pdf>; Natural Areas Ordinance) regarding the prohibition of domestic animals and pets on the natural area. Domestic animals and pets may be a problem at the natural area due to the large number of residential developments that surround the site.

The use of adjacent properties has affected portions of the natural area. Localized impacts at the Limestone Creek Natural Area are related to the following two offsite uses: 1) Limestone Creek neighborhood north of the natural area; and 2) Island Way Road.

The Limestone Creek neighborhood was originally platted without any surface drainage other than ineffective roadside ditches. A storm sewer system was installed in 1999 that routed the stormwater to a retention basin that was created on the western border of the natural area. This retention basin intercepted the runoff that came out of the neighborhood and the land to the west. The water supply for the western tributary was essentially cut off, and the tributary dried up. Although the retention basin was designed to allow excess water to flow into the tributary, the amount of water entering the basin was less than predicted. Water levels in the basin never staged high enough to allow flow into the tributary. The retention basin was reconstructed as a stormwater lake during the construction of Island Way Road in 2004.

The last improvement to the Limestone Creek neighborhood was the paving of the residential streets in 2000. The streets were originally laid out as 30-foot-wide private easements. There is only enough room to put in a two lane road and a sidewalk within a 30-foot strip, so the sidewalks were built immediately adjacent to the road curb on the north side of the street. The mailboxes were placed on private land on the south side of the street where there was no sidewalk. The south side of 1st Street, however, was the natural area. The mailboxes were placed on the northern edge of the natural area, and the perimeter fencing had to be placed several feet back from the property line to accommodate the mailboxes. The pavement and curbing for 1st Street also encroaches into the natural area by as much as two feet due to survey and construction errors. The T-shaped turnarounds at the eastern end of 4th and 3rd Streets also encroach into the natural area from one to nine feet due to survey and construction errors.

Construction of Island Way Road began in early 2004. Island Way Road connects to Limestone Creek Road and restores this road's original access to Indiantown Road. Approximately 0.44 acres of the Viens Tract were transferred at cost to the County's Engineering and Public Works department for construction of the road as part of a pre-acquisition agreement. This road forms the southwestern border of the natural area and was completed in early 2005. The contractor building the road strayed outside the road right-of-way and construction easements, and unnecessarily excavated a portion of the natural area just north of the C-18 Canal for construction of stormwater control structure. The contractor was fined and had to pay for site restoration.

The drainage system for Island Way Road and the basins north of the road was designed with a control elevation high enough to allow water to flow into the western tributary again. A bleed down opening and a conveyance pipe was constructed to bring the stormwater to a bubble-up structure in the tributary at the western edge of the natural area. Some wet season water flows were restored via this arrangement beginning in 2004.

1.4 USES THAT ARE NOT APPROPRIATE

The County's Board of County Commissioners (BCC) has adopted a Natural Areas Ordinance that regulates public uses on county natural areas such as Limestone Creek Natural Area. The Natural Areas Ordinance restricts public uses within a county-managed natural area to those that are compatible with the perpetual preservation and protection of the natural area. This ordinance permits passive recreational activities such as hiking, nature study and photography. Other uses (for example, fishing, canoeing/kayaking, horseback riding and/or bicycling in areas designated for such uses, environmental education, and scientific research) are permitted as long as they do not jeopardize the protection of the existing natural resources. The Natural Areas Ordinance prohibits destructive uses such as off highway vehicles (OHV) use and dumping, and requires special permits for camping, horseback riding, scientific research involving collection of plant and animal specimens or the use of watercraft in wetlands, and nighttime use of the natural area. Except for service animals, no dogs, cats or other domestic animals are permitted on the natural area. The ordinance also prohibits damaging, taking, molesting, trapping, hunting and/or poaching of plants and animals.

There are no plans for any concessions to be located on the site, nor are there plans to provide a camping area or allow horseback riding on the natural area. There are sufficient retail businesses in the vicinity of the natural area to supply services normally provided by concessionaires. Camping and horseback riding are not appropriate for the site given the rare and imperiled status of several of its natural communities, and the sensitivity of the rare and endangered plant and animal species - both of which could be negatively impacted if camping or equestrian use were permitted. Additionally, the site is too small to accommodate such impacts.

The Southwest Fork of the Loxahatchee River is a navigable water body and fishing is allowed under state regulations. The County recognizes that the banks of the river have historically been used by fishermen, and this use will not be prohibited. Because there can be undesirable impacts and littering associated with fishing, ERM has attempted to minimize these impacts by providing a fishing pier with a regularly emptied trash receptacle. The goal of the pier is to encourage fishermen to concentrate their usage in one location. Boating is also allowed on the river and a kayak launch is provided at the southeast parking area.

No vehicles (for example, OHVs, skateboards, etc.) are permitted beyond the designated parking lot/trailhead, except as authorized by the County's Access Policy for Use of Natural Area Trails and Other Public Use Facilities by Persons with Mobility Disabilities. Bicycle usage is prohibited within the site except on multi-use trails which have been designated for bicycle use. Drones are also not permitted within the natural area.

1.5 OUTPARCELS

There are no outparcels adjacent to the natural area that would be suitable for acquisition. All of the land(s) immediately south of the natural area (and incorporated into the natural area) is State-

owned and leased to the county, and all of the lands immediately adjacent to the natural area have already been developed or cleared for public, commercial, residential, recreational, educational or transportation purposes.

1.6 MANAGEMENT AND USE RESTRICTIONS

Management activities and public uses on the natural area are restricted to those that are consistent with the preservation and protection of the rare and endangered plants, animals and ecosystems found on the site. To ensure that the natural area is preserved and protected, in perpetuity, management activities and public uses on the site are regulated by restrictions imposed by the Natural Areas Ordinance (see Section 1.4). A 22.4-acre portion of the site also is preserved and protected under the restrictions imposed by a conservation easement granted by the County to the South Florida Water Management District (see Section 1.7 and Appendix D).

Other significant management and public use restrictions are related to the site's ownership, and to grants and agreements, which helped the County acquire the site. The remaining 31.3 acres (the canal and the canal right-of-way; Figure 2) are managed by the County as part of the natural area pursuant to a permit requirement (GP-013, Occupancy/Linear Park Permit) with the South Florida Water Management District (see Section 1.7). Management and use of the 22.4-acre portion of the natural area (Figure 2) also is limited by the conditions imposed in the Florida Communities Trust (FCT) Grant Award Agreement dated March 24, 2004 (Appendix E).

Management of the majority of the natural area is also regulated by the County's Unified Land Development Code, Article 14 Chapter B (Wellfield Protection Ordinance) due to the proximity of the Town of Jupiter's water supply wells. This ordinance is highly compatible with, and supportive of, natural areas best management practices which prohibit/limit the production and storage, and restrict the use and handling of the same substances regulated by the Wellfield Protection Ordinance (substances such as solvents, gasoline, motor oil and pesticides).

The size, shape and location of the natural area do not restrict certain management activities such as invasive/nonnative vegetation removal or upland restoration activities. However, these factors do limit what can be done on the site relative to the reintroduction of fire. The site's proximity to West Indiantown Road, I-95, Florida's Turnpike, Limestone Creek Elementary school, and residential, commercial and industrial areas limit the options for prescribed burning. The site's proximity to the C-18 canal and the need to maintain adequate flood control for adjacent developed lands limit what can be done to restore the hydrology of the site.

Management of the Southwest Fork of the Loxahatchee River frontage is restricted by the right of the public to use these waters for boating, fishing, swimming and other public purposes.

There are no other known legislative or executive constraints that affect the development, use or management of the site. The natural area is not within an aquatic preserve or a designated area of critical state concern, and is not under study for such a designation.

1.7 EASEMENTS, CONCESSIONS, LEASES AND OTHER ENCUMBRANCES

There are two recorded easements, one canal right-of-way, one plat, one reservation, three SFWMD General Permits, one SFWMD Standard Permit, one SFWMD Order Granting Waiver, one set of grant award restrictions, and three sets of encroachments that restrict use of, or benefit, the natural area. In addition, one taxing authority, Loxahatchee River District (formerly known as Loxahatchee River Environmental Control District), has the right to levy assessments over the natural area and place a lien if the assessments are not paid. There are no concessions or leases that currently affect the natural area. No additional easements, concessions, leases or other encumbrances are anticipated.

Unless otherwise noted, copies of recorded easements and other encumbrances that restrict use of, or benefit, the natural area are provided in Appendix D. A summary of the pertinent documents is provided below.

1.7.1 Order of Taking by County Engineering Department – Utility Easement Over the Western 25 Feet of Charnock Tract to Benefit Limestone Creek Neighborhood, Town and Loxahatchee River District

In 1996, the County obtained a 25-foot-wide utility easement along the western border of the Charnock Tract (Figure 3) via the eminent domain process. The County subsequently installed a water line and related facilities, and allowed Loxahatchee River District to install sanitary sewer gravity collection lines, within the easement. In 1997, the County sold the water line and related facilities to the Town of Jupiter. On August 18, 2009, the County's Department of Environmental Resources Management (ERM) granted the Loxahatchee River District permission to install a sanitary sewer force main within the 25-foot-wide utility easement. Force main construction was completed in November 2010. The improvements, which are located within the utility easement, benefit the adjacent Limestone Creek neighborhood.

1.7.2 County to SFWMD - Conservation Easement to Benefit Natural Area

In 2005, the BCC approved a resolution establishing a standard form conservation easement to be placed over all county-owned natural areas (R2005-1770). This conservation easement provides a level of protection that is not affected by the retirement of county and/or state conservation bonds. It limits improvements to those that support land management activities and recreational opportunities that have little or no impact on natural resources. It also allows for the removal/eradication of nonnative and nuisance plants and animals, and the implementation of environmental restoration/enhancement projects. In February 2009, the County granted a standard form conservation easement over the Viens, Gamot and Charnock Tracts (a 22.3-acre portion of the natural area) to the SFWMD (Appendix D). A conservation easement will not be placed over the 29.3-acre portion of the natural area that is located within the C-18 Canal right of way or the 0.1-acre parallel parking area donated to the County by SFWMD.

1.7.3 Multiple Owners to Central and Southern Florida Flood Control District – Establishment of C-18 Canal Right-of-Way to Benefit the Natural Area, and Surrounding and Upstream Lands

In 1956, the owners of the present-day Viens, Gamot and Charnock Tracts conveyed ownership of the southern portions of their parcels to the Central and Southern Florida Flood Control District (“Flood Control District”; now known as SFWMD). The Flood Control District joined these lands with other lands to create the present-day C-18 Canal right-of-way (see “SFWMD C-18 Canal Right-of-Way”, Figure 3). The portion of the southwest fork of the Loxahatchee River lying within the C-18 Canal right-of-way was channelized to provide drainage and flood control for the natural area, and surrounding and upstream lands. The need to maintain adequate drainage and flood control for the adjacent and upstream lands restricts use of the portion of the natural area that lies within the C-18 Canal right-of-way

1.7.4 Loxahatchee Gardens Farms Plat

An obsolete October 1912 plat identified as “Loxahatchee Gardens Farms” includes the Gamot and Charnock Tracts of the natural area (the northern portions of Tracts 26 and 27, respectively), as well as a portion of the C-18 Canal right-of-way (the southern portions of Tracts 26 and 27). Regardless of this fact, the plat has no real effect on the natural area. None of the platted public road right of ways are located within the present-day natural area. In addition, although the 1912 plat shows that the southern portions of parcels 26 and 27 (now part of the C-18 Canal right-of-way) once contained wetlands, the plat places no restrictions on the affected lands.

The Viens Tract is located southwest (outside) of the platted area.

1.7.5 Reservation of Petroleum, Petroleum Products and other Mineral Rights

In 1945, when the Trustees of the Internal Improvement Fund of the State of Florida sold the Gamot Tract to A. J. and Gertrude Gamot, it reserved an undivided title to half of all petroleum and petroleum products, and three-quarters of all other minerals found on or under the property. Although Florida Statute 270.11(2) extinguished the state’s right to enter the affected portion of the natural area in order to explore for these resources, the state retained its right to share in any petroleum, petroleum products and/or other mineral resources found on the property in the future.

1.7.6 SFWMD to County - General Permit for Fencing within C-18 Canal Right-of-Way to Benefit the Natural Area

In November 2004, SFWMD issued General Permit No. 12494 to the County. This permit allowed the County to remove an existing 4-foot-high, chain-link fence south and east of 1st Street (between the Viens and Charnock Tracts), and replace it with a 6-foot-high, green vinyl chain-link fence and

vehicular access gate. Pursuant to the permit requirements, the County must pay for and install an additional vehicular access gate within the fence line and/or improve the existing vehicular access gate, if requested by SFWMD. The County is responsible for routine maintenance of portions of the canal right of way that lie within, and up to 15 feet outside of, the fenced area. This General Permit may be revoked by SFWMD.

1.7.7 SFWMD to County – General Permit for Creation of a Linear Park to Benefit the Natural Area

In January 2005, SFWMD issued General Permit No. 013-G.P. to the County. This permit allowed the County to create a linear park (including foot trails, a wildlife observation platform, fishing platform and unpaved management roads) within the 29.3-acre “SFWMD C-18 Canal right-of-way” portion of the natural area (Figure 3). It also allowed the County to install mitigation plantings and landscaping in accordance with the permit conditions. Pursuant to the permit, the County must mow the right of way at least quarterly, and remove trash and debris, nonnative vegetation, and excessive weeds and vines from the permitted area. This General Permit may be revoked by SFWMD.

1.7.8 SFWMD to County – General Permit for Construction of an Oxbow with Rip Rap, Fishing Pier and Salinity Control Weir to Benefit the Natural Area

In March 2007, SFWMD issued General Permit No. (Mod) 013-G.P. to the County. The permit allowed the County to construct an oxbow (with riprap) along the northern canal bank, install a salinity control weir to improve conditions within the natural area’s westernmost blackwater creek, and relocate/plant native vegetation within certain portions of the canal right of way. It also allowed the County to construct a fishing pier within the northern portion of the canal right of way, instead of the previously permitted “fishing platform.”

This permit contained certain design and maintenance criteria that the County must adhere to throughout the life of the permit. These criteria include:

- 1) the fishing pier cannot extend into the channel more than 25 percent of the entire width of the canal;
- 2) all of the structural supports for the fishing pier that are perpendicular to the flow of water must be at an elevation of +6.47 feet NGVD or higher;
- 3) all riprap used as part of the project must be clean and environmentally acceptable;
- 4) all construction materials must be large and strong enough to remain intact during extreme water flows and discharges within the C-18 canal;

- 5) if the authorized oxbow becomes stagnant or experiences significant shoaling, the County must excavate a third flushing connection to the C-18 Canal or dredge the channel, as needed, to remedy the problem; and
- 6) the permitted restoration areas must be maintained on a regular basis to keep the right of way free of excessive weeds and nonnative, invasive plant species (Category I plant species as defined by Florida Exotic Pest Plant Council).

This General Permit may be revoked by SFWMD.

1.7.9 SFWMD to County – Standard Permit for Construction of a Shellrock Parking Area with Driveway and Fencing to Benefit the Natural Area; Order Granting Waiver

In August 2011, SFWMD issued Standard General Permit (No. 13893) to the County. The purpose for this permit was to allow the County to construct/improve and maintain an equipment staging area, shellrock parking area and driveway, and associated fencing and gates, in the southern portion of the C-18 Canal right of way, just west of Central Boulevard. As part of the permit conditions, the County is required to maintain the project area. The required maintenance includes repairing permitted facilities and smoothing/grading the parking area, as needed, and removal of debris and litter. In addition, the project area must be mowed at least five times per year.

Also in August 2011, SFWMD issued an “Order Granting Waiver” to the County. This waiver modified Standard Permit No. 13893, a right-of-way permit, which cannot be found on the SFWMD online ePermitting system. The waiver allowed the County to improve/construct the requested equipment staging area, shellrock parking area and driveway, and associated fencing and gates as permanent and/or semi-permanent aboveground encroachments within the SFWMD’s 100-foot-long designated equipment staging area. The waiver also granted the County permission to use and park motor vehicles within a designate portion of SFMWD’s canal right of way.

1.7.10 FCT Grant Award Agreement

A 22.3-acre portion of the natural area was acquired with matching funds from FCT and therefore is constrained by the conditions imposed in the associated Grant Award Agreement (Appendix E). Pursuant to this agreement, the grant property must be managed for conservation, protection and enhancement of natural and historical (if any) resources and for compatible, passive, natural resource-based public outdoor recreation. As the grant recipient, the County must provide FCT with at least 60 days prior written notice regarding any proposed lease of any interest in, the operation of any concession on, any sale or option related to the grant property, the granting of any management contracts, and any use of the FCT project site by any person other than in that person’s capacity as a member of the general public. The County may not execute related documents without the prior written approval of FCT. All fees collected from a lease, concession contract, management contract, etc. on a FCT project site shall be reported to FCT and placed in a segregated account solely for the upkeep and maintenance of that site.

Any proposed modification to the approved management plan and/or any site alterations or physical improvements that are not addressed in the approved management plan, and that affects an FCT-funded portion of the natural area, requires prior FCT review and approval.

1.7.11 Florida Department of Transportation (FDOT) Encroachment

The first set of encroachments that affect the natural area were created by FDOT between 1996 and 1998 (FDOT 1996, Palm Beach County 1998). During this timeframe, FDOT constructed a north-south oriented concrete block spillway between Central Boulevard and the Gamot Tract (Figure 3). The spillway extends from just south of the Church Street right of way into the northern right of way for the C-18 Canal. When FDOT constructed the spillway, it extended the northern and southern ends of the spillway westward into the eastern portion of the Gamot Tract without the benefit of an easement. The northern encroachment extends as much as 5.4 feet (measured in an east-west direction) into the natural area; the southern encroachment extends as much as 16.8 feet (measured in an east-west direction) into the natural area (Todd 2002). When the County purchased the Gamot Tract in July 2002, it acquired the land subject to the FDOT encroachments.

1.7.12 Roadway Encroachments

Roadway improvements completed by the County's Roadway Division in the Limestone Creek neighborhood account for the last two sets of encroachments. Both sets of encroachments were constructed around 2000 (Palm Beach County 1998, Dailey 2002 and 2003).

The first set of roadway related encroachments affects the northern portion of the Viens Tract (Figure 3). When the County's Roadway Division improved 1st Street, a portion of those improvements - pavement, curbs, stormwater inlets and one sanitary sewer clean-out facility - "spilled over" into the northern portion of the Viens Tract. These roadway facilities encroach 1.8 feet to 3.7 feet (measured in a north-south direction) into the natural area (Dailey 2002). The greatest amount of encroachment occurs in the northeastern portion of the Veins Tract. Because the County's Roadway Division constructed a sidewalk along the northern edge of the road, mailboxes associated with the single-family homes north of 1st Street had to be installed south of the road. These mailboxes encroach an additional one to two feet into the northern portion of the Viens Tract.

The second set of roadway related encroachments affects the western portion of the Charnock Tract (Figure 3). Paved turnaround areas constructed by the County's Roadway Division at the eastern ends of 3rd Street and 4th Street extend 1.1 feet and 9.2 feet (measured in an east-west direction), respectively, into the western portion of the natural area (Dailey 2003).

The County considers both sets of these encroachments "acceptable" since they were related to county roadway projects and were in existence when the County purchase the affected natural area tracts.

1.8 PLAN DEVELOPMENT AND REVIEW

The BCC approved an initial management plan for this site on September 12, 2006. Although it is the County's goal to review each approved management plan at least once every ten years, budget constraints and the resulting loss of staff have delayed the preparation of this update. This updated management plan identifies changes that occurred at the natural area since the preceding management plan was approved by the BCC.

The main goal of this management plan is to help ensure that the site's natural resources are protected in perpetuity. Scientific research, environmental education and resource-based recreational uses are permitted as long as they do not jeopardize the protection of these resources. In keeping with these goals, this management plan: 1) identifies the existing natural resources, including rare and imperiled species and vegetation communities; 2) identifies any changes that occurred to those resources subsequent to approval of the initial management plan; 3) identifies factors that affect the preservation, restoration and long-term management of the existing resources; 4) addresses the site-specific goals, strategies and techniques that will be used to preserve, restore/enhance, manage and monitor the existing resources going forward; 5) ensures that the natural area continues to be managed in accordance with applicable grant restrictions and/or lease conditions; 6) evaluates the effect, if any, of existing recreational uses on the site's natural resources; and 7) identifies any recreational uses that could be added or that should be discontinued at the site. This management plan also includes information related to the site's connectivity with other conservation areas, an estimation of annual management and maintenance costs, and any other issues identified by staff.

All draft natural areas management plans prepared by ERM are reviewed by a seven-member, BCC-appointed, advisory committee known as the Natural Areas Management Advisory Committee (NAMAC). The purpose of NAMAC is to review and comment on draft management plans developed for natural areas acquired and/or managed by the County, and to hold public hearings on initial management plans prior to their review and adoption by the BCC. As development of each draft management plan nears completion, NAMAC members are invited to tour the natural area with staff. All comments received from NAMAC members during the site visit are taken into consideration during completion of the draft management plan. The draft management plan is then sent to NAMAC and the SFWMD as co-owner of the site, for review and comment. The draft management plan also is posted on the ERM website for public review and comment.

Members of the public and SFWMD representatives were invited to comment on this draft management plan at the (month day year) regularly scheduled meeting of NAMAC when the plan was initially discussed by the committee. Comments also were accepted in the weeks leading up to the plan's final review and approval by NAMAC on (month day year). No comments were received during the public review process. Members of the public also had the opportunity to comment on the plan on (month day year) when it was considered and approved by the BCC. This updated management plan was reviewed and approved by FCT on (month day year).

1.9 SITE ACQUISITION HISTORY

In 1986, the BCC funded an inventory of the native ecosystems in Palm Beach County by two Florida Atlantic University professors, Dr. Grace Iverson and Dr. Daniel Austin (Iverson and Austin 1988). The study was completed in 1988 with additional work in 1989. The study identified 38 “A” quality sites, including 14 identified as “high priority for acquisition sites” by the County’s Environmentally Sensitive Lands Acquisition Advisory Committee. On March 12, 1991, the voters of Palm Beach County approved a \$100 million bond referendum to purchase environmentally sensitive lands with emphasis on the 14 high-priority sites. Although Limestone Creek Natural Area was not one of the 38 “A” quality sites identified in the Iverson/Austin study, it was determined by the Environmentally Sensitive Lands Acquisition Selection Committee [ESLASC]/Conservation Lands Acquisition Selection Committee to be worthy of purchase by the County for conservation purposes.

In 1996, the County’s ESLASC added the Limestone Creek site to the list of natural area sites targeted for acquisition under a 1991 environmentally sensitive lands bond referendum. The County was unable to acquire the site at that time because the owners disagreed with the valuation in the County’s appraisals. The \$150 million Lands for Conservation Purposes Bond Issue Referendum was approved by County voters on March 9, 1999. Priority acquisition sites remaining from the 1991 referendum list were also eligible under the 1999 referendum. The owners of the tracts in the natural area reduced their asking prices to a level consistent with the appraisals, and the first tracts were acquired in July 2002. The 6.4-acre Viens Tract and 7.2-acre Gamot Tract were acquired in July 2002 for \$559,225 and \$723,875, respectively. The 8.7-acre Charnock Tract was not acquired until September 2003 because of complications with liens that were placed on the property. The price for the Charnock Tract was \$870,759. The locations of the county-owned, county-leased and county-managed lands are shown in Figure 2.

In July 2002, the County submitted an application for matching funds for the Limestone Creek Natural Area to the Florida Communities Trust (FCT)’s Florida Forever Program. The application did not receive enough points to be placed on the funded list, but was placed on a standby list. In July 2003, funding for the project became available, and FCT approved and provided \$1,094,023 in matching funds in April 2004. In August 2004, the County applied for a right-of-way permit to SFWMD to manage a linear park on the 29.3 acres of canal right-of-way located adjacent to the natural area. The permit was granted in January 2005 and runs indefinitely, but can be revoked at will by SFWMD upon reasonable written notice.

Information regarding notable events taking place at the natural area during and subsequent to 2002 is in the following chapters: “Management and Restoration Activities” (Chapter 4), “Site Development and Improvement” (Chapter 5) and “Chronology of Major Events” (Chapter 8).

2. PURPOSE AND OBJECTIVES

2.1 PURPOSE OF ACQUISITION

The primary purpose of the County's Natural Areas System is to protect native ecosystems and biological diversity throughout Palm Beach County. The primary purpose for the acquisition of this natural area was to preserve, restore/enhance and manage the site's ecological resources, including the existing natural communities, their component plant and animal species, and local groundwater resources. The complete acquisition and development of the site as a natural area has provided members of the public with opportunities for recreational activities, environmental education and scientific research that are consistent with the primary purpose of the site's acquisition.

It also has helped the County comply with portions of its comprehensive plan by preserving and restoring/enhancing the natural and historical resources of the natural area, while providing compatible public uses. Policies and objectives outlined in the County's Comprehensive Plan that are furthered by the acquisition and management of the natural area include: the preservation and protection of native communities and ecosystems to ensure that representative communities remain intact (Conservation Element, Goal 2, Objective 2.1); the protection and preservation of endangered and threatened species, species of special concern and their associated habitats (Conservation Element, Goal 2, Objective 2.4); and the continued efforts to eradicate prohibited invasive non-native vegetation (Conservation Element, Goal 2, Objective 2.5).

All portions of the natural area are important to preserving ecological resource values of the site. Because every portion of the site provides habitat for at least one rare or endangered plant species, animal species or natural community, no portions of the property can be declared as surplus.

2.2 MANAGEMENT GOALS AND OBJECTIVES

The natural area contains hydric flatwoods, hydric hammock, mesic flatwoods, mesic hammock, scrubby flatwoods, and tidal swamp native vegetation communities (Figure 4). These communities, most of which can be considered as moderate- to high-quality within the context of urbanized southeastern Florida, were in a somewhat degraded condition at the time of site acquisition. Maintaining and improving the ecological quality of these native vegetation communities is one of the primary management goals for this site. Another primary goal is to restore, enhance and/or manage disturbed areas in a manner that will enhance the overall biological diversity of the site and/or meet specific needs of listed species. Habitats for listed species are managed for the needs of individual species when such management is compatible with the overall management of the ecosystems within the natural area.

The following goals and objectives reflect desired management outcomes that are specific to Limestone Creek Natural Area. The objectives are actions or measureable outcomes of management targeted to achieve either short-term (achievable within 2 years) or long-term goals (achievable within 10 years). All of the following goals and objectives are subject to and contingent upon annual budgetary funding and appropriations by the BCC.

Habitat Restoration and Improvement

- Goal 1. Maintain and enhance a healthy scrubby flatwoods community (short-term and long-term).
- Objective A. Conduct prescribed burns within Management Unit 3 (Figure 4) at 5- to 15-year interval to maintain “ideal” scrubby flatwoods fire conditions as recommended by FNAI (2010). [Note: This frequency is contingent upon appropriate weather conditions, smoke and safety considerations, funding and resource availability, and other factors required for burning within an urban environment.]
- Objective B. If the “ideal” burn intervals identified in Objective A cannot be met, conduct prescribed burns and/or use mechanical vegetative reduction methods within Management Unit 3, as needed, to create a mosaic of natural communities and successional stages, and reduce the risk of catastrophic wildfire.
- Goal 2. Maintain and enhance a healthy mesic flatwoods community (short-term and long-term).
- Objective A. Conduct prescribed burns in Management Units 2 and 4 (Figure 4) at 2- to 3-year intervals to maintain “ideal” mesic flatwoods fire conditions as recommended by FNAI (2010). [Note: This frequency is contingent upon appropriate weather conditions, smoke and safety considerations, funding and resource availability, and other factors required for burning within an urban environment.]
- Objective B. If the “ideal” burn intervals identified in Objective A cannot be met, conduct prescribed burns and/or use mechanical vegetative reduction methods within Management Units 2 and 4, as needed, to create a mosaic of natural communities and successional stages, and reduce the risk of catastrophic wildfire.

Imperiled Species Habitat Maintenance, Enhancement, Restoration or Population Restoration

- Goal 1. Protect, restore/enhance and maintain imperiled species habitat (short-term and long-term).
- Objective A. Conduct prescribed burns in accordance with the schedule provided in Table 3 to maintain the diversity and health of the native plant communities on the site.
- Objective B. Monitor the status of imperiled plant species populations in accordance with species-specific monitoring schedules established by ERM.

Objective C. Conduct periodic animal species surveys, including gopher tortoise (*Gopherus polyphemus*) surveys, and ongoing opportunistic surveys for all animal species observed on the natural area, including imperiled species.

Objective D. Enforce relevant provisions of the Natural Areas Ordinance, such as those dealing with damage to or removal of plants, molestation or harassment of animals, introduction or release of nonnative plants and animals, and prohibition of domestic animals and pets.

Nonnative, Invasive and Nuisance Species Maintenance and Control

Goal 1. Control nonnative and invasive plant species, and nonnative and nuisance animal species so that they do not significantly impact native plant communities (short-term and long-term).

Objective A. Maintain coverage of invasive/nonnative plant species at less than 1 percent of the natural area by conducting annual invasive/nonnative plant treatments.

Objective B. Monitor the site for feral hogs (*Sus scrofa*), domestic and feral cats, stray dogs, raccoons (*Procyon lotor*) and other nonnative/nuisance animals, as needed, during opportunistic observations and scheduled wildlife surveys, and remove/control populations of nonnative/nuisance animals as necessary and feasible.

Cultural and Historical Resources

This management objective is not applicable to Limestone Creek Natural Area. No significant cultural or historical resources have been identified on the site. If any cultural or historical resources are identified in the future, the procedures used to protect the newly discovered cultural/historical resource(s) will depend on which agency has the ultimate review authority - Florida Department of State, Division of Historical Resources (FDHR) or the County pursuant to Article 9 of the County's Unified Land Development Code.

Sustainable Forest Management

This management objective is not applicable to Limestone Creek Natural Area. The natural area does not provide commercial forest resources.

Capital Facilities and Infrastructure

Goal 1. Maintain the existing facilities and infrastructure in safe condition (short-term and long-term).

- Objective A. Monitor the integrity and condition of facilities and infrastructure on a regular basis.
- Objective B. Close unsafe areas to the public immediately upon the detection of a problem.
- Objective C. Replace/repair damaged fencing and signage as soon as possible.
- Objective D. Replace/repair minor cracked/damaged infrastructure issues within six months of detection, contingent upon receipt of any necessary permits, construction contract requirements and/or site conditions.
- Objective E. Replace/repair major cracked/damaged major infrastructure issues within one year of detection, contingent upon receipt of any necessary permits, construction contract requirements and/or site conditions.

Goal 2. Maintain the overall appearance and aesthetics of the natural area (short-term and long-term).

- Objective A. Maintain public use facilities (cleaning of concrete nature trail, fishing pier, parking lot, etc.) on a biweekly or as-needed basis.
- Objective B. Mow management accessways and firebreaks on an as-needed basis.
- Objective C. Paint over or remove graffiti from public use facilities on an as-needed basis.

Public Access and Recreational Opportunities

Goal 1. Continue to provide non-consumptive/non-destructive, resource-based public access and recreational opportunities within the natural area (short-term and long-term).

Security

Goal 1. Implement appropriate security and access control measures to prevent unauthorized activities, such as use by OHVs, dumping and off-trail use (short-term and long-term).

- Objective A. Install and maintain a fence and gate system that is designed to restrict public vehicular access to designated parking areas, eliminate dumping on the site, and limit bicycle use to trails specifically designated for such (use/uses).

- Objective B. Install and maintain signage to identify the site as a natural area and inform the public as to the uses and activities permitted and not permitted on the site.
- Objective C. Continue to fund the Wildlands Task Force to enforce the Natural Areas Ordinance, as amended.
- Objective D. Provide annual training sessions designed to educate local law enforcement officers about County ordinances related to the protection of natural areas and site-specific security issues.

3. NATURAL AND CULTURAL RESOURCES

Limestone Creek Natural Area contains a remnant of the native upland communities formerly present in southeastern Florida. Agriculture, urbanization, road construction, hydrologic modifications, fire suppression and other human-related disturbances have eliminated or severely modified all of the native upland and wetland communities near the natural area. The site's natural communities currently represent a mosaic of historical, successional and altered vegetation communities. The natural area is not a designated area of state concern or under study for such designation, and is not within an aquatic preserve.

A thorough inventory and assessment of the existing natural resources had to be conducted before meaningful management goals and objectives could be developed for the natural area. The following sections summarize the site's existing natural resources. Disturbances that have affected, and/or continue to affect, these natural resources also are identified. Restoration, enhancement and management activities designed to mitigate for adverse impacts to the site's natural resources are described in Chapters 4 and 5. A discussion of the archaeological and historical resources is provided in Section 3.5.

Both the scientific and common names of plant and animal species are provided the first time the species is mentioned in this management plan. After the initial reference, only the common name is used. Lists of plants and animals recorded at the natural area are provided in Appendixes A and B, respectively.

3.1 HYDROLOGY

Limestone Creek Natural Area was once part of a pine flatwoods forested floodplain (Davis 1943, United States Department of Agriculture [USDA] 1940). Limestone Creek was a small blackwater stream that flowed east and emptied into the Southwest Fork of the Loxahatchee River. The C-18 Canal project, which replaced the natural creek bed and included the S-46 control structure, was completed in 1958. The S-46, a large spillway constructed just west of the natural area, holds water levels upstream at 14.5 feet, while discharging the downstream water at tidal levels. Due to the location of the natural area downstream of the spillway, the construction of the C-18 Canal lowered ground water levels in the Limestone Creek floodplain. The two small blackwater creeks (one remnant and the other restored; Figure 4) that flow intermittently through the natural area were tributaries of Limestone Creek.

The Limestone Creek neighborhood was originally platted in the mid-1950s without any surface drainage. A storm sewer system for the neighborhood was installed in 1999 that routed the stormwater to a retention basin created on the western border of the natural area. The stormwater retention basin was intended to divert water into the western tributary creek; however, the amount of water entering the basin was less than predicted. Water levels in the basin never staged high enough to discharge into the tributary, and the western tributary dried up. When Island Way Road was constructed in 2004, ERM required Palm Beach County Engineering, as part of the roadway mitigation, to construct a new stormwater structure that bypassed the retention basin and directs water into the western tributary creek for rehydration. The eastern tributary creek was also effected by the installation of the Limestone Creek neighborhood storm sewer system. This system diverted

the neighborhood runoff that originally fed the eastern tributary and diverted it to the western storm basin. As a result, the eastern tributary is now site-specific rainfall driven, no longer functions as a creek, and acts more like an ephemeral pond. Impacts to mangroves during the construction of the Island Way Bridge required the creation of an oxbow tidal swamp on the north slope of the C-18 Canal next to Island Way Road. The oxbow was completed in 2006. In 2000, the SFWMD created an oxbow tidal swamp on the north bank of the C-18 Canal next to Central Boulevard.

Five hydrological restoration projects were completed within the natural area between 2000 and 2008. These projects included the construction of the two fore mentioned oxbows in 2000 and 2006, and the construction of three additional oxbows, two on the south side and one on the north side, along the C-18 Canal in 2008 (see Section 4.4.4 and Figure 6a). In addition to these features, two weir structures (one listed as a salinity barrier in Figure 6a) were constructed in 2008 on the western tributary creek to impede salt water intrusion and rehydrate the upper portion of the creek. The restoration projects and related water control structures are described in Sections 4.4.4 and 5.5.

3.2 NATURAL COMMUNITIES

The following discussion provides a general description of each of the “intact” and altered (“disturbed”) plant communities present on the natural area – (Canal, canal berm, disturbed mesic hammock, hydric flatwoods, hydric hammock, mesic flatwoods, mesic hammock, scrubby flatwoods and tidal swamp) (Figure 4). Unless otherwise indicated, the descriptions provided for intact communities are based upon FNAI’s classification system (FNAI 2010). If a community is so altered that it no longer resembles or functions as an intact plant community, an alternative description has been developed. The phrase "natural community" is used in this plan, even when a plant community has been altered. A list of the typical plant species found in the County is provided for each of the intact plant communities found on the site; these lists are based on plant community descriptions contained in FNAI (2010) and species ranges provided by Wunderlin and Hansen (2011).

The goal of natural communities management is to restore and maintain as many of the natural communities that historically occupied the site as possible. Nearly all of the natural communities on the natural area have been enhanced or restored (see Section 4.5). They will be maintained through the implementation of invasive/nonnative plant and nonnative/nuisance animal control programs (see Sections 4.5.2 and 4.5.3), through the closure of all old OHV trails that are not part of the management accessway/firebreak system, through security measures designed to eliminate OHV use and dumping (see Section 4.7), and through the maintenance of more natural hydroperiods. Fire-maintained communities – hydric flatwoods, mesic flatwoods and scrubby flatwoods - also will be maintained through the implementation of a prescribed burn program and/or through mechanical vegetation reduction (see Section 4.5.1).

The only area that lacks a natural community is the parking lot. This 0.5-acre area also includes the entrance driveway (Figure 4).

3.2.1 Blackwater Stream

Blackwater streams are characterized as perennial or intermittent seasonal waterways. The dark, tea-colored water of blackwater streams reduces light penetration and inhibits the growth of submerged aquatic plants. Typical plant species include goldenclub (*Orontium aquaticum*), smartweeds (*Polygonum* spp.), flatsedges (*Cyperus* spp.) and grasses (Family Poaceae) - all of which have been or could be recorded at the site. Listed animal species occurring in Palm Beach County that are typically associated with blackwater streams include American alligator (*Alligator mississippiensis*) and alligator snapping turtle (*Macrochelys temminckii*) (Bartlett and Bartlett 2011, FNAI and FDNR 1990, NatureServe 2018). Although it is not a fire-maintained community, the blackwater stream community will be burned at the same time and frequency as the adjacent fire-maintained communities. Prescribed fire will be allowed to burn into the blackwater stream community as far as available fuels and moisture levels allow it to go. At the natural area, this community was rehydrated and restored with the installation of the weir and salinity barrier and now occupies approximately 0.9 acres.

FNAI (2018) ranked blackwater stream as G4/S3 – apparently secure globally, but very rare and local in Florida or found locally in a restricted range or vulnerable to extinction from other factors.

3.2.2 Canal and Berm

The canal and berm community was created in the late 1920s when the C-18 Canal was dug through the southern portion of the site. The oxbow portions of the canal was created during restoration efforts (See section 4.4.4.3). Prior to the site's acquisition by the County, the berms and canal slopes had become colonized by a mixture of ruderal, native and invasive nonnative plant species, including Brazilian pepper. The deeper portions of the canal are typically unvegetated, open water areas. With the exception of hard-to-control invasive nonnative grasses such as guinea grass, all of the invasive nonnative plant species have been removed from the canal community. The canal and berm community covers 7.3 acres.

3.2.3 Hydric Hammock

Hydric hammock is characterized as an evergreen hardwood and/or cabbage palm (*Sabal palmetto*) forest with a variable understory often dominated by palms and ferns, occurring on moist soils. Hydric hammock soils are generally saturated, but are inundated only for short periods following heavy rains. The normal hydroperiod is seldom over 60 days per year. This community generally has a closed canopy of oaks and palms, an open understory, and a sparse-to-moderate groundcover of grasses and ferns. Typical hydric hammock plant species whose ranges include the County are cabbage palm, laurel oak (*Quercus laurifolia*), live oak (*Quercus virginiana*), red cedar (*Juniperus virginiana*), red maple, sweetbay, slash pine, water oak (*Quercus nigra*), swamp dogwood (*Cornus foemina*), American elm (*Ulmus americana*), Walter's viburnum (*Viburnum obovatum*), wax myrtle, common persimmon (*Diospyros virginiana*), swamp bay, eastern poison ivy, myrsine (*Myrsine cubana*), wild coffee (*Psychotria nervosa*), American beautyberry (*Callicarpa*

americana), sugarberry (*Celtis laevigata*), sweetgum (*Liquidambar styraciflua*), flatsedges (*Cyperus* spp.), woodoats (*Chasmanthium* spp.), Carolina scalystem (*Elytraria caroliniensis*), basketgrass (*Oplismenus hirtellus*), maiden ferns (*Thelypteris* spp.), cinnamon fern, royal fern, swamp fern, netted chain fern (*Woodwardia areolata*), Virginia chain fern, golden polypody (*Phlebodium aureum*), shoestring fern (*Vittaria lineata*), wild pines, peppervine (*Ampelopsis arborea*), rattan vine (*Berchemia scandens*), yellow jessamine (*Gelsemium sempervirens*), greenbriers (*Smilax* spp.), summer grape (*Vitis aestivalis*) and muscadine (*Vitis rotundifolia*).

Hydric hammock is not a fire-maintained community, but it does burn on occasion. When hydric hammock communities burn, the intensity of the fire determines which plant species will survive the fire. Cabbage palms are fire tolerant and are favored in hydric hammocks that have experienced high intensity fires. Live oaks can survive low intensity fires, but other hydric hammock species may be killed by fire. Prescribed fire will be allowed to burn into the hydric hammock community as far as available fuels and moisture levels allow it to go. The hydric hammock community at the natural area covers 3.7 acres.

FNAI (2018) ranked hydric hammock as G4/S4 - apparently secure globally and in Florida, but possibly rare in parts of its range.

3.2.4 Mesic Flatwoods

Mesic flatwoods is the most widespread natural community in Florida. It is characterized as having an open overstory of pines, which in South Florida consists of slash pine. The understory generally includes a low, dense groundcover layer of grasses, forbs and shrubs. Other typical mesic flatwoods plant species that occur in the County include saw palmetto (*Serenoa repens*), gallberry (*Ilex glabra*), coastalplain staggerbush (*Lyonia fruticosa*), fetterbush, dwarf huckleberry (*Gaylussacia dumosa*), shiny blueberry (*Vaccinium myrsinites*), dwarf live oak (*Quercus minima*), running oak (*Quercus pumila*), wiregrass (*Aristida stricta* var. *beyrichiana*), witchgrasses and bluestem grasses, plus a large number of showy forbs.

Mesic flatwoods communities require frequent fire; all of the common plant species recover quickly after a fire and several plant species require fire to reproduce. Nearly all natural fires in mesic flatwoods occur at 1- to 6-year intervals, with 2- to 3-year intervals being the most common. Reintroduction of fire into long unburned flatwoods can result in high pine mortality due to excessive smoldering at the base of the trees, a side effect of fuel and litter build-up. Growing season fires (April to mid-August) are favored over winter burns because many of the grasses and forbs require fire to flower and set seed.

The mesic flatwoods community at the natural area occupies 9.2 acres. It will be prescribed burned at the “ideal” frequency of once every 2 to 3 years, contingent upon appropriate weather conditions, smoke and safety considerations, funding and/or resource availability, and other factors that may limit burning within an urban environment. If the “ideal” burn frequency cannot be met, prescribed burns and/or mechanical vegetative reduction methods will be used, as needed, to create

a mosaic of natural communities and successional stages within Management Units 2 and 4, and reduce the risk of catastrophic wildfire.

FNAI (2018) ranked mesic flatwoods as G4/S4 - apparently secure globally and in Florida, but possibly rare in part of its range.

3.2.5 Mesic Hammock

Mesic hammock is a rarely-inundated, evergreen hardwood and/or palm forest. It is characterized by a closed canopy that is dominated by live oak; cabbage palm is common in the canopy and subcanopy. Other canopy and subcanopy plant species found in the County that also may be found in mesic hammock communities include gumbo limbo (*Bursera simaruba*), satinleaf (*Chrysophyllum oliviforme*), water oak (*Quercus nigra*), laurel oak, sweetgum (*Liquidambar styraciflua*), sugarberry (*Celtis laevigata*) and slash pine. Shrubs found in the County that are typical of mesic hammock communities include saw palmetto, American beautyberry (*Callicarpa americana*), American holly (*Ilex opaca*), gallberry, sparkleberry (*Vaccinium arboreum*), hog plum (*Ximenia americana*), common persimmon (*Diospyros virginiana*), Carolina laurelcherry (*Prunus caroliniana*), wax myrtle, Simpson's stopper (*Myrcianthes fragrans*), myrsine, wild coffee (*Psychotria* spp.), low panic grasses (*Panicum* spp.), witchgrasses, basketgrass (*Oplismenus hirtellus*), flatsedges (*Cyperus* spp.), tall nutgrass (*Scleria triglomerata*), bracken (*Pteridium aquilinum*), partridgeberry (*Mitchella repens*), toothpetal false reinorchid (*Habenaria floribunda*) and other ground orchids, Spanish moss (*Tillandsia usneoides*), wild pines (*Tillandsia* spp.), resurrection fern (*Pleopeltis polypodioides* var. *michauxiana*), golden polypody (*Phlebodium aureum*), shoestring fern (*Vittaria lineata*), Florida butterfly orchid (*Encyclia tampensis*), muscadine, greenbriers (*Smilax* spp.), yellow jessamine (*Gelsemium sempervirens*), eastern poison ivy and Virginia creeper (*Parthenocissus quinquefolia*).

Mesic hammock is not a fire-maintained community. Intense fires can destroy mesic hammock. The mesic hammock at the natural area has either been placed in a no-burn zone or will be protected from prescribed fire by the creation of temporary firebreaks. This community occupies 8.4 acres at the natural area.

FNAI (2018) ranked mesic hammock as G3/S3? – both globally and in Florida this natural community is either very rare and local throughout its range, or found locally in a restricted range or vulnerable to extinction from other factors. The question mark indicates that the state status is questionable at present.

3.2.6 Disturbed Mesic Hammock

Disturbed mesic hammock has many of the same plant species as intact mesic hammock, but the plants are smaller and sparser, and there are larger expanses of bare sand. Over the past 13 years the conversion of approximately 1.3 acres of disturbed mesic flatwoods and disturbed easement (as depicted in the initial management plan) to disturbed mesic hammock was accomplished through a series of native restoration plantings conducted on the southern portion of the site (see Section 4.4.4, 4.5.4 and Figure 6a), natural recruitment and the ongoing removal of

invasive/nonnative plant species (see Section 4.4.2). The disturbed mesic hammock community currently covers 1.3 acres; it should transition to mesic hammock over time.

3.2.7 Scrubby Flatwoods

Scrubby flatwoods are characterized as having an open canopy of widely-spaced pine trees and a low, shrubby understory dominated by scrub oaks and saw palmetto, often interspersed with areas of barren white sand. Scrubby flatwoods will not flood, even under extremely wet conditions (Abrahamson and Hartnett 1990). The principal canopy species in South Florida is slash pine. In the County the understory consists of one or more of three scrub oaks - myrtle oak, Chapman's oak and sand live oak - and shrubs typical of mesic flatwoods such as saw palmetto, gallberry, coastalplain staggerbush, fetterbush and deerberry (*Vaccinium stamineum*). Grasses and subshrubs include wiregrass, broomsedge bluestem (*Andropogon virginicus*), little bluestem (*Schizachyrium scoparium*), dwarf live oak, shiny blueberry, dwarf huckleberry, gopher apple (*Licania michauxii*), Chapman's goldenrod (*Solidago odora* var. *chapmanii*), running oak, coastalplain honeycombhead (*Balduina angustifolia*), narrowleaf silkgrass and October flower (*Polygonella polygama*). Listed animal species that are typically associated with scrubby flatwoods in Palm Beach County include gopher tortoise and Florida scrub-jay (Abrahamson and Hartnett 1990, Bartlett and Bartlett 2011, NatureServe 2018).

Due to the relatively sparse ground cover and the presence of open, sandy areas, natural fire frequency in scrubby flatwoods is lower than in other flatwoods communities (Abrahamson and Hartnett 1990). Under natural conditions, this community burns once every 5 to 15 years. Scrubby flatwoods tend to burn in a spotty fashion leaving a mosaic of lightly-burned, intensely-burned and unburned areas.

The scrubby flatwoods community at the natural area will be prescribed burned at the "ideal" frequency of once every 5 to 15 years, contingent upon appropriate weather conditions, smoke and safety considerations, funding and/or resource availability, and other factors that may limit burning within an urban environment. If the "ideal" burn frequency cannot be met, prescribed burns and/or mechanical vegetative reduction methods will be used, as needed, to create a mosaic of natural communities and successional stages within Management Unit 3, and reduce the risk of catastrophic wildfire.

FNAI (2018) ranked scrubby flatwoods as G2/S2? - imperiled both globally and in Florida because of rarity or vulnerability to extinction. The question mark indicates that the state status is questionable at present.

3.2.8 Tidal Swamp

Tidal mangrove swamps are dense forests that occur along relatively flat, low-energy, marine and estuarine shorelines. Mangrove swamps are dominated by four tree species: red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*) and buttonwood (*Conocarpus erectus*). Mangrove swamps often lack an understory, but species such as gray nicker, coinvine, rubbervine (*Rhabdadenia biflora*), perennial glasswort (*Sarcocornia ambigua*), shoregrass (*Monanthochloe littoralis*), giant leather fern (*Acrostichum*

danaeifolium), saltwort (*Batis maritima*) and bushy seaside oxeye (*Borrchia frutescens*) may be found in openings and along the edges of mangrove swamps in the County. Mangrove swamp does not burn and is not a fire-maintained community. The mangrove swamp community at the natural area, created for roadway mitigation and canal bank restoration, occupies 3.3 acres.

FNAI (2018) ranked mangrove swamp as G5/S4 – demonstrably secure globally and apparently secure in Florida, although it may be rare in parts of its range.

3.2.9 Wet Flatwoods

Wet flatwoods are characterized as relatively open-canopy forests of scattered slash pine, with a sparse or absent midstory and a dense groundcover of hydrophytic grasses, herbs and low shrubs. Typical understory plant species that may be found in the County include sweetbay, swamp bay, loblolly bay, pond-cypress, cabbage palm, dahoon, wax myrtle, gallberry, saw palmetto, fetterbush, wiregrass, blue maidencane, toothachegrass (*Ctenium aromaticum*), coastalplain yelloweyed grass (*Xyris ambigua*), Carolina redroot and beaksedges. During the rainy season, water frequently stands on the surface, inundating the wet flatwoods for one month or more per year. Natural fire frequency in wet flatwoods has been estimated at 1 to 10 years. Shorter fire intervals favor grassy wet flatwoods, while longer intervals favor a shrubbier subtype. The recommended burn interval for South Florida wet flatwoods is 4 years.

The wet flatwoods community at the natural area was rehydrated during site restoration and now occupies 0.2 acres. The wet flatwoods community will be prescribed burned on a 5- to 8-year interval. Although the proposed burn interval is longer than what is typically desired for wet flatwoods communities, resource limitations, and site-specific smoke management and safety concerns severely limit weather conditions under which prescribed burning may take place.

FNAI (2018) ranked wet flatwoods as G4/S4 - apparently secure globally, but rare in parts of its range, and apparently secure in Florida.

3.3 PLANTS AND ANIMALS – OVERVIEW

As of January 2019, 272 species of plants have been recorded at the natural area (Appendix A). Of these, eleven have been listed for protection or special management by a government agency or have been ranked by FNAI (Table 1). Seventy-five species of plants recorded at the site are not native to the South Florida mainland (see Section 4.4.2 and Appendix A).

As of January 2019, 167 species of animals have been recorded at the natural area - 5 malacostracans, 9 arachnids, 45 insects, 7 reptiles, 87 birds, 9 mammals and 5 fishes (Appendix B). Nineteen of these species have been listed for protection or special management by a government agency or have been ranked by FNAI (Table 2). Five species of invertebrates and eight species of vertebrates recorded at the site are not native to the South Florida mainland (see Section 4.4.3 and Appendix B).

Some native plant and animal species recorded at the natural area are habitat-specific, using only one natural community, while others use a variety of natural communities. Therefore, the preservation, restoration, enhancement and management of all of the natural communities at the natural area are critical to the long-term preservation of plant and animal species indigenous to the site.

3.4 LISTED SPECIES

3.4.1 Plants

Eleven plant species recorded at the natural area have been listed for protection or special management by at least one governmental agency or have been ranked by FNAI (Table 1). These species will be protected as components of the natural communities of which they are a part. All listed/ranked plant species recorded at the natural area will be protected by implementing management activities designed to restore, enhance and maintain the natural communities in which they occur; controlling/removing invasive/nonnative vegetation; implementing a prescribed burn program; routing management accessways, trails and other public use facilities away from known populations whenever possible; relocating plants that cannot be avoided during construction and restoration activities; and protecting the site from plant collectors. Species known to be susceptible to fire may be protected during prescribed burn activities by one or more of the following actions: having multiple management units, burning only one unit at a time to maintain a seed source on the unburned parts of the site, maintaining a mosaic of seral stages on the site, creating temporary firebreaks, or relocating individual plants to other locations on the site prior to a prescribed burn. Information regarding the monitoring of listed/ranked plant species is provided in Section 7.2.

This section includes a brief description of each listed/ranked plant species and any species-specific management/protection strategies that may be used to protect that species. The ranks and designations assigned to the species are provided in Table 1. Listed/ranked plant species recorded at the natural area are discussed below in alphabetical order by common name. The typical habitats provided for each species are as described by Wunderlin and Hansen (2011) unless otherwise noted.

Cinnamon fern (*Osmunda cinnamomea*)

This terrestrial fern was first recorded at the natural area by ERM staff in 1991; it is frequently observed at the natural area. Cinnamon fern is typically found in freshwater marshes, swamps and bogs.

Common wild pine (*Tillandsia fasciculata*)

This epiphytic bromeliad was first recorded at the natural area by ERM staff in 1997; it is occasionally observed at the natural area. The common wild pine population decreased following the 2004 and 2005 hurricane seasons. It is typically found in cypress swamps, hammocks and flatwoods. All species of *Tillandsia* may be killed directly by fire, or indirectly as a result of the loss of the protective tree canopy or death of the host tree (Robertson and Platt 1992 and 2001).

Giant wild pine (*Tillandsia utriculata*)

This epiphytic bromeliad was first recorded at the natural area by ERM staff in 1997; it is occasionally observed at the natural area. Giant wild pine is typically found in hammocks and cypress swamps. All species of *Tillandsia* may be killed directly by fire, or indirectly as a result of the loss of the protective tree canopy or death of the host tree (Robertson and Platt 1992 and 2001).

Inflated & reflexed wild pine (*Tillandsia balbisiana*)

This epiphytic bromeliad was recorded at the natural area by ERM staff in 2009; it is very rarely observed at the natural area. Inflated & reflexed wild pine is typically found in hammocks and scrub. All species of *Tillandsia* may be killed directly by fire, or indirectly as a result of the loss of the protective tree canopy or death of the host tree (Robertson and Platt 1992 and 2001).

Nodding club-moss (*Lycopodiella cernua*)

This terrestrial fern ally was first recorded at the natural area by ERM staff in 2017; it is very rarely observed at the natural area. It is typically found in wet flatwoods, pond margins, bogs, hammocks and ditches.

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

This terrestrial fern was recorded at the natural area by ERM staff in 1997 and 2006; it is very rarely observed at the natural area. This species is typically found in swamps, marshes and bogs. Royal fern has a low tolerance to fire (LaRue 2008).

Saw palmetto (*Serenoa repens*)

This perennial shrub was first recorded at the natural area by ERM staff in 1997; it is frequently observed at the natural area. This species is typically found in pinelands, scrub and coastal upland communities. It is a significant food for and cover for wildlife. Saw palmetto is adapted to fire.

Simpson's stopper (*Myrcianthes fragrans*)

This woody shrub was recorded at the natural area by ERM staff in 1997 and 2006. It also was planted along the edge of the first created oxbow in the mid 2000s. This species is typically found in coastal hammocks.

Spreading pinweed (*Lechea divaricata*)

This herb was first recorded at the natural area by ERM staff in 1997; it is frequently observed at the natural area. It is typically found in scrub and scrubby flatwoods (Chafin 2000). This species is adapted to fire.

Tiny polygala (*Polygala smallii*)

This diminutive endemic forb was first recorded at the natural area by ERM staff in 1997; it is frequently observed at the natural area. Tiny polygala is typically found in pinelands.

Wild cotton (*Gossypium hirsutum*)

This medium to large perennial shrub was first recorded at the natural area by ERM staff in 1997 and 2006; it is very rarely observed at the natural area. Wild cotton is typically found in coastal hammocks, beaches and disturbed sites.

3.4.2 Animals

Nineteen animal species recorded at the natural area have been listed for protection or special management by at least one governmental agency or have been ranked by FNAI (Table 2). They include one malacostracan, four insects, two reptile, eleven bird and one mammal species. The listed/ranked animal species at the natural area will be managed and protected as components of the natural communities of which they are a part. All listed/ranked animal species will be managed and protected through the implementation of management activities designed to restore, enhance and maintain the natural communities used by these species; by establishing a protective buffer zone around any existing nest or rookery, or any nest or rookery that may be discovered in the future; and by the enforcement of anti-poaching regulations. ERM will coordinate with Florida Fish and Wildlife Conservation Commission (FWC) on the management of the site for protection of listed animals.

This section includes a brief description of each listed/ranked species, including the habitats in which it is typically found and the species' primary diet. The ranks and designations assigned to the species are provided in Table 2. Listed/ranked animal species recorded at the natural area are discussed in alphabetical order by common name.

American alligator (*Alligator mississippiensis*)

This large aquatic reptile was first recorded at the natural area by ERM staff in 2006; it is rarely observed at the natural area. It is a carnivore; its diet is primarily snails, aquatic insects and crustaceans when young, and fish, turtles, snakes, small mammals and birds when older (Ashton and Ashton 1991). The American alligator is primarily a freshwater species. It may be present in any water-retaining habitat, including ponds, canals, lakes, rivers, large streams, borrow pits, swamps and marshes (Bartlett and Bartlett 2011).

American redstart (*Setophaga ruticilla*)

This migratory warbler was first recorded at the natural area by ERM staff in 2003; it is frequently observed at the natural area. American redstarts typically feed on insects and spiders (Pranty et al. 2006). Fall migrants arrive in Florida between late July and early November, and spring birds

pass through between late March and early June (Maehr and Kale 2005). This species does not nest in South Florida (Sherry and Holmes 1997).

Bald eagle (*Haliaeetus leucocephalus*)

This very large bird of prey was first recorded at the natural area by ERM staff in 2012. It has not been recorded on the natural area since that time. Bald eagles feed primarily on fish and waterbirds (Pranty et al. 2006). This species inhabits coastal beaches, salt marshes, dry prairies, mixed pine and hardwood forests, wet prairies and marshes, pine flatwoods, sandhills and agricultural areas (Maehr and Kale 2005). In Florida, most bald eagles are year-round residents, but winter migrants do occur. Bald eagles typically nest in pine trees, but also may nest in mangrove trees or cypress; most nests are built more than 50 feet off the ground (Stevenson and Anderson 1994). The bald eagle is not known to have nested on the natural area.

Blue land crab (*Cardisoma guanhumi*)

This large burrowing crab was first recorded at the natural area by ERM staff in 2007. It has not been recorded on the natural area since that time. Blue land crabs feed primarily on leaves, fruits and grasses collected near the vicinity of its burrow (Hostetler et al. 2016). This species inhabits coastal and estuarine regions of the Caribbean, and Central and South America and is rarely found more than 8 km from the ocean (Hostetler et al. 2016). In south Florida, *Cardisoma* lives in two major types of colonies. In one of these, the burrows are located in flat ground not immediately adjacent to free surface water. These may be either among mangroves, in open fields of tall grass, or in open hardwood groves. In the second type of colony, the burrows are located in the banks of drainage ditches or canals, near the edges of fresh-water streams or ponds, or in hard soil near salt water (Gifford 1962).

Cassius blue butterfly (*Leptotes cassius theonus*)

This small butterfly was first recorded at the natural area by ERM staff in 1997; it is rarely observed at the natural area. Cassius blue butterflies are locally common along the edges of hammocks, thickets, disturbed areas and gardens (Minno et al. 2005). Some of its larval food plants include eastern milkpea (*Galactia volubilis*), hairy pod cowpea (*Vigna luteola*) and rosary pea (*Abrus precatorius*). All of these plant species have been found on the natural area.

Ceraunus blue butterfly (*Hemiargus ceraunus antibubastus*)

This butterfly was first recorded at the natural area by ERM staff in 2013. It has not been recorded on the natural area since that time. The ceraunus blue butterfly inhabits scrubs, sandhills, flatwoods and weedy, disturbed sites (Minno et al. 2005). Some of its larval food plants include partridge pea (*Chamaecrista fasciculata*), sensitive pea (*Chamaecrista nictitans*) and hairy indigo (*Indigofera hirsute*). All of these plant species have been found on the natural area.

Checkered white (*Pontia protodice*)

This butterfly was first recorded at the natural area by ERM staff in 2013. It has not been recorded on the natural area since that time. Checkered white butterflies are found in disturbed sites such as weedlots, roadsides and cultivated fields (Minno et al. 2005). Its larval food plants include herbs in the mustard family such as pepper grass (*Lepidium virginicum*).

Florida prairie warbler (*Setophaga discolor paludicola*)

This nonmigratory warbler was first recorded at the natural area by ERM staff in 2017; it is very rarely observed at the natural area. Prairie warblers living in the Florida mangroves are considered to be a separate subspecies from the more widespread migratory ones (Maehr and Kale 2005, Nolan et al. 1999). Prairie warblers glean for insects and spiders and may also eat fruit (Pranty et al. 2006). This species is not known to nest on the natural area.

Glossy ibis (*Plegadis falcinellus*)

This medium-large wading bird was first recorded at the natural area by ERM staff in 2015; it is very rarely observed at the natural area. Glossy ibis typically feed on crayfish, fish, reptiles, amphibians and insects (Maehr and Kale 2005, Pranty et al. 2006). They inhabit freshwater marshes, swamps, lakes, flooded agricultural areas and occasionally estuaries (Pranty et al. 2006). Nesting occurs in mixed colonies with other wading birds in shrubs and trees that are either over standing water or on islands. Glossy ibises build platform nests made of sticks. This species is not known to nest at the natural area.

Gopher tortoise (*Gopherus polyphemus*)

Based on population surveys for this species at the natural area, a relatively large population of this medium-sized terrestrial turtle is present on the site. Gopher tortoises are plant eaters; they feed on 400 species of plants (Ashton and Ashton 2008). They can travel up to two miles from their burrows to feed. They also may eat carrion, small animals, insects and other invertebrates. The gopher tortoise typically inhabits sandhill, scrub, scrubby flatwoods, xeric hammock, pine flatwoods, dry prairie, coastal strand, mixed pine-hardwood communities and a variety of disturbed well-drained habitats (FWC 2012). The gopher tortoise is a keystone species in upland communities because of the important role that this species plays in relation to other plants and animals. At least 411 species of vertebrate and invertebrate animals use gopher tortoise burrows (Mushinsky et al. 2006).

The close proximity of the natural area to smoke-sensitive areas severely limits the use of prescribed fire as a gopher tortoise habitat management tool. Therefore, mechanical vegetation reduction activities were conducted in Management Units 1, 2, 3 and 4 in 2013 and 2014 to reduce fuel loads and create open space suitable for gopher tortoises. In the future, mechanical vegetation reduction activities may be used in lieu of fire, or in addition to fire, when it is not possible to conduct prescribed burns at the “ideal” burn intervals outlined in Sections 2.1 and 4.4.1. Based on

the 2017 survey results and opportunistic observations by ERM staff, it appears that the gopher tortoise population is stable in the areas in which the vegetation had been mechanically reduced.

Little blue heron (*Egretta caerulea*)

This medium-sized heron was first recorded at the natural area by ERM staff in 1997; it is regularly observed at the natural area. Little blue herons feed on small fish and amphibians, aquatic crustaceans, insects, worms and snakes (FWC 2013a). This species inhabits coastal beaches, salt marshes, mangroves, hardwood swamps, cypress swamps, wet prairies, freshwater marshes, lakes and ponds, and flooded agricultural areas (Maehr and Kale 2005, Pranty et al. 2006). Nesting occurs between late February and August in single species or multiple species wading bird colonies, mainly at saltwater sites (Maehr and Kale 2005). The little blue heron is not known to nest at this site.

Osprey (*Pandion haliaetus*)

This large bird of prey was first recorded at the natural area by ERM staff in 1997; it is regularly observed at the natural area. It feeds almost exclusively on fish (FWC 2013b, Pranty et al. 2006). Ospreys are widely distributed in Florida and may be found near coastal beaches, salt marshes, open saltwater, open freshwater, mangroves, and wet prairies and marshes (Maehr and Kale 2005). In South Florida, nesting occurs from late November to early summer (FWC 2013b). Ospreys use live or dead trees, telephone poles, and human-made structures for nesting; they create large stick nests high above the ground that they use for many years (Pranty et al. 2006). They are not known to nest at the natural area.

Snowy egret (*Egretta thula*)

This wading bird was first recorded at the natural area by ERM staff in 2009; it is regularly observed at the natural area. The snowy egret feeds on a variety of fish, aquatic crustaceans, insects, and small amphibians, worms or snakes (FWC 2013a). It is a common and widespread Florida resident that is found in almost any wetland habitat, including coastal beaches, freshwater and salt marshes, mangroves, hardwood swamps, cypress swamps, wet prairies, flooded agricultural areas and urban environments (Maehr and Kale 2005, Pranty et al. 2006). Platform nests are created in shrub-covered wetlands or islands in coastal lakes and lagoons (Maehr and Kale 2005). Snowy egrets nest in colonies with other wading birds; eggs are laid from March through August. This species is not known to nest at the natural area.

Statira sulphur (*Aphrissa statira*)

This large butterfly was first recorded at the natural area by ERM staff in 2013. It has not been recorded on the natural area since that time. Its larval food plant is coinvine (*Dalbergia ecastaphyllum*) (Minno et al. 2005), which is found at the natural area. The statira sulphur uses both upland and wetland habitats, such as coastal uplands and the margins of mangroves (Glassberg et al. 2000).

Swallow-tailed kite (*Elanoides forficatus*)

This long-tailed bird of prey was first recorded flying over the natural area by ERM staff in 2007; it is very rarely observed at the natural area. This species feeds on large insects, tree frogs, small snakes and nestling birds (Pranty et al. 2006). Swallow-tailed kites require a mosaic of communities, with tall, accessible trees for nesting and open areas for foraging. Habitats include xeric scrub, hardwood and cypress swamps, mesic hammocks, mixed pine and hardwood forests, pine flatwoods, sandhills, riparian forests and agricultural environments (Maehr and Kale 2005, Pranty et al. 2006). This species typically builds platform nests in tall pine or cypress trees (Pranty et al. 2006). This species is not known to nest on the natural area.

Tricolored heron (*Egretta tricolor*)

This long-necked wading bird was first recorded at the natural area by ERM staff in 2006; it is regularly observed at the natural area. It feeds primarily on small fish (Pranty et al. 2006). Tricolored herons are fairly-common permanent residents in Florida, except in the western Panhandle. They primarily live in coastal habitats such as estuaries and mangroves, but also are present in many types of wetlands, including the edges of inland marshes, lakes and ponds, and flooded agricultural fields. Tricolored herons are colonial nesters; they create platform nests in mangroves or other dense aquatic shrubs. Eggs are laid from late February through July (Maehr and Kale 2005). The tricolored heron is not known to nest at the natural area.

West Indian manatee (*Trichechus manatus*)

The West Indian manatee was first recorded at the natural area by ERM staff in 2003 within the C-18 Canal of the natural area/in the created oxbows; it is frequently observed at the natural area. This species inhabits a variety of aquatic habitats, including freshwater rivers and springs, estuarine bays, marine coastlines and canals in urban areas (FWC 2007). West Indian manatees are generalist herbivores that feed on a variety of marine and freshwater floating, emergent, bank and benthic vegetation. Manatees feed on the seagrass within the created oxbows of natural area.

Wood stork (*Mycteria americana*)

This large wading bird was first recorded at the natural area by ERM staff in 2005; it is regularly observed at the natural area. Wood storks feed primarily on fish, but crustaceans, gastropods, amphibians, reptiles, mammals, other birds and arthropods also may be consumed (USFWS 1997 and 2007). They typically inhabit freshwater ponds, wet prairies and marshes, cypress swamps, salt marshes mangroves and flooded agricultural fields (Maehr and Kale 2005, Pranty et al. 2006). In Florida, nesting occurs in large colonies in forested wetlands from November to May, either high in cypress trees or lower in mangroves. Freshwater colony sites must remain flooded throughout the nesting period to protect the young against predation and abandonment (USFWS 1997). The wood stork is not known to nest at this natural area. However, USFWS has designated the entire eastern half of Palm Beach County as a core foraging area for this species; four rookeries have been recorded in the County (USFWS 2016).

Yellow-crowned night-heron (*Nyctanassa violacea*)

This medium-sized wading bird was first recorded at the natural area by ERM staff in 2003; it is regularly observed at the natural area. Yellow-crowned night-herons feed on crabs, crayfish and fish (Pranty et al. 2006). This species inhabits beaches, mudflats and mangroves in Florida, and is less commonly found in inland swamps and springs. Yellow-crowned night-herons are fairly common permanent residents in the Florida peninsula. Nesting occurs between March and June in Florida, usually singly or in small colonies, sometimes with other wading bird species, in a shrub or tree in which a platform has been constructed (Maehr and Kale 2005, Pranty et al. 2006). This species is not known to nest at the natural area.

3.5 ARCHAEOLOGICAL AND HISTORICAL RESOURCES

No archaeological or historical resources are known to exist within the natural area (ERM 2002). Any future ground disturbance will be coordinated with Florida Department of State, Division of Historical Resources (FDHR) and the Palm Beach County Archaeologist. If any archaeological or historical sites are discovered in the future, FDHR's and the County's best management procedures will be followed to protect those sites. If human remains are found, the provisions of Section 872.05, Florida Statutes, will be followed. The County will comply with Chapter 267, Florida Statutes, in its management of any archaeological or historical sites discovered on the natural area. If historical resources are found on the natural area, a historical resources protection plan will be developed in consultation with the Palm Beach County Historic Preservation Officer. If future resources permit and funding is appropriated, the County will consider conducting an archival and historical study to determine the historical significance of said resource(s).

- Objective D. Provide annual training sessions designed to educate local law enforcement officers about County ordinances related to the protection of natural areas and site-specific security issues.

4. MANAGEMENT AND RESTORATION ACTIVITIES

Baseline environmental assessments of the existing plant communities, and plants and animals were conducted by ERM staff between 1997 and 2006. This information was used to identify the initial management activities necessary to protect, restore/enhance and maintain the natural resources of the site, and to determine the locations and types of public use facilities that were installed. Additional environmental investigations conducted between 2007 and 2018 were analyzed to identify any changes that should be made to the existing public use facilities, land management practices or monitoring requirements. This information serves as the basis for this updated management plan.

4.1 MANAGEMENT RESPONSIBILITIES

Management activities are primarily the responsibility of the County, with assistance from the South Florida Water Management District (SFWMD) and volunteers from the local community. These activities are coordinated by ERM. A linear park agreement, which includes a breakdown of management responsibilities, was approved by the County and the SFWMD in 1987 (see Appendix D). Management of the natural area also will be coordinated with Florida Department of Environmental Protection, which manages the Loxahatchee River Aquatic Preserve.

4.2 MANAGEMENT UNITS

The natural area is divided into five management units using management accessways, and natural and manmade features as boundaries and firebreaks (Figure 4). The management units have been designed to maximize the long-term diversity of natural communities, and native plant and animal species on the site. These units range in size from 5.5 to 18.0 acres, and are small enough to allow for safe and practical fire management. A management unit may be subdivided into smaller units in order to facilitate management and/or monitoring activities, or to minimize the effect of smoke on adjacent properties during a prescribed burn. The boundaries of the management units were slightly modified from those proposed in the original management plan in order to minimize/avoid impacts to existing upland communities.

4.3 MAINTENANCE

4.3.1 Removal of Debris and Litter

All of the debris and litter found on the natural area at the time of its acquisition has been removed. If additional debris is found, it will be removed in a timely manner unless such removal would cause undesirable damage to a rare or imperiled natural community, or listed species. The installation of perimeter fencing and management access gates has and will continue to help prevent dumping on the site. Periodic site cleanups to remove litter are conducted by county staff with the assistance of volunteers.

4.3.2 Trail Maintenance

Periodic trail maintenance will be performed by county staff and community volunteers. All existing trails not used for site management or as part of a designated public use trail will be allowed to revegetate with native vegetation.

4.3.3 Facilities Maintenance

County staff is responsible for the maintenance of all public use facilities, fencing/gates, signage and management accessways/firebreaks. The County also is responsible for maintaining the blackwater creek weir and salinity barrier structure located on the western side of the site; the SFWMD manages the C-18 Canal.

4.4 RESTORATION AND ENHANCEMENT ACTIVITIES

The site has been and will continue to be managed in a manner that preserves, restores and enhances the natural resource values. Restoration/enhancement activities conducted to date include the commencement of a fire management program (see Section 4.4.1), implementation of invasive exotic/nonnative plant and nonnative/nuisance animal control programs (see Sections 4.4.2 and 4.4.3, respectively), exclusion of unauthorized uses (see Section 4.5) and completion of several environmental restoration/enhancement projects (see Section 4.4.4).

4.4.1 Fire Management

Because of development, natural, lightning-induced fire can no longer fulfill the needs of natural communities in the County which are dependent upon fire for their long-term survival (for example, basin marsh, depression marsh, dome swamp, mesic flatwoods, scrub, scrubby flatwoods, slough marsh, wet flatwoods and wet prairie). Natural fire can no longer spread from adjacent lands onto the natural area because all of the surrounding fire-dependent communities have been lost to development. When natural fire does occur within or adjacent to the natural area, it is quickly extinguished due to the threat it poses to adjacent developed areas. Prescribed fire and mechanical fuel reduction activities will be used at this site to help maintain the existing fire-dependent communities and reduce the risk of damage from wildfire on the adjacent developed areas.

ERM has assumed the primary responsibility for prescribed burning at the natural area. Assistance in the form of firefighting staff and equipment will be requested from Palm Beach County Fire Rescue. Additional assistance may be provided by Florida Department of Agriculture and Consumer Services' (FDACS) Florida Forest Service (FFS), the County's Parks and Recreation Department, FWC and trained volunteers. Fire-related safety training is required of anyone participating in a prescribed burn. All prescribed burns will comply with Section 590.125(3), Florida Statutes (Certified Prescribed Burning; Legislative Findings and Purpose).

ERM has written a flexible fire management plan for the natural area (Appendix F). Development of the fire management plan was coordinated with FFS and FWC. The fire management plan takes into consideration surrounding land uses, smoke management concerns, safety issues, and the

ecological benefits and consequences of the specific fire management strategies. It contains specific tools and management practices designed to minimize adverse impacts to native vegetation and wildlife, while maximizing the beneficial effects of prescribed burns. A specific burn plan will be prepared for the proposed burn area prior to conducting a prescribed burn.

Development-related smoke management concerns dictate extremely narrow weather conditions in which prescribed burning may take place at the natural area. Mechanical reduction of vegetation may be used as a surrogate for fire if a given area/habitat cannot be burned.

Surveys for fire-intolerant listed plant species will be conducted before each prescribed burn. If deemed appropriate, fire-intolerant plants may be relocated outside the burn area. If relocation is not practical due to the presence of hard-to-relocate species or larger populations of listed plants, a temporary firebreak may be created to protect the area that contains the listed species from the planned burn. These relatively small unburned areas will increase the diversity of the site. A permit will be obtained for the relocation of a listed plant species when required.

At this site, Management Units 2, 3 and 4 have been designated as “burn units” (Figure 4); Management Units 1 and 5, which are dominated by hydric hammock, mangrove swamp, mesic hammock and open water, will not be treated with prescribed fire. Depending on the specific conditions and objectives of a burn, a management unit may be subdivided into smaller subunits to reduce smoke concerns or provide specific habitat benefits. Staff also may investigate the use of micro-burns to help restore habitat and increase species diversity.

Each management unit was designed so that fire can burn through ecotones and move in a natural, spotty fashion across the landscape. The resulting patchwork of burned and unburned areas will produce a mosaic of vegetation at various stages of maturity, thereby maximizing diversity within and among the various plant communities. This will provide habitat for species that typically use, or may even be restricted to, communities in a particular state of maturity.

The burn interval for each management unit was chosen based on the predominant natural community present in that unit. An interval of 5 to 8 years was selected for Management Units 2 and 4, which are dominated by mesic flatwoods and/or wet flatwoods (see Figures 3 and 4). An interval of 8 to 15 years was selected for Management Unit 3, which is dominated by scrubby flatwoods.

The prescribed burn program for this site began with a prescribed burn in a portion of Management Unit 5 in August 2005 (Figure 6b). An additional prescribed burn was conducted in Management Unit 4 in July 2009. Portions of Management Units 2 and 4 were mechanically reduced in lieu of burning in June 2005 and April 2013 and portions of Management Units 1 and 3 were mechanically reduced in lieu of burning in April 2014. A portion of Management Unit 5 was mechanically reduced in lieu of burning in April 2015 and portions of Management Units 2 and 3 were mechanically reduced in lieu of burning in June 2016 (Figure 6b).

4.4.2 Invasive/Nonnative Plant Control

Like many fragmented conservation lands in southeastern Florida, the natural area has been invaded by a number of exotic nonnative plant species. To date, 75 nonnative plant species have been recorded at the natural area – 28 percent of the plant species recorded on the site (Appendix A). Many of these species were brought to the site by animals (especially birds), planted on the site by previous property owners, and/or spread from adjacent properties or from vegetation piles that were dumped on the site prior to its acquisition. Many species were recorded prior to the implementation of the exotic invasive/nonnative plant control program and may no longer be present. Nonnative plant species are expected to continue to colonize the site from surrounding properties; periodic invasive/nonnative plant control treatments will be required to prevent these species from adversely affecting the natural area.

A number of the nonnative, and some native, plant species recorded at the natural area exhibit invasive tendencies. In this management plan, the phrase “invasive plant species” includes the plants designated as Category I (invasive) and Category II (potentially invasive) by Florida Exotic Pest Plant Council (FLEPPC 2017), those designated as noxious weeds, or Class I or Class II prohibited aquatic plants by Florida Department of Agriculture and Consumer Services (FDACS 2016a and 2008, respectively), as well as native plant species that are harmful to other native vegetation (such as love vine [*Cassytha filiformis*]) or that are too dense or inappropriate for the targeted vegetation community. Invasive nonnative plant species pose a serious threat to the natural communities and listed species found at the site, and are a major management concern.

Forty-two (56 percent) of the nonnative plant species recorded at the natural area are designated as either Category I or Category II species by FLEPPC (2017). A current copy of FLEPPC’s list of invasive exotic plant species can be found at <http://www.fleppc.org/list/list.htm>. Fifteen (20 percent) of the nonnative plant species have been designated as noxious weeds by FDACS (2016a) and four (5 percent) have been designated as Class I prohibited aquatic plant species (FDACS 2008). All of these species are identified in Appendix A.

The control of exotic nonnative and invasive native plant species is a high priority at this site. A multi-phase invasive/nonnative plant control program began in April 2005 and was completed in fall 2009. Follow-up invasive/nonnative plant treatments have been conducted since 2010. The site is now in maintenance condition. A site is considered to be in “maintenance condition” when the coverage of invasive plant species does not exceed 1 percent of the canopy or understory layers within any given management year. Ongoing invasive/nonnative vegetation treatments will be needed in order to keep the site in maintenance condition. In addition to invasive nonnative plant species, invasive native species also can have an adverse impact on fragmented natural communities. Native plant species that have an adverse effect on other native species at the natural area, or are too dense or inappropriate for the targeted vegetation community, may be targeted for eradication/control until such time that the invasive native species is no longer having an adverse impact on the site.

Methodologies used to control/eradicate invasive nonnative and invasive native plant species at the natural area have included and/or may include mechanical removal, herbicidal treatment, hand removal and the use of periodic prescribed fire. Biological control methods may be used on a

case-by-case basis. Ruderal species, which are typical of open disturbed sites and do not invade functioning natural communities, are controlled through prescribed burning and avoiding unnecessary disturbances.

Mechanical removal methods are typically used to remove accessible, dense stands of highly invasive nonnative trees such as Australian-pine (*Casuarina equisetifolia*), Brazilian pepper (*Schinus terebinthifolia*) and melaleuca (*Melaleuca quinquenervia*). The tree and its root system are mechanically removed, then chipped for on-site use or off-site disposal. Any outlying sprouts or resprouts from root remnants are treated with herbicides. Mechanical removal methods were used in April 2005 to remove 0.6 acres of Australian-pine from the western portion of the natural area.

Herbicidal treatments are typically used to control/eradicate individual and scattered invasive/nonnative trees, shrubs and palms; inaccessible (by heavy equipment) dense stands of invasive/nonnative trees; and invasive/nonnative vines and groundcover species. Aquatic plant species that become problematic at the site may be controlled using an appropriate aquatic herbicide. Herbicidal application methodologies include hack-and-squirt, cut-stump, basal bark, foliar treatments and broadcast spraying. Hack-and-squirt, cut-stump and basal bark methods are typically used to control/eradicate individual and scattered nonnative trees, shrubs and palms. Foliar treatments are used for invasive/nonnative vines, and for small patches of invasive/nonnative grasses, sedges and forbs. Broadcast spraying is primarily used for larger areas of invasive/nonnative grasses, sedges and forbs. Invasive/nonnative plant species that are resistant to herbicides or that easily resprout from basal mats, roots or vegetative fragments may require repeated herbicide application before the species is eradicated from an area. All herbicide treatments comply with the instructions on the herbicide label, are applied under the supervision of a licensed applicator and employ Best Management Practices for their application.

Hand removal is used for seedlings of invasive/nonnative tree and shrub species. Since tree and shrub seedlings are not reproductive, they are typically pulled out of the ground and left to decompose on site after the soil has been shaken from the roots of the plant.

Hand removal also may be used in combination with herbicide treatments to treat invasive/nonnative vines, as well as invasive/nonnative plants that are resistant to herbicides. In the case of invasive/nonnative vines, the targeted vine is cut at an appropriate height. The base is then hand-pulled or treated with a systemic herbicide; vine stems are either removed from the supporting plant or left to decompose in the trees. In the case of plants that are resistant to herbicides, hand removal may be used as the sole plant control method or it may be used as a follow up method to remove plants that are still alive following an herbicidal treatment.

Finally, hand removal may be used to help control plant species that readily reestablish from seed (for example, rose natalgrass [*Melinis repens*] and thalia lovegrass [*Eragrostis atrovirens*]) or that resprout from vegetative fragments (for example, air potato [*Dioscorea bulbifera*], American evergreen [*Syngonium podophyllum*] and nightblooming cactus [*Hylocereus nudatus*]). In these cases, the seedheads and vegetative parts of the invasive/nonnative plants are bagged and removed from the site.

4.4.3 Nonnative/Nuisance Animal Control

Nonnative and nuisance (feral and certain native species) animals can be a problem on sites like the natural area. The presence and impacts of nonnative/nuisance animals are monitored as part of the systematic and opportunistic wildlife surveys. Targeted surveys for nonnative/nuisance animals also may be performed if additional information is required. Nonnative/nuisance animal control programs will be developed and implemented, as necessary, to control species that adversely affect the natural area.

Thus far, four species of invertebrates and eight species of vertebrates recorded at the natural area are not indigenous to the South Florida mainland (see Appendix B). A short description of the potentially harmful nonnative invertebrate species and all nonnative/nuisance vertebrate species found on the natural area is provided below. No control methods will be used for species identified below as having no significant impact on the natural area.

One of the nonnative invertebrate species recorded at the natural area - the red imported fire ant (*Solenopsis invicta*) - may be targeted for control in the future due to its adverse effect on native animal species. This species is discussed in more detail below. The two other nonnative invertebrate species either are not having a negative effect or are having a positive effect on the natural area (the melaleuca snout beetle [*Oxyops vitiosa*] is a beneficial insect that was purposely released to provide biological control of melaleuca [Cuda et al. 2009]).

The red imported fire ant is an aggressive ant that can cause dramatic reductions in populations of native ants and other insects (Core 2003). It also poses a threat to hatchlings of ground-nesting wildlife, including gopher tortoises, sea turtles, alligators and birds (Core 2003, Wetterer and Moore 2005). Red imported fire ants have a very painful sting (Core 2003). There are no effective and acceptable methods to control this species at this time, but a control strategy may be implemented in the future if such methods are developed.

The brown anole (*Anolis sagrei*) has become the most abundant anole in South Florida. This prolific species is well adapted to habitats modified by humans and can live in most inland and coastal habitats, including disturbed areas (Meshaka et al. 2004). Although its primary diet is insects, the brown anole also eats smaller green anoles (*Anolis carolinensis*); this predation appears to have caused a rapid decline in the population of the native green anole in Florida. This species is occasionally observed at the natural area. Potential control efforts for this species will be explored if it is determined that it is having a negative effect on the natural area.

The brown basilisk (*Basiliscus vittatus*) is a long-limbed, fast-moving lizard that can run on its hind legs (Bartlett and Bartlett 2011). This species is commonly present along canals and pond edges, in agricultural habitats, and in low-density suburban areas (Bartlett and Bartlett 2011, Meshaka et al. 2004). This lizard primarily feeds on invertebrates, but may eat some fruits; it is prey for various species of snakes (Meshaka et al. 2004). It is occasionally observed at the natural area. Potential control efforts will be explored if it is determined that the brown basilisk is having a negative effect on the natural area.

FWC has estimated that there are approximately 5.3 million cats (*Felis catus*) in Florida that spend some or all of their time outdoors, potentially preying on wildlife, and that approximately 2.8 million of those may be feral (FWC 2003). Cats are an increasing problem in natural areas in South Florida because of their predation on birds and small animals. There also is the potential for rabies to spread to feral and domestic cats from infected wildlife. This species is occasionally observed at the natural area and may enter the natural area from adjacent residences. Control of feral and domestic cats will focus on educating the surrounding community, combined with selective live-trapping, if necessary.

Although members of the public walk their dogs (*Canis lupus familiaris*) on the natural area, the Natural Areas Ordinance prohibits this activity. Natural area rules signs posted at each public entrance to the site contain a “no pets” statement. Law enforcement officers will inform anyone observed walking a dog on the natural area that pets are not allowed on the site and that the dog walker may be subject to citation under the provisions of the Natural Areas Ordinance. Repeat offenders also may be trespassed from the natural area under the Palm Beach County Parks and Natural Areas Trespass Ordinance (Ordinance 2016-021).

The Egyptian goose (*Alopochen aegyptiacus*) is a common exotic goose species in the wild in Florida that likely originated from escapees from captive waterfowl collections (Callaghan et al. 2017). There is evidence of breeding populations in Florida (Pranty and Ponzio 2014). This species is occasionally observed at the natural area. It does not appear to be negatively impacting native species.

The Eurasian collard-dove (*Streptopelia decaocto*) is a medium to large-sized, stocky dove. It is most common in coastal, suburban and agricultural areas where food, roosts and nesting sites are abundant (Johnson and Donaldson-Fortier 2012). Eurasian collard-doves are grain eaters and are frequent visitors to bird feeders (Pranty et al. 2006). This species is occasionally observed at the natural area. Eurasian collard-doves are not expected to affect the natural area in any significant way.

A common pet, the monk parakeet (*Myiopsitta monachus*) has become the most widespread and abundant parrot in North America (Pranty et al. 2006). Monk parakeets typically build large, communal stick nests in trees, palms or on artificial structures such as radio towers, light poles and electric utility structures (Johnson and Logue 2012, Pranty et al. 2006). This species feeds on a wide variety of flowers, fruits, seeds, berries and other plant material. It is rarely observed at the natural area. This species does not appear to adversely affect native plants or animals (Johnson and Logue 2012).

The raccoon is common throughout Florida. It feeds on fruits, plant material, eggs, crustaceans, small animals and garbage. Raccoons are found wherever suitable combinations of woods and wetlands provide acceptable food and den sites, from swamps and marshes to mesic woods, cultivated areas and urban situations (Whitaker and Hamilton 1998). This species is one of the primary carriers of the rabies virus in the United States (The Humane Society of the United States 1997). This species is occasionally observed at the natural area. Wildlife cameras and

opportunistic surveys may be used to monitor the raccoon population within the natural area, if necessary to determine if any actions are needed to control this species.

Rock pigeons (*Columba livia*) nest in stick and grass nests built on building roofs and ledges, and under bridges or highway overpasses (Pranty et al. 2006). They eat grain and other seeds, and will occasionally eat insects. It is rarely observed at the natural area. Rock pigeons are not expected to adversely affect the natural area.

4.4.4 Restoration and Enhancement Projects

The restoration and enhancement of natural communities within the natural area began in earnest in 2004. Activities conducted to date include the implementation of a prescribed burn program, and mechanical vegetation reduction and pine thinning activities designed to reduce fuel levels and create a mosaic of natural communities and successional stages within the site (see Section 4.4.1; Figure 6b); implementation of invasive/nonnative plant and nonnative/nuisance animal control programs (see Sections 4.4.2 and 4.4.3, respectively); and removal of trash dumped on the site. Upland restoration/enhancement, mangrove swamp restoration/enhancement, and hydrological restoration projects completed for the site are described in the following subsections. Although no large scale planting projects are anticipated at the site, scattered planting of native species may occur in the future.

Restoration/enhancement activities conducted to date have already begun to improve all of the natural communities on the site in terms of biological composition and ecological function. However, it will take several years for plantings to mature and for additional native plants to recruit into the restored/enhanced areas. Once this has happened, restoration of the site will be considered complete.

Even though restoration of the site is not yet complete, the amount of disturbed habitat found on the natural area has decreased significantly over the past 13 years. Between 2006 and 2019, all of the areas classified as “Australian pine” in the initial management plan (approximately 0.6 acre) were restored to mesic hammock. During that same timeframe, the amount of disturbed habitat present on the site went from 22.5 acres down to 2.4 acres.

4.4.4.1 Native Plantings

General restoration plantings conducted between 2008 and 2018 included the installation of approximately 19,800 native trees, shrubs, and grasses in disturbed upland portions of the site. These plants were installed in mesic flatwoods and created oxbows within the natural area to encourage the restoration of those areas (Figure 6a). Species planted in these areas included several species of cordgrass (*Spartina* sp.), fakahatchee grass (*Tripacum dactyloides*), firebush (*Hamelia patens*), muhly grass (*Muhlenbergia capillaris*), railroad vine (*Ipomoea pes-caprae*), red mangrove (*Rhizophora mangle*), sea ox-eye (*Borrchia frutescens*), seashore paspalum (*Paspalum vaginatum*), and South Florida slash pine (*Pinus elliottii* var. *densa*).

Mitigation plantings for offsite construction were completed at the natural area between 2008 and 2009. Approximately eighty native trees and 744 native shrubs were installed in mesic flatwoods

communities in an effort to “jump-start” the restoration of those areas (Figure 6a). The species planted included: American beautyberry (*Callicarpa americana*), dahoon holly (*Ilex cassine*), firebush, live oak, myrsine (*Rapanea punctata*), red maple (*Acer rubrum*), South Florida slash pine, and wild coffee (*Psychotria nervosa*). Also during oxbow construction, approximately forty-nine cabbage palms (*Sabal palmetto*) and two laurel oaks (*Quercus laurifolia*) were relocated to hydric hammock communities on the natural area.

4.4.4.2 Hydric Hammock/Mesic Flatwoods Restoration/Enhancement

Approximately 1.7 acres of hydric hammock and 1.3 acres of mesic flatwoods were restored/enhanced in the western and southern portions of the natural area between 2006 and 2009 (labeled “native plantings” in Figure 6a). At the time of acquisition, these areas were dominated by invasive/nonnative plants. Prior to commencement of the restoration/enhancement project, most of the nonnative/invasive vegetation was mechanically removed. The cleared areas were then planted with native plant species including relocated cabbage palms and several species of oak.

4.4.4.3 Mangrove Swamp Restoration/Enhancement

Approximately five acres of mangrove swamp were created on both the north and south banks of the C-18 Canal in the natural area between 2004 and 2010 (Figure 6a) as part of the five created oxbows detailed in Section 4.4.4.4. At the time of acquisition, the banks of the open water area were relatively steep and provided limited intertidal habitat. The mangrove tidal swamp creation projects included the mechanical scrape down of the shoreline to create expanded intertidal areas, and planting native mangrove and salt marsh species such as smooth cordgrass (*Spartina alterniflora*) and sand cordgrass (*Spartina bakeri*). In addition, littoral shelves were created within the open water area and planted with red mangroves, cordgrass and other appropriate estuarine species. All of the restored/enhanced mangrove swamp areas have filled in with naturally-recruited native vegetation.

4.4.4.4 Hydrological Restoration

Five hydrological restoration projects were constructed within the natural area between 2000 and 2008: two created mitigation oxbow tidal swamps and a three phase construction/restoration project. The purpose of these projects was to: 1) restore historic surface water flow patterns within the blackwater creeks; 2) prevent saltwater intrusion in the creek; and 3) to provide intertidal habitat for marine species, reduce shoreline erosion and slow water velocity along the C-18 Canal within the natural area.

In 2000, County Engineering created the first mitigation oxbow tidal swamp on the north bank of the C-18 Canal next to Central Boulevard for impacts associated with the construction of the Central Boulevard Bridge. In addition, impacts to mangroves during the County’s 2004 construction of the Island Way Bridge, SFWMD required the creation of a second mitigation oxbow tidal swamp on the north slope of the C-18 Canal next to Island Way Road (Figure 6a). The oxbow was completed in 2006 but had vandalism issues. To stem some of the rip-rap

disturbance and sedimentation issues, the bottle neck in the oxbow where the creek intersects was altered; the bottle neck was widened, the slope reduced, and sediment removed from the channel. The areas which contained erosion from water seepage were filled with pea-rock.

A Loxahatchee River Preservation Initiative (LRPI) grant was awarded to ERM in 2005 for a three phase construction/restoration project. Phase I included the design and construction of two weir structures (one listed as a salinity barrier in Figure 6a) on the western tributary creek to impede salt water intrusion and rehydrate the upper portion of the creek. The design of an oxbow on the north side of the C-18 Canal was also part of this initial phase. Construction of the Phase I weirs was completed in February 2008. However, an emergency repair was completed on the lower weir structure (salinity barrier) in July 2009. Water held by the salinity barrier undermined the soil around both sides of the structure. Additional sheet pilings were installed at both ends of the structure to extend the subterranean wall ten feet in both directions and the rip-rap was reset. Phase II, which included the construction of the oxbow on the north side of the C-18 Canal, was completed in September 2008. Phase III, the construction of two additional oxbows on the south side of the C-18 Canal, was also completed in 2008.

4.5 SECURITY

The Palm Beach County Sheriff's Office (Sheriff's Office) has the primary responsibility for public safety and law enforcement at Limestone Creek natural area, including routine patrols of the boundaries. The County also has contracted with the Sheriff's Office to have Wildlands Task Force deputies conduct extra patrols of the natural area when needed. The Wildlands Task Force is a specially trained and specially equipped unit that was formed to prevent illegal activities on natural areas managed by the County and to enforce the provisions of the Natural Areas Ordinance. There is no on-site manager or security guard and no on-site staff residence. Instead, ERM staff, trained volunteer site stewards and/or neighborhood watch groups (where available) visit the site on a regular basis and report any signs of illegal and prohibited activities to the Wildlands Task Force.

The County's Natural Areas Ordinance regulates public use of the natural area. The ordinance provides for passive recreational activities (for example, hiking, nature study and photography), environmental education and scientific research. It prohibits destructive uses such as OHV use, dumping, and poaching of plants and animals. The ordinance gives law enforcement personnel the authority to fine and/or arrest persons damaging a natural area.

The Palm Beach County Parks and Natural Areas Trespass Ordinance (Trespass Ordinance; Ordinance 2016-021) allows law enforcement personnel to issue a Trespass Notice to an individual who violates any applicable local or state law while on a natural area or park that is owned and/or operated by the County. For the purpose of the Trespass Ordinance, the term "applicable local law" includes county ordinances, rules and regulations, as well as notices contained on posted signs. The Trespass Ordinance also provides due process for individuals receiving a Trespass Notice by way of an appeals process before a special magistrate. The Trespass Notice prohibits such individuals from returning to the county natural area(s) or park(s) specified in the notice for one, five or ten years, after receiving their first, second or third Trespass Notice, respectively.

Dumping on public lands is prohibited by state law (state statute 403.413).

The natural area is open to the public daily from sunrise to sunset. Access hours are posted at each public entrance. In addition, regulatory signs have been posted at each corner of the natural area and every 500 feet along the perimeter of the natural area (with the exception of the east perimeter along Central Blvd where there are no regulatory signs). The regulatory signs state that the site is a protected natural area and cite the appropriate county ordinance.

With the exception of Central Blvd., the entire perimeter of the site is fenced to help prevent unauthorized access to the natural area (see Section 5.2).

4.6 STAFFING

Because of the following factors, on-site staffing is not proposed for this natural area:

- the low-impact, non-consumptive activities allowed on the site require limited oversight by staff;
- the site is closed from sunset to sunrise;
- sufficient security measures (fencing, regulatory signage, Wildlands Task Force) are in place to protect the site when it is closed to the public;
- ERM staffing levels are insufficient to provide on-site staffing at any of the County's natural areas; and
- construction and use of a permanent office or residence for on-site staff would adversely affect the site's natural resources.

Instead, ERM has created a roving management team trained to conduct all levels of management activities, including invasive/nonnative vegetation control, prescribed burning, mechanical vegetation reduction activities and environmental monitoring. ERM also has created a volunteer site steward program. These trained volunteers periodically visit their assigned site and provide feedback to staff regarding the site's condition and any problems noted. Volunteers from local citizens' organizations, businesses and schools will provide additional support where feasible and necessary.

4.7 COORDINATION WITH ADJACENT LAND MANAGERS

Conservation and/or undeveloped lands located adjacent to the natural area include the SFWMD's Southwest Fork Loxahatchee River right-of way, the Town of Jupiter's municipal preserve and Crossroads LLC's vacant industrial lot. All adjacent conservation land managers were invited to review and comment on this management plan as it was reviewed by NAMAC. Staff members who serve on NAMAC facilitated review of this management plan by the County's Parks and Recreation Department, and SFWMD. ERM staff has and will continue to coordinate with adjacent conservation land manager(s) whenever proposed hydrological changes or other management activities, such as prescribed burns and nonnative/nuisance animal control, could affect an adjacent conservation or park land.

The County will review any land use changes or development plans proposed for properties adjacent to the natural area to ensure the protection of biological communities and to avoid or minimize adverse impacts to listed species. The County also will work with the Town/developer to try to locate any required preserve area(s) so that they are adjacent to the natural area.

4.8 GREENWAY CONNECTIONS/MANAGEMENT

Limestone Creek_Natural Area is 1 of 35 conservation lands and parks that lie within the Jeaga Wildways system (Jeaga). Jeaga includes approximately 165,000 acres of conservation lands in northern Palm Beach County and southern Martin County; it is a cooperative effort among partnering land managers and educational centers to link conservation lands, parks and activity/education centers through a system of designated and thematic elements. Development and management of the natural area has helped implement the Jeaga master plan by creating public use facilities that provide for and encourage recreational uses that do not harm the exiting natural or historic resources. The County will coordinate with agencies managing other conservation lands within Jeaga to ensure that the natural area is managed as part of a linked conservation lands system. A map and other information about Jeaga may be found on ERM's website at <http://discover.pbcgov.org/erm/Pages/JeagaWildways.aspx>.

4.9 PUBLIC OUTREACH, ENVIRONMENTAL EDUCATION AND SCIENTIFIC RESEARCH

ERM has a very active public outreach and environmental education program. To help members of the public become invested in the natural area, numerous volunteer opportunities, environmental education events and resource-based recreational activities are provided each year. These events may be led by ERM staff or by volunteer community groups, clubs, businesses and/or knowledgeable individuals.

Interpretative exhibits have been prepared and installed in kiosks located adjacent to the parking lots and pedestrian entrances. These exhibits help educate the public about the natural resources present on the site, the negative impacts of invasive/nonnative plants and nonnative/nuisance animals, any restoration/enhancement projects that have been undertaken at the site, ongoing management activities such as prescribed fire and/or mechanical vegetation reduction activities, and/or any other relevant topics.

Information related to the site's natural resources, location, size and any existing public use facilities/recreational amenities, as well as links to the site's trail guide, current management plan, any restoration project summaries and photo album may be found on ERM's Limestone Creek Natural Area webpage at: [http:// discover.pbcgov.org/erm/NaturalAreas/Limestone-Creek.aspx](http://discover.pbcgov.org/erm/NaturalAreas/Limestone-Creek.aspx). Information on how to obtain a free natural areas map application for mobile devices may be found at: <http://discover.pbcgov.org/erm/Publications/ERMsMobileMaps.pdf>. Printed copies of the site's trail guide are available in brochure boxes attached to kiosks that are adjacent to the public entrances. All printed materials indicate that the natural area was acquired using FCT funds.

No specific research needs have been identified for this site. ERM does not anticipate performing any scientific research other than compiling and interpreting the data from monitoring activities,

but will allow researchers affiliated with institutes of higher learning, botanical gardens and government agencies to conduct scientific research on a permit basis.

4.10 RESPONSE TO SIGNIFICANT EVENTS

Five hurricanes affected the natural area between 1999 and 2017 - Hurricane Irene in October 1999; Hurricanes Francis and Jeanne in September 2004; Hurricane Wilma in October 2005; and Hurricane Irma in September 2017. All of these storms caused tree/limb damage and deposited invasive/nonnative seeds within the natural area. The 2004 hurricanes caused significant stress to the slash pines in the area directly north of the observation platform. These slash pines sustained prolonged westerly winds as the eye of both Hurricanes passed to the north. This distress made the trees extremely susceptible to pine bore beetles which killed a 1-acre area containing mature trees. Invasive/nonnative plants that sprouted after each storm event were treated as part of the ongoing invasive/nonnative plant control program.

If a natural or human-caused event severely damages structures or native vegetation, or alters the natural values of the site in the future, ERM staff will assess the nature of the damage/alteration and take actions necessary to protect the public and minimize/mitigate impacts to the site. The first priority following a significant event will be to secure the site to ensure public safety and prevent dumping, vandalism and unauthorized vehicular use. If hazardous conditions exist, the natural area will be closed to the public until such conditions have been eliminated. The site also may be closed until public use facilities have been repaired. Damaged/altered native plant communities will be managed to encourage natural regeneration following such an event. Management practices will be adjusted, if necessary, to accommodate the new conditions at the site. The County will inform FCT and SFWMD about any impacts caused by the event, and any actions designed to help restore damaged/altered natural resources and/or public use facilities. If the natural values of the site are severely limited or eliminated, the County and SFWMD will discuss future plans for the site. All significant events affecting the natural area will be discussed in the next scheduled report to FCT and the next Annual Site Evaluation (ASE). The event also will be summarized in the next update to the management plan.

4.11 CLIMATE CHANGE

The natural area will help address climate change in two ways: 1) the preservation and restoration/enhancement of the existing plant communities will help reduce greenhouse gases by converting carbon dioxide to oxygen; and 2) the restored/enhanced plant communities will serve as a refuge for wildlife affected by climate change-induced habitat losses.

5. SITE DEVELOPMENT AND IMPROVEMENT

All structural improvements and major land alterations were done in compliance with applicable local, state, regional and federal laws and regulations. All required licenses and permits were obtained prior to the commencement of any construction, native vegetation removal or major land alterations on the natural area. All of the existing improvements were constructed in disturbed portions of the site to the greatest extent practicable. The location of each improvement was surveyed for listed species prior to the construction of that facility. If any listed species were found within the construction area, the location of the improvement was adjusted to avoid impacts to the listed species, or the listed species was relocated to a safe location on the natural area.

5.1 PUBLIC USE FACILITIES AND ACCESS

The natural area is a publicly owned preserve and resource-based, outdoor recreational site. It is open to the public during daylight hours, unless a special, after-hours use permit has been issued. The hours of operation are posted at each designated public access point.

All public use facilities (Figure 7) were carefully chosen, designed and located so that they do not jeopardize the site's natural resources, including the rare and endangered plants, animals and natural communities. The public use facilities also were designed and located to ensure that more than 70 percent of the predominately natural habitat was left intact and protected from human disturbance.

With the exception of the foot bridge(s), fishing pier, and canoe/kayak launch, public use facilities were placed in upland portions of the site as much as possible to reduce the potential for flooding. However, portions of some of the hiking trails pass near or go through low lying areas and may hold water during the rainy season or after a significant rain event.

Public uses permitted on this site include nature appreciation and study, hiking, nature photography, bird/wildlife watching, canoeing/kayaking, fishing and picnicking. In addition, the County developed a multiuse trail so that bicyclists could enjoy the natural area in a manner that does not jeopardize the site's natural resources. The relatively small size of the parking lots limit the number of people that are on the site at any given time. With the exception of designated bicycle trail, and the use of vehicles for management purposes, all human traffic within the natural area is by foot.

Several of the existing public use facilities are compliant with Americans with Disabilities Act (ADA) requirements. The parking lot includes one designated ADA-compliant parking space. This parking space connects to an ADA-compliant pathway that leads to an interpretive kiosk and an ADA-compliant concrete nature trail. Other ADA-compliant public use facilities constructed on the site include hardened multiuse trail(s), foot bridge(s), wildlife observation platform(s), canoe/kayak launch, shade shelter and fishing pier.

Public access to the natural area is available via three parking areas. The first on-site parking lot offers 5-car and 1-bus paved parking, located just south of Church street (Figure 7). Unpaved areas within this parking lot have been landscaped with native plants to provide additional wildlife

habitat and to enhance the parking lot's appearance. A second on-site parking lot offers 8-car and 1-bus gravel parking access to the kayak launch, located on the southern bank of the C-18 canal and accessible via Central Blvd. Finally, visitors to the natural area may parallel park on the street, in one of the 7 spaces available, behind the Town's Jupiter West shopping plaza. Access to this parking lot is from Island Way to the west. The entrance to the natural area is northwest of this parking lot via a pedestrian maze gate. Bicycle racks have been installed adjacent to the on-site parking lots to encourage visitors to ride bicycles to the natural area. Gates have been installed across the driveway to control entry to the on-site parking lots. County staff open and close the gates to the parking lots, as needed. In the future, staff may investigate the feasibility of installing solar-powered entrance gates.

In addition to the parking lots, members of the public can access the natural area through seven pedestrian access gates – one in the northeast corner, one off central blvd next to the canal, one at the southwestern parking lot, one off Island Way, one at the middle and one at the end of 1st street, and one at the end of 2nd street. These gates provide access for pedestrians and bicyclists.

Approximately 1.7 miles of trail have been created within the natural area (Figure 7). This includes a 0.3-mile-long nature trail, approximately 0.2 miles of natural-surfaced hiking trails, and 1.2 miles of pedestrian/bicycle trails. All of the trails can be accessed from the parking lot and/or from one of the non-vehicular access points.

The concrete and boardwalk nature trail begins at the parking lot. The nature trail is a minimum of 5-feet-wide to accommodate wheelchairs and other non-motorized mobility devices. Trail markers have been placed along the nature trail with station numbers that correspond to information in the printed trail guide.

Access to the hiking trails is from the access gate along 1st street (Figure 7). The hiking trail has a natural soil base. Improvements to the hiking trails include the addition of color-coded blazes on trees and/or posts to help keep hikers on the trail, and the occasional removal of roots, rhizomes, rocks and/or other potential trip hazards. Most of the natural-surfaced portion of the hiking trail is maintained at a width of three to six feet. However, portions of the hiking trail that are co-located with one of the site's management accessways/firebreaks are wider than six feet (see Section 5.4). Management accessways/firebreaks that are not part of the designated hiking trail also may be used for foot traffic, but will not be improved beyond what is necessary for their primary use. Public use of secondary trails is discouraged using signage and vegetative barriers, by not maintaining the trails and encouraging the regeneration of native vegetation on these trails.

Access to the multiuse trails is from multiple access gates along Church Street, Central Blvd. and Island Way (Figure 7). The multiuse trails have a hardened, crushed rock base. Most of the multiuse trails are maintained at a width of six feet. However, portions of the trail that are co-located with one of the site's management accessways/firebreaks are wider than six feet (see Section 5.4).

Non-trail amenities provided at the natural area include a wildlife observation platform with benches, a fishing pier, 2 multiuse bridges, a memorial bench, and a canoe/kayak launch. The wildlife observation platform is accessible from the parking lot via the nature trail. The fishing

pier is located in the middle of the site and is accessible via the multiuse or hiking trail. The canoe/kayak launch is located just off Central Blvd. and is accessible from the southwestern parking lot. Drinking water and restrooms are not available at the natural area.

5.2 FENCING AND GATES

Most of the perimeter of the site has been fenced to restrict access to and prevent unauthorized use of the site. If off-trail bicycle activity occurs within the site, additional gates and/or fencing will be considered along affected portions of the site.

The types of fencing that currently exist on the natural area include two-rail, split-rail; three-rail, split-rail with wire mesh backing; galvanized chain-link; and 6-foot-tall, vinyl-coated chain-link. Chain-link fencing that existed along the southern perimeter of the natural area at the time of the site's acquisition was left in place and incorporated into the fencing plan for the natural area. In the summer of 2004, three-rail, split-rail fencing with wire mesh backing was installed along the edge of the site where it borders Church St.; two-rail, split-rail fencing was installed around the perimeter of the main parking lot. Six-foot-tall, vinyl-coated chain-link fence was installed around the perimeter of the site where the natural area borders unfenced residential, industrial and/or commercial properties in the spring of 2005.

Fencing has not been installed along Central Blvd where the steep drainage ditch and guardrail restrict access to the natural area. The County will consider installing a fence to restrict access to these areas if security becomes a problem.

Pre-existing management access gates located along the C-18 Canal right-of-way were incorporated into the management access plan for the natural area. Nine new management access gates have been installed at the natural area. These gates are located at both parking areas, the western edge of 1st street, and along the northwestern boundary adjacent to the neighborhood. All of these gates provide vehicular access for management and monitoring activities, public safety and law enforcement.

Public access gates installed at the natural area are described in Section 5.1.

5.3 SIGNS

A sign identifying the site as a natural area was installed on along Central Blvd near the kayak launch/parking lot to inform drivers of the existence of the natural area. An entrance signs was installed on Church street, near the main entrance to the parking lot. A permanent dedication sign was also installed near the entrance to the main parking lot. The dedication sign states that the natural area was acquired for environmental preservation and public recreation purposes with funds provided by the County and FCT, and is managed by the County with assistance from the SFWMD.

Regulatory signs have been posted at each corner of the natural area and every 500 feet along the perimeter of the natural area with the exception of the southern boundary along the shopping plaza.

These signs identify Limestone Creek Natural Area as a protected site and cite the County's Natural Areas Ordinance. Access hours and natural area rules signs have been installed adjacent to the parking lot and other public access points. Signs that notify visitors of trail use restrictions, security patrols, the presence of hidden cameras and other site-specific information also have been or may be installed on the site. Trail markers with station numbers corresponding to descriptive information in the trail guide have been installed along the nature trail. Trail markers also have been installed at various points along the hiking trail to keep hikers on the designated trail. A trash receptacle has been installed adjacent to the fishing pier.

5.4 MANAGEMENT ACCESSWAYS/FIREBREAKS

A network of management accessways/firebreaks has been established around the perimeter of the natural area and between each of the management units (Figure 5). Management accessways/firebreaks are cleared, drivable trails. They typically have an unimproved sand/dirt surface; however, at this site portions of the management accessways were stabilized using GeoWeb fabric and/or shell-rock material to improve management and emergency vehicular access to the site. Management accessways/firebreaks are primarily used for vehicular access related to land management activities and for the containment of wildfires and prescribed burns when they occur. Management accessways/firebreaks also have been used as part of a designated hiking and/or multiuse trail.

Temporary firebreaks - firebreaks that are not part of the management accessway system - may be established within management units to separate fire-intolerant natural communities from adjacent burn areas and/or to create smaller burn units. These firebreaks, which are cleared on an as-needed-basis, may include areas that have been cleared of vegetation (bare soil), as well as areas where the vegetation has been mowed or cut/chopped. Temporary firebreaks are allowed to revegetate following a prescribed burn.

Management accessways/firebreaks were located on existing trails and within disturbed areas whenever possible; natural firebreaks were used when feasible. The management accessways/firebreaks on this site were designed and located to ensure that more than 70 percent of the predominately natural habitat was left intact and protected from human disturbance. Prior to construction, all management accessway/firebreak locations were surveyed for listed species. If a listed species was likely to be impacted by the proposed construction, the management accessway/firebreak was rerouted or the listed species was relocated elsewhere on the site.

5.5 OTHER STRUCTURES AND IMPROVEMENTS

The only other structures that have been constructed within the natural area are two weirs in the blackwater creek in the western portion of the natural area. These structures were constructed in 2008 as part of the hydrological restoration project (see Section 4.4.4). The weirs were constructed to hydrate the blackwater creek and prevent salt water intrusion into the creek. The County will maintain the weir structures. Additional improvements to the natural area include three constructed oxbows along the bank of the C-18 canal (see Section 4.4.4).

5.6 PRIORITY SCHEDULE FOR SITE DEVELOPMENT AND MANAGEMENT ACTIVITIES

Completed and proposed restoration/enhancement activities - fire management, mechanical vegetation removal/thinning, invasive/nonnative plant removal/control, nonnative/nuisance animal control and restoration/enhancement projects - are described in Section 4.4. Completed site improvements are described in Sections 5.1 through 5.5. Public use facilities have been constructed; the natural area was officially opened to the public in May 2009. Management of the natural area is now in maintenance mode; invasive/nonnative vegetation and nonnative/nuisance animal control activities are ongoing, and structures will be replaced when needed due to age or damage.

A priority schedule for ongoing and proposed management activities over the next ten years is provided in Table 3. All of the activities shown in Table 3 are contingent upon annual budgetary funding and appropriations by the BCC.

converting carbon dioxide to oxygen; and 2) the restored/enhanced plant communities will serve as a refuge for wildlife affected by climate change-induced habitat losses.

6. COSTS AND FUNDING SOURCES

The County has primary responsibility for development, restoration/enhancement, management and maintenance of the natural area. Existing county personnel accomplish these activities with assistance from county contractors and community volunteers. The Town has primary responsibility for public safety and law enforcement within the natural area.

6.1 CAPITAL AND MAINTENANCE COSTS

As of May 2019, capital and maintenance costs related to completed wildfire mitigation, environmental restoration/enhancement, site development and security projects/activities (see Sections 4.4, and 5.1 through 5.5) totaled \$2,192,728. All future capital and maintenance projects and activities are subject to, and contingent upon, annual budgetary funding and appropriations by the BCC.

6.2 ESTIMATED ANNUAL MANAGEMENT, MAINTENANCE AND REPLACEMENT COSTS

Annual management, maintenance and replacement costs are expected to average \$268,823 over the next ten years (Table 3 and 4). These costs will be minimized by coordinating the management and maintenance of natural areas on a countywide basis. Costs also will be minimized whenever possible through the use of volunteers for non-hazardous/non-technical activities. However, existing county personnel will do most of the ongoing management and maintenance work, including all hazardous and technical work, with assistance from county contractors. All future capital projects, management and maintenance activities (repair/replacement of site improvements, invasive/nonnative vegetation and nonnative/nuisance animal control activities, wildfire mitigation, etc.) are subject to, and contingent upon, annual budgetary funding and appropriations by the BCC.

6.3 FUNDING SOURCES

Most of the funds used to acquire, secure, develop, restore/enhance, manage and maintain the natural area have and will continue to come from various county funding sources. Grants and other outside funding sources have been and will continue to be used to offset some of these costs as opportunities arise. To date, approximately \$1,094,023 of the acquisition costs were paid by FCT, and portions of the capital improvements and restoration costs were paid using grant funds received from both the Loxahatchee River Preservation Initiative (LRPI; approximately \$755,000) and the Indian River Lagoon License Plate program (IRLLP; approximately \$76,558).

A portion of the capital costs, including acquisition costs, were paid using funds from the Palm Beach County Lands for Conservation Purposes Bond Issue Referendum of March 9, 1999. The balance of capital costs, as well as all long-term land management/maintenance costs, have and will continue to come from the Palm Beach County Natural Areas Fund, Palm Beach County

Natural Areas Stewardship Endowment Fund, Ag Reserve Land Management Fund and/or Palm Beach County General Fund, as may be amended.

The County has established a Natural Areas Stewardship Endowment Fund that includes funds from restricted gifts and other sources. These funds are invested and the interest earned provides operating funds for county natural areas. The County also has established a Natural Areas Fund to help pay for the development, restoration/enhancement and management of county natural areas. Funding sources for the Natural Areas Fund includes ad valorem dollars, cash payments made in lieu of preservation requirements contained in Article 14, Chapter C (Vegetation Preservation and Protection Ordinance) of the Palm Beach County Unified Land Development Code (ULDC), as well as monies received from the sale of development rights removed from natural area lands, and the use of county natural areas as offsite mitigation areas. Dollars for natural areas land management are also available from the Ag Reserve Land Management Fund, which derives its funds from leases of county-owned land in the Agricultural Reserve. And lastly, the Pollution Control Recovery Trust Fund, which receives fees related to civil violations under Article 14 of the ULDC, may be used to help pay for restoration/enhancement projects on county natural areas. Even with these possible funding sources, the County recognizes the need for additional management funds. ERM will investigate all possible local, state, or federal sources of land management funds, however, the County will not apply for funds from any grant program whose requirements conflict with the terms and conditions of the FCT grant award agreement.

7. MONITORING AND REPORTING

The natural area is managed specifically to preserve, restore/enhance and maintain its natural resource values, and to allow public uses that do not adversely affect the existing resources. Restoration/enhancement and other land management activities are continually monitored and assessed to determine whether the stated objectives for natural vegetation communities and listed species are being achieved, and/or to identify any new species not previously identified on the site. Management practices are adjusted (a process known as “adaptive management”) if an analysis of the monitoring data indicates that management objectives are not being met. Likewise, anthropogenic impacts are monitored to ensure that public uses do not negatively impact the natural area. Monitoring data also is used to prepare Annual Site Evaluation reports (ASEs) (see Section 7.7).

Monitoring protocols have been developed to ensure consistency on all natural areas managed by ERM. Copies of the current monitoring protocols are available upon request. An overview of the types of monitoring activities conducted on the natural area is provided in the following sections. If any of the monitoring protocols described in this chapter are revised, or if new monitoring protocols are developed for this site prior to the next update of this management plan, the monitoring requirements contained in this chapter will automatically be revised so that they comply with the revised/new monitoring protocols.

7.1 PHOTOMONITORING

Photomonitoring is used to obtain a qualitative, long-term visual record of changes in the natural area’s vegetative structure and/or condition over time. This includes the effects of planned management and restoration/enhancement activities (for example, mechanical removal of invasive/nonnative vegetation, ditch filling/plugging, recontouring of areas which have been mined or filled, restoration planting activities, mechanical vegetation reduction and prescribed fire) or to document changes related to a destructive natural event (for example, a hurricane, wildfire, pest or disease).

7.2 NATURAL COMMUNITY MONITORING

ERM has developed a “Pine Flatwoods Rapid Assessment” to help site managers evaluate the effects of land management activities on three vegetation layers – canopy, midstory/shrub and groundcover – within mesic flatwoods and wet flatwoods natural communities. The Pine Flatwoods Rapid Assessment allows site managers to determine the current condition of onsite mesic flatwoods and wet flatwoods natural communities; compare the current condition of these natural communities to pre-determined, desired conditions; and use the resulting data to evaluate the effects of certain land management activities on the condition of these natural communities.

If rapid assessment monitoring protocols are developed for other natural communities found on this site, those protocols will automatically be included in the monitoring program for this site.

7.3 VEGETATION MONITORING

Vegetation transects may be established within the natural area in the future to monitor the effect(s) of a destructive natural event (for example, a hurricane, wildfire, pest, disease or invasive species). Data collected from the vegetation transects may include information on vegetation community structure and/or composition of natural communities.

Any plant species that has been listed for protection or special management by at least one governmental agency and/or ranked as a S1, S2 or S3 species by FNAI, and that is being monitored in accordance with the vegetation monitoring protocol, has been and will continue to be recorded in ERM's Environmental Enterprise Database (EEDB). Staff also may collect population and/or demographic information for one or more of the listed plant species found on the site to document the effect(s) of land management activities, changing site conditions and/or a significant natural event on that plant species; and/or when permits require more intense monitoring.

Plant species that are encountered opportunistically (during a normal site visit) on a natural area and that have not previously been documented on the site are recorded in the EEDB.

7.4 WILDLIFE MONITORING

Migratory wildlife surveys are conducted at the natural area to record the resident and migratory wildlife found on the site. Optional nonmigratory wildlife surveys also may be conducted, if deemed appropriate by staff. Migratory wildlife surveys are conducted when migratory bird species are expected to be present - September through October and February through May. Nonmigratory wildlife surveys are conducted from June through August, or from November through January.

Any animal species observed at the site that has been listed for protection or special management by at least one governmental agency or that has been ranked as a S1, S2 or S3 species by FNAI, and that is being monitored in accordance with the wildlife monitoring protocol, has been and will continue to be recorded in ERM's EEDB. A species-specific monitoring plan may be developed for any listed animal species that is recorded as breeding on the site or if more intense monitoring is needed to help identify or evaluate management activities designed to help protect a particular species. Regularly-scheduled species-specific monitoring has been conducted at the natural area for gopher tortoise.

Animal species that are encountered opportunistically on a natural area and that have not previously been documented on the site are recorded in the EEDB.

7.5 HYDROLOGICAL MONITORING

Since there are no wetlands, hydrological monitoring is not conducted at this site.

7.6 CLIMATE CHANGE MONITORING

All of the monitoring information gathered on the site will be evaluated for changes that may be the result of climate change. If significant changes in rainfall patterns and/or natural communities are noted over time, staff will attempt to mitigate for these changes. If the changes cannot be mitigated for, management practices will be modified to provide the highest quality natural communities practicable under the new climate conditions.

7.7 REPORTS

Following submittal of the 2006 annual report, ERM will prepare and submit a stewardship report to FCT once every 5 years. The submittal date for the first 5-year report will be determined when FCT officially approves the 5-year reporting schedule. The County commits to follow up visits performed by FCT. Any revenue collected will be tracked by the County and reported annually to FCT. The stewardship report will be designed to meet the reporting requirements for the FCT-funded portion of the natural area.

Staff also will prepare an ASE report each year. Each ASE will include information related to structural improvements, natural events, land management activities, monitoring events and restoration/enhancement activities that occurred on the site during the prior year. A general review of land management and restoration/enhancement efforts, and the status of natural communities and listed species will be completed at the end of each management year and included in the ASE. ASEs will be used in conjunction with data stored in the EEDB to allow staff to analyze and evaluate the success of land management and restoration/enhancement activities over a period of years.

Information on all new listed plant and animal species recorded at the natural area will be provided to FNAI on an annual basis, using one of the forms that are available at <http://www.fnai.org/fieldreportingforms.cfm>, or as otherwise requested by FNAI.

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