Land Management Plan

for

Halpatiokee Regional Park

Martin County, Florida

Developed for

Martin County's Ecosystem Restoration & Management Division

PREPARED BY

Sustainable Ecosystems International
July 14, 2017

Executive Summary

Martin County's Ecosystem Restoration and Management Division manages approximately 500 acres of conservation lands within Halpatiokee Regional Park. The park is located just east of the Interstate 95 junction with Kanner Highway (Exit 101). The conservation lands include parcels that were acquired for conservation purposes over the last several decades, and include parcels that were acquired using state funds through the Save or Rivers, Florida Communities Trust, Preservation 2000 and Conservation and Recreational Lands (CARL) programs and locally-generated funds.

Martin County has chosen to develop this plan for the properties by incorporating state and local requirements into a single Management Plan for the ten-year period from 2018-2027. The plan identifies and describes the acquisition history, the size, location and condition of existing vegetative communities, the results of floral and faunal surveys, including the presence of known Threatened and Endangered species, cultural resources and existing recreational opportunities.

The Plan identifies Martin County's intent to continue to manage properties within the Halpatiokee Regional Park for the dual purposes of ecosystem sustainability and habitat-appropriate, non-consumptive public recreation. Guiding principles include:

1. Maintaining healthy ecosystems through standard land management techniques (e.g., re-introduction and use of fire or mechanical fuel reduction, where appropriate);
2. Restoring vegetative communities that have been degraded;
3. Controlling invasive non-native flora and fauna that adversely affect native ecosystems;
4. Maintaining trails for public use (e.g., hiking, biking, cane/kayaking), and expanding or enhancing these features as may be warranted;
5. Working with existing user groups and seeking opportunities to engage new user groups to maintain and/or enhance recreational opportunities that do not have significant adverse impacts on natural resources;
6. Maintaining a collaborative relationship with managers and staff of Atlantic Ridge Preserve State Park, which abuts the property to the east;
7. Maintaining collaborative relationships with state agencies, including the Florida Forest Service, the South Florida Water Management District, the Florida Communities Trust and the Florida Department of Environmental Protection; and
8. Seeking to establish mutually beneficial relationships with other potential user groups whose activities would not be counterproductive to the primary goal of ecosystem conservation.

The Plan was revised following input received at a public workshop and during a meeting with an advisory committee, and includes order-of-magnitude budgets and schedules.

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1.0 INTRODUCTION

Halpatiokee Regional Park is located in east-central Martin County just east and south of the Kanner Highway Exit (Exit 101) off Interstate 95 (Figure 1 - Vicinity Map) in Township 39 South, Range 41 East. The address of the park is 7645 South River Road, Stuart, Florida, 34997, and the public access to the park is approximately one mile south of Kanner Highway on two-lane Lost River Road. An additional access road for use by park staff is located at the north end of the property, also off Lost River Road. The property includes approximately four miles of river frontage on the west side of the South Fork of the St. Lucie River, and the adjoining property to the east is primarily Atlantic Ridge Preserve State Park.

During the last several decades, over 6,000 acres of upland, wetland and riverine habitats have been acquired for conservation and public recreation along the upper reaches of the South Fork of the St. Lucie River in Martin County. At approximately 5,000 acres, the largest of these is the Atlantic Ridge Preserve State Park, for which the State of Florida adopted a Unit Management Plan in 2005. Six properties along the west side of the upper reaches of the South Fork of the St. Lucie River (Figure 2) which were purchased by governmental entities are managed by Martin County (County). Management Plans with varying levels of detail were developed for Martin County and/or the South Florida Water Management District (SFWMD) for some individual properties following their individual acquisitions. The most recent of these previous management plans was a 32-page Plan developed in 2003 that covered two of the six parcels that are included in this plan. At that time, public access was envisioned, but no specific public use plan had been developed. Therefore, this 10-year update to the previous management plan includes updates and/or new sections and subsections on a broad variety of topics, most notably:

- Vegetative communities
- Threatened and Endangered species
- Hydrology
- Soils
- Control of invasive non-native flora and fauna
- Public Use
- Establishment and coordination with user groups
- Identification of goals, objectives, actions, budgets and schedules

The parcels have been acquired using funds allocated by the State of Florida through various public land acquisition programs, including the Preservation 2000 (P 2000), the Florida Communities Trust (FCT), and the Save our Rivers program (which was administered by SFWMD), and Martin County's Lands for You and Lands for Healthy Rivers programs.

In 1999, Martin County began development of a Master Plan for Halpatiokee Park. This effort

continued as additional parcels were acquired. In 2006, the County determined that management of the park should focus on two areas:

1. Resource Management. Restoration and management of natural communities through removal and control of invasive non-native species and re-introduction of prescribed fire, where appropriate; and

2. Including passive recreation such as: hiking biking, equestrian, fishing, canoeing, kayaking, boating (non-internal combustion engines), picnicking, camping, wildlife observation, and environmental studies.

There is presently no admission fee charged for entrance to the park, nor is one proposed. Therefore, Martin County has made various improvements as funds have become available through standard budgeting processes and grants. Today, the park provides residents and visitors with a high-quality resource-based outdoor recreation experience in what has become a highly urbanized region of Florida.

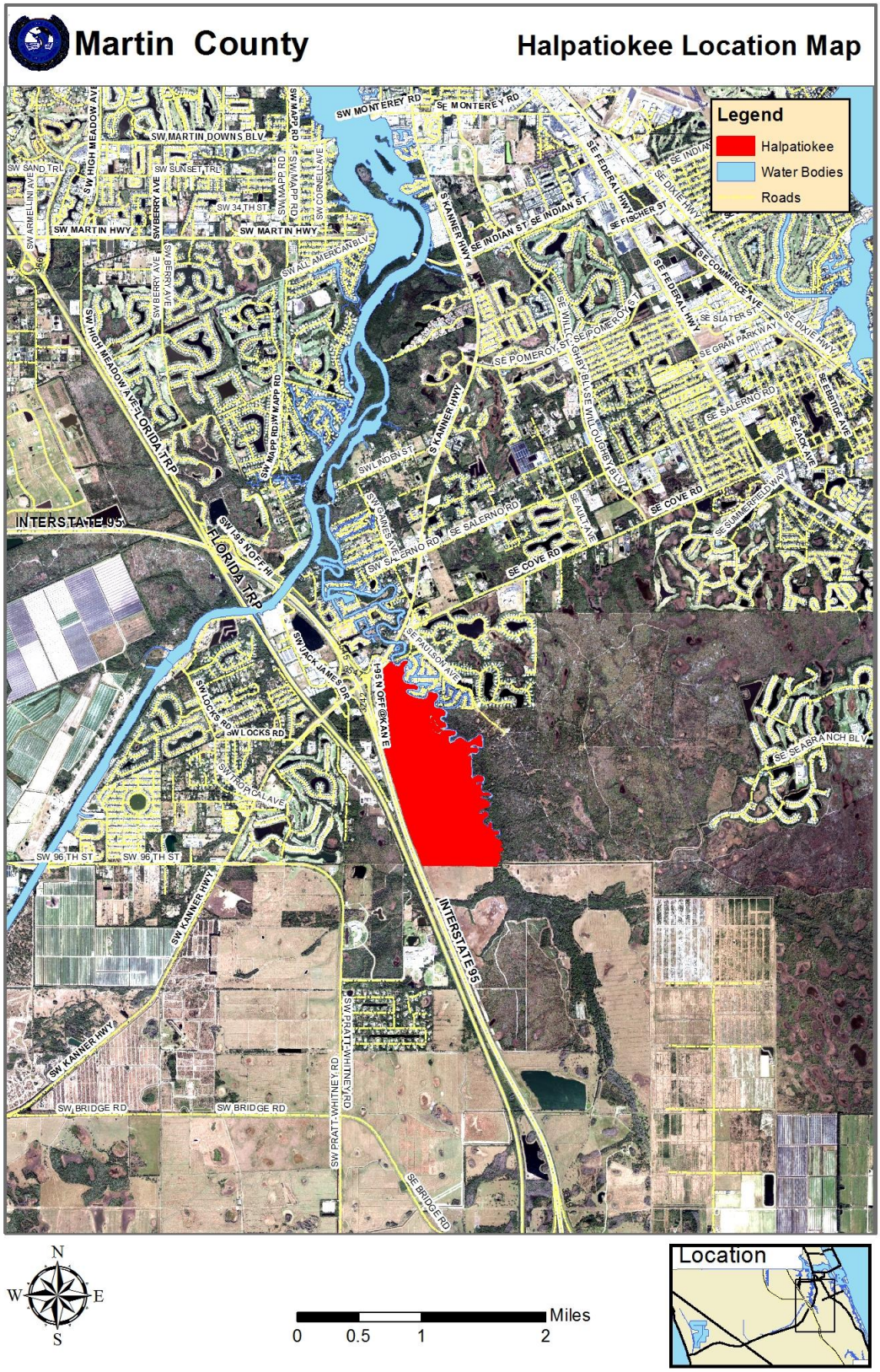


Figure 1 - Halpatiokee Location Map

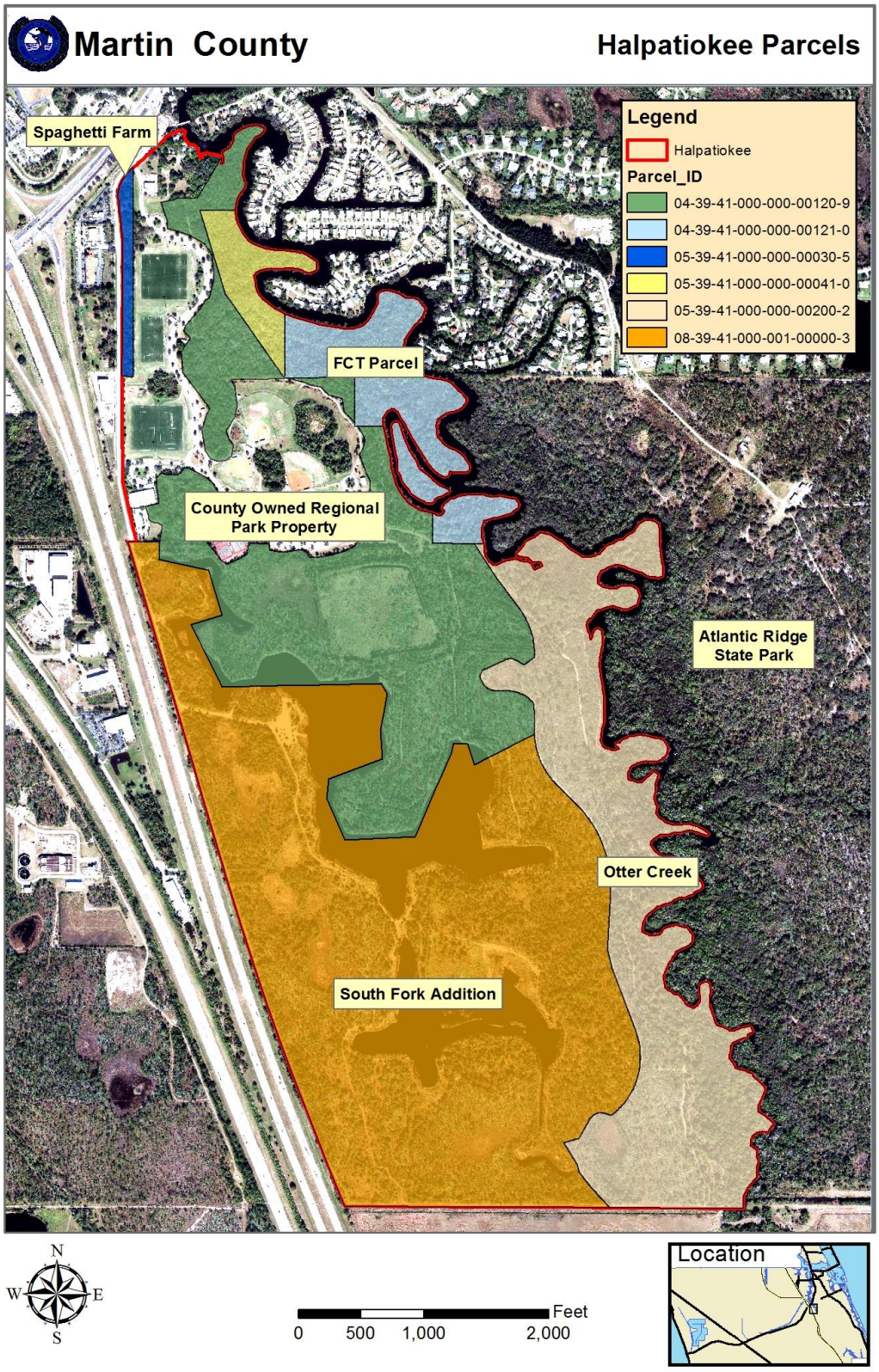


Figure 2 - Halpatiokee Parcel Map

The designated uses of the property are for environmental conservation and non-consumptive public outdoor recreational activities that do not significantly affect natural resources. Hunting, unauthorized use of off-road vehicles, use of power-assisted vehicles and collection of native plants and plant parts (e.g., palmetto berries) have been determined to be incompatible uses and are prohibited, except as permitted by Martin County. A balance is sought between the goals of maintaining and enhancing natural conditions and providing various recreational opportunities. Natural resource management activities are aimed at protecting and enhancing natural systems. Development in the park is directed toward providing recreational facilities, in a reasonable balance, that are both convenient and safe.

The park protects approximately 500 acres of watershed and approximately four miles of frontage on the South Fork of the St. Lucie River. These lands provide habitat for sustainable populations of hundreds of species of native flora and fauna, including at least 13 species that are designated by the State of Florida as Endangered or Threatened. The park's miles of hiking trails, biking trails, paddling trails and riverside campsite provide high-quality nature-based recreational opportunities for outdoor enthusiasts.

In an effort to streamline planning efforts and more comprehensively address management needs, Martin County has elected to create a single Land Management Plan (LMP) that assimilates all the County-owned and County-managed conservation lands along the South Fork of the St. Lucie River in the Halpatiokee properties complex. Doing so fulfills the management plan requirements for both the FCT program lands and for properties leased from the Florida Division of State Lands.

The purpose of this Land Management Plan is therefore to create a single document that includes: a) a history of County-related land acquisition projects along the South Fork; b) a replacement of the 2003 Management Plan that had been developed for portions of the property, c) descriptions of vegetative communities and notable species that are present within the mosaic of parcels; d) a compilation and identification of previous management and habitat restoration activities; e) input from the public, including those of a land management advisory committee; and f) identification of short-term and long-range management activities and their associated order-of-magnitude budgets.

1.2 Purpose and Significance of the Park

Halpatiokee Regional Park conserves over 500 acres of natural lands along the waterfront and in the watershed of the South Fork of the St. Lucie River, and provides easily-accessible recreational opportunities for residents and visitors to Martin County. Following initial acquisition of tracts in the southern part of the property in the 1990s by the State of Florida through the Save Our Rivers program, Martin County has acquired additional properties to create a property that conserves native flora and fauna and offers a variety of nature-based recreational opportunities.

The property attracts thousands of visitors annually who visit the property for hiking, off-road non-motorized biking, canoeing, kayaking, wildlife observation and other recreational pursuits. The property provides habitat for native flora and fauna, including endangered and threatened species, protects water quality in the South Fork, and allows for aquifer recharge.

1.3 Purpose and Scope of the Plan

This plan serves as the basic statement of policy and direction for the management of Halpatiokee Regional Park. It identifies the goals, objectives, actions and criteria or standards that guide each aspect of park administration, and sets forth the specific measures that will be implemented to meet management objectives and provide balanced public utilization. The plan has been developed to meet the requirements of the Florida Communities Trust (which provided funding toward the acquisition) and the Florida Division of State Lands as required by Chapter 259, Section 032 of Florida Statutes for lease agreements on properties that are larger than 160-acres. This plan supersedes previous versions of the Management Plan for the property.

The plan consists of three interrelated components: a Resource Management Component, a Land Use Component and an Implementation Component.

The Resource Management Component provides a detailed inventory and assessment of the natural and cultural resources of the park. Resource management needs and issues are identified, and measurable management objectives are established for each of the park's management goals and resource types. This component provides guidance on the application of such measures as prescribed burning, exotic species removal, imperiled species management, cultural resource management and restoration of native plant communities.

The Land Use Component is the recreational resource allocation plan for the park. It is based on a wide variety of considerations, including the identification of suitable points of access, hours of operation, population being served, adjacent land uses, natural and cultural resources within the park, and public uses.

The Implementation Component consolidates the objectives and actions for each of the park's management goals. Tables are included that address budgets and schedule over the ten year life of this management plan.

All development and resource alterations proposed in this plan are subject to funding, the issuance of appropriate permits, easements, licenses, and other required legal instruments. Approval of the management plan does not constitute an exemption from complying with all applicable local, state and federal agency requirements.

In the development of this plan, the potential of the park to accommodate secondary management purposes was analyzed. This analysis considered the park's natural and cultural resources, management needs, aesthetic values, visitation and visitor experiences.

For this park, it was determined that some recreational activities (e.g., off-road vehicle use, horseback riding) and no secondary purposes (e.g., hunting, timber harvesting, leases for grazing) could be accommodated in a manner that would not interfere with the primary purpose of environmental conservation and non-consumptive, resource-based outdoor recreation. No portions of the property have been determined to be outside the intended uses that should be

considered surplus. Uses such as water resource development projects, water supply projects, storm water management projects, linear facilities, harvesting of native plant products (e.g., palmetto berries) and sustainable agriculture and forestry (other than those forest management activities specifically identified in this plan) are not consistent with this plan.

The dual uses of the property for conservation and nature-based recreation represent "balanced public utilization" as defined by the State of Florida.

1.4 Management Program Overview

Management Authority and Responsibility

The Martin County Ecosystem Restoration and Management Division (ER&M) manages environmentally sensitive lands when they are owned by the County and/or the County has been designated as the lead managing entity. Management Plans are developed and adopted by the Board of County Commissioners on a property-by-property basis, with consideration given to the unique features of each tract, while complying with the Policies, Goals and Objectives contained in the County's Comprehensive Growth Management Plan (CGMP) and existing Land Use and Zoning requirements, as follows.

A. Goals and Objectives of the Management Plan

1. Management Goal

   The overall goals of this project are to maintain the unique scenic, natural, cultural and historic features of the conservation areas within Halpatiokee Regional Park, protect these features from future adverse impacts, and to provide the public with site-appropriate outdoor recreational opportunities.

   The Halpatiokee parcels will be managed only for the conservation, protection and enhancement of natural resources, and for public outdoor recreation that is compatible with the conservation, protection and enhancement of the site.

2. Objectives

   a. Preserve the unique scenic values, cultural and historic features of the site;

   b. Provide a linkage between Halpatiokee and other surrounding natural resource areas;

   c. Protect native plant communities, including floral and faunal species designated by the State (FWC and FDACS) and/or the federal government as Endangered, Threatened, Species of Special Concern, or Commercially Exploited;
   d. Provide for site-appropriate public access and recreation;

e. Restore vegetative communities to the extent feasible, and where appropriate, enhance the site to improve its biological function; and

f. Educate the public about the unique scenic, natural, cultural, and historical features present on site.

B. Comprehensive Plan Directives, Policies and Goals

Martin County's Comprehensive Plan contains a number of requirements that protect and conserve natural resources and provide public access to waterways and diverse recreational opportunities. The following are several key examples of how the acquisition and restoration of the Halpatiokee Regional Park furthers Comprehensive Plan directives and goals.

Chapter 9: Conservation, Open Space and Recreation Element

The acquisition and management of Halpatiokee supports Goal A, Objective 9.1J, Policy 1 to acquire environmentally sensitive lands to protect unique, rare or endangered habitat, assure survival of listed wildlife species, protect scenic water corridors and provide public access to open space.

Acquisition of the project site furthers Objective 9.1G Policy 14, ensuring the preservation of native upland of sufficient size that enables individual wildlife and plant species, that are rare, endangered, threatened, or of special concern, to survive on a long term basis.

Chapter 7: Recreation Element

The acquisition supports Objective 7.1B, Policy 7 to seek acquisition of waterfront parks over and above the minimum Level of Service.

Chapter 13: Drainage and Natural Coastal Management Element

The management of Halpatiokee supports Section Goal 13.1. to protect and improve the quantity and quality of Martin County's groundwater and surface water resources.

The management of Halpatiokee site supports Goal 13.2. to improve water quality and management in the St. Lucie River and Estuary to attain and maintain a stable estuarine ecosystem capable of supporting healthy native seagrasses and oysters and their dependent species.

Land Use

The Land Use map for Halpatiokee (Appendix A) identifies the boundaries of three different Land Use categories on different portions of the property. The eastern portion, along the South Fork of the St. Lucie River, is designated as Conservation (PS-2). The northerly portions of the park, which include the recreational fields, are designated Recreational. The southwesterly portion still retains the Estate Density designation that was assigned to it prior to its acquisition for conservation. Martin County will pursue changing the designation of the southerly area to Public Conservation (See

Recommendations – Section 3.1.4). No adjacent land uses are in presently in conflict with the existing and planned uses of the property.

FCT Acknowledgement

Existing educational kiosks and signs at Halpatiokee identify the property as having been acquired with funds from the Florida Communities Trust and operated as a natural conservation area with passive recreational facilities. The Project Site will be identified in all literature and advertising as having been acquired with funds from the Florida Communities Trust and operated as a natural conservation area with passive recreational facilities.

Management Coordination

The park is managed in coordination with a variety of state agencies and other county departments. At the state level, the Florida Department of Agriculture and Consumer Services, Florida Forest Service (FFS), assists County staff in the development of wildfire emergency plans and provides the authorization required for prescribed burning. The Florida Fish and Wildlife Conservation Commission (FWC), assists staff in the enforcement of state laws pertaining to wildlife, imperiled species management, freshwater fish and other aquatic life existing within the park, and has awarded grants for various park improvements. The Division of Recreation and Parks within the Florida Department of Environmental Protection (FDEP) manages Atlantic Ridge Preserve State Park, which abuts Halpatiokee on the east side of the South Fork. The Florida Department of State, Division of Historical Resources (DHR) assists in identifying potential archaeological and historical sites. As lessor of portions of Halpatiokee and regulator of surface water management systems, the SFWMD is both a partner and permit manager for management and hydrologic improvements in the park.

Within the County, the Ecosystem Restoration and Management Division works collaboratively with a variety of other divisions and departments, including Engineering, the Metropolitan Planning Organization, Growth Management, Legal, and the Board of County Commissioners.

1.5 Public Participation

In June, 2017, Martin County provided opportunities for public input by both conducting a public workshop and convening an Advisory Group meeting to review and comment on the draft management plan. The evening public hearing was conducted over a two-hour period in an open-house format. Interested attendees were given the opportunity to discuss the draft plan with staff, and to provide oral and written comments and suggestions. Approximately 30 people attended the meeting.

The purpose of the Advisory Group meeting was to provide the Advisory Group members, which includes collaborating agencies, (e.g., FWC, SFWMD, FDEP) and representatives of user groups (e.g., Florida Trails Association, Airborne Mountain Bike Club, Native Plant Society) an opportunity to discuss the draft management plan and provide any relevant input.

A Prospectus summarizing the Management Plan was posted on the County's website on May, 19 2017, more than 30 days in advance of the public workshop, the Draft Management Plan was posted two weeks prior to the June 22, 2017 public workshop, and written comments on

the draft plan were accepted through June 30th. ER&M staff gave thoughtful consideration to the comments and suggestions made during the public workshop and at the meeting of the Advisory Group, and made numerous revisions and additions to the Draft Plan prior to the release of the July 2017 Management Plan.

1.6 Other Designations

Halpatiokee Regional Park is not within an Area of Critical State Concern as defined in Section 380.05, Florida Statutes, and it is not under study for such designation. Halpatiokee is, however, adjacent to the Atlantic Ridge Ecosystem, which in 2017 is ranked #21 in Florida Forever's category for Partnerships & Regional Incentives Projects.

2.0 RESOURCE MANAGEMENT COMPONENT

INTRODUCTION

Martin County has implemented resource management programs for preserving and enhancing representative examples of natural resources at parks under its administration. Following a description of the history of acquisition, this component of the Management Plan describes the natural resources and cultural resources of Halpatiokee Regional Park and identifies the methods that will be used to manage them. The management actions identified in this plan are consistent with the responsibilities of Martin County's Ecosystem Restoration and Management Division.

ER&M places a primary emphasis on protecting natural resource communities, and to the degree feasible, restoring them to the condition in which they occurred prior to impacts by human-related activities. Single species management for imperiled species may be appropriate in certain circumstances, but Martin County's goal is to ensure sustainable populations of imperiled species through appropriate management of the vegetative communities on which they depend.

To the extent to which cultural resources are present on properties managed by ER&M, the goal for cultural resources is to preserve sites and objects that represent Florida's cultural periods, significant historic events or persons. This goal is to stabilize, reconstruct or restore cultural resources, or to rehabilitate them for public use as appropriate.

Because natural resource areas within Martin County's Halpatiokee Regional Park have already been fragmented by surrounding development and are dwarfed in relation to the adjoining (~ 5,000-acre) Atlantic Ridge Preserve State Park, it is acknowledged that there are managerial constraints and that maintenance of sustainable populations of flora and fauna will be affected by conditions and activities that occur beyond park boundaries.

The park is divided into three overall management zones (Figure 3). The shape and size of each zone is based on a variety of factors, including vegetative community types, boundaries of burn units, locations of existing roads and natural fire breaks, and active recreation areas (e.g., ball fields) that are managed by Martin County's Parks and Recreation Department and which are not part of this Plan.

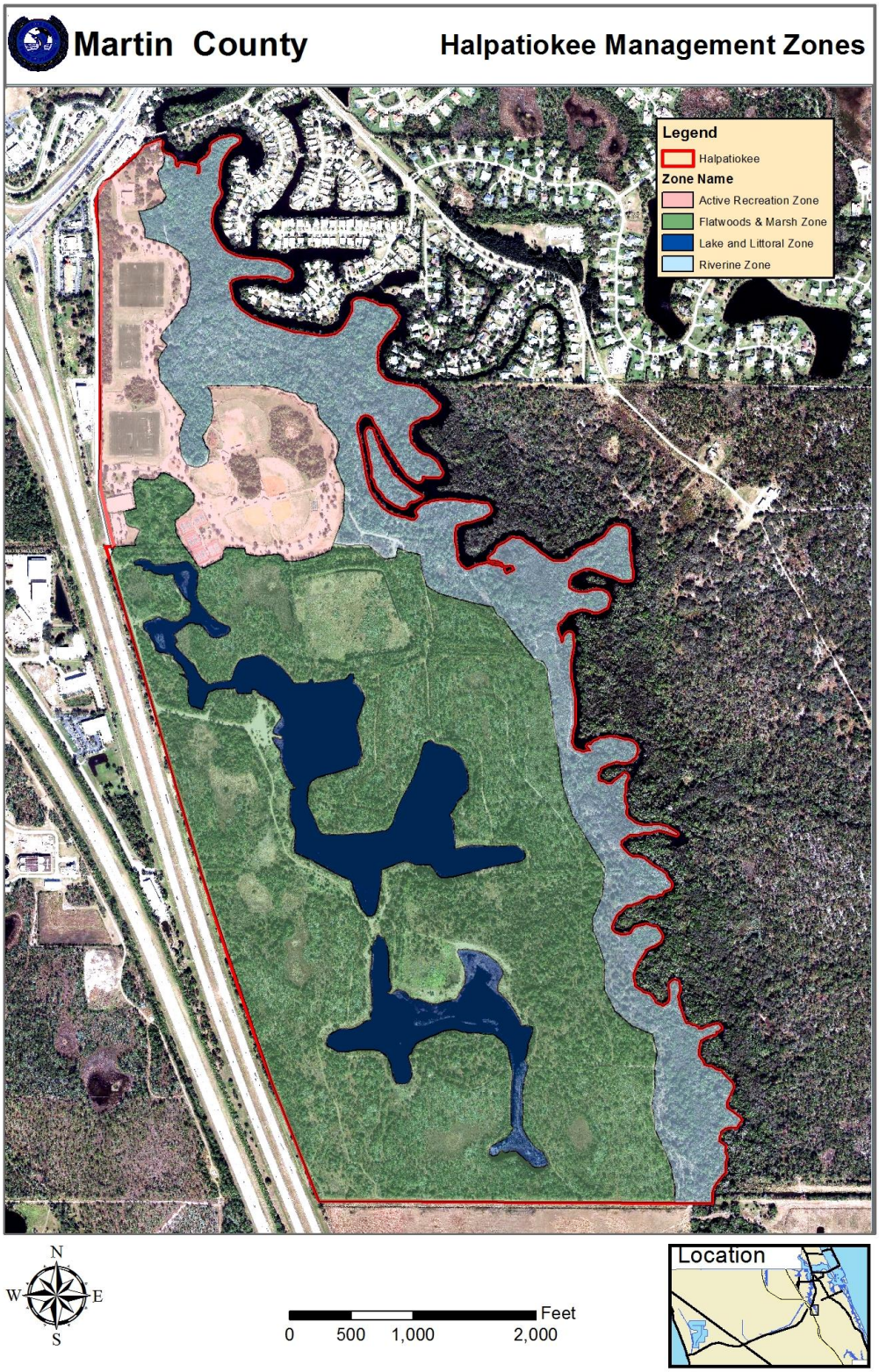


Figure 3 – Halpatiokee Management Zones

2.1 History of Acquisition

As mentioned in Section 1.0, Halpatiokee Regional Park consists of six contiguous, publicly-owned tracts (Figure 2, Table 1 & Appendix B) that are owned and/or managed by Martin County.

Table 1
Parcels within Halpatiokee Regional Park

Property Control Number	Size	Year of Acquisition	Owner	Parcel Reference Name
04-39-41-000-000-00200-2	100.0	1987	SFWMD	Otter Creek
04-39-41-000-000-00121-0	26.7	1996	Martin Co.	FCT Parcel
05-39-41-000-000-00041-0	9.21	1996	Martin Co.	N/A
04-39-41-000-000-00120-9	181.84	1998	Martin Co.	Incl. Rec. Park
08-39-41-000-001-00000-3	248.21	1999	SFWMD	S. Fork Addition
05-39-41-000-000-00030-5	3.10	2008	Martin Co.	"Spaghetti Farm"

Approximately 57 acres of the 181.84 acre northern parcel were acquired for the purposes of active recreation. These areas include lighted soccer, softball and baseball fields, tennis courts, a hockey rink, etc. This active recreation component of the regional park is managed by Martin County's Parks and Recreation Department and is not included in this management plan. However, the conservation and active recreation parcels do share some common infrastructure (e.g., parking facilities, surface water management system, etc.).

Acquisition of vacant lands in this area for conservation purposes began with the purchase of the 100-acre "Otter Creek" parcel by the South Florida Water Management District (SFWMD) in 1987 through the State's Save Our Rivers program. Additional parcels were acquired in subsequent years, using funds generated through Martin County's public land acquisition programs and with funds allocated through the state's Conservation and Recreational Lands (CARL) and Florida Communities Trust (FCT) programs. The parcels that are owned by SFWMD are leased to Martin County for management purposes.

The lease requires that the SFWMD-owned properties be managed for conservation and non-consumptive recreation. Martin County funds were also used to help acquire the abutting vacant property on the east side of the South Fork of the St. Lucie River, which is managed by

the Florida Park Service as Atlantic Ridge Preserve State Park.

With the 57 acres of active recreational park deducted from the total, this plan addresses the balance of approximately 510 acres that are dedicated to permanent conservation. Management of the conservation properties is the responsibility of Martin County's Ecosystem Restoration and Management (ER&M) Division, which also manages other county-owned conservation lands.

Analysis of a 1958 aerial photograph (Figure 4) of the property indicates that, prior to its acquisition by governmental entities, much of the acreage that now constitutes Halpatiokee Regional Park had been used by previous owners for low-intensity cattle grazing and agriculture. With the exception of a variable-width buffer along the South Fork of the St. Lucie River, much of the property had been planted in Bahia (*Paspalum notatum*) to improve conditions for cattle grazing.

The activity that spurred interest in public acquisition of the property was a proposal by Charles Greenlees in 1985 to develop "Otter Creek", a 410 home development that was to have included 39 riverfront lots. Mr. Greenlees had two large lakes excavated to create waterfront lots, and sold the excavated soil for the construction of I-95. With an interest in conserving the South Fork, local environmental groups approached the SFWMD asking that the river frontage be considered for acquisition through the Save Our Rivers (SOR) program. SOR was a statewide land conservation program administered by the state's water management districts that focused on acquisition of riverine and floodplain properties to help protect water quality and aquifer recharge. One hundred acres of what would become Halpatiokee Regional Park was purchased through the SOR program in 1987, with the balance of the Otter Creek property being purchased for potential future residential development – first by the Mobil Corporation and then by the Terrabrooke Corporation.

In 1989, a majority of voting residents in Martin County approved a referendum, to create "Lands for You", a local land acquisition program, the goal of which was to use County-generated funds as a match with state funds to acquire properties from willing sellers for conservation and recreation. Lands for You funds were used in 1998 to purchase approximately 182 acres in the heart of what was to become Halpatiokee Regional Park.

Following acquisition of the 182-acre parcel, Martin County contracted with the Orlando-based land planning firm of Glatting Jackson Kercher Anglin Lopez and Rinehart to develop a master plan for the property. The Glatting Jackson team conducted floral and faunal inventories, wetland delineations and other initial investigations and helped the County develop a management strategy for the property.

The most recent large addition to the regional park complex was the 248 acre "South Fork Addition", that was acquired by SFWMD in 1999, is leased to Martin County, and is included in this Land Management Plan.

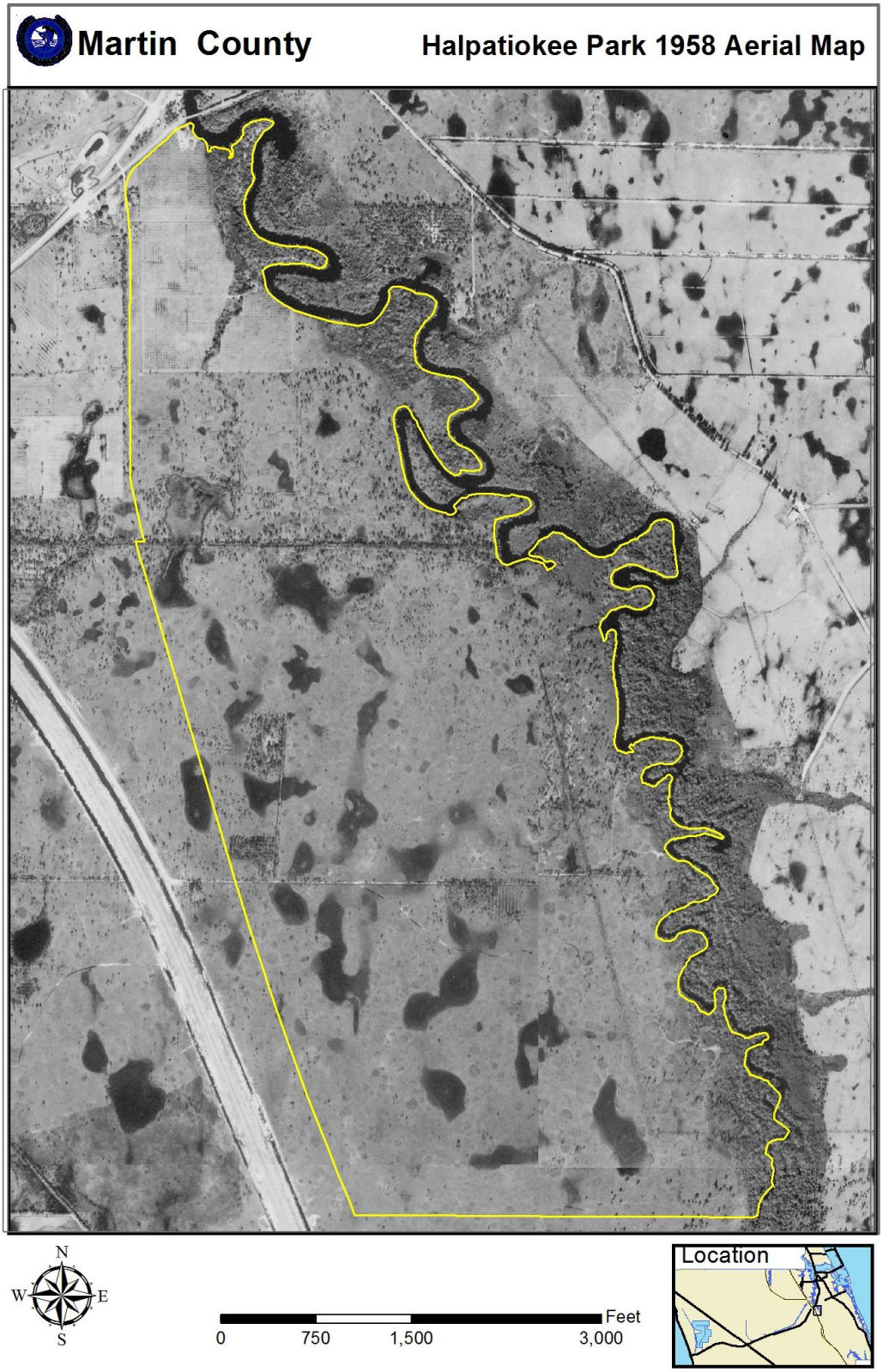


Figure 4 – 1958 Aerial of Halpatiokee Park

2.2 Natural Resources

2.2.1 Geology

From a geological perspective, the surficial deposits that formed the Atlantic coastal ridge, the Everglades and the naturally-occurring St. Lucie River system are all very young. All are less than six million years old, and most formed during the Pleistocene Era (approximately 120,000 years ago), during an interglacial period when sea level was approximately 25 feet higher than it is presently.

During the Wisconsin Stage, which began approximately 100,000 years ago, glacial ice increased, and sea level fell, until approximately 20,000 years ago. When sea level reached a low point approximately 300 feet below the current level, the climate was windy, cool and dry, leading to the formation of large sand dunes. From about 15,000 to 6,000 years ago, sea level rose at a relatively rapid rate of more than three feet per century. As this period ended, the rise in sea level slowed and modern vegetation became established.

The geological formations that underlie Halpatiokee Regional Park form two aquifers that are separated by a confining layer. The relatively shallow Surficial Aquifer generally extends from 15 to 150 feet below the ground surface. Below the confining layer, the Floridan aquifer extends from approximately 600 to 1,500 feet below the surface.

2.2.2 Topography and Hydrology

Halpatiokee Regional Park consists of approximately 500 acres of comparatively low-lying pine flatwoods and riverine forest along the South Fork of the St. Lucie River. The Indiantown (SE) and Gomez, Florida USGS 7.5 Minute Series Quadrangle Maps (photo revised 1983) show the South Fork area to be relatively flat with a surface elevation of approximately 10 feet above mean sea level. There is one sandy ridge in the eastern portion of the property where elevations reach 15-20 feet above MSL that supports a scrubby flatwoods plant community. Based on review of the quadrangle map and portions of the property for which detailed topographic information is available, overland sheet flow and near-surface groundwater flow is eastward, toward the South Fork of the St. Lucie River.

Two major sub-surface aquifers underlie Halpatiokee Regional Park; the shallow, non-artesian surficial aquifer, and the lower, Floridan aquifer. Local rainfall recharges the surficial aquifer. The principal recharge to the Floridan aquifer is primarily in central Florida, particularly in Polk and Pasco counties. No wells, artesian or otherwise, are located on the subject property.

The Federal Emergency Management Agency (FEMA) maps for the area (Figure 5) indicate that although the low-lying areas east of the South Fork are in a Regulatory Flood zone, the steep banks along the west side of the property are in a 1% Annual Chance Flood Hazard Zone. Other portions of the park further to west are in a 0.2% Annual Chance Flood Zone or are in an area of Minimal Flood Hazard.

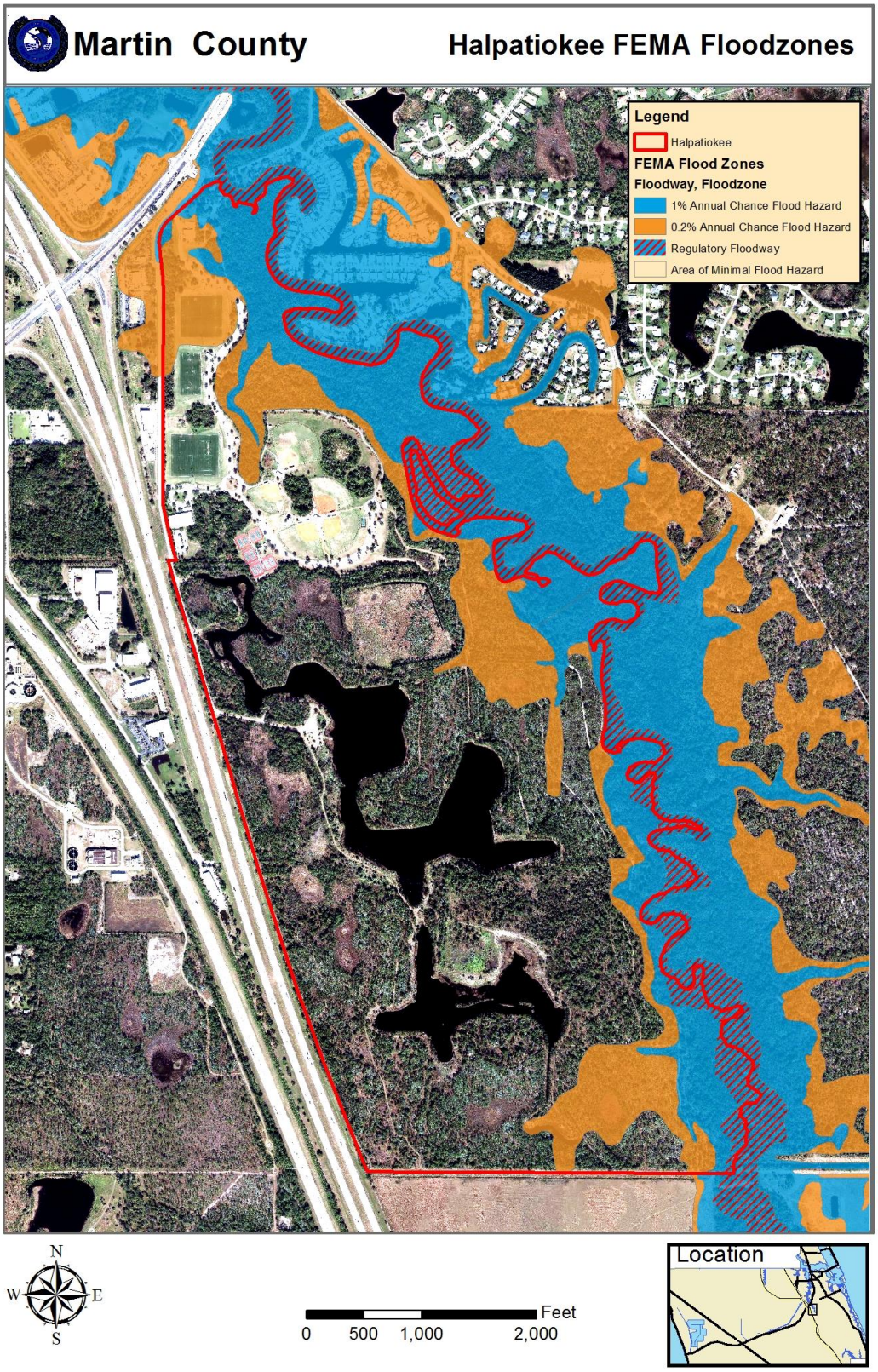


Figure 5 – FEMA High Hazard Areas

Martin County Utilities Department operates a water and wastewater treatment facility located less than ½ mile to the west of Halpatiokee Park, to the west of I-95 and the Florida Turnpike. Engineering analyses conducted for the Utilities Department indicate that the operation of the Tropical Farms facility does not have an adverse impact on wetland or upland communities in Halpatiokee Park.

Overall, site hydrology appears to be adequate to sustain the natural plant communities on the site, although it appears to have been somewhat modified by anthropogenic activities. The construction of Interstate 95 and the Florida Turnpike, which collectively form the park's western boundary, have most likely affected hydrologic conditions in the park. Additional hydrologic impacts likely resulted from the excavation of drainage conveyances for the purposes of water management for agricultural purposes (i.e., cattle grazing) and the excavation of man-made lakes that were created in the mid-1980's in anticipation of lake front housing tracts in the proposed Otter Creek development. In 1986, an assessment of portions of the property by SFWMD detected subtle changes in the species composition of the hydric hammock community bordering the South Fork. The District concluded that "As a result of changes to the land usage in the surrounding drainage basin that this area is drier for longer periods of time than it had been in the past. A lowering of the water table altered the community from hydric to more mesic conditions."

Four specific areas of hydrologic changes are notable.

1. Runoff from I-95 presently sheets flow into a drainage swale that parallels a portion of the park boundary west of Lost River Road. During periods of heavy rainfall, surface water in this swale flows over a portion of the at-grade road into the park. No analyses of the hydrological and/or water quality effects of this situation have been performed.

2. Several west-east oriented drainage conveyances have been present in the eastern portion of the property since before the tracts were purchased by governmental entities. Review of historical aerial photography indicates that these features, which vary in length and cross-section, were excavated prior to 1953. Existing service roads, some of which now serve dual use as hiking trails, are located adjacent to these drainage conveyances and were constructed using soils excavated from the drainage conveyances. Culverts were added by Martin County at locations where existing maintenance/service roads cross these features. Most of these conveyances are relatively shallow, and likely have a comparatively minimal effect on the localized hydrology. However, one canal has gradually eroded its banks and cut into existing soils such that it is now 8-12 feet below the adjoining natural grade. The presence of this drainage feature for several decades appears to have lowered the localized water table to the extent that vegetative communities are adapting to more xeric conditions.

3. An approximately 12-acre area located between the northerly most lake and the recreational fields was created as part of a surface water management system more than 20 years ago, when the property was privately owned. A berm was created around the perimeter of this area, to help direct excess surface water into this impoundment.

   The peripheral berm was built directly through the wetland system, resulting in the isolation and hydrologic alteration of several acres within the impoundment interior. As a result, plant communities in the impoundment interior were heavily impacted by exotic and nuisance

native vegetation. Following public acquisition, Martin County recognized that the presence of this feature was altering localized hydrologic conditions. In 2010, engineering and environmental work were conducted in this area on behalf of Martin County by Captec Engineering and EW Consultants, Inc., respectively. Grant funds were secured, an Environmental Resource Permit (ERP) was obtained and, in 2013, field work was performed to remove portions of the containment berm. Removal of the berm promoted sheet flow, improved the hydrologic connection and the normalization of water levels in the interior of the impoundment interior. Native wetland and upland vegetation have recolonized naturally in areas where portions of the berm had been removed, substantially improving localized hydrologic and vegetative conditions. Portions of the berm, and a perimeter excavated area remain, but no further restoration is recommended.

4. When the property was acquired by Martin County, the man-made lakes in the central portion of the property were relatively steep-bank borrow pits with little littoral vegetation. As part of the 2009-2013 aquatic habitat enhancement work, grant funds from project partner FWC's Aquatic Habitat Restoration/Enhancement subsection (AHRE) were combined with county funds to create an elaborate Aquatic Enhancement Plan (Figure 6). The plan focused on re-grading steep shorelines to create wide littoral zones, after which thousands of native shoreline herbaceous and tree plantings (e.g., bulrush, pondweed, duck potato, pickerelweed, cypress) were installed. Following planting, a significant amount of follow up maintenance has been needed within the lake area. This work has included supplemental plantings in areas where initial plantings were not successful, and follow up efforts to control exotic and nuisance native vegetation. As a result of these efforts, on-going monitoring has confirmed a high level of survival of plantings and indicated a very successful project.

   Following completion of the shoreline re-grading, FWC developed and implemented a fish stocking program. 10,000 fingerling largemouth bass (*Micropterus salmoides*) were stocked in 2015. Follow-up fish surveys conducted by FWC have revealed that, in addition to largemouth bass which were the focus of the initial stocking effort, six other fish species and American eels (*Anguilla rostrata*), were identified in the lakes (Appendices G and H). The presence of the eels, which have not been stocked, suggest that during periods of high water, aquatic organisms may move from the South Fork of the St. Lucie River, through man-made swales and ditches into the interior lakes, which are otherwise considered to be "isolated".

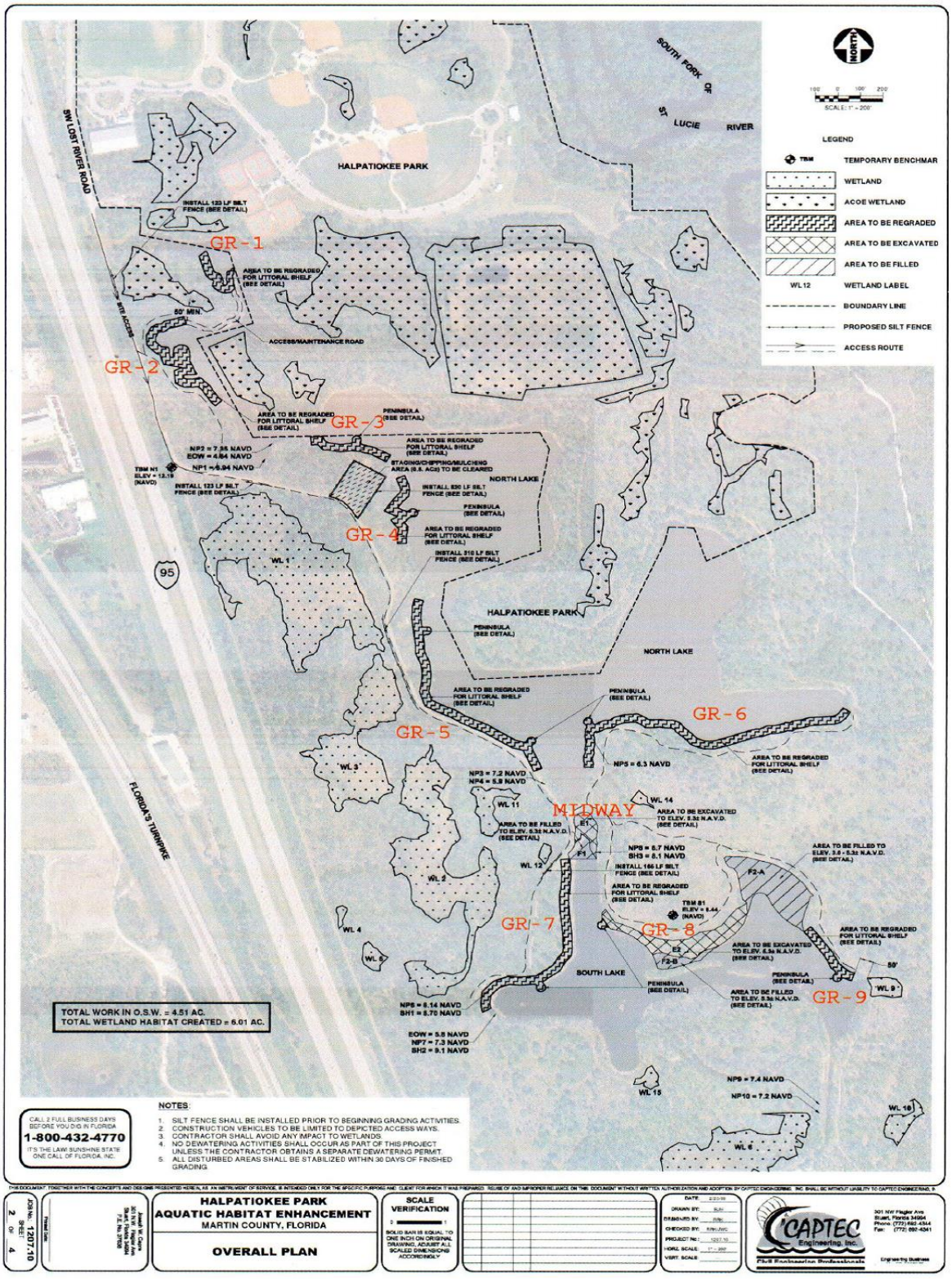


Figure 6 - Aquatic Habitat Enhancements

2.2.3 Soils

A custom Soil Resource Report from the U.S. Department of Agriculture's Natural Resources Conservation Service (Appendix C) for Halpatiokee Regional Park and adjoining properties identifies six soil types that are present within the project area (Figure 7). Nettles Sand (Mapping Unit 63) is the predominant soil type on the property. Kesson Sand (mapping unit 67), open water (Mapping Unit 99), Paola and St. Lucie Sands (Mapping Unit 6), Waveland and Lawnwood fine sands (Mapping Unit 5) and Wabasso and Oldsmar fine sands (Mapping Unit 56) are also present, in diminishing proportions. Detailed descriptions of these soil types include the following:

Upland Soils

Nettles Sand (63): The majority of the property consists of Nettle Sand. This poorly drained soil type underlies broad areas of South Florida slash pine flatwoods. The water table is generally at a depth of 6 to 18 inches. Areas with this soil type do not tend to flood under normal circumstances. This soil is not listed as hydric. This soil type includes minor components of Salerno, Oldsmar, and Waveland soils, all of which are non-hydric. It also includes hydric Basinger sands, which are likely the result of the soil underlying herbaceous wet prairies and marshes on the property.

Paola and St. Lucie Sands (6): NRCS maps the presence of a north-south oriented polygon approximately 18 acres in size in the east-central part of the property as Paola and St. Lucie Sands. These excessively drained, sandy soils are present on historic ridges and dunes of xeric uplands. The depth to the water table is more than 80 inches, and these soils are not hydric. It has minor components of Jonathan, Archbold, Hobe and Pomello sands, all of which are also non-hydric.

Water and Wetland Soils

Kesson Sand (67): NRCS maps the presence of four north-south oriented polygons adjacent to the South Fork in the northern part of the property, as Kesson Sand. These are very poorly drained soils where the water table is at about the ground level. This soil is hydric. It contains soil components of Bessie, tidal, Wulfert, tidal and Durbin, tidal soils, all of which are hydric, and approximately 5% Canaveral soil, which is not hydric.

Water (99): NRCS maps the man-made lakes and the South Fork of the St. Lucie River as Water

Waveland and Lawnwood fine sands, depressional (5): NRCS maps two small depressional wetlands near the south boundary of the property as Waveland and Lawn-wood fine sands, depressional. The water table is at or near the ground surface, and ponding is frequent. These soils are hydric. They contain components of Basinger and Placid soils, both of which are hydric, and approximately 7% Olsmar, a non-hydric soil.

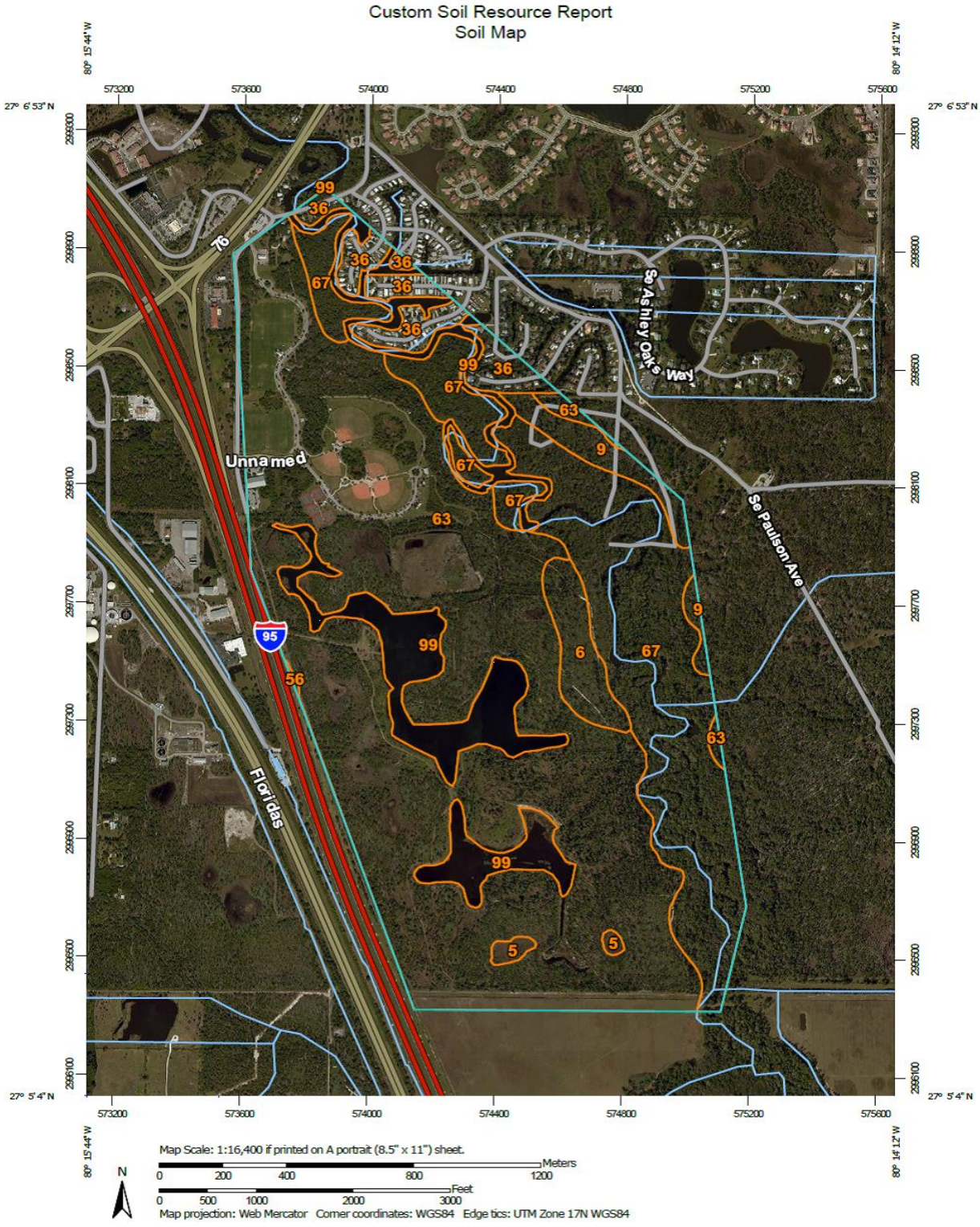


Figure 7 - Soils Map Source: Natural Resource Conservation Service

2.2.4 Regional Context

Halpatiokee is one of over 25 publicly-owned conservation parcels in east-central Martin County. Large publicly-owned parcels within a ten mile radius of Halpatiokee include Atlantic Ridge Preserve State Park, Jonathan Dickinson State Park, Hobe Sound National Wildlife Refuge and Pal-Mar, the expansive low-lying wetland mosaic that straddles the Palm Beach - Martin County line.

Numerous smaller parks and preserves, many of which are owned and managed by Martin County, are located within a ten mile radius to the north of Halpatiokee (Figure 8). Together, these conservation properties provide numerous recreational opportunities for Martin County residents and visitors, conserve valuable habitat for native flora and fauna, including species that are designated as Endangered and Threatened, recharge the subsurface aquifer and protect the headwaters and watersheds of the South Fork of the St. Lucie and other rivers.

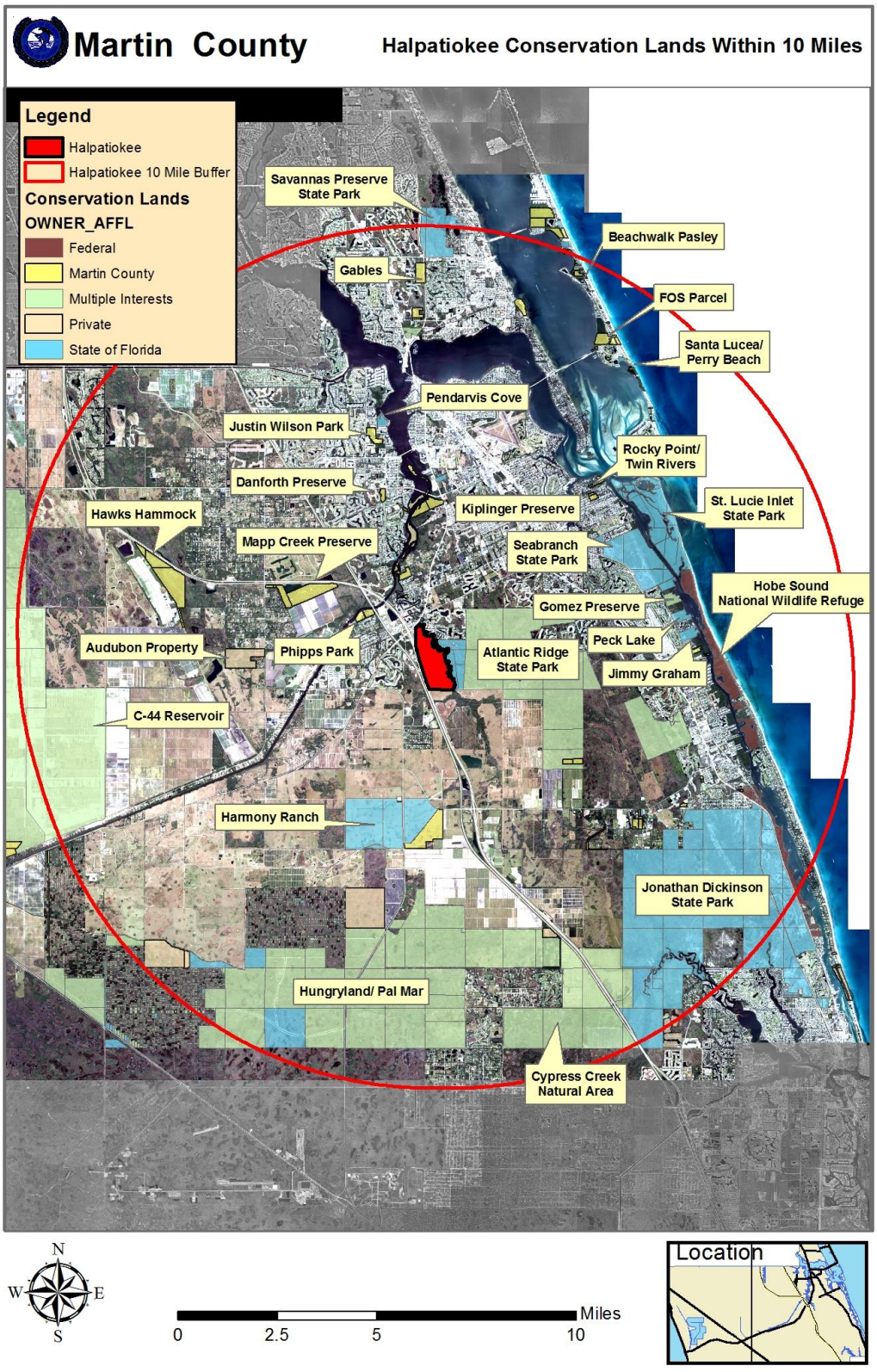


Figure 8 – Proximity Conservation Lands Map

2.2.5 Vegetative Communities

Martin County has mapped seven vegetative communities (Figure 9) present on the property, in addition to the active use recreation area that is not subject to this management plan. These include upland areas, wetlands, and both natural and man-made open-water areas. Following Table 2,_ which identifies the acreage totals for each habitat, narrative descriptions of each community type are provided in this section.

Table 2

Vegetative Communities and Acreages of Conservation Lands in Halpatiokee Regional Park

Vegetative Community	Acreage	Percent of Total
Mesic Hammock	22.2	4.5%
Scrubby Flatwoods	18.7	3.8%
Mesic Flatwoods	272.0	52.5%
Freshwater Tidal Swamp	58.9	11.7%
Depression Marsh	47.7	9.4%
Wet Flatwoods	32.7	6.5%
Open Water	58.7	11.6%

Mesic Hammock

This forested upland community area occurs in several relatively small north-south oriented polygons near the eastern and western edges of the property. It constitutes approximately 22.2 acres (~4.5%) of the conservation lands on the property. These areas are dominated by a closed-canopy of mature live oak (*Quercus virginiana*), laurel oak (*Quercus laurifolia*) and cabbage palm (*Sabal palmetto*) trees, with occasional large slash pines (*Pinus ellitottii*). Shrubs include wax myrtle (*Myrica cerifera*), saw palmetto (*Serenoa repens*), wild coffee (*Psychotria nervosa*) and saplings of cabbage palms and the previously-mentioned tree species. Groundcover species are generally sparse in this community.

The 2003 management plan identified that activities associated with cattle grazing had

previously altered portions of the understory in this community by forming dense sods of bahia grass (*Paspalum notatum*) and carpetgrass (*Axonopus* spp.), although a diversity of other species, such as Boston fern *(Nephrolepis exaltata)*, broomsedge *(Carex* spp.), elephant's foot (*Elephantopus alatus*), St. John's wort *(Hypericum* spp.), and muscadine grape *(Vitis rotundifolia)* were found to still exist. Cattle were removed from the property over 20 years ago, so the impacts associated with grazing are presently unnoticeable.

Epiphytic plants, including bromeliads, ferns and orchids are common on the trees in this community, and are locally abundant in some areas. Species include various *Tillandsia* air plants, including several species that are state-listed as Threatened or Endangered, including *T. balbisiana, T. fasciculata,* and *T. utriculata*.

While no tree coring studies have been conducted on the property, estimates are that the live oaks in this community are at least decades old. This community is in excellent condition, with comparatively little human-related or natural adverse impacts.

Scrubby Flatwoods

One north-south oriented polygon of scrubby flatwoods exists near the east boundary of the property in an area that closely aligns with the Paola and St. Lucie Sands soils (see mapping unit 6 on Figure 7). It constitutes approximately 18.7 acres (~3.8%) of the conservation lands on the property. Slash pines are the dominant trees in this community, which has an open tree canopy. This community is shrub-dominated, and includes mature specimens of saw palmetto (*Serenoa repens*), myrsine (*Myrsine cubana*), Chapman's oak (*Quercus chapmanii*), sand live oak (*Quercus geminata*), tarflower (*Bejaria racemosa*), coastal staggerbush (*Lyonia ferruginea*) and fetterbush (*Lyonia lucida*). Groundcover species are generally sparse in this community, except where trails and/or maintenance roads bisect it.

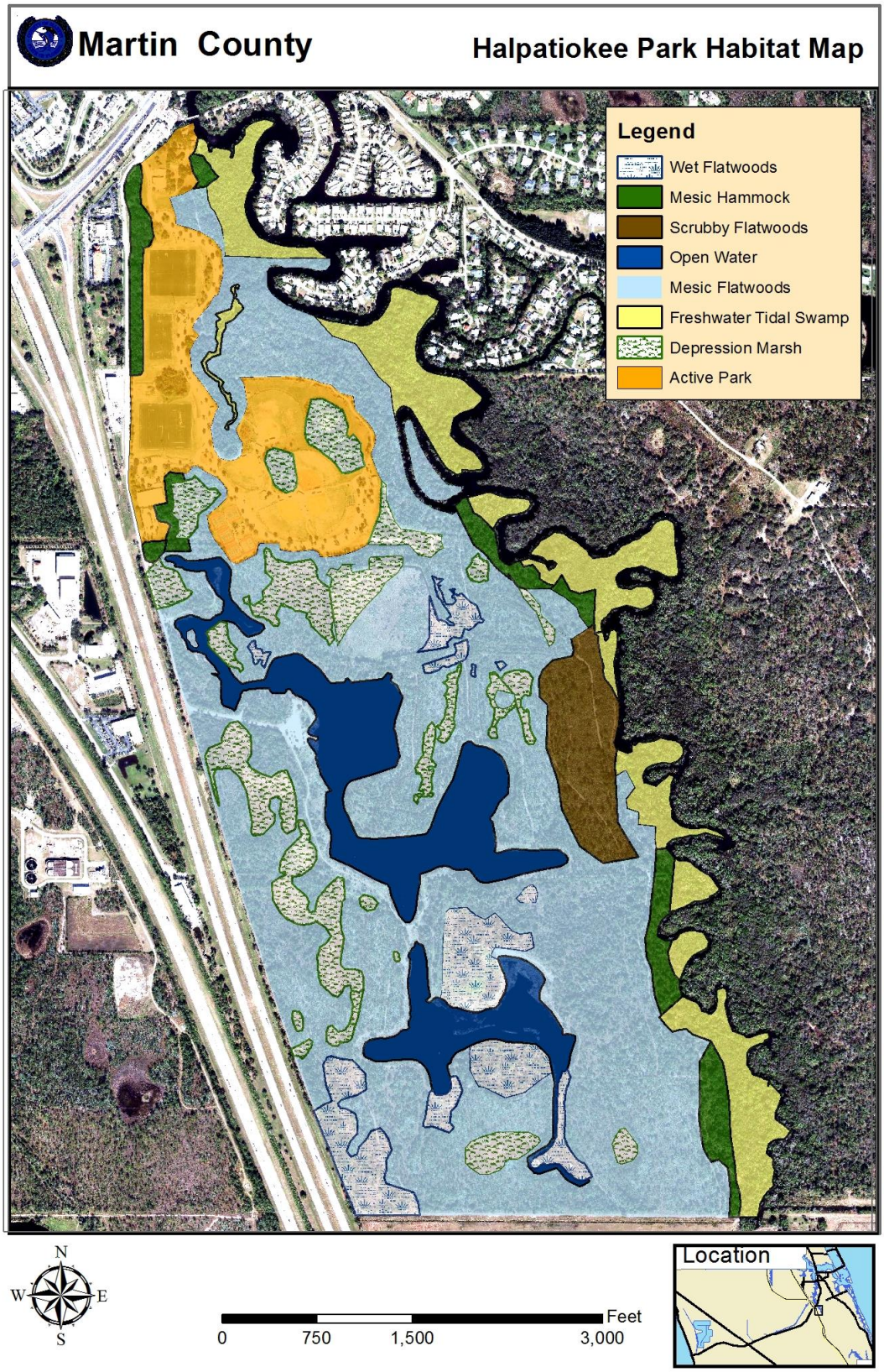


Figure 9 - Vegetative Communities Map

A notable component of the faunal community in the scrubby flatwoods is a population of gopher tortoises (*Gopherus polyphemus*), a state-listed Threatened species.

Overall, this community is also in excellent condition, with comparatively little human-related or natural adverse impacts. A lack of fire management in the recent past, however has left this community in an over-mature condition, where the threat of wildfire is enhanced. Gopher tortoises have moved toward the periphery and open areas (along existing paths) as the shrub canopy has become too dense to allow the existence of herbs for tortoise foraging.

In recognition of the need to restore fire as a management tool in this community, during 2016, Martin County initiated a fuel load reduction program. Chipper/shredders were used to create firebreaks and reduce fuel loads to prepare the scrubby flatwoods for management burns.

Mesic Flatwoods

Pine flatwoods are the most abundant vegetative community on the property, occurring throughout most of the property with the exception of areas along the South Fork. It constitutes approximately 272.0 acres (~52.5%) of the conservation lands on the property. This community consists of an open canopy of slash pines, with a highly variable presence of saw palmetto *(Serenoa repens).*

Saw palmettos are abundant in the slightly higher elevations, but are minimally present or non-existent in areas where the pine flatwoods transition to wetter areas. Additional shrub species found in this community include, wax myrtle, particularly in areas of former pasture, and gallberry *(Ilex glabra).* The diverse herbaceous layer, which occurs throughout openings in the shrub layer, is comprised of wiregrass *(Aristida beyrichiana),* bluestem *(Andropogon spp.),* pennyroyal *(Piloblephis rigida*), yellow milkwort *(Polygala rugelii)* and various Cyperaceae. One notable herbaceous species present in this community is Catesby's Lily *(Lilium catesbaei*), a showy wildflower that is designated by FDACS as Threatened. These mesic flatwoods are high quality upland habitats, although naturally high water levels during the rainy season make them less useable for recreational purposes.

Overall, most of the mesic flatwoods communities are in relatively good condition. Exceptions to this are areas between the two lakes and on the western side of the north lake. These areas were previously dominated by invasive non-native vegetation, including Brazilian pepper (*Schinus terebinthefolius*), earleaf acacia (*Acacia auriculiformis*), Melaleuca (*Melaleuca quinquenolia*), downy rose myrtle (*Rhodomyrtus tomentosa*), wedelia (*Sphagneticola trilobata*), guinea grass (*Panicum maximum*) and others. Using exotic species control contractors, Martin County has been working to address invasives in this area since soon after bringing that parcel into county management.

Historically, pine flatwoods would typically burn on a fire return interval of three to five years, but many areas on the subject property have not been burned in the recent past. Martin County is re-initiating a more aggressive fire management program, and hopes to get the pine flatwoods onto a schedule for management burns (See Section 3.1.3).

Freshwater Tidal Swamp

Several polygons of freshwater tidal swamp form the western shoreline of the South Fork of the St. Lucie River. It constitutes approximately 58.9 acres (~11.7%) of the conservation lands on the property. Red mangroves (*Rhizophora mangl*e) dominate the shoreline, while the predominant canopy species away from the shoreline include pond apple (*Annona glabra*), cabbage palm, water hickory (*Carya aquatica*), red bay (*Persea borbonia*), Florida red maple (*Acer rubrum*) and Carolina ash (*Fraxinus caroliniana*), which is at the southerly limit of its range on the east coast.

One particularly notable tree species in this community is the Florida royal palm (*Roystonia regia*), a species designated by FDACS as Endangered. The origin of the royal palms at Halpatiokee is undetermined. Royal palms have been planted in Martin County as ornamentals, but the specimens in Halpatiokee are decades old and are primarily in the freshwater tidal swamp, at comparatively inaccessible locations, where they would not have been intentionally planted. It is generally accepted that royal palms found north of extreme south Florida are products of seed dispersal from planted specimens.

Shrubs present in this community include Virginia willow (*Itea virginica*), and saplings of the previously-mentioned tree species. Groundcovers and herbaceous species in this community include string lily (*Crinum americanum*), leather fern (*Acrostichum danaeifolium*), swamp fern (*Blechnum serrulatum*), and two fern species that are designated by FDACS as Commercially Exploited: royal fern (*Osmunda regalis*) and cinnamon fern (*Osmunda cinnamomea*). Another notable fern in this community is toothed lattice-vein fern (*Thelypteris serrata*), a species that is designated by FDACS as Endangered. Vines include poison ivy (*Toxicodendron radicans)* and Virginia creeper (*Parthenocissus quinquefolia*).

This vegetative community also provides habitat for a variety of state-listed epiphytes. Orchids include the greater yellowspike orchid (*Polystachya concreta*), and *Vanilla mexicana*, both of which are designated as Endangered. *Tillandsia* air plants include *T. balbisiana, T. fasciculata* and *T. utriculata*, species which are designated as Threatened, Endangered and Endangered, respectively.

Overall, the freshwater tidal swamp is in excellent condition. Martin County has employed contractors to control invasive pest plants in this area, and aside from occasional populations of small-leaf climbing fern (a.k.a. old world climbing fern) *(Lygodium microphyllum*), most Category I invasives are in maintenance mode. Red bays on the property (and throughout Martin County and Florida) are dying as a result of laurel wilt disease, a fungus that is spread by the redbay ambrosia beetle (*Xyleborus glabratus*).

Depression Marsh

Numerous polygons of depression marsh have been mapped, most of which are in the central and western portions of the property. It constitutes approximately 47.7 acres (~9.4%) of the conservation lands on the property. With the exception of the former impoundment, these communities are naturally-occurring depressions within the mesic flatwoods. Except for northerly areas of the property, wetland boundaries have not been delineated. Trees are mostly absent from this vegetative community, which is dominated by wetland shrubs and herbs. Shrubs include Carolina willow (*Salix caroliniana*), corkwood (*Stillingia aquatica*),

wax myrtle, and St. John's wort (*Hypericum* spp.).

Herbs include pickerelweed (*Pontedaria lanceolata*), ferns (*Thelypteris* spp.), various flatsedges (*Cyperus* spp.), alligator flag (*Thalia geniculata*), and yelloweye grasses (*Xyris* spp.).

Although each of these areas has its own unique hydrology, in general, depression marshes are valuable foraging areas for wading birds, including the wood stork, a federally-listed and state-listed threatened species. The wetlands in Halpatiokee Regional Park are within the 17.6-mile Core Foraging Area (CFA) for two nesting colonies of wood storks, one approximately 7.5 miles to the northeast at Bird Island in the Indian River Lagoon near Sewall's Point, and one approximately 12 miles to the north northwest in the North Fork of the St. Lucie River.

Wet Flatwoods

Martin County has identified several polygons of wet flatwoods, most of which are in the south central portion of the property. These areas abut the north and south shores of the existing south lake and the southwest corner of the property and cumulatively constitute approximately 32.7 acres (~6.5%) of the conservation lands on the property. . Wet flatwoods in central and south Florida tend to have an open canopy of small-diameter slash pines and dahoon holly (*Ilex cassine*). Palmettos are absent or a minor component of the shrub layer, which is dominated by myrsine, Virginia willow (*Itea virginica*), fetterbush (*Lyonia lucida*), and wax myrtle (*Myrica cerifera*).

Groundcover species include swamp fern (*Blechnum serrulatum*), cinnamon fern, royal fern, and Virginia chain fern *(Woodwardia virginica*).

With the widespread fire suppression in south Florida in general, and the subject property in particular, wet flatwoods are often difficult to delineate, as the ecotone between it and pine dominated mesic flatwoods is often obscured.

On the subject property, this community is in fair condition. Hydrology appears to have been altered as a result of excavation of the lakes and the construction of I-95. In spite of extensive treatment of climbing fern, invasive non-native plant species require on-going attention.

Open Water

Two types of open-water communities are present on the subject property; the natural South Fork of the St. Lucie River and two interior, man-made lakes.

The naturally-sinuous, northerly-flowing South Fork of the St. Lucie River extends approximately four miles along the property's eastern boundary from near the old humpback bridge (suitable for pedestrians and bicycles, but not motor vehicles) on the north, to the point at which the river becomes non-navigable at its headwaters near the southern boundary of the property. Because Martin County's ownership of Halpatiokee ends at the Mean High Water line, technically there is no open-water river acreage owned by the County.

With most of the river frontage on both sides of this blackwater stream being publicly-owned conservation land without riverfront development, water quality is generally good, except when incoming tides coincide with discharges from Lake Okeechobee and the C-44 basin through the S-80 Structure.

Volunteers with the Florida Oceanographic Society (FOS) and/or Marine Resources Council (MRC) monitor water quality in the Indian River Lagoon, and the St. Lucie River, including the South Fork, on a weekly basis. Five parameters are tested: temperature, salinity, dissolved oxygen, pH, and water clarity. Two water quality monitoring sites are located on the South Fork, and the average values for these two sites are posted by FOS for a site referred to as the "Winding South Fork". FOS assigns letter grades A (Excellent) to F (Destructive) for each of their 10 monitoring areas, which are published weekly. Grades for the Winding South Fork vary considerably, primarily based on rainfall. During the period from January 1 through June 30, 2017, grades for the Winding South Fork site have ranged from A to F.

FOS' closest water quality monitoring site to Halpatiokee is at Hosford Park, a small County-owned park which is approximately 0.2 miles downstream of Halpatiokee' s northern boundary. Long-term data for the Hosford Park site for the period from 2012-mid-2017 and a one-page example of how the weekly data are presented free-of-charge to interested members of the public, are in Appendix I.

Bacteriological sampling in the South Fork is not routinely performed as part of the FOS water quality monitoring program. However, in an effort to prevent bacteriological contamination in surface waters from anthropogenic sources, properties along the South Fork and other surface waters in Martin County are being gradually transferred from septic tanks and wells to Martin County's regional utility system. Halpatiokee Regional Park and its associated park manager's home and the commercial canoe/kayak rental facility were recently connected to the County's regional water system. Some homes along the South Fork remain on septic tanks, while others have been connected to Martin County Utilities' system of water and/or sewer services.

The comparatively low vertical clearance of the humpback bridge prevents access by most motorized watercraft, leaving the river primarily accessible to low-impact canoeists, kayakers and low clearance/shallow draft vessels.

The South Fork in this area has the tea-colored waters that are typical of blackwater streams, which are laden with tannins, particulates, dissolved organic matter and iron derived from drainage through swamps and marshes. Blackwater streams are generally acidic (pH = 4.0 - 6.0), but may become circumneutral or slightly alkaline during low-flow stages when influenced by alkaline groundwater. The dark-colored water reduces light penetration and, thus, inhibits photosynthesis and the growth of submerged aquatic plants.

Emergent and floating aquatic vegetation are minimally present, due to typically steep banks. Typical animals include longnose gar, shiners, and several species of sunfish, cooters,

alligators, and river otters. West Indian Manatees (*Trichechus manatus*) are frequently present in this portion of the river.

There are two land-locked, man-made lakes in the central portion of the property. These lakes were constructed prior to public acquisition as part of a private development that involved mining fill to create waterfront lots for future residential use. Cumulatively, they constitute approximately 58.7 acres (~11.6%) of the conservation lands on the property. The northern lake is approximately 45 acres in size, approximately 20 feet deep at its deepest location, and includes both wide, open-water areas and narrow, winding waterways that are enjoyed by canoeists and kayakers. Two canoe launches, one at the northern end and one near the central body of the lake, provide access for non-motorized vessels.

The southerly lake, also man-made, is approximately 14 acres in size, reaches a maximum depth of approximately 10 feet, and is connected to the north lake via a 48 inch corrugated metal pipe culvert. Boaters interested in accessing the south lake must currently portage their vessels approximately 250 feet over cleared uplands between the two lakes. Presently, stabilized shoreline take-out and put-in locations do not exist between the two lakes.

Considering the man-made origination of these lakes, they appear to generally be in good condition. As described in Section 2.2.2, habitat enhancement work has recently been completed to re-grade and plant portions of the shorelines with appropriate littoral vegetation. When other waters in the St. Lucie River and/or Indian River Lagoon have been plagued in recent years with recurring water quality advisories, the typically land-locked condition of these lakes has provided a clean water haven for public access and use during times of degraded water quality in the River.

Service Roads

Several un-paved, at-grade, service roads occur throughout the property. These open, sandy roads provide access for property managers and invasive species control contractors.

2.2.6 Imperiled Species

The U.S. Department of the Interior defines endangered and threatened and designates species of flora and fauna as such based on each species' distribution and individual populations, life history and degrees of threat. Separately, the State of Florida designates species for protection based on the individual species' abundance, distribution and degree of threat in Florida. At the state level, imperiled faunal species are designated as Endangered, Threatened and Species of Special Concern and their protection is managed by the Florida Fish and Wildlife Conservation Commission (FWC). Floral species are designated as Endangered, Threatened, or Commercially Exploited, and their designation and protection is managed by the Florida Department of Agricultures' Department of Agriculture and Consumer Services (FDACS).

Observations of the presence of federally-listed and state-listed imperiled species on the Halpatiokee property include direct observations by management staff, observations by members of the general public that are reported to management staff, and observations that

occur during formalized investigations by environmental specialists under contract with Martin County.

Field surveys for threatened and endangered species have been conducted on one or more of the parcels that now constitute Halpatiokee by C&N Environmental Consultants in 1998, Glatting Jackson Kercher Anglin in 1999, EW Consultants in 2010 and Sustainable Ecosystems International in 2016. Although none of these investigations have involved detailed surveys or trapping for small mammals, reptiles or amphibians, data have been recorded regarding sightings of species that are designated by the state and/or federal government as Endangered and Threatened (Table 3).

Table 3
Imperiled Species Documented at Halpatiokee Regional Park

Species Scientific Name	Common Name	Federal Designation	State Designation	Habitats present	Abundance
Fauna					
Alligator mississippiensis	American Alligator	T (S/A)	N/A	Aquatic South Fork Lakes	Low
Gopherus polyphemus	Gopher Tortoise	N/A	T	Scrubby Flatwoods Pine Flatwoods Xeric Hammock	Moderate
Grus canadensis pratensis	Florida Sandhill Crane	N/A	T	Mesic Flatwoods Depression Marshes	Low [1]
Egretta tricolor	Tri-colored Heron	N/A	SSC	Depression Marshes Roadside Swales	Low
Egretta caerulea -	Little Blue Heron	N/A	SSC	Depression Marshes Roadside Swales	Low
Eudocimus albus	White Ibis	N/A	SSC	Depression Marshes Roadside Swales Mesic Flatwoods	Low
Mycteria americana	Wood Stork	T	T	Depression Marshes Roadside Swales Mesic Flatwoods	Low
Trichechus manatus	West Indian Manatee	E	E	South Fork	Low

[1] = Nesting documented

Species		Federal Designation	State Designation	Habitats present	Abundance
Scientific Name	Common Name				
Flora					
Lilium catesbaei	Catesby's Lily	N/A	T	Mesic Flatwoods	Moderate
Nephrolepis biserrata	Giant Sword Fern	N/A	T	Freshwater Tidal Swamp	Low
Osmunda cinnamomea	Cinnamon Fern	N/A	CE	Freshwater Tidal Swamp Mesic Flatwoods Depression Marshes	Moderate
Osmunda regalis	Royal Fern	N/A	CE	Freshwater Tidal Swamp Mesic Flatwoods Depression Marshes	Moderate
Polygala nana or smallii [2]	Yellow Polygala	E	E	Scrubby Flatwoods	Low
Polystachya concreta	Greater Yellowspike Orchid	N/A	E	Freshwater Tidal Swamp Xeric Hammock	Low
Roystonea regia	Florida Royal Palm	N/A	E	Freshwater Tidal Swamp	Moderate
Thelypteris serrata	Toothed lattice-vein Fern	N/A	E	Freshwater Tidal Swamp	Moderate
Tillandsia balbisiana	Northern Needleleaf	N/A	T	Freshwater Tidal Swamp Xeric Hammock	High
Tillandsia fasciculata	Cardinal Air Plant	N/A	E	Freshwater Tidal Swamp Xeric Hammock	High
Tillandsia utriculata	Giant Air Plant	N/A	E	Freshwater Tidal Swamp Xeric Hammock	High
Vanilla mexicana	Mexican Vanilla	N/A	E	Xeric Hammock	Low

[2] = Confirmation of identification pending

Table 4
Additional imperiled fauna that have not been documented to be present, but whose habitat is present on the property

Scientific Name	Common Name	Federal Designation	State Designation	Habitats
Fauna				
Aphelocoma coerulescens	Florida Scrub Jay	T	T	Scrubby Flatwoods
Drymarchon couperi	Eastern Indigo snake	T	E	Freshwater Tidal Swamp Xeric Hammock Mesic Flatwoods
Egretta thula	Snowy Egret	N/A	SSC	Depression Marshes Roadside Swales
Flora				
Bletia purpurea	Pinepink	N/A	T	Mesic Flatwoods
Calopogon multiflorus	Many-flowered Grass-pink	N/A	E	Mesic Flatwoods
Coelorachis tuberculosa	Florida Jointtailgrass	N/A	T	Pond Margins
Conradina grandiflora	Many-flowered False Rosemary	N/A	T	Scrubby Flatwoods
Lechea cernua	Nodding Pinweed	N/A		Scrubby Flatwoods
Nemastylis floridana	Celestial Lily	N/A	E	Mesic Flatwoods
Ophioglossum palmatum	Hand Fern	N/A	E	Freshwater Tidal Swamp
Pinguicula caerulea	Blueflower Butterwort	N/A	T	Mesic Flatwoods Depression Marshes
Pinguicula lutea	Yellow Butterwort	N/A	T	Mesic Flatwoods Depression Marshes

Scientific Name	Common Name	Federal Designation	State Designation	Habitats
Platanthera nivea	Snowy Orchid	N/A	T	Mesic Flatwoods
Pogonia ophioglossoides	Rose Pogonia	N/A	T	Mesic Flatwoods Depression Marshes
Pteroglossaspis ecristata	Giant Orchid	N/A	T	Mesic Flatwoods Depression Marshes
Zephyranthes simpsonii	Simpson's Zephyr Lily	N/A	T	Mesic Flatwoods Depression Marshes

An inquiry to the Florida Natural Areas Inventory, which serves as a clearinghouse for documented sightings of species that are tracked by that entity, has revealed the potential presence of a number of additional species (Appendix D), some of which are designated by the federal government or the State of Florida as Endangered or Threatened.

Gopher tortoises are the most abundant protected species found on the property. The scrubby flatwoods have the highest density of gopher tortoises on the property, but their burrows are also present in the mesic flatwoods and hammocks.

Gopher tortoises are considered a keystone species, due to the large number of other animals that are often associated with their burrows. Among these are the Florida mouse (*Podomys floridanus*), Florida pine snake (*Pituophis melanoleucus mugitus*), eastern indigo snake (*Drymarchon couperi*) and gopher frog (*Lithobates capito*). Management of the upland habitat on the property for gopher tortoises will benefit commensal species.

Under natural conditions, gopher tortoise habitat is subject to periodic wildfires. A prescribed fire/fuel reduction program is included as a management strategy to reduce the likelihood of catastrophic wildfires and improve habitat for gopher tortoises and other fire-dependent species. Tortoise burrows, often exceed ten feet in length and typically extend at least five feet below the ground surface, provide temporary shelter for tortoises and other animals during burns, thereby reducing the potential for injury and/or potential mortality. The details of this management initiative are included in the Restoration and Management section of this Management Plan.

Although scrub jays (*Aphelocoma coerulescens*) have not been documented on the site, some suitable jay habitat exists at Halpatiokee, and this species has been reportedly observed on the adjacent Atlantic Ridge Preserve State Park. As a part of its management strategy, the County will record observations of scrub jays that may be sighted in the future during routine site inspections. The County will also improve habitat for scrub jays through the prescribed fire/fuel load management program (see Restoration and Management Section).

Other species that are designated as Threatened, Endangered, or Species of Special Concern also inhabit vegetative communities that are present on the property, and could potentially be documented if additional and/or detailed surveys were performed. Faunal and floral species that are designated as imperiled whose preferred habitats are present at Halpatiokee are identified in Table 4.

Once per year, the County will provide documentation to FNAI of all listed species found on the property during the previous year. The County will use forms provided by FNAI. The County will also coordinate with FWC regarding the protection of any additional listed animal species that are encountered during site visits. Protection and management of Halpatiokee's animal and ecological habitats, wetlands and shorelines is consistent with the goals and objectives of several federal, state and local government agencies which exert regulatory authority to ensure compliance with water quality, species protection, pollution control and resource recovery programs.

2.2.7 Non-native Flora and Fauna

Southeast Florida's climate, environmental and anthropogenic conditions create numerous opportunities for the establishment and spread of plants and animals that are not native to Florida. The FWC has determined that over 500 fish and wildlife species that are not native to Florida have been observed in the state. Harmful species range from tiny Ambrosia beetles that are causing widespread death of bay trees and other members of the Lauraceae to very large Burmese pythons that are wreaking havoc on mammal, reptile and amphibian populations in the Everglades ecosystem. Additionally, hundreds of non-native plant species have also been documented to occur in Florida. Although many non-native species do not adversely affect or minimally affect natural areas, the lack of natural controls (e.g., diseases, predators, etc.) results in some species having significant adverse impacts on native ecosystems.

In Florida, FWC's Wildlife Impact Management Section works to manage and minimize the impacts that nonnative animal species have on Florida's fish, wildlife and marine life, and FWC's Invasive Plant Management Section is the lead agency responsible for coordinating and funding two statewide programs controlling invasive aquatic and upland plants on public conservation lands and waterways. The Florida Exotic Pest Plant Council (FLEPPC) is the state organization that evaluates the threat that non-native plant species pose to the health and well-being of native ecosystems. FLEPPC has two designations for non-native invasive pest plants.

Category I species - Invasive exotics that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. This definition does not rely on the economic severity or geographic range of the problem, but on documented ecological damage.

Category II species - Invasive exotics that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species. These species may become ranked Category I if ecological damage is demonstrated.

A copy of FLEPPC's most recent (2017) list of invasive plants, which serves as the reference for this report, is attached as Appendix E.

Martin County has worked aggressively to eradicate/control invasive pest plants at Halpatiokee. No areas are presently mapped as being primarily invasive species. To date, the primary focus has been on species designated by FLEPPC as Category I exotics, including Brazilian pepper, old-world climbing fern, ear-leaf acacia (*Acacia auriculiformis)*, Melaleuca (*Melaleuca quinquenervia)* and downy rose-myrtle (*Rhodomyrtus tomentosa*), species that had previously been abundant. Now that control of these species has mostly shifted to long-term maintenance, the focus is shifting more toward Category II species, including, Guinea grass (*Panicum maximum*) and bahia

grass, all of which are present in comparatively low abundances throughout the property.

Black mimosa (*Mimosa pigra*), also known as catclaw mimosa, is one other Category I exotic of note on the property. It is considered one of the ten most invasive species in the world, but is not currently prevalent along the Treasure Coast. However, two small populations of this species have been found at Halpatiokee Park. Through management efforts, this species is now in a maintenance state on the property. Future management efforts should focus on the removal of black mimosa to prevent it from becoming a major problem.

Martin County is an active member and participant in the Treasure Coast Cooperative Invasive Species Management Area (CISMA), a collaborative partnership whose mission is to implement a comprehensive, cooperative approach across boundaries to address the threats of invasive species within the Treasure Coast Cooperative Invasive Species Management Area. Martin County intends to continue participation in CISMA through the period covered by this Management Plan.

Several of the problematic non-native species have been documented to occur on the subject property. These species are identified on Table 5, which also includes the vegetative communities that are primarily affected and generalized degrees of infestation on a species-by-species basis.

Table 5 - Non-Native Fauna and Flora observed at Halpatiokee Regional Park

Scientific Name	Common Name	FLEPPC Category	Degree of Infestation	Habitats Present
Abrus precatorius	Rosary Pea	I	3	Freshwater Tidal Swamp Mesic Hammock Mesic Flatwoods Depression Marsh
Acacia auriculiformis	Earleaf Acacia	I	3	Freshwater Tidal Swamp Mesic Hammock Mesic Flatwoods Depression Marsh
Alternanthera philoxeroides	Alligatorweed	II	2	Freshwater Tidal Swamp Depression Marsh
Dactyloctenium aegyptium	Crowfoot Grass	II	3	Disturbed Areas
Dioscorea bulbifera	Air potato	I		Disturbed Areas
Hydrilla verticillata	Hydrilla	I	3	Open Water
Imperata cylindrical	Cogon Grass	I	3	Disturbed Areas
Lantana camara	Lantana	I	2	Mesic Flatwoods Disturbed Areas
Ludwigia peruviana	Primrose Willow	I	3	Depression Marsh
Lygodium microphyllum	Old World Climbing Fern	I	3	Freshwater Tidal Swamp Xeric Hammock Mesic Flatwoods Depression Marsh
Macroptilium lathyroides	Wild Bushbean	II	2	Disturbed Areas

Scientific Name	Common Name	FLEPPC Category	Degree of Infestation	Habitats Present
Melaleuca quinquinervia	Melaleuca	I	2	Mesic Flatwoods Wet Flatwoods Depression Marsh
Melinis repens	Rose Natalgrass	I	3	Disturbed Areas
Mimosa pigra	Black mimosa Catclaw mimosa	I	2	Disturbed Areas Depression Marshes Wet Flatwoods
Momordia charantia	Balsampear	II	3	Disturbed Areas Freshwater Tidal Swamp Mesic Hammock Mesic Flatwoods Depression Marsh
Nephrolepis cordifolia	Tuberous Sword Fern	I	2	Freshwater Tidal Swamp Depression Marsh Mesic Flatwoods Mesic Hammock Disturbed Areas
Panicum maximum	Guineagrass	II	4	Disturbed Areas
Panicum repens	Torpedograss	I	3	Depression Marsh Open Water
Richardia grandiflora	Largeflower Mexican Clover	II	2	Disturbed Areas

Scientific Name	Common Name	FLEPPC Category	Degree of Infestation	Habitats Present
Rhodomyrtus tomentosa	Downy rose-myrtle	I	3	Mesic Flatwoods Mesic Hammock Wet Flatwoods
Sansevieria hyancinthoides	African Bowstring Hemp	II	1	Disturbed Areas
Schinus terebinthifolius	Brazilian Pepper	I	3	Freshwater Tidal Swamp Mesic Hammock Mesic Flatwoods Depression Marsh Disturbed Areas
Schefflera actinophylla	Queensland Umbrellatree	I	2	Freshwater Tidal Swamp Xeric Hammock Mesic Flatwoods Depression Marsh Disturbed Areas
Solanum diphyllum	Two-leaf Nightshade	II	1	Freshwater Tidal Swamp Mesic Flatwoods Disturbed Areas
Spermaocoe verticillata	Shrubby False Buttonweed	II	2	Disturbed Areas
Sphagneticola trilobata	Trailing Wedelia	II	4	Disturbed Areas
Syagrus romanzoffiana	Queen Palm	II	2	Freshwater Tidal Swamp Xeric Hammock Mesic Flatwoods Depression Marsh

Scientific Name	Common Name	FLEPPC Category	Degree of Infestation	Habitats Present
Syngonium podophyllum	Pothos, American Evergreen	I	3	Freshwater Tidal Swamp Xeric Hammock Mesic Flatwoods Depression Marsh Disturbed Areas
Triadica sebifera	Chinese Tallow Tree	I	1	Freshwater Tidal Swamp Mesic Flatwoods Depression Marsh
Urena lobata	Caesarweed	I	4	Disturbed Areas
Fauna				
Sus scrofa	Wild hogs	N/A	4	Freshwater Tidal Swamp Mesic Flatwoods Depression Marsh Disturbed Areas
Anolis sagrei	Brown Anole -	N/A	4	Freshwater Tidal Swamp Scrubby Flatwoods Mesic Flatwoods Depression Marsh Disturbed Areas
Osteopilus septentrionalis	Cuban Treefrog	N/A	4	Freshwater Tidal Swamp Mesic Flatwoods Depression Marsh Disturbed Areas

Infestation Codes:

0 = No Current Infestation. All previously known sites have been treated and no additional plants are known.

1 = A single plant or small population. .
2 = Scattered individual plants or small populations.
3 = Scattered dense patches - locally dense populations of a single species.
4 = Dominant – multiple plants and/or populations where the plant is the dominant vegetative species
5 = Dense monoculture – dense stands where most native species have been eliminated
6 = Linear populations – populations that are scattered along a road, trail, property line or other landscape feature

Martin County has contracted with invasive species control experts who are licensed herbicide applicators. These contractors have expended considerable time, effort and resources to control invasive non-native species on the Halpatiokee property. Most contracts have required follow-up re-treatments within 30-60 days after the initial treatment, to attack individuals that were inadvertently missed the first time, or which survived the initial treatments. The initial efforts to control exotic vegetation began in 2001. Since that time close to $1,000,000 has been spent on the eradication of non-native invasive vegetation at Halpatiokee, with most of that money expended through contracted services. Over the past several years, the County has completed full property sweeps to remove invasive vegetation one time per year. Certain grassy and herbaceous species such as air potato, wedelia and guinea grass are treated quarterly. In addition, nuisance native vegetation (e.g., cattail [*Typha latifolia*]) are treated two or three times per year. On average, Martin County, with the help of granting agencies, spends $70,000 per year treating invasive, exotic vegetation on the property.

Because some invasive plants (e.g., Chinese tallow tree, climbing fern, primrose willow) typically infest wetland areas where broadcast herbicide spraying could have adverse impacts on non-target species, the work is laborious, must be done by hand, and is expensive.

As noted in the "Degree of Infestation" column of Table 5, most invasive plants on the property are now in "Maintenance mode", where each re-treatment event focuses primarily on young plants where seeds deposited by birds, other wildlife, or wind have germinated.

Martin County should also prioritize monitoring for identifying and removing species from Halpatiokee Park that are designated in the Early Detection Rapid Response (EDRR) program (Appendix E). The EDRR program is designed to eradicate non-native species before they become major pests in order to minimize long-term treatment costs. EDRR species have been found to be major problems in parts of the world, but are not prevalent locally. Information regarding any EDRR species found on the Halpatiokee property will be transmitted by ER&M staff to the Early Detection and Distribution Mapping System (EDDMAPS) and submitted for vouchering.

With the exception a permit that has been issued by Martin County to a licensed trapper to remove wild hogs from Halpatiokee and other large-scale county-managed conservation lands, to date, the County has had no efforts to control non-native fauna at Halpatiokee. Hogs are removed from the site at no cost to the County.

Cuban treefrogs are known to exist on the property, but the size of the population and their effect on native wildlife is not known. FDEP has begun an experimental program to capture and remove this species at Jonathan Dickinson State Park. Depending on the State's success with this program, Martin County may consider corrective action if this species is determined to be adversely affecting native species.

Populations of various species of iguanas are becoming increasingly widespread in South Florida, but to date, none have been documented to be present at Halpatiokee.

Burmese pythons, which are wreaking havoc with wildlife populations in the Everglades, have been found as close as Jupiter (JDSP, 2012), but to date, this species has not been documented to be present at Halpatiokee.

Recently, technological improvements are being developed to assist in the tracking and recording of invasive species. One of these, "I'vegot1" allows observers to submit invasive species sightings directly from the field on iPhones. Reports are uploaded to EDDMapS and e-mailed directly to local and state verifiers for review. More information is available at http://www.eddmaps.org/florida/iphone/ ER&M staff will maintain an awareness of these reporting tools and develop public awareness materials that will enable park visitors to assist in the identification and reporting of non-native species.

2.2.8 Special Natural Features

The most notable natural resource features in Martin County are preserved in state parks, Hobe Sound National Wildlife Refuge and county-owned coastal properties. The property is not within a designated Aquatic Preserve, Outstanding Florida Water, or a designated area of critical state concern, or an area under study for such designations. There are no caves, blue holes, high bluffs, beaches or other outstanding natural resource features at Halpatiokee.

The most notable natural resource feature is the approximately four miles of narrow, winding, free-flowing blackwater stream of the South Fork of the St. Lucie River that is in public conservation ownership and is free of waterfront development. The river provides habitat for manatees and rare plants and wilderness-type recreational opportunities that are easily accessible to residents and visitors to Martin County.

There are no known concentrations of renewable or non-renewable mineral resources (e.g., oil, gas, phosphate) on the property.

2.2.9 Areas subject to a Preserve Area Management Plan

Martin County's Comprehensive Growth Management Plan (CGMP) requires that, in most cases, all wetlands and up to 25% of native uplands be preserved when development is proposed on tracts of vacant land. In addition, a native vegetation buffer is required along all wetlands or water bodies. Depending on a variety of factors, this buffer may be 50 feet wide or 75 feet wide. Wetland boundaries must be delineated in compliance with the State of Florida's unified wetland definition. Management Plans, which must be developed and proposed as part of the applicant's request for

development approval, are incorporated to ensure the long-term viability of the areas set aside.
Martin County's initial development of Halpatiokee Regional Park in 1999 required that a Preserve Area Management Plan (PAMP) be developed for designated lands that were within the boundaries of the parcel that was owned by the County at that time.

The PAMP requires that invasive pest plants be eradicated, prohibits certain development-related activities within the preserves, and commits the County to managing the preserves for ecological sustainability. The portions of the property that are subject to the PAMP, some of which overlap with the vegetative communities previously described, are shown on Figure 10.

This Management Plan includes all areas at Halpatiokee that are subject to the approved PAMP and becomes the guiding document for the management of all the conservation lands at Halpatiokee, including those in the PAMP.

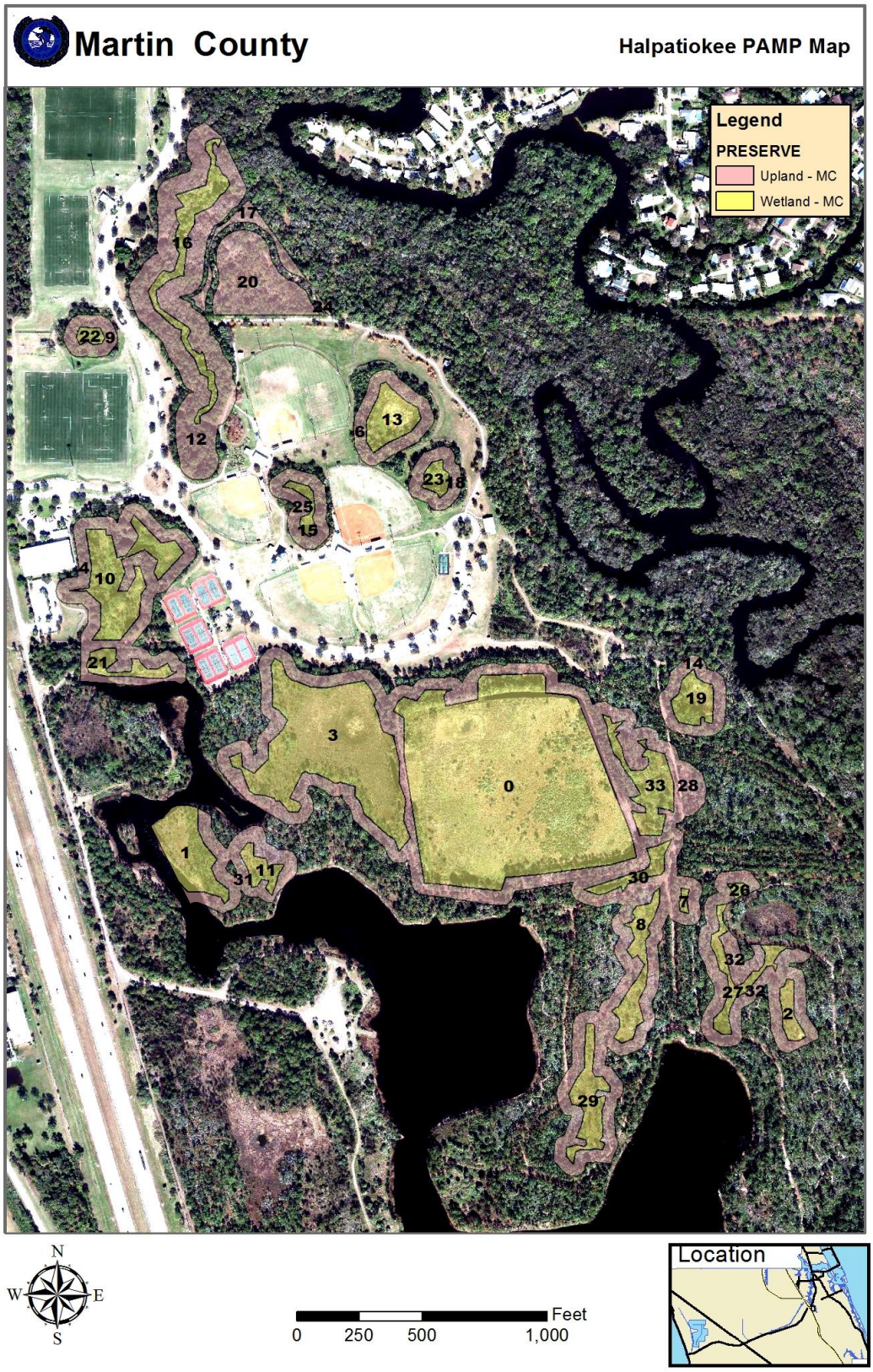


Figure 10 - Areas of Halpatiokee that are subject to an existing Preserve Area Management Plan

As shown on Figure 10, areas of Halpatiokee that are subject to the PAMP include both uplands and wetlands. The size of each preserve that is subject to PAMP requirements is identified in Table 6.

Table 6
Sizes of Preserves that are subject to PAMP Requirements

Preserve ID#	Upland or Wetland	Size (Acres)
0	Wetland	13.75
1	Wetland	1.35
2	Wetland	0.31
3	Wetland	5.43
4	Upland	3.41
5	Upland	0.85
6	Upland	1.08
7	Wetland	0.06
8	Wetland	0.87
9	Upland	0.55
10	Wetland	1.93
11	Wetland	0.36
12	Upland	5.77
13	Wetland	0.81
14	Upland	0.94
15	Wetland	0.21
16	Wetland	1.30
17	Upland	0.54
18	Upland	0.68
19	Wetland	0.60
20	Upland	2.14
21	Wetland	0.44
22	Wetland	0.15
23	Wetland	0.25
24	Upland	0.03
25	Upland	0.94
26	Wetland	0.07
27	Wetland	0.67
28	Upland	13.37
29	Wetland	0.91
30	Wetland	0.39
31	Upland	1.63
32	Upland	3.00
33	Wetland	1.13

While most of the land management activities that are proposed in this Land Management Plan are consistent with the constraints contained in the PAMP, some activities (e.g., construction of public access facilities) may not be consistent with

County Growth Management restrictions in some areas. As a result, the only allowable activities within any PAMP areas will be those that help protect or enhance wetland or upland habitats.

2.3 Cultural Resources

In this section, all cultural resources that are known to be present on the site are identified and described.

The Florida Department of State's Division of Historical Resources (DHR) has been contacted to determine if any known sites of archeological, historical or cultural significance are present on the property. DHR has consulted the Florida Master Site File and determined that no previously recorded archeological, historical or cultural sites are known to be present at Halpatiokee (Appendix F). Historically significant structures are known to be in the general vicinity, but none are known to be present within the boundary of the subject site.

DHR has determined that one field survey had been conducted in the area, but the spatial extent of this survey is not known. It is possible that a detailed survey could reveal the presence of historically or culturally significant sites on the property, but none are presently known.

Martin County's long term goal shall be to ensure that no archeologic, historic or cultural sites of significance will be knowingly impacted as a result of County activities. To achieve this goal, the short-term goal shall be that Martin County will hire an archaeological consultant to survey all portions of the footprint of any new proposed development on the site to ensure that there will be no impact to cultural resources. A copy of that report will be submitted to FCT or the Division of State Lands once it has been completed. Should such a site be discovered during future assessments or construction layout, appropriate measures will be conducted to avoid impacts to cultural resources. The collection of artifacts and/or the disturbance of archaeological and historical sites on the project site will be prohibited unless prior authorization has been obtained from the Department of State, Division of Historical Resources.

Martin County will also notify the Division of Historical Resources to coordinate for the protection and management of these artifacts as required by Chapter 267 Florida Statutes, specifically sections 267.061(2) (a) and (b). Martin County will submit a copy of any survey findings to the Division of Historical Resources for inclusion in the Florida Master Site File. If applicable, all significant resources will be interpreted on site for the public.

The measurable goal shall be the number of sites of archeological, historical or cultural significance that are identified, preserved, and/or damaged annually due to County activities.

RESOURCE MANAGEMENT PROGRAM

3.0 Management Goals, Objectives and Actions

Measurable objectives and actions are identified in this section for each of the management goals for Halpatiokee. Refer to the Implementation Schedule and Cost Estimates in the Implementation Component of this plan for spreadsheets identifying the recommended actions, target year for completion and estimated costs to fulfill the management goals and objectives of this park.

While Martin County utilizes the State-mandated ten-year management plan to serve as the basic statement of policy and future direction for each park over 160 acres in size, task-specific plans may be desirable at times to provide specific guidance for staff to accomplish many of the resource management goals and objectives at Halpatiokee. When detailed planning is appropriate for site-specific activities including prescribed fire management, exotic plant management and imperiled species management, appropriate County budget requests will be made and programmed into annual work plans.

Resource management strategies will be periodically assessed to determine their effectiveness, and allow modifications to be made as a result of actual managerial (e.g., cost, personnel) and field conditions (e.g., hurricanes, droughts). Any useful input will be used to refine techniques, methodologies and strategies for future management activities.

The goals, objectives and actions identified in this management plan will serve as the basis for Halpatiokee management and restoration. This plan will be updated as required every 10 years, however consistent observations and consideration of changing conditions in the field throughout the ten-year period will help inform any need to reassess the management plan's priority schedules and cost estimates.

3.1 Natural Resource Management

3.1.1 Hydrologic Management

Martin County's Goal shall be to protect water quality and quantity in the park, restore hydrology to the extent feasible and desirable, and maintain the restored condition.

The natural hydrology at Halpatiokee has been impaired to varying extents since before the properties were brought into public ownership. Actions have been taken during the most recent 10-year management cycle at Halpatiokee to obtain funds, conduct engineering and permitting and then remove a berm in the central part of the property where a surface water impoundment had previously been located.

In other areas, habitats on the property have adapted to decades-old drainage patterns and seasonal water level fluctuations. In the low, gradually-sloping coastal plain, even minor changes to natural hydrology can result in changes in vegetative communities. Hydrologic restoration is typically done by filling or plugging ditches,

removing obstructions to surface water sheet flow, installing culverts or low-water crossings on roads, and installing water control structures to manage water levels.

At Halpatiokee, however, where these drainage conveyances have been in place for decades and where existing service roads, firebreaks and trails are on fill adjacent to ditches, backfilling or plugging ditches is likely to adversely affect existing floral and faunal communities, recreational uses and create new changes in vegetative communities.

Objective: Prevent adverse changes in vegetative communities that could result from human-induced factors.

Actions: Staff will document ground surface conditions at two locations in the western part of the property and one location on the east (Figure 11) where existing culverts have washed out, become plugged or may be inappropriately sized. Site inspections will be performed during the rainy season and/or following heavy rain events to determine if problems can be easily rectified through routine maintenance, or if more-detailed engineering analyses and/or additional activities should be considered.

The measurable metric for this goal shall be the number of inspections in the problem areas and implementation of any corrective action that may be warranted.

3.1.2 Water Quality

Martin County's Goal shall be to protect recreational users of the South Fork at Halpatiokee from adverse impacts associated with degraded water quality that originates off-site.

During periods of excessive discharge from Lake Okeechobee and local watershed basins through the C-44 Canal, water sampling and analyses of surface waters in the Indian River Lagoon and the St. Lucie have revealed the presence of cyanobacteria with toxin-potential that could adversely affect human health. When incoming tides push water upstream in the South Fork, water that contains potentially toxic cyanobacteria could reach portions of the South Fork adjacent to Halpatiokee. The Florida Department of Health has the responsibility to determine any water advisories that should be posted in the South Fork. Typically, they advise that if cyanobacteria is visibly present, to not have contact with the water.

Objective: Communicate with the Martin County office of the Florida Department of Health on conditions in the South Fork, and ensure that any "avoid contact with the water signs" are posted at highly visible locations in the Halpatiokee Park area.

Actions: Coordinate with the Martin County office of the Florida Department of Health to pre-determine locations, including river access locations for posting signs in the event of a cyanobacteria bloom or fecal contamination in the area. A measurable goal shall be the number of river users who develop illnesses directly related to recreation on the South Fork.

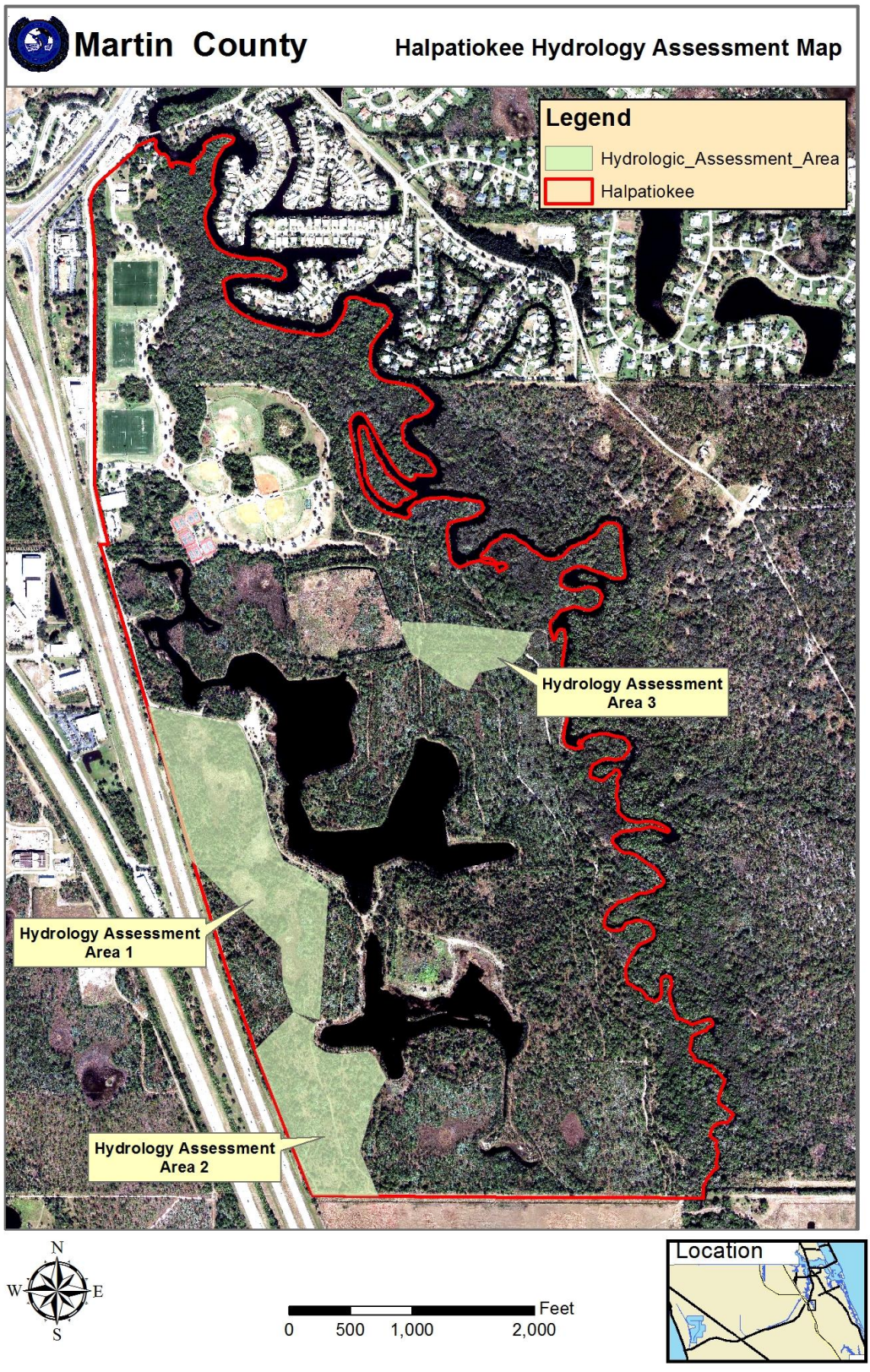


Figure 11- Areas to be evaluated for potential hydrologic improvement

3.1.3 Natural Communities Management

Martin County's Goal shall be to maintain existing vegetative communities in Halpatiokee in a sustainable and healthy condition, and to restore impacted habitats, where feasible.

Most of the existing flatwoods and depression marshes generally appear to be in good condition. However, a burn plan does not presently exist for Halpatiokee, and the lack of fire over the last several decades has led to a build-up of vegetative fuel and increased the risk of wildfires. Mesic and scrubby flatwoods are fire-maintained communities in southern Florida. In the absence of fire, these communities become overgrown in both shrub height and density. Overgrown flatwoods reduce plant and animal diversity and numbers and negatively affect gopher tortoises, often causing them to abandon existing burrows and move to areas that are more open, where they are at increased risk. Additionally, overgrown flatwoods are a wildfire hazard. For ecosystem health and wildfire safety, it is imperative that these habitats receive proper fuel load reduction. Addressing this situation typically involves returning fire to its natural role in fire-dependent natural communities.

In areas where reintroduction of fire could create hazardous conditions due to dense fuel loads and/or surrounding land uses, other methods, including mechanical fuel load reduction can be implemented. These treatments can be used to prepare areas for the eventual return of prescribed fire. Such mechanical treatments include, but are not limited to, roller-chopping, disking, grinding/mulching, mowing/bush-hogging, tree stand thinning/timbering, and earthworks. These activities are regularly used to thin both shrub (including palmetto) and tree densities to appropriate levels for increased ecosystem health, as well as to decrease the potential and the severity of wildfire.

In addition to benefitting vegetative communities, fire benefits a wide variety of animal species, including: white tailed deer *(Odocoileus virginianus seminolus),* northern bobwhite *(Colinus virginianus),* wild turkey (*Meleagris gallopavo),* gopher tortoises, gopher frogs, indigo snakes *(Drvmarchon. corais couperi),* pine snakes *(Pituophis melanoleucus mugitus),* meadowlarks *(Sturnella magna)* and other species. For scrubby flatwoods, maintenance fire creates a mosaic that includes areas with an open understory of oaks that is beneficial to gopher tortoises, their commensals, and groundcover plant species that thrive in open sunlight. Maintenance burning on a site-appropriate schedule also minimizes damage to slash pines by reducing the potential for tree-killing crown fires in both the scrubby flatwoods and in scrub.

During the most recent 10-year management cycle, Martin County acknowledged the need to re-introduce fire at Halpatiokee as an efficient and cost-effective management tool. Mechanical reduction of fuel loads has been completed in the southeastern portion of the property, but additional work needs to be done to prevent tree mortality.

Objective: Development and implementation of a prescribed burn and/ or fuel reduction

program for fire-dependent vegetative communities present at Halpatiokee that can be implemented in a manner that avoids or minimizes tree mortality.

Actions: Martin County's long-term goal shall be to manage fire dependent communities for ecosystem function, structure and processes through mechanical fuel load reduction, where necessary, and prescribed burns recognizing of the use of the property by trail users. County staff, in collaboration with the Florida Forest Service (FFS) and Martin County Fire Rescue, will apply standard land management practices to assess existing fuel loads and firebreaks, and determine the need for the creation of new firebreaks and/or mechanical fuel load reduction activities.

To accomplish this, the short-term goal shall be for the County to coordinate with the FFS, Martin County Fire Rescue and user groups to establish a burn plan for the property. The burn plan will identify areas that need mechanical fuel load reduction, the desired fire return interval, set targets for the acreages of each vegetative community to be managed, prioritize areas and establish manageable burn zones. The boundaries of burn units will be developed with recognition that portions of hiking and biking trails presently exist in areas that may need mechanical reduction (roller chopping, shredding) prior to returning fire to the property in order to prevent/minimize tree mortality.

Prior to implementing a prescribed fire program, where there are existing trails, Martin County will work with the respective user group(s) to identify sensitive trail features and to manage trails to make them more fire resilient (e.g., replacing wooden trail stabilization features with inter-locking brick systems). The acreage targets established in the burn plan will serve as the measurable goals through which progress is measured in future years.

Unlike fires in the scrub community (both wildfires and prescribed burns) that may result in mortality of mature sand pine trees, the size, location and fire return intervals for burn units in the slash pine dominated areas at Halpatiokee will be established in order to create a multi-year burn rotation. There will be a concerted effort to ensure that the entirety of an individual trail (or habitat) will not be impacted during a single event.

Prior to burning, Martin County will develop and implement an educational program that will be offered to nearby residents, adjacent property owners, and park users. This education program may include coordination with existing fire management awareness programs, including Jonathan Dickinson State Park's "Firefest" and the Forest Services' wildfire hazard mitigation initiative, as well as neighborhood notices. As part of this program, all residents within at least a quarter mile buffer of the Park will be notified in advance when prescribed fire projects will be conducted and given the opportunity to speak with ER&M Division and FFS staff. Staff will be available to discuss why prescribed burns and or mechanical fuel reduction are conducted and to answer questions in order to address concerns of adjacent property owners, park users and other interested individuals.

The County will consider using lighted "message boards" in advance and during burns to notify potentially affected parties of management burns.

If Halpatiokee's proximity to I-95 and the Florida Turnpike make re-introduction of fire impractical on part or all the property, the Burn Plan shall identify targets and locations for alternative treatment methods to maintain low risks of wildfires.

Restoration and Management of Natural Communities. At some locations, the reintroduction and maintenance of natural processes is inadequate to restore pre-existing communities. At Halpatiokee, the only sizable areas that may require active management in excess of the hydrological and reintroduction of fire previously discussed, are areas to the north and south of the central portion of the south lake (see Figure 6). These areas appear to be in transition; recovering from impacts that occurred during previous activities, including the re-grading of the shoreline to create littoral zones. Soil disturbance in these areas has resulted in an increase in opportunistic, weedy species. Current efforts are underway to control pest plants.

Areas west of the north lake and near the north entrance to the park have been negatively impacted by un-authorized use of off-road and/or four-wheel drive vehicles. Over time, previously existing natural vegetative communities may restore themselves without human assistance, but more aggressive enforcement of existing regulations is warranted.

Existing educational kiosks inform users of current prohibitions on the collection of saw palmetto berries, but there are indications that this practice continues.

Martin County has adopted a local Ordinance (#17.9) that identifies allowed and prohibited uses in County parks. Dogs are presently allowed on conservation lands at Halpatiokee, provided they are on a leash and that pet waste is removed. Unfortunately, both these criteria are frequently disregarded. Pets not on a leash pose threats to existing wildlife, and the presence of pet waste along hiking and biking trails can cause water quality and area enjoyment issues. To encourage compliance with pet waste removal requirements, Martin County currently provides pet waste stations near trailheads, where bags are provided for the collection of pest waste.

Martin County's Goal shall be to maintain, natural vegetative communities and restore impacted areas where restoration is feasible and desirable.

Objective: Re-create healthy vegetative communities in areas that are presently degraded.

Actions: ER&M staff will assess natural vegetative community recovery in areas adjacent to the central portion of the south lake during the period from 2017-2022, and develop site specific actions plans to restore the communities if natural re-growth is not resulting in desirable vegetative community changes.

ER&M staff will work with County Parks and Recreation staff, law enforcement personnel and users to achieve increased compliance with existing ordinances and park rules, including illegal harvesting of palmetto berries.

The measurable metric for this goal shall be the number of acres restored habitat.

3.1.4 Rectification of Land Use Designation

When Martin County acquires new parcels, the tracts have land use designations that indicate the existing and forecasted future land use(s). When parcels are purchased for permanent conservation and/or recreation, a processed is followed to change the designated land use to correspond to the new intended use. This has been completed for several of the individual parcels that now constitute Halpatiokee Park. One parcel, however (Property Control Number 08-39-41-000-001-0000-3 [see Figure 2 and Appendix A]), still retains its previous land use of Residential Estate Density - two units per acre.

Martin County's Goal shall be to pursue changes in the Land Use to make all parcels within Halpatiokee have the land use that best suits their intended use.

Objective: Change the designated Land Use on Property Control Number 08-39-41-000-001-0000-3 from Estate Density to Conservation or Institutional/Recreational.

Actions: Martin County's ER&M Division will work the County's Growth Management Department to identify the appropriate Land Use designation for Parcel # 08-39-41-000-001-0000-3, and follow county procedures to complete the re-designation.

The measurable metric for this goal shall be the successful completion of the changing of the Land Use on Parcel # 08-39-41-000-001-0000-3.

3.1.5 Imperiled Species Management

Martin County's Goal shall be to maintain, improve or restore populations of imperiled species and their habitats in the park.

Martin County's ER&M Division strives to maintain healthy populations of imperiled plant and animal species primarily by implementing effective management of vegetative communities. Imperiled species that occur in Halpatiokee are more abundant on larger, state-owned or federally-owned park lands either adjacent to or in close proximity to Halpatiokee, so single species management is not a major concern for Halpatiokee.

The 2016 floristic survey at Halpatiokee documented the locations where various state-listed Threatened and Endangered species were observed. While it is not Martin County's primary responsibility to ensure the on-going sustainability of populations of all imperiled species that occur on the property, the development of a database of imperiled species is an important step in determining if populations are expanding, dwindling or remaining steady.

Although detailed monitoring of individual imperiled species (e.g., locations of active and abandoned gopher tortoise burrows, populations of orchids) may be desirable, it is beyond the capacity of Martin County's few ER&M staff. An accepted principle is that habitat management for vegetative community sustainability will result in

sustainable populations of imperiled species.

For example, even without going through the expensive and labor-intensive process of mapping all gopher tortoises at Halpatiokee, and then re-mapping their numbers and locations after fires, numerous studies at other locations have verified that the re-introduction of fire into scrubby flatwoods and other upland communities has improved the forage base for tortoises, and ultimately led to greater numbers of this keystone species.

Objective: Continue to document observations of flora and fauna to inventory species present (Appendix G).

Actions: Within the ten-year period of this Management Plan, Martin County will update baseline species occurrence inventory lists for imperiled plants and animals during normal site monitoring activities and checking on the location where imperiled species were documented during 2016.

When the time comes to re-conduct a floristic survey at Halpatiokee, consideration will be given to conducting the field investigation(s) during a time period (i.e. spring) when the results of the investigation will complement the results of the September 2016 investigation.

ER&M staff will seek assistance from the Audubon Society or other individuals with knowledge of birds to help compile more thorough bird lists for the property, with particular attention on documenting seasonal variability and nesting.

ER&M staff will seek assistance from other individuals or groups who may be able to provide additional information about the flora and fauna at Halpatiokee. Limited data are available regarding amphibians at Halpatiokee, and comparatively few data are available regarding populations of butterflies and moths. Martin County will reach out to individuals who have expertise in these areas to try to improve on the database for Halpatiokee.

One group of imperiled plant species that is presently subject to undue stress are *Tillandsia* air plants, including the giant air plant (*Tillandsia utriculata*), the cardinal air plant (*Tillandsia fasciculata*), and northern needleleaf (*T. balbisiana),* three species that are locally abundant at Halpatiokee and all of which are designated by the state as Endangered or Threatened. The Mexican bromeliad weevil (*Metamasius callizona*) has been well documented to be linked to the demise of *Tillandsia* air plants. Although the weevils can be controlled chemically, it is neither advisable nor prudent to use chemicals for weevil control in park settings. Research is underway by the University of Florida's Agricultural Extension program regarding potential biological controls for weevil infestations (IFAS, 2016). During the 2016 floristic survey, weevil contaminated bromeliads were not seen at Halpatiokee.

Objective: Maintain sustainable populations of species that are state-listed as Endangered or Threatened.

Actions: Martin County's ER&M Division will monitor on-going research regarding state of the art controls of Mexican weevils and intermittently spot-check *Tillandsia* plants at

Halpatiokee to determine when/if implementation of countermeasures is warranted.

Martin County will obtain determination from a state or federal botanist or other competent source as to whether the small, yellow-flowered Polygala that is present near the southern boundary of the scrubby flatwoods is *Polygala smallii*, a federally-listed Endangered species, or *Polygala nana*.

As a keystone species whose burrows provide valuable habitat for over 300 other species of animals, maintaining a healthy and sustainable population of gopher tortoises at Halpatiokee will benefit many commensal organisms. Unfortunately, several factors are working against tortoises both statewide and along the Treasure Coast. A statewide problem for gopher tortoises is the affliction known as Upper Respiratory Tract Disease (URTD). The disease is highly contagious between tortoises, and no cure is presently known. No investigations have been undertaken at Halpatiokee to determine if URTD is present in the local tortoise population. A second issue that tortoises at Halpatiokee face is continued fragmentation of habitat. With impassable barriers on the north (Kanner Highway), east (open water of the South Fork) and west (I-95 and the Florida Turnpike) at Halpatiokee, the potential for dispersal (both immigration and emigration from nearby areas) is limited. An outbreak of URTD at Halpatiokee could therefore have catastrophic impacts, both on the local tortoise population and on the commensal organisms that rely on their burrows.

Objective: To maintain sustainable populations of gopher tortoises at Halpatiokee

Actions: Martin County's ER&M Division will work with FWC's SE Florida Regional Tortoise biologist to initiate an in-house educational and monitoring program to train on-site personnel on observable symptoms of URTD in tortoises. When opportunities present themselves, staff will inspect tortoises encountered at Halpatiokee for URTD, seek professional assistance from veterinarians, if necessary, and develop and implement appropriate countermeasures if URTD is confirmed.

The Florida population of yellowspike orchids (*Polystacha concreta*) is limited to the southern half of peninsular Florida. During the period since the last Management Plan for Halpatiokee was developed, this state-listed Endangered species has been located at two locations along the riverfront xeric hammock and freshwater tidal swamp communities at Halpatiokee. In the past, Martin County's ER&M Division has worked with Florida Atlantic University to learn more about the abundance and distribution of this Endangered species at Halpatiokee as part of FAU's participation in the Million Orchid Project. Additionally, ER&M has worked with a collaborative partnership that includes the University of Florida, Florida International University and Fairchild Tropical Garden regarding the presence of *Vanilla mexicana* in parks in Martin County that are managed by ER&M. Personnel with these entities have indicated their willingness and potential availability to provide assistance by conducting surveys and re-introducing orchids at Halpatiokee and/or other properties managed by ER&M.

Objective: Martin County's ER&M staff will work with scientific, educational, and/or conservation organizations to further understand the abundance and distribution of yellowspike orchids and vanilla orchids at Halpatiokee.

Actions: ER&M staff will maintain dialogue with scientific, educational and/or conservation organizations to learn more about the abundance and distribution of yellowspike orchids and vanilla orchids at Halpatiokee.

During contracted management activities, Martin County will provide maps and GPS coordinates of listed species to prevent negative impacts.

An additional state-designated threatened plant species that occurs in the freshwater tidal swamp at Halpatiokee is the toothed lattice-vein fern (*Thelypteris serrata*). This terrestrial/emergent species has been documented to occur along the riverbank of the South Fork. Although no systematic surveys have been conducted to gain insight into the abundance and distribution of this species in Halpatiokee, anecdotal observations have suggested that individuals of this species may be susceptible to being "shaded out" when vines and other shrubs grow over this species and prevent it getting the sunlight that it needs.

Objective: Martin County's ER&M staff will encourage local conservation organizations to further understand the abundance and distribution of *Thelypteris serrata* at Halpatiokee.

Actions: Martin County's ER&M staff will seek to establish relationships with local conservation organizations, scientific organizations and/or academic institutions that may have the human resources available to conduct research on the distribution and abundance of *Thelypteris serrata* in Halpatiokee.

During contracted management activities Martin County will provide maps and GPS coordinates of listed species to prevent negative impacts.

The measurable metrics for this goal shall include the number of actions taken by ER&M with regard to Threatened and Endangered Species.

3.1.6 Management of Non-Native Species

Martin County's Goal shall be to eradicate and/or control exotic and invasive plants and animals at Halpatiokee through site-appropriate levels of on-going maintenance.

Through past eradication efforts invasive species levels are mostly at minimal levels on the property. Martin County will continue to seek grants, allocate funding and hire contractors to keep exotic and invasive flora and fauna in maintenance mode to prevent further damage to existing vegetative communities.

Objective: Maintain vegetative communities in a condition where non-native flora and fauna constitute less than 1% cover in each vegetative community at Halpatiokee.

Activities: ER&M staff and/or their contractors will eradicate or control populations of non-native fauna that are found to be having adverse impacts on native flora and fauna.

In consultation with FWC, ER&M staff (and/or their contractors) will continue to remove feral hogs from Halpatiokee and assess the need to develop and implement control protocols for other non-native animals, including nine-banded armadillos, coyotes, iguanas, amphibians, non-native birds, feral cats and feral dogs. Exotic animals will be removed from the park as authorized by FWC. Additionally, staff will continue enforcement programs so that users are aware that dogs on the property are to be on leashes at all times.

ER&M staff will also continue to facilitate the removal of invasive/ exotic vegetation at Halpatiokee. Some of the grass or vine species will require multiple treatment events every year to keep the plants in a maintenance condition. Lake shoreline areas will also require multiple treatment events every year to keep the invasive/ exotic species in check.

Martin County will continue their participation in the Treasure Coast Cooperative Invasive Species Management Area.

The measurable metrics for this goal shall include the number of acres treated for invasives and/or the number of contracts entered into with exotic species control contractors.

3.1.7 Arthropod Control Plan

During the last several years, there has been an increased focus in Florida on diseases that are spread to humans by mosquitos. West Nile Virus, Zika and Dengue Fever all have the potential to be spread at Halpatiokee by mosquitos.

Martin County's Ecosystem Restoration and Management Division works closely with the Mosquito Control Division within the Martin County Board of County Commissioners. The Mosquito Control Division currently monitors the area through larval sampling and landing rate counts. Site specific control measures are usually not necessary due to the presence of aquatic predators that feed on mosquito larvae. When needed, Mosquito Control does spray standing water with Bti (*Bacillus thuringiensis israelenis*) or methoprene. When high populations of mosquitoes are present, as evidenced through landing-rate counts and trap numbers, adulticides are applied in residential areas surrounding the preserve through Ultra-Low Volume (ULV) truck application fogging.

3.2 Cultural Resource Management

As a part of any future development activities, Martin County will hire an archaeology consultant to survey all portions of the proposed development footprint to ensure that there will be no impacts to cultural resources. A copy of all reports generated will be transmitted to FCT and/ or the Florida Division of State Lands after they are completed. Should such a site be discovered during future assessments or construction, appropriate measures will be

conducted to avoid impacts to the cultural resources. The collection of artifacts or the disturbance of archaeological and historical sites on the project site will be prohibited unless prior authorization has been obtained from the Department of State, Division of Historical Resources.

Martin County will also notify the Division of Historical Resource to coordinate for the protection and management of these artifacts as required by Chapter 267 Florida Statutes, specifically sections 267.061 (2) (a) and (b). Martin County will submit a copy of any survey findings to the Division of Historical Resources for inclusion in the Florida Master Site File. If appropriate and feasible, all significant resources will be interpreted on site for the public.

4.0 LAND USE AND RECREATION COMPONENT

Offering and maintaining high-quality nature-based recreational opportunities is a key goal in Martin County's management of Halpatiokee Regional Park. The park's easily-accessible location off Interstate 95 together with the active recreation opportunities of lighted ballfields, tennis courts, skating rink, hiking, biking and paddling trails make it a highly attractive and well-used facility, both for youth team sports and backcountry recreation.

Following the acquisition of individual parcels, Martin County has been successful in opening each of the parcels in the Halpatiokee complex for the types and levels of public recreational activities that are appropriate and consistent with the conservation goals for which the parcels were acquired. Martin County has worked hard to create and maintain recreational opportunities that do not have significant adverse environmental impacts. By cultivating relationships with user groups, Martin County has been able to get feedback on the recreational opportunities it provides and be successful in recruiting representatives of user groups that provide assistance with the creation, maintenance and expansion of trails.

The majority of recreational infrastructure at Halpatiokee is on lands that are managed by Martin County's Parks and Recreation Department which are not part of this Management Plan for conservation areas. Infrastructure in the conservation areas consists of the culverts, footbridges and trail stabilization areas shown on Figure 12.

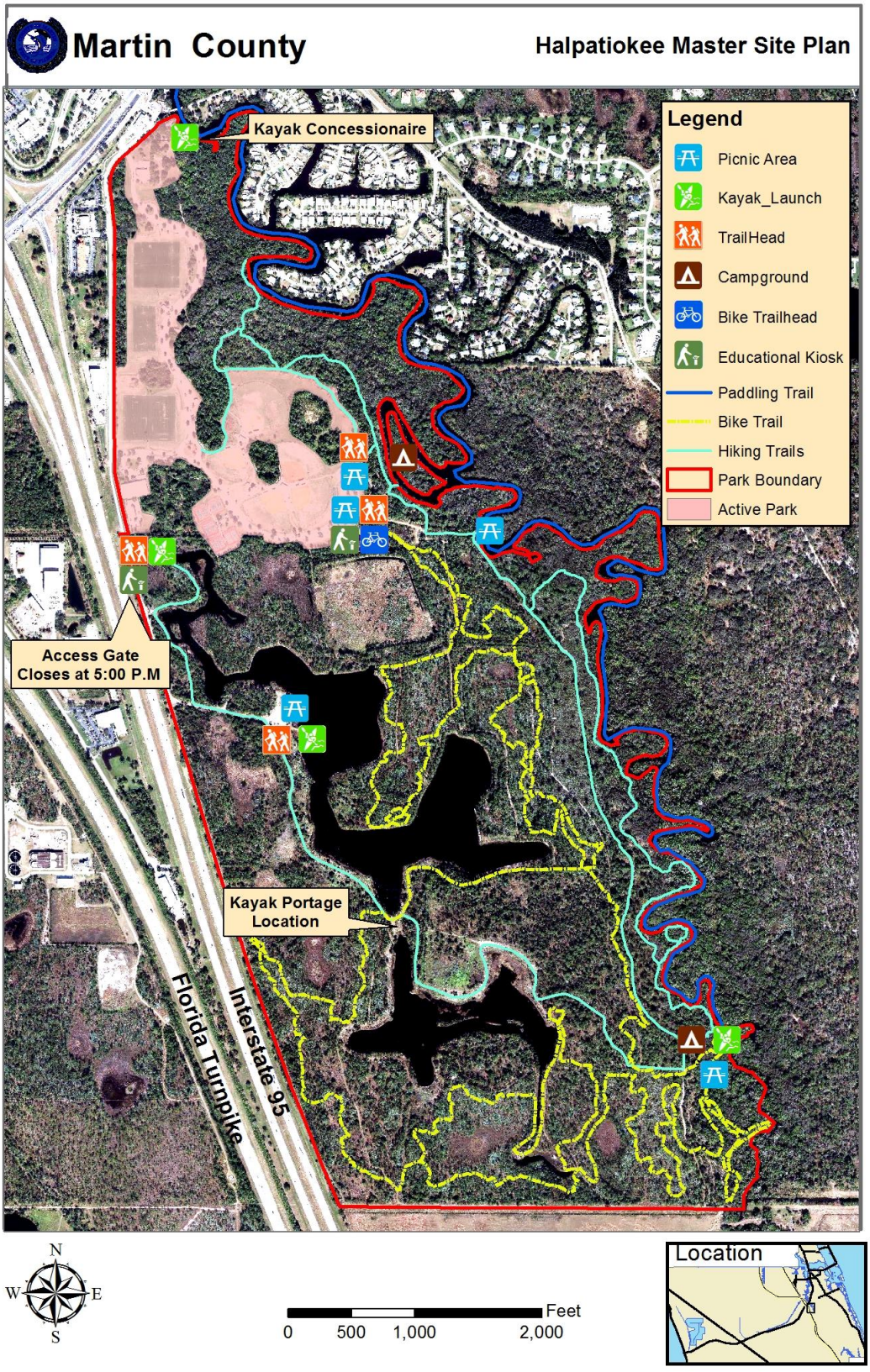


Figure 12 – Master Site Plan for Recreational Amenities

The park is open from sunrise to sunset. Recreational opportunities include:

- Approximately eight miles of hiking trails. The trail includes roughly three miles of the Florida Trail, pedestrian footbridges over waterways and a significant section along the South Fork;
- Approximately eight miles of off-road non-motorized biking trails;
- Picnic tables and park benches near the South Fork River along the hiking trails;
- A back-country campsite for primitive camping (available on a by-reservation-only basis);
- Access to a network of inter-connected man-made lakes for use of non-motorized vessels (i.e., canoes, kayaks);
- Kayak and canoe rental lease (through a concessionaire contractor) that includes a building and vessel launch area at the northeast corner of the property;
- Approximately 4.2 miles of paddling trail along the South Fork of the St. Lucie River adjacent to the properties (Figure 13), which is part of a county-wide Blueway paddling trail;
- Covered picnic shelters and pavilions (within the Regional Park); and
- Educational kiosks and signage that include maps and information about native flora and fauna.

Figure 13 - County-Wide Blueway Paddling Trail

Martin County has developed mutually beneficial relationships with several user groups at Halpatiokee. These include the following groups and areas of coordination:

Group	Area of Interest
Florida Trail Association	Hiking trails
Airborne Mountain Bike Club	Bike trails
Martin County Geocachers	Treasure-hunting advocates

A variety of other groups (e.g., Martin County Rocks, the Martin County Chapter of the Florida Native Plant Society, Boy Scouts of America, Girl Scouts of America, Audubon of Martin County, school groups, etc.) also use the property on an intermittent basis for field trips or other outings and activities.

Picnic shelters are also available for group use on an advanced-reservation basis.

Educational kiosks with maps and information are posted near trailheads.

While most users comply with park rules, Martin County has repeatedly suffered vandalism at Halpatiokee. Gates that secure the property during times when the park is closed have been destroyed, and off-road vehicles routinely impact the backcountry area, primarily near the canoe/kayak launch. Pet owners disregard park rules that require dogs be kept on leashes and that pet owners clean up pet waste. Interpretive signs have been vandalized and destroyed. Palmetto berries are harvested and transported off-site, reducing their productivity as food for native wildlife and reducing natural seed dispersal.

Occasionally, user groups request that Martin County consider creating additional recreational amenities, most recently the creation of an 18-hole disk golf course. Martin County evaluates these proposals on a case-by-case basis to determine their suitability and whether they will have a significant adverse effect on the natural resources for which the park was acquired.

As required in the Preserve Area Management Plan, the lease from the State and terms of the FCT grant, in general only passive recreation amenities (e.g., trails, boardwalks, benches, etc.) are allowed within the conservation areas of the property.

Key challenges involve separating incompatible user groups and disseminating information about recreational opportunities.

Martin County's relationship with the Florida Trail Association (FTA) goes back over a decade. FTA has created hiking trails and maintains them, which is particularly helpful after hurricanes, which can topple trees and make the trails temporarily impassible.

Similarly, Martin County's relationship with the Airborne Mountain Bike Club has been mutually beneficial. The Club has worked with Martin County regarding the layout for new trails. The Club maintains the trails and has stabilized areas of trails that are subject to erosion. The trails are open to Club members and the general public, and the adverse impacts of these trails on the ecology are minimal.

Martin County recently created a new canoe/kayak launch near the northwestern-most

shore of the north lake to allow paddlers the opportunity to have water access during periods when the main access to the primary launch is closed.

Canoe and kayak owners have created a new ingress/egress point onto the South Fork east of the existing trailhead.

The littoral zone enhancement project along the lakeshores has improved aesthetic and environmental conditions in both lakes. An on-going challenge for paddlers, however, is the lack of direct connection between the north and south lakes. The lakes are connected by a culvert that is adequate for water movement, but is too small for canoes and kayaks. Presently, the only public access to the south lake for paddlers is by portaging their craft approximately 200 feet across a land bridge. The pathway is relatively clear, but take-out and put-in locations are not groomed for easy use.

Thefts have occurred from vehicles parked at Halpatiokee while recreationists make use of trails and other recreational opportunities.

4.1 Proposed Recreational Enhancements

Martin County's Goal is to continue to provide high quality back-county recreational opportunities that do not have significant adverse effects on natural resources of the park.

Objective: Maintain collaborative relationships with existing user groups and consider entering into similar relationships with other potential future user groups who can assist in creating and maintaining trails and recreational infrastructure.

Activities: ER&M staff will maintain open dialog with representatives of existing user group constituencies and thoughtfully consider requests to expand, modify and/or create new recreational activities.

Martin County will post trail maps on its website, work with user groups to identify problems with existing trail signage and make improvements to trails and trail signage as appropriate. Improvements may also include "You are Here" maps, tree-blazing to more effectively separate user groups, and consideration of development of a system of Quick Response (QR) barcoded signs that will allow trail users to access trail maps and information about local flora and fauna while in the field.

The ER&M Division will consider working with Martin County TV to develop informational segments about Halpatiokee (and potentially other conservation lands managed by ER&M).

Martin County will continue maintaining trail systems on the property and consider requests to add new footpaths. Activities will include trail maintenance, boardwalk/ footbridge repairs, and sign replacement as necessary.
Martin County may consider, with respect to staffing constraints, working with existing and potential new user groups to establish guided tours and events to help park visitors learn more about local flora, fauna and recreational opportunities. Recreational activities

to be considered include field trips that highlight birds, plants, invasive flora and fauna, astronomy, geocaching, orienteering, back-country camping, fishing, and kayaking. If appropriate, the County may choose to enter into formal agreements with user groups to identify the responsibilities of each party.

Martin County's ER&M Division will continue to work with the County's Metropolitan Planning Organization and the state's Office of Greenways and Trails to create and enhance trail connections for bicyclists and pedestrians.

To encourage more active participation by residents and visitors, Martin County's ER&M Division will develop and maintain lists of projects that could be performed by Eagle Scout candidates, enrollees in the Florida Master Naturalist program and alternative spring break groups.

Martin County will evaluate engineering designs, permitting and costs for stabilizing existing take-out and put-in locations or otherwise improving the connection between the two lakes in a manner that will prevent the need for paddlers to portage between lakes. If funds cannot be allocated to facilitate this improvement, Martin County will improve shoreline conditions in take-out and put-in locations to enhance safety for paddlers.

Martin County will consider applying for grants that would help improve accessibility (e.g., kayak launch in the lake that meets the Americans with Disabilities Act, fishing pier, observation deck(s).

Martin County will evaluate conditions on the island in the South Fork and the informal canoe/kayak launch that has been created on the South Fork near the existing trailhead. In recognition that the steep banks that occur along the west side of the South Fork make creation of new paddling landfalls challenging, and in an effort to increase linkages with Atlantic Ridge Preserve State Park (ARPSP), Martin County will work with FDEP to assess the potential and determine budgets for creating new canoe/kayak landfall(s) and making any improvements that may be necessary to ensure their safe use.

Similarly, Martin County will work with ARPSP to discuss the feasibility of interconnecting hiking and/or biking trails between Halpatiokee and Atlantic Ridge.

ER&M staff will work with County Parks and Recreation staff, enforcement personnel and users to increase compliance with existing ordinances and park rules, to deter thefts from vehicles of park users and to prosecute individuals implicated in rule, law and/or ordinance violations.

If coordination with enforcement personnel reveals that changes to existing park rules, ordinances, statutes or laws are warranted to protect park resources (e.g., specific prohibitions referencing off-road vehicles, including power-assisted bicycles), Martin County will work with the appropriate level of jurisdiction to rectify existing shortcomings.

The measurable metrics for this goal shall include the number of new educational/awareness items (e.g., trail maps, trail signage improvements, trail linkages) that are produced or developed on an annual basis.

4.2 Carrying Capacity

Although weekends and holidays are times of highest use of Halpatiokee's hiking, biking and paddling trails, efforts to physically separate trails for incompatible user groups has been largely successful in preventing problems between users.

Upon occasion, trails get busy, users disregard cautions to stay on trails designated for their use, and repeated use of specific trail routes may result in rutting of trails.

Thus far, the existing levels of use have not required that Martin County consider restricting numbers of users, other than through posted open hours. Issues of carrying capacity may be re-evaluated during the next 10-years in coordination with the Martin County Parks Department as needed.

No less frequently than annually, ER&M staff will evaluate the conditions of the trails, collaborate with the maintaining entities, and determine if rutting or other trail impacts are severe enough that trails, or sections thereof, warrant being moved or restored.

4.3 Optimal Boundary

The concept of optimal (or optimum) boundary is that, over time, modification of a park's boundary may be desired for one or more purposes. At times, land acquisitions may involve purchasing portions of tracts that do not meet the requirements or needs of the acquiring entity (e.g., homes that are situated on the property being acquired). At other times, a park owner may want to acquire adjacent or adjoining properties that will enhance the natural resource protections and/or recreational amenities or increase and management efficiency.

It is recognized that Martin County's ownership of approximately 500 acres of conservation lands at Halpatiokee is a minor holding in relation to the adjacent 4,800+ acres of state-owned lands that comprise the Atlantic Ridge Preserve State Park (ARPSP). Cumulatively these public lands conserve a significant portion of the upstream watershed of the natural portion of the South Fork of the St. Lucie River.

However, a critical component for the protection of any watershed is the control of its headwaters. Presently, a hog-wire fence separates the southern boundary of the parcels that are included in this management plan from adjoining lands to the south. The fence presently extends across the South Fork, restricting paddler's access to navigable waters further upstream.

The land immediately upstream (south) of the existing park boundary is largely in its natural condition. Some of the upland portions have been converted to bahia pasture for cattle or are managed for sod. To date, the upper reaches of the South Fork and its associated wetlands and wetland buffers appear from Google Earth images to be primarily intact.

In evaluating the potential benefits of acquiring additional lands adjoining Halpatiokee,

Martin County has consulted the Management Plan for the Atlantic Ridge Preserve State Park. Lands identified by FDEP for potential expansion at Atlantic Ridge are shown on Figure 14.

Preservation of all or a portion of these headwaters through public acquisition or another conservation mechanism (e.g., conservation easement) would accomplish three primary purposes. First and foremost, it would permanently conserve the headwaters of the South Fork. Secondly, restoration of terrestrial areas that are presently in agricultural land use would reduce the risk that water quality in the South Fork would be adversely affected through the continued application of fertilizers, herbicides, and/or other agricultural practices. Finally, considering the improved pasture condition of part of the tract, opportunities would exist for creating new recreational activities (e.g., trails for dirt bikes and/or off-road ATV use) that would not be appropriate for lands that are in their natural state.

In its Unit Management Plan for ARPSP, on the issue of state acquisition of these adjoining lands, FDEP states:

> "These lands are considered important in protecting one of the largest patches of natural land left on this coast – conserving an important scrub, pine flatwoods, marshes, and the floodplain of the South Fork of the St. Lucie River, protecting the quality of water in the St. Lucie and Loxahatchee River basins, and allowing the public to enjoy the original landscape of this fast-growing area."

Additionally, it should be noted that lands identified on the optimal boundary map in both this Plan and the ARPSP Unit Management Plan are solely for planning purposes and not for regulatory purposes. A parcel's identification on the optimum boundary map is not for use by any party or other government body to reduce or restrict the lawful right of private landowners.

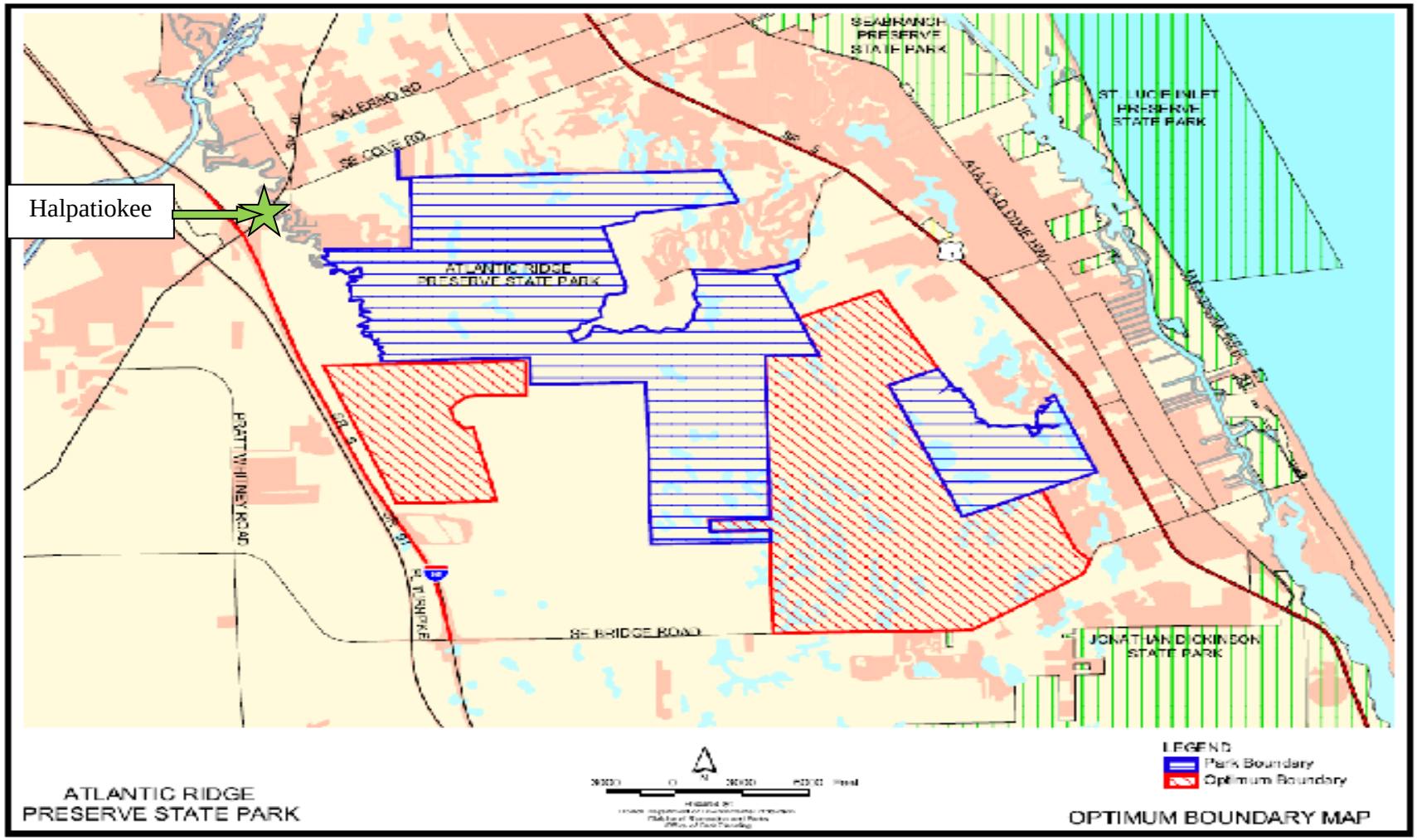


Figure 14 - Atlantic Ridge Preserve State Park – Optimum Boundary

Source: Unit Management Plan for Atlantic Ridge Preserve State Park, FDEP 2005

Identification on the map does not permit or allow any government entity to impose additional or more restrictive environmental land use or zoning regulations. Identification is not to be used as the basis for permit denial or imposition of permit conditions.

The optimum boundary map reflects lands identified as being desirable to enhance the values of the park. The parcel includes privately-owned lands that improve the continuity of existing park lands, provide additional natural and cultural resource protection and allow for future expansion of recreational activities.

Martin County's Goal is to collaborate with adjoining property owners to use fee acquisition, conservation easements and/or other tools to permanently conserve and protect water quality in the South Fork of the St. Lucie River.

Objective: Establish and maintain collaborative relationships with other owners and managers of public lands along the South Fork to accomplish mutual goals for natural resource conservation.

Action: Martin County will remain engaged with management at Atlantic Ridge Preserve State Park and support efforts the state may make to acquire properties within the headwaters of the South Fork and to create trail linkages between Halpatiokee and Atlantic Ridge.

Although there is no measureable metric for this goal, the County will coordinate and continually communicate with Florida State Park Service personnel and adjoining property owners regarding potential expansion of the regional park/preserve system.

4.4 Budget

Martin County's Ecosystem Restoration and Management Division is responsible for management of more than 20 properties, which range in size from small, oceanfront tracts to properties over 3,000 in size (i.e. Pal-Mar east). No admission fee is presently charged for access to Halpatiokee, and none is proposed. Funds for management and improvements are appropriated through the County's annual budgeting process. In an effort to minimize costs to taxpayers, property improvements are often accomplished when grant applications are successful.

Funds are required for property management, eradication/control of invasive species, fire management, and management of natural and recreational resources. Order of magnitude estimates of financial needs over the ten year cycle of this Management Plan are shown in Table 7.

The County generates no direct income through the use of the conservation lands at Halpatiokee. However, concessionaires under contract with the County's Parks and Recreation Department provide food and beverage sales in active, team recreation areas and rentals of kayaks and canoes for use on the South Fork and the lakes.

Table 7

Budget Estimates

Activity	Year 1 ($)	Estimate over 10 yr life of Mgmt Plan [1]	Comments/Explanation
Invasive Plant Mgmt (Uplands)	65,000	900,000	Annual costs may decrease as populations of invasives are controlled
Invasive Plant Mgmt (Lakes)	5,000	70,000	Annual costs may decrease as populations of invasives are controlled
Footbridge Repair & Replacement	N/A	$40,000	$15,000 in 2021 and 25,000 in 2026 Assumes no new structures
Trail Maintenance	5,000	70,000	Assumes partnerships with user groups continue
Fire Management	15,000	200,000	Includes creation & maintenance of firebreaks, mechanical fuel load reduction, Mgmt burns
Interpretive Sign Replacement	N/A	15,000	New signs & kiosks recently installed
Floristic Survey	N/A	5,000	Req'd by FCT, to be performed in 2026
Update of Land Mgmt Plan	N/A	80,000	Req'd by FCT and FDEP, to be performed in 2027
Totals:	90,000	1,380,000	

[1] Assume 6% increase/yr, unless otherwise noted

In addition to the management costs described above, there are additional staff costs (salary, benefits, fringe, etc.) that will expend their time dedicated to the management and assessment of the Halpatiokee conservation areas.

4.5 Schedule for Implementation

Most activities called for in this plan (e.g., treatment of invasive species, trail maintenance, etc.) are on-going activities. Others (e.g., completing an updated floristic survey) have more specific time frames. The times for these activities to be conducted during the ten-year span of this Management Plan are shown on Table 8.

Progress on the actions identified in Sections 3 and 4 will be evaluated on a regular basis. Interim objectives may be identified, and adjustments made as funds and time allow.

Table 8
Schedule for Implementation

Activity	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Inspections by staff										
Invasive Plant Mgmt (Uplands)										
Invasive Plant Mgmt (Lakes)										
Footbridge Repair & Replacement										
Trail Maintenance										
Develop Fire Mgmt Plan & implement fire education program										
Fire Management/Fuel load reduction										
Interpretive Sign Replacement										
Hydrologic Improvements										
Determine if species of *Polygala* is *smallii*										
Floristic Survey										
Change the Land Use on Parcel # 08-39-41-000-001-0000-3										
Update Land Mgmt Plan										

References and Literature Cited

Florida Department of Agriculture and Consumer Services, Florida Administrative Code, Chapter 5B-40.0055Regulated Plant Index.

Florida Department of Environmental Protection, 2005. Unit Management Plan for Atlantic Ridge Preserve State Park.

Florida Department of Environmental Protection, 2012. Unit Management Plan for Jonathan Dickinson State Park.

Florida Fish and Wildlife Conservation Commission, 2017. Florida's Endangered and Threatened Species.

Florida Statutes, the Division of Historical Resources, Chapter 267

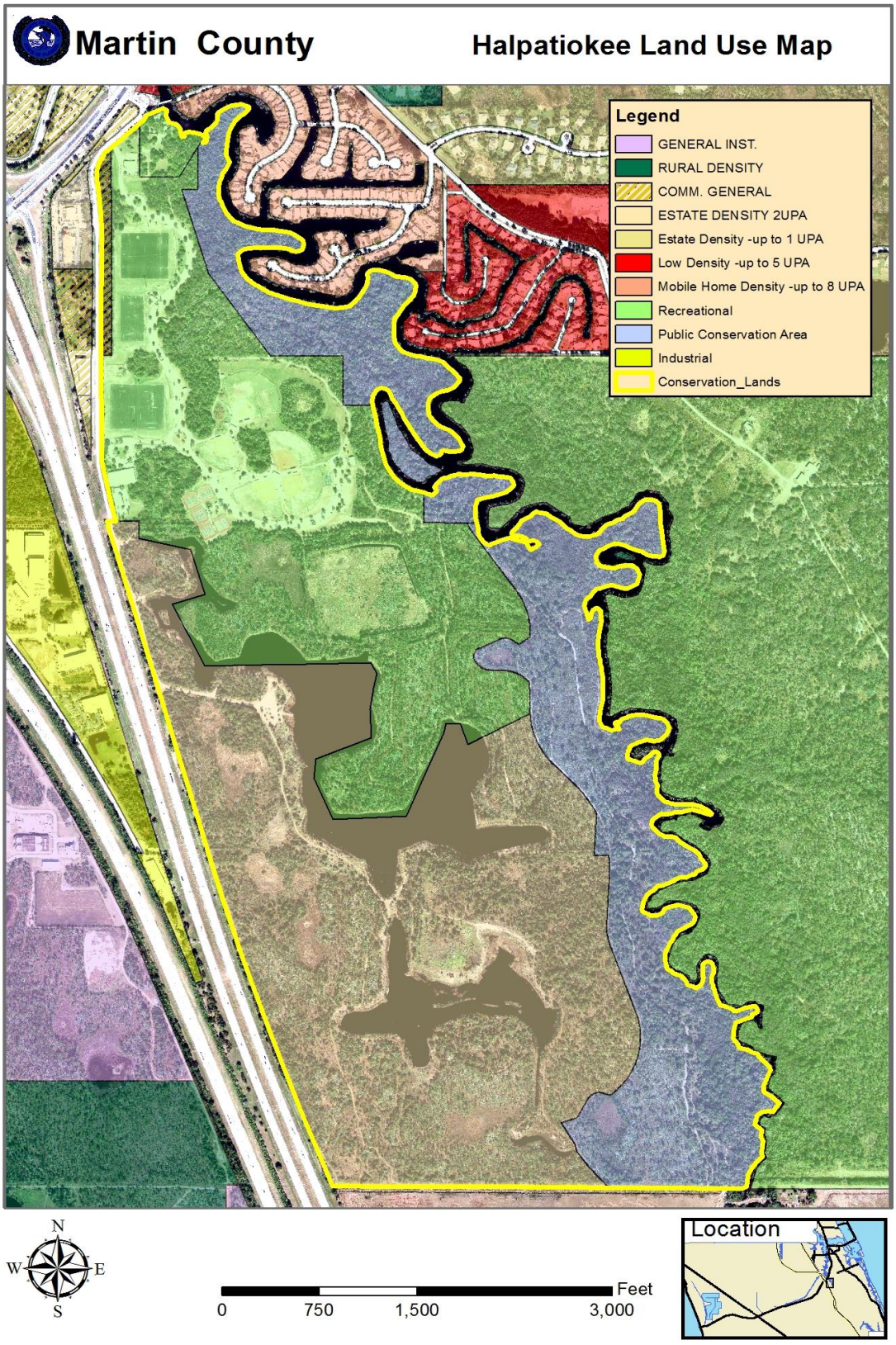
Florida Statutes, Division of State Lands, Chapter 259, Section 032

Larson, Barbra and J. Howard Frank, Mexican Bromeliad Weevil (suggested common name), Metamasius callizona (Chevrolat) (Insecta: Coleoptera:Curculionidae). University of Florida – Institute of Food and Agricultural Sciences, Technical Publication # EENY161.

Wunderlin, R. P., B. F. Hansen, A. R. Franck, and F. B. Essig. 2017. Atlas of Florida Plants (http://florida.plantatlas.usf.edu/).[S. M. Landry and K. N. Campbell (application development), USF Water Institute.] Institute for Systematic Botany, University of South Florida, Tampa

Appendix A

Land Use Map of Park and Vicinity


Martin County
Halpatiokee Land Use Map
Legend
GENERAL INST.
RURAL DENSITY
COMM. GENERAL
ESTATE DENSITY 2UPA
Estate Density -up to 1 UPA
Low Density -up to 5 UPA
Mobile Home Density -up to 8 UPA
Recreational
Public Conservation Area
Industrial
Conservation_Lands
N
W
E
S
0
750
1,500
3,000
Feet
Location

Appendix B

Parcel Summary Maps and Legal Descriptions


Halpatiokee PCN - 05-39-41-000-000-00030-5
SW Gaines Ave
SW Kanner Hwy
SW Lost River RD
Legend
Roads
EXP
MAA; MAC; MIA; PKY
MIC
RES; RMP
Airport
Parcel Polygons
Parcel Backlines
Parcel Easements
Red: Red
Green: Green
Blue: Blue
0
690
Feet
Date: 3/30/2017
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Author: Martin County, GIS
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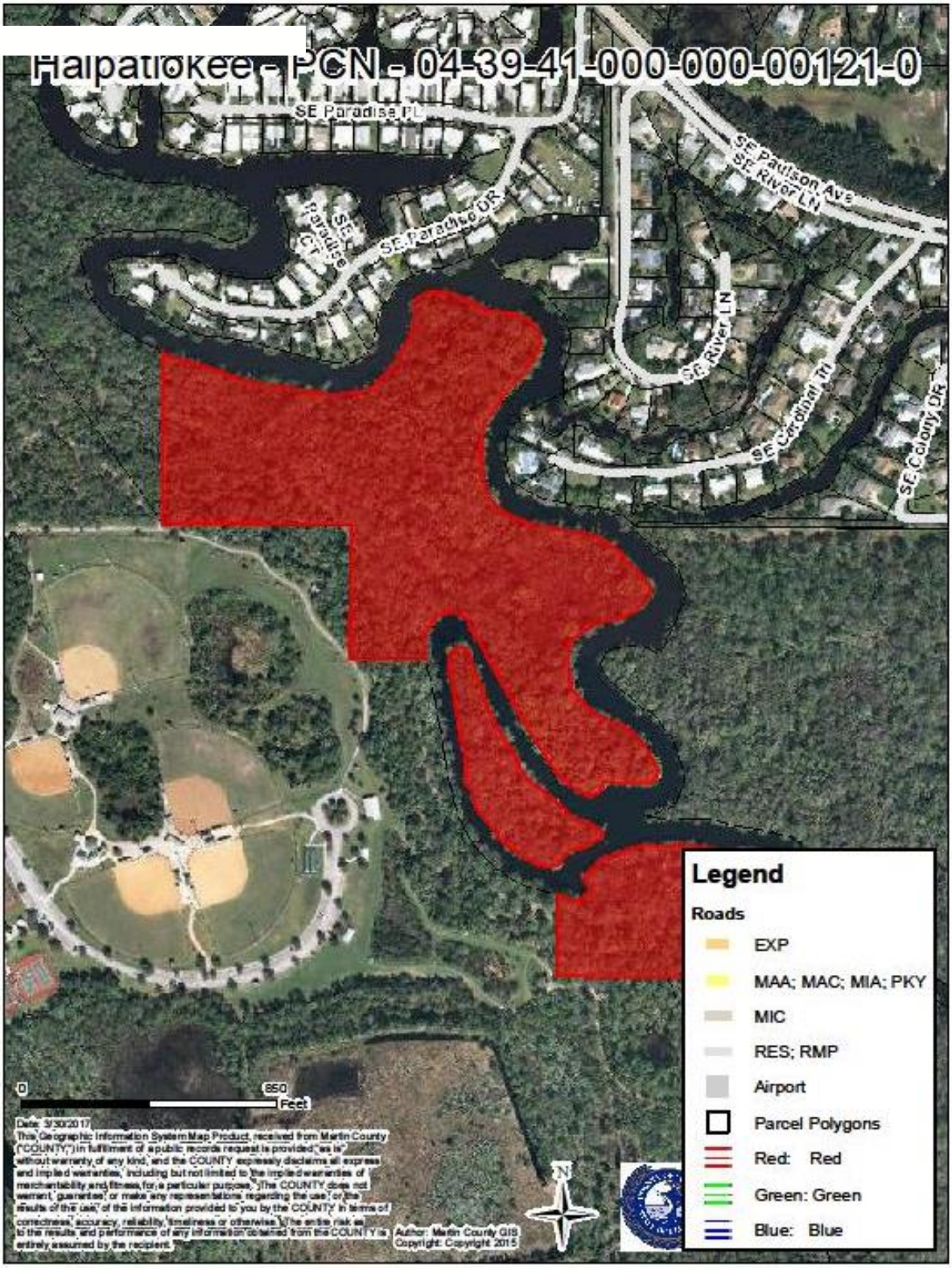
Halpatiokee - PCN - 04-39-41-000-000-00121-0
SE Paradise PL
SE Paradise DR
SE Paulson Ave
SE River LN
SE River LN
SE Cardinal LN
SE Colony DR
Legend
Roads
EXP
MAA; MAC; MIA; PKY
MIC
RES; RMP
Airport
Parcel Polygons
Red: Red
Green: Green
Blue: Blue
0
850
Feet
Date: 3/30/2017
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Author: Martin County GIS
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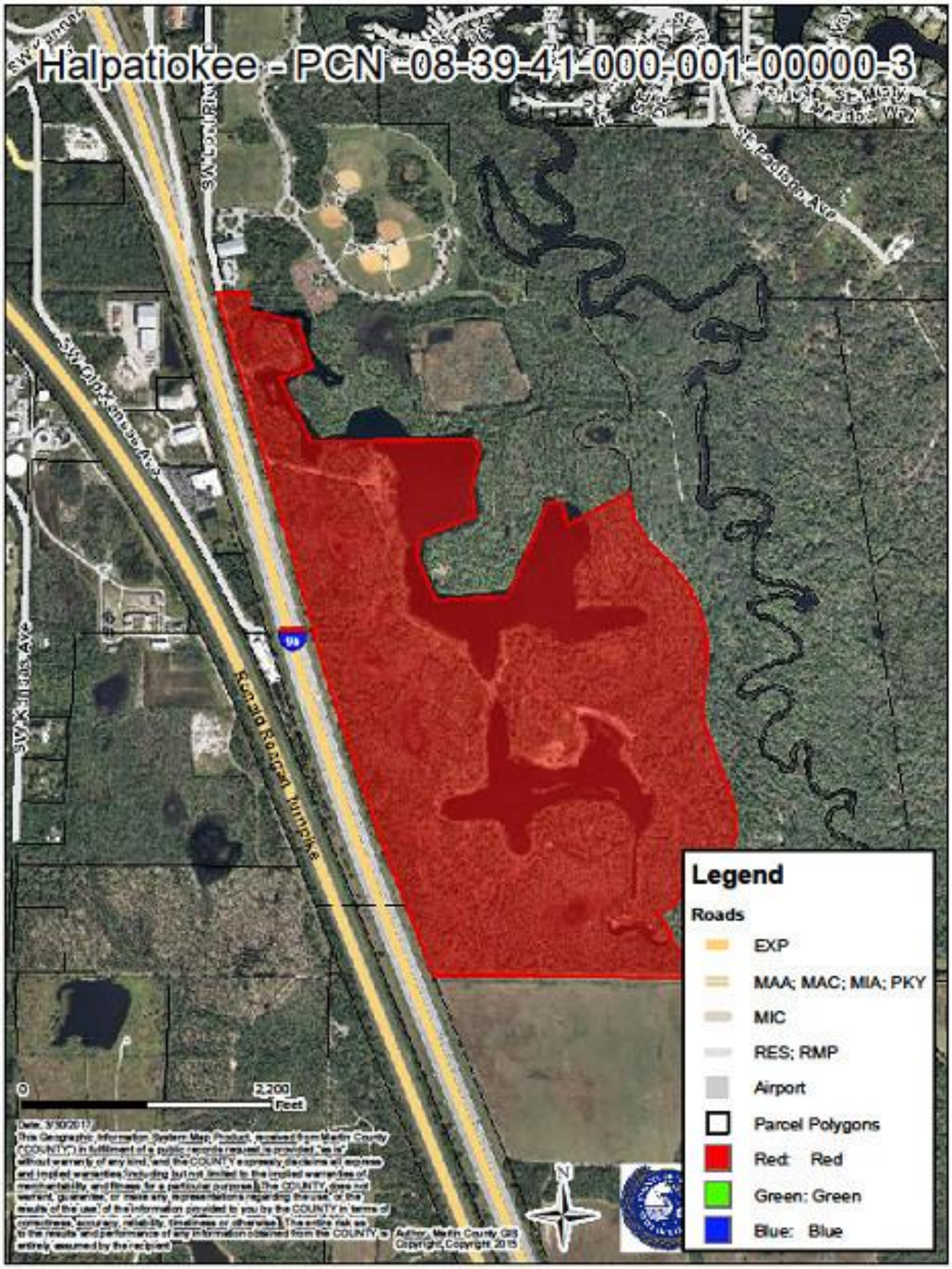
N


Halpatiokee - PCN -08-39-41-000-001-00000-3
Ronald Reagan Turnpike
SW Kanner Ave
SW Locks Rd
SW Pratt Whitney Rd
Legend
Roads
EXP
MAA; MAC; MIA; PKY
MIC
RES; RMP
Airport
Parcel Polygons
Red: Red
Green: Green
Blue: Blue
0
2,200
Feet
N
Author: Martin County GIS
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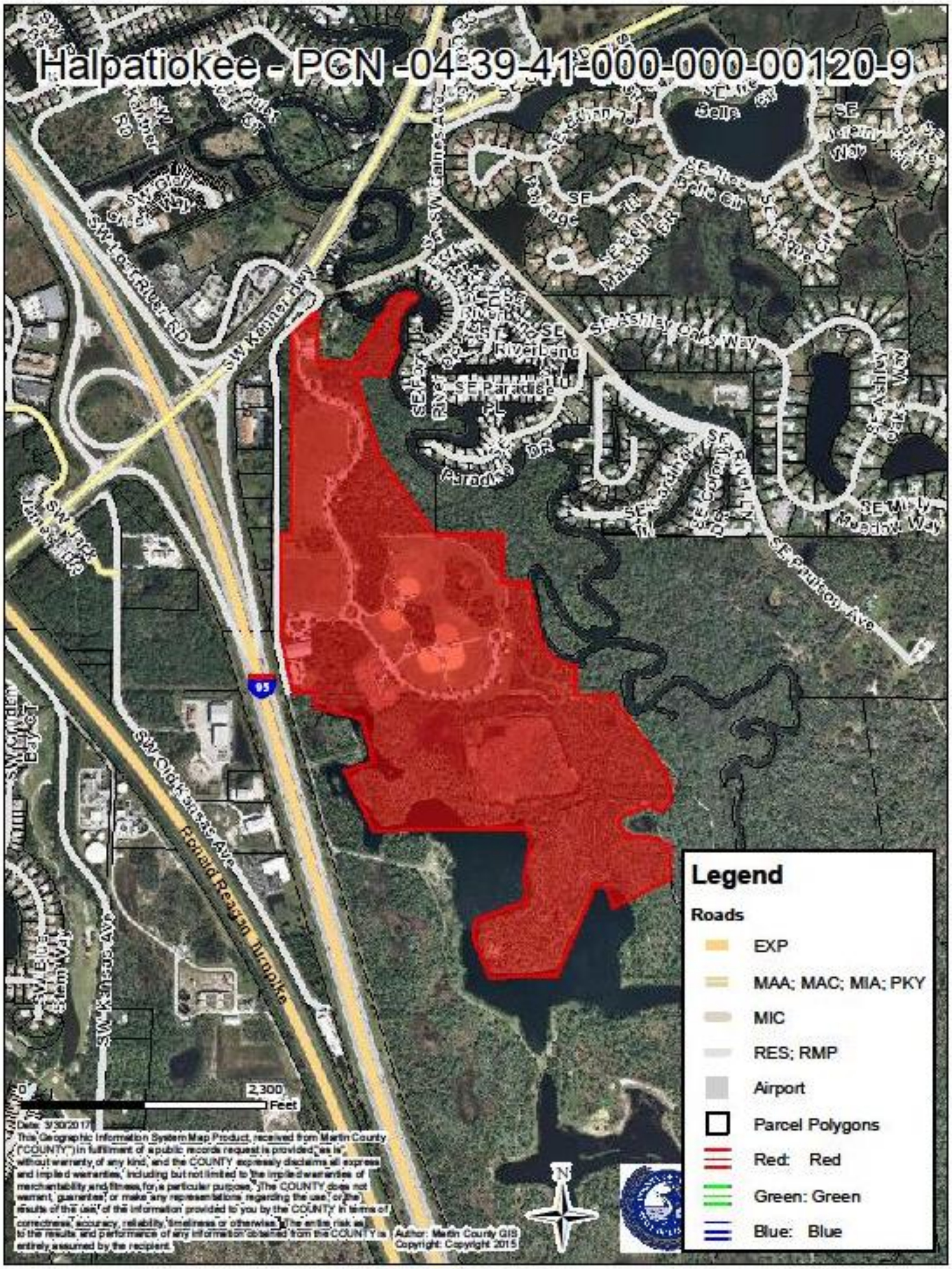

Halpatiokee - PCN -04-39-41-000-000-00120-9
Legend
Roads
EXP
MAA; MAC; MIA; PKY
MIC
RES; RMP
Airport
Parcel Polygons
Red: Red
Green: Green
Blue: Blue
0
2,300
Feet
Date: 3/30/2017
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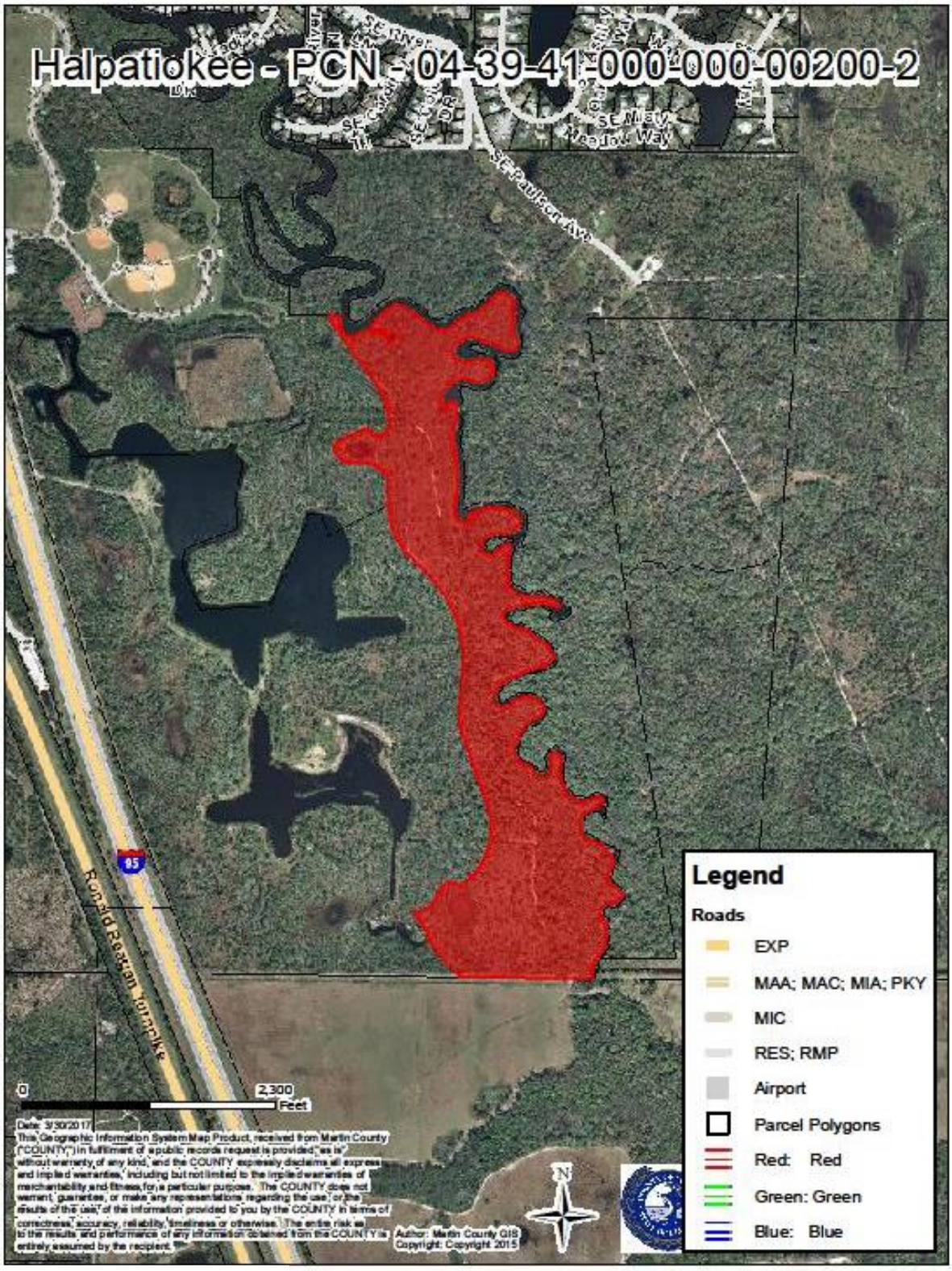
Copyright: Copyright 2015
SW Kanner Hwy
SE Paradise PL
SE Riverbend
SE Ashley Oaks Way
SE Paulson Ave
SW Old Kansas Ave
Ronald Reagan Turnpike
95


Halpatiokee - PCN -05-39-41-000-000-00041-0
SE Riverbend ST
SE Fork River DR
SE Fork Ct
SE Paradise PL
SE Paradise Ct
SE Paradise DR
12
COVE LOTS
Legend
Roads
EXP
MAA; MAC; MIA; PKY
MIC
RES; RMP
Airport
Parcel Polygons
Parcel Backlines
Parcel Easements
Red: Red
Green: Green
Blue: Blue
0
550
Feet
N
Author: Martin County GIS
Copyright. Copyright 2015


Halpatiokee - PCN - 04-39-41-000-000-00200-2
SE Paulen Ave
SE May Meadow Way
Ronald Reagan Turnpike
95
0
2,300
Feet
Date: 3/30/2017
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Author: Martin County GIS
Copyright: Copyright 2015
N
Legend
Roads
EXP
MAA; MAC; MIA; PKY
MIC
RES; RMP
Airport
Parcel Polygons
Red: Red
Green: Green
Blue: Blue

Legal Descriptions of 100-Acre "Otter Creek" parcel leased from the State of Florida

C-16001

EXHIBIT "A"

Legal Description

Being a parcel of land lying in Sections 4 and 9, Township 39 South, Range 41 East, Martin County, Florida.

All that part of the Easterly 800 feet of the southeast one quarter (S.E. 1/4) of the Southwest one quarter AND all of that part of the Westerly 400 feet of the Southwest one-quarter (S.W. 1/4) of the Southeast one-quarter (S.E. 1/4) of Section 4,Township 39 South, Range 41 East lying southerly of the South Fork of the St. Lucie River.

AND

All of that part of section 9, Township 39 South, Range 41 East lying Westerly and Southerly of the South Fork of the St. Lucie River and lying Easterly of the following described line:

Commence at the Northwest Corner of said Section 9; thence South 89°46'18" East along the North line of said Section 9, a distance of 1500.98 feet to the POINT OF BEGINNING; thence South 22°03'18" East, a distance of 61.00 feet; thence South 39°03'18" East, a distance of 600.00 feet to the beginning of a curve concave Southwesterly having a radius of 570.00 feet; thence along the arc of said curve a distance of 387.45 feet through a central angle of 38°56'46"; thence South 53°40'28" West, a distance of 107.87 feet; thence North 57°29'55" West, a distance of 58.24 feet to the beginning of a curve concave Southerly having a radius of 110.00 feet; thence Westerly along the arc of said curve, a distance of 110.43 feet through a central angle of 57°31'13"; thence South 64°58'52" West, a distance of 194.72 feet; thence South 24°52'57" West, a distance of 39.41 feet; South 33°50'21" East a distance of 47.95 feet to the beginning of a curve concave Northeasterly having a radius of 125.00 feet; thence Southeasterly along the arc of said curve a distance of 88°59'39" East, a distance of 96.63 feet to the beginning of a curve concave Southwesterly having a radius of 275.00 feet; thence Southeasterly along the arc of said curve a distance of 230.39 feet through a central angle of 48°00'03"; thence South 02°03'51" East non-tangent to the last described curve a distance of 250.58 feet to the beginning of a curve oncave Northeasterly having a radius of 600.00 feet; thence Southeasterly along the arc of said curve a distance of 450.55 feet through a central angle of 43°01'29"; thence South 45°05'20" East a distance of 229.92 feet to the beginning of a curve concave Southwesterly having a radius of 915.00 feet; thence Southerly along the arc of said curve a distance of 764.11 feet through a central angle of 47°50'50"; thence South 02°56'10" West, a distance of 393.13 feet to the beginning of a curve concave Easterly having a radius of 550.00 feet; thence Southerly along the arc of said curve a distance of 224.87 feet through a central angle of 23°25'32"; thence South 20°29'22" East, a distance of 545.23 feet to the beginning of a curve concave Westerly having a radius of 575.00 feet; thence Southwesterly along the arc of said curve a distance of 746.17 feet through a central angle of 74°21'07"; thence North 72°57'35" West non-tangent to the last described curve a distance of 54.93 feet to the beginning of a curve concave Southerly

having a radius of 100.00 feet; thence, Southwesterly along the arc of said curve a distance of 135.97 feet through a central angle of 77°54'26"; thence South 29°07'59" West a distance of 173.13 feet; thence South 73°07'59" West a distance of 130.00 feet; thence South 31°52'01" East a distance of 200.00 feet; thence South 15°52'01" East, a distance of 65.00 feet; thence 43°22'01" East, a distance of 215.38 feet to a point in the South line of Section 9, Township 39 South, Range 41 East, and the POINT OF TERMINATION of said line; thence for reference run North 89°39'23" West along said South line a distance of 296.95 feet to the South quarter section corner of said Section 9; thence North 89°38'48" West along said South line a distance of 1830.60 feet to a point in the Easterly right-of-way line of I-95 (S.R. No. 9); thence continue North 89°38'48" West a distance of 815.13 feet to the Southwest corner of said Section 9.

Containing 100.00 acres, more or less.

Legal Description of 248-acre “South Fork Addition” leased from the State of Florida

EXHIBIT "A"

LEGAL DESCRIPTION OF THE LEASED PREMISES

Exhibit "A"
Tract No. XI-100-027

A parcel of land lying in Sections 8 and 9, Township 39 South, Range 41 East, Martin County, Florida, being more particularly described as follows:

Commence at the Northeast corner of said Section 8; thence North 89°42'17" West, along the North line of the aforesaid Section 8, a distance of 1016.05 feet to the Northwest corner of those lands described in Official Records Book 1352, Page 0021, Public Records of Martin County, Florida, said point also being the POINT OF BEGINNING of the herein described lands; thence, departing the North line of Section 8, along the Westerly and Southerly courses of said lands described in Official Records Book 1352, Page 0021, the following courses and distances: South 00°17'43" West, a distance of 102.84 feet to a point on the approximate existing top of bank of a lake; thence South 05°38'13" West, along said approximate existing top of bank, a distance of 34.00 feet; thence entering the waters of said lake, by the following courses and distances: South 77°48'37" East, a distance of 406.60 feet;
thence South 16°36'36" East, a distance of 375.07 feet;
thence South 72°38'00" West, a distance of 260.00 feet;
thence South 26°35'16" East, a distance of 554.74 feet;
thence North 88°48'59" East, a distance of 1,274.43 feet;
thence South 27°48'48" East, a distance of 95.03 feet;
thence South 10°04'29" West, a distance of 295.93 feet;
thence South 03°34'05" East, a distance of 225.30 feet;
thence South 68°56'46" West, a distance of 457.90 feet;
thence South 05°53'30" West, a distance of 156.24 feet;
thence South 23°50'51" East, a distance of 362.85 feet;
thence North 87°01'07" East, a distance of 562.67 feet;
thence North 23°21'05" East, a distance of 727.95 feet;
thence North 12°31'18" East, a distance of 75.00 feet;
thence South 87°30'19" East, a distance of 112.46 feet;
thence South 18°42'48" East, a distance of 175.00 feet;
thence North 62°55'49" East, a distance of 151.17 feet to a point on the approximate existing top of bank of said lake; thence, departing the waters of said lake; continue North 62°55'49" East, a distance of 389.49 feet to a point on the Westerly boundary of the South Florida Water Management District property described in Official Records Book 748, Page 516, Martin County, Florida; thence along said Westerly boundary by the following courses and distances: South 02°01'35" East, a distance of 1.13 feet to the beginning of a curve concave Northeasterly, having a radius of 600.00 feet and a central angle of 43°01'29"; thence Southeasterly along the arc of said curve to the left, a distance of 450.55 feet to the end of said curve; thence South 45°03'04" East, a distance of 229.92 feet to the beginning of a curve, concave Southwesterly, having a radius of 915.00 feet and a central angle of 47°50'50"; thence Southerly along the arc of said curve to the right, a distance of 764.11 feet to the end of said curve; thence South 02°58'26" West, a distance of 393.13 feet to the beginning of a curve, concave Easterly, having a radius of 550.00 feet and a central angle of 23°25'52"; thence Southerly, along the arc of said curve to the left, a distance of 224.92 feet to the end of said curve; thence South 20°27'06" East, a distance.

of 545.23 feet to the beginning of a curve, concave Northwesterly, having a radius of 575.00 feet and a central angle of 74°21'07"; thence Southwesterly along the arc of said curve to the right, a distance of 746.17 feet; thence North 72°55'19" West, non-tangent to the last curve, a distance of 54.93 feet to the beginning of a curve, concave Southeasterly, having a radius of 100.00 feet and a central angle of 77°54'26"; thence Southwesterly along said curve to the left, a distance of 135.97 feet to the end of said curve;
thence South 29°10'15" West, a distance of 173.13 feet;
thence South 73°10'15" West, a distance of 130.00 feet;
thence South 31°49'45" East, a distance of 200.00 feet;
thence South 15°49'45" East, a distance of 65.00 feet;
thence South 37°49'45" East, a distance of 165.00 feet;
thence South 43°19'45" East, a distance of 213.02 feet to the South line of Section 9, Township 39 South, Range 41 East; thence, along the South line of said Section 9 and departing the West line of those lands described in the aforesaid Official Records Book 748, Page 516, North 89°38'44" West, a distance of 291.71 feet to the South one quarter corner of said Section 9; thence North 89°38'59" West, along the South line of the aforesaid Section 9, a distance of 1830.91 feet to the Easterly Right-of-Way line of Interstate 95, as shown on Sheet 5 of the Florida Department of Transportation Right-of-Way map of State Road 9 (I-95) Section 89095-2410, last revised on 2/1/85; thence, along the Easterly Right-of-Way line of said State road 9 (I-95), the following courses and distances: North 22°16'13" West, a distance of 350.96 feet to the beginning of a curve, concave Northeasterly, having a radius of 24,381.33 feet and a central angle of 05°51'42"; thence, along the arc of said curve to the right, a distance of 2494.34 feet to the end of said curve; thence North 16°24'31" West, a distance of 2744.10 feet to the intersection with the North line of the aforesaid Section 8; thence along the North line of said Section 8, South 89°42'17" East, a distance of 252.17 feet to the Point of Beginning.

Containing 247.34 acres, more or less.

R:\legals\atlantic\100-027.lgl
December 3, 1999

LEGAL DESCRIPTION
Kimmens 12/22/99
Date

Legal Description for parcels included in the Grant Award Agreement between the Florida Communities Trust and Martin County

EXHIBIT A

LEGAL DESCRIPTION

THREE PARCELS OF LAND LYING IN SECTION 4 AND 5, TOWNSHIP 39 SOUTH, RANGE 41 EAST, MARTIN COUNTY, FLORIDA. SAID PARCELS BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

PARCEL NO. 1:

BEGINNING AT THE INTERSECTION OF THE NORTH LINE OF THE SOUTHEAST 1/4 OF SAID SECTION 5 WITH THE WESTERLY SHORELINE OF THE SOUTH FORK OF THE ST. LUCIE RIVER; THENCE SOUTH 89° 49' 36" WEST, ALONG SAID NORTH LINE, A DISTANCE OF 267.5 FEET, MORE OR LESS, TO A POINT LYING 665.93 FEET EAST OF AS MEASURED ALONG SAID NORTH LINE, THE NORTHWEST CORNER OF THE NORTHEAST 1/4 OF THE SOUTHEAST 1/4 OF SAID SECTION 5; THENCE SOUTH 17° 20' 52" EAST, A DISTANCE OF 698.80 FEET; THENCE SOUTH 35° 09' 02" EAST, A DISTANCE OF 805.88 FEET TO THE NORTHEAST CORNER OF THE SOUTHEAST 1/4 OF THE SOUTHEAST 1/4 OF SAID SECTION 5; THENCE NORTH 89° 58' 59" EAST, A DISTANCE OF 560.00 FEET TO REFERENCE POINT "A"; THENCE SOUTH 00° 00' 00" EAST, A DISTANCE OF 395.00 FEET; THENCE NORTH 90° 00' 00" EAST, A DISTANCE OF 214.50 FEET, MORE OR LESS TO THE ABOVE MENTIONED WESTERLY SHORELINE OF THE ST. LUCIE RIVER; THENCE MEANDERING IN A GENERAL NORTHWESTERLY DIRECTION, A DISTANCE OF 6310 FEET, MORE OR LESS TO THE POINT OF BEGINNING.

SUBJECT TO A 100 FOOT EASEMENT FOR ACCESS PURPOSES WITH THE NORTH LINE OF SAID EASEMENT BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

BEGINNING AT THE AFOREMENTIONED REFERENCE POINT "A"; THENCE NORTH 89° 58' 59" EAST, A DISTANCE OF 500 FEET, MORE OR LESS, TO THE WESTERLY SHORELINE OF THE SOUTH FORK OF THE ST. LUCIE RIVER.

PARCEL NO. 2:

TREASURE ISLAND, BEING PART OF THE SOUTH ONE-HALF OF THE SOUTHWEST ONE-QUARTER OF SAID SECTION 4, BOUNDED BY THE WATERS OF THE WEST CHANNEL OF THE SOUTH FORK OF THE ST. LUCIE RIVER.

PARCEL NO. 3:

COMMENCING AT THE S.W. CORNER OF SAID SECTION 4; THENCE SOUTH 89° 56' 00" EAST, ALONG THE SOUTH LINE OF SAID SECTION 4, A DISTANCE OF 1170.00 FEET TO THE POINT OF BEGINNING; THENCE NORTH 00° 32' 34" WEST, PARALLEL TO THE WEST LINE OF SAID SECTION 4, A DISTANCE 210 FEET, MORE OR LESS, TO THE SOUTHERLY SHORELINE OF THE SOUTH FORK OF THE ST. LUCIE RIVER, THENCE EASTERLY AND SOUTHERLY ALONG SAID SHORELINE, A DISTANCE OF 1330 FEET, MORE OR LESS, TO THE INTERSECTION WITH THE SOUTH LINE OF SAID SECTION 4; THENCE NORTH 89° 56' 00" WEST, ALONG SAID SOUTH LINE, A DISTANCE OF 403 FEET, MORE OR LESS, TO THE POINT OF BEGINNING.

/data/eng/sr/legals/ottercrk.leg

LEGAL DESCRIPTION

AN EASEMENT FOR ACCESS PURPOSES BEING A PORTION OF THE NORTH 50.00 FEET OF THE SOUTH 65.00 FEET OF SECTIONS 4 AND 5, TOWNSHIP 39 SOUTH, RANGE 41 EAST, MARTIN COUNTY, FLORIDA.

BOUNDED ON THE WEST BY THE EASTERLY RIGHT-OF-WAY LINE OF PARCEL 100, PART B, FEE SIMPLE RIGHT-OF-WAY AS DESCRIBED IN O.R. BOOK 620, PAGE 349.

BOUNDED ON THE EAST BY THE WEST LINE OF PARCEL NO. 3 UPLAND "F", ACCORDING TO THE SPECIFIC PURPOSE SURVEY BY G.C.Y., INC., CIVIL ENGINEERS & LAND SURVEYORS AT 1505 S.W. MARTIN HWY., PALM CITY, FLORIDA FOR MARTIN COUNTY OTTER CREEK ADDITION, FILE AND DRAWING NO. 93-1001-06-01, SHEET 2 OF 6, DATED NOVEMBER, 1994.

/data/eng/sr/legals/ottercrk.leg

Appendix C

Natural Resource Conservation Service Soils Report

United States Department of Agriculture

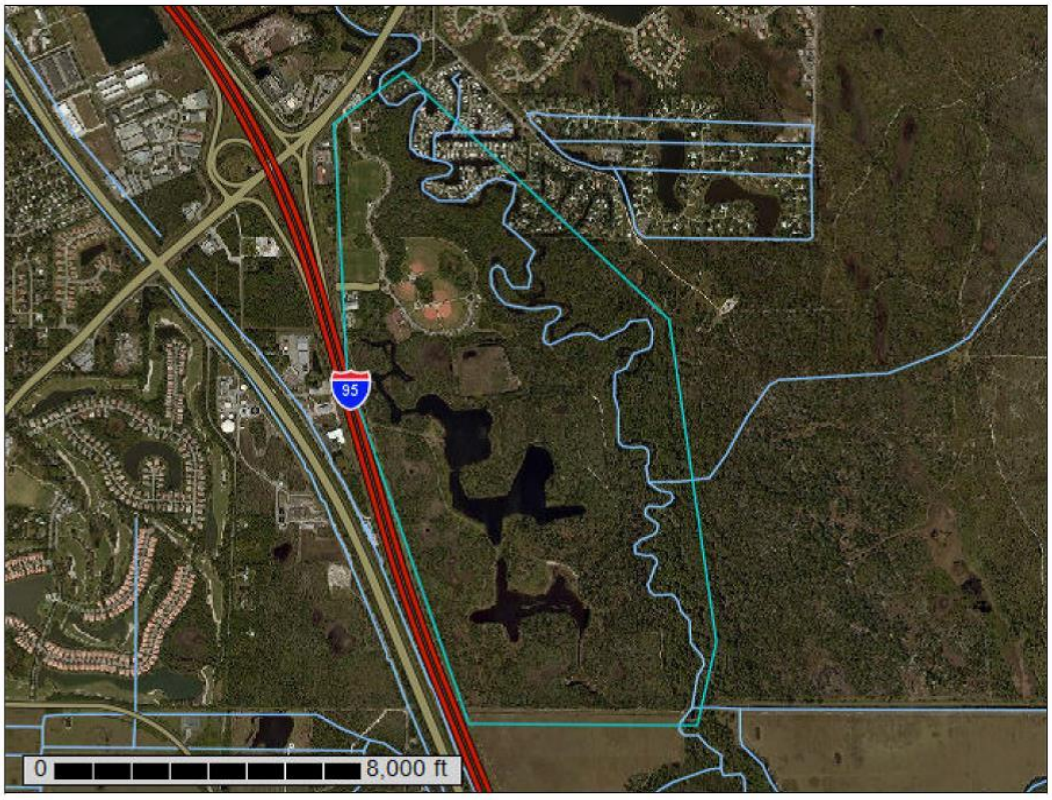
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Martin County, Florida

Halpatiokee Regional Park



May 1, 2017

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

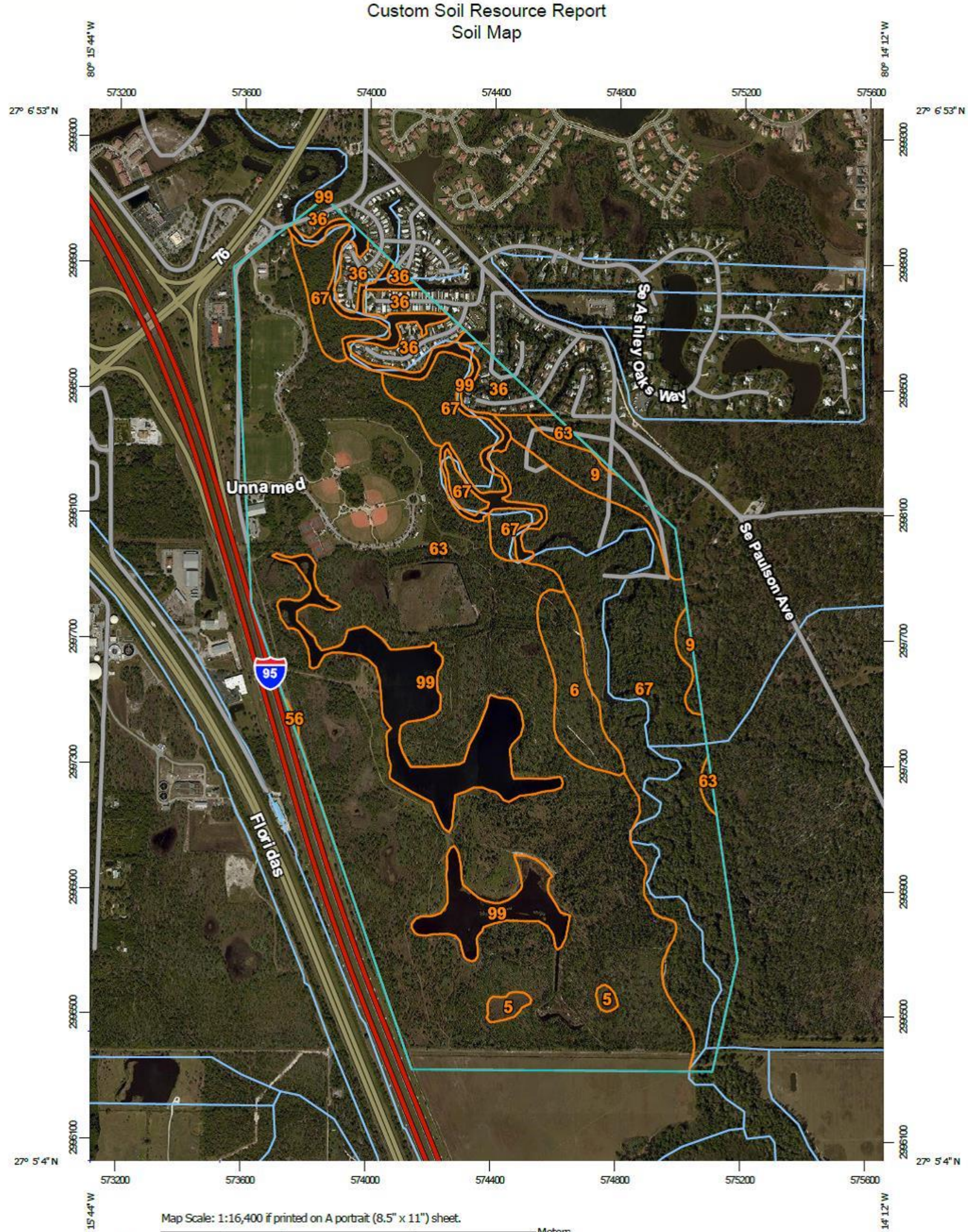
After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map



Map Scale: 1:16,400 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0, 200, 400, 800, 1200

Feet: 0, 500, 1000, 2000, 3000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 17N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Martin County, Florida
Survey Area Data: Version 15, Sep 14, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 15, 2010—May 8, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Martin County, Florida (FL085)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
5	Waveland and Lawnwood fine sands, depressional	3.3	0.4%
6	Paola and St. Lucie sands, 0 to 8 percent slopes	18.3	2.5%
9	Pomello sand, 0 to 5 percent slopes	16.9	2.3%
36	Arents, 0 to 2 percent slopes	29.3	3.9%
56	Wabasso and Oldsmar fine sands, depressional	0.3	0.0%
63	Nettles sand	438.2	58.8%
67	Kesson sand, tidal	164.1	22.0%
99	Water	75.4	10.1%
Totals for Area of Interest		**745.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor

components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Martin County, Florida

5—Waveland and Lawnwood fine sands, depressional

Map Unit Setting

National map unit symbol: 1jq7p
Mean annual precipitation: 56 to 64 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Waveland and similar soils: 40 percent
Lawnwood and similar soils: 40 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Waveland

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 2 inches: fine sand
Eg - 2 to 43 inches: fine sand
Bh - 43 to 77 inches: fine sand
Cg1 - 77 to 91 inches: loamy fine sand
Cg2 - 91 to 99 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 30 to 50 inches to ortstein
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 0.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Freshwater Marshes and Ponds (R156BY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G156BC145FL)

Hydric soil rating: Yes

Description of Lawnwood

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits

Typical profile

A - 0 to 3 inches: fine sand
E - 3 to 22 inches: fine sand
Bh - 22 to 29 inches: fine sand
Cg - 29 to 80 inches: loamy fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 30 inches to ortstein
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 0.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B/D
Other vegetative classification: Freshwater Marshes and Ponds (R156BY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G156BC145FL)
Hydric soil rating: Yes

Minor Components

Oldsmar

Percent of map unit: 7 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R156BY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Basinger

Percent of map unit: 7 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip

Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Slough (R156BY011FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: Yes

Placid

Percent of map unit: 6 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R156BY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G156BC145FL)
Hydric soil rating: Yes

6—Paola and St. Lucie sands, 0 to 8 percent slopes

Map Unit Setting

National map unit symbol: 1jq7q
Mean annual precipitation: 56 to 64 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Paola and similar soils: 45 percent
St. lucie and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paola

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve, side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 3 inches: sand
E - 3 to 32 inches: sand
B/C - 32 to 80 inches: sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained

Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 39.96 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Other vegetative classification: Sand Pine Scrub (R156BY001FL), Sandy soils on ridges and dunes of xeric uplands (G156BC111FL)
Hydric soil rating: No

Description of St. Lucie

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Eolian or sandy marine deposits

Typical profile

A - 0 to 3 inches: sand
C - 3 to 80 inches: sand

Properties and qualities

Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Excessively drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very high (19.98 to 39.96 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 1.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Other vegetative classification: Sand Pine Scrub (R156BY001FL), Sandy soils on ridges and dunes of xeric uplands (G156BC111FL)
Hydric soil rating: No

Minor Components

Jonathan

Percent of map unit: 4 percent
Landform: Rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R156BY003FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G156BC121FL)
Hydric soil rating: No

Archbold

Percent of map unit: 4 percent
Landform: Rises on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R156BY001FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G156BC121FL)
Hydric soil rating: No

Hobe

Percent of map unit: 4 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R156BY001FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G156BC121FL)
Hydric soil rating: No

Pomello

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R156BY003FL), Sandy soils on rises and knolls of mesic uplands (G156BC131FL)
Hydric soil rating: No

9—Pomello sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 1jq7t
Mean annual precipitation: 56 to 64 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 350 to 365 days

Farmland classification: Not prime farmland

Map Unit Composition

Pomello and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pomello

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 3 inches: sand
E - 3 to 46 inches: sand
Bh - 46 to 64 inches: sand
Bw/C - 64 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Other vegetative classification: South Florida Flatwoods (R156BY003FL), Sandy soils on rises and knolls of mesic uplands (G156BC131FL)
Hydric soil rating: No

Minor Components

Archbold

Percent of map unit: 3 percent
Landform: Rises on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Sand Pine Scrub (R156BY001FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G156BC121FL)
Hydric soil rating: No

Jonathan

Percent of map unit: 3 percent
Landform: Rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R156BY003FL), Sandy soils on rises, knolls, and ridges of mesic uplands (G156BC121FL)
Hydric soil rating: No

Salerno

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R156BY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Waveland

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R156BY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

36—Arents, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 1jq8k
Mean annual precipitation: 56 to 64 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Arents and similar soils: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arents

Setting

Landform: Rises on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear

Parent material: Altered marine deposits

Typical profile

C - 0 to 30 inches: fine sand
2Ab - 30 to 36 inches: mucky fine sand
2Eb - 36 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A
Other vegetative classification: Forage suitability group not assigned (G156BC999FL)
Hydric soil rating: No

56—Wabasso and Oldsmar fine sands, depressional

Map Unit Setting

National map unit symbol: 1jq96
Elevation: 10 to 60 feet
Mean annual precipitation: 56 to 64 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Wabasso and similar soils: 45 percent
Oldsmar and similar soils: 40 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wabasso

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave

Across-slope shape: Concave
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: fine sand
E - 5 to 31 inches: fine sand
Bh - 31 to 35 inches: fine sand
Bt - 35 to 43 inches: sandy clay loam
Cg - 43 to 80 inches: loamy fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: C/D
Other vegetative classification: Freshwater Marshes and Ponds (R156BY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G156BC145FL)
Hydric soil rating: Yes

Description of Oldsmar

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 12 inches: fine sand
E - 12 to 34 inches: fine sand
Bh - 34 to 52 inches: fine sand
Bt - 52 to 68 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Other vegetative classification: Freshwater Marshes and Ponds (R156BY010FL), Sandy soils on stream terraces, flood plains, or in depressions (G156BC145FL)
Hydric soil rating: Yes

Minor Components

Floridana

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R156BY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G156BC245FL)
Hydric soil rating: Yes

Tequesta

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R156BY010FL), Organic soils in depressions and on flood plains (G156BC645FL)
Hydric soil rating: Yes

Riviera

Percent of map unit: 4 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: Freshwater Marshes and Ponds (R156BY010FL), Sandy over loamy soils on stream terraces, flood plains, or in depressions (G156BC245FL)
Hydric soil rating: Yes

Winder

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave, linear

Other vegetative classification: Freshwater Marshes and Ponds (R156BY010FL), Loamy and clayey soils on stream terraces, flood plains, or in depressions (G156BC345FL)
Hydric soil rating: Yes

63—Nettles sand

Map Unit Setting

National map unit symbol: 1jq9d
Mean annual precipitation: 56 to 64 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Farmland of unique importance

Map Unit Composition

Nettles and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nettles

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 5 inches: sand
E - 5 to 32 inches: fine sand
Bh - 32 to 51 inches: fine sand
Btg - 51 to 62 inches: fine sandy loam
Cg1 - 62 to 71 inches: loamy sand
Cg2 - 71 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 30 to 50 inches to ortstein
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0

Available water storage in profile: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D
Other vegetative classification: South Florida Flatwoods (R156BY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Minor Components

Salerno

Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R156BY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Oldsmar

Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R156BY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

Basinger

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Slough (R156BY011FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: Yes

Waveland

Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: South Florida Flatwoods (R156BY003FL), Sandy soils on flats of mesic or hydric lowlands (G156BC141FL)
Hydric soil rating: No

67—Kesson sand, tidal

Map Unit Setting

National map unit symbol: 1jq9j
Elevation: 10 to 20 feet
Mean annual precipitation: 56 to 64 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 350 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Kesson, tidal, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kesson, Tidal

Setting

Landform: Tidal marshes on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy marine deposits with shells

Typical profile

A - 0 to 6 inches: sand
C1 - 6 to 23 inches: sand
C2 - 23 to 38 inches: sand
C3 - 38 to 80 inches: sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: Very frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Strongly saline (16.0 to 32.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 30.0
Available water storage in profile: Low (about 5.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A/D

Other vegetative classification: Forage suitability group not assigned (G156BC999FL)
Hydric soil rating: Yes

Minor Components

Canaveral
Percent of map unit: 5 percent
Landform: Dunes on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Forage suitability group not assigned (G156BC999FL)
Hydric soil rating: No

Bessie, tidal
Percent of map unit: 5 percent
Landform: Tidal marshes on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Forage suitability group not assigned (G156BC999FL)
Hydric soil rating: Yes

Wulfert, tidal
Percent of map unit: 5 percent
Landform: Tidal marshes on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Forage suitability group not assigned (G156BC999FL)
Hydric soil rating: Yes

Durbin, tidal
Percent of map unit: 5 percent
Landform: — error in exists on —
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Forage suitability group not assigned (G156BC999FL)
Hydric soil rating: Yes

99—Water

Map Unit Composition
Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified
Other vegetative classification: Forage suitability group not assigned (G156BC999FL)
Hydric soil rating: Unranked

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

Appendix D

Florida Natural Areas Inventory Imperiled Species and Definitions of Rankings

FLORIDA
Natural Areas
INVENTORY

1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
850-224-8207
fax 850-681-9364
www.fnai.org

May 11, 2017

Michael Yustin
Martin County Board of County Commissioners
2401 SE Monterey Road
Stuart, FL 34996

Dear Mr. Yustin,

Thank you for requesting information from the Florida Natural Areas Inventory (FNAI). We have compiled the following information for your project area.

Project: Halpatiokee Park

Date Received: 5/8/2017

Location: Martin County

Based on the information available, this site appears to be located on or very near a significant region of scrub habitat, a natural community in decline that provides important habitat for several rare species within a small area. Additional consideration should be given to avoid and/or mitigate impacts to these natural resources, and to design land uses that are compatible with these resources.

Element Occurrences

A search of our maps and database indicates that we currently have three element occurrences mapped in the vicinity of the study area (see enclosed map and element occurrence table). Please be advised that a lack of element occurrences in the FNAI database is not a sufficient indication of the absence of rare or endangered species on a site.

The element occurrences data layer includes occurrences of rare species and natural communities. The map legend indicates that some element occurrences occur in the general vicinity of the label point. This may be due to lack of precision of the source data, or an element that occurs over an extended area (such as a wide ranging species or large natural community). For animals and plants, element occurrences generally refer to more than a casual sighting; they usually indicate a viable population of the species. Note that some element occurrences represent historically documented observations which may no longer be extant. Extirpated element occurrences will be marked with an 'X' following the occurrence label on the enclosed map.

Likely and Potential Rare Species

In addition to documented occurrences, other rare species and natural communities may be identified on or near the site based on habitat models and species range models (see enclosed Biodiversity Matrix Report). These species should be taken into consideration in field surveys, land management, and impact avoidance and mitigation.

Florida Resources
and Environmental
Analysis Center

Institute of Science
and Public Affairs

The Florida State University

Tracking Florida's Biodiversity

FNAI habitat models indicate areas, which based on land cover type, offer suitable habitat for one or more rare species that is known to occur in the vicinity. Habitat models have been developed for approximately 300 of the rarest species tracked by the Inventory, including all federally listed species.

FNAI species range models indicate areas that are within the known or predicted range of a species, based on climate variables, soils, vegetation, and/or slope. Species range models have been developed for approximately 340 species, including all federally listed species.

The FNAI Biodiversity Matrix Geodatabase compiles Documented, Likely, and Potential species and natural communities for each square mile Matrix Unit statewide.

Managed Areas

Portions of the site appear to be located within Atlantic Ridge Preserve State Park, managed by Florida Department of Environmental Protection, Division of Recreation and Parks, the Halpatiokee Regional Park Conservation Area, managed by Martin County, and the South Fork Addition, managed by Martin County.

The Managed Areas data layer shows public and privately managed conservation lands throughout the state. Federal, state, local, and privately managed conservation lands are included.

Land Acquisition Projects

This site appears to be located within the Atlantic Ridge Ecosystem Florida Forever BOT Project, which is part of the State of Florida's Conservation and Recreation Lands land acquisition program. A description of this project is enclosed. For more information on this Florida Forever Project, contact the Florida Department of Environmental Protection, Division of State Lands.

Florida Forever Board of Trustees (BOT) projects are proposed and acquired through the Florida Department of Environmental Protection, Division of State Lands. The state has no specific land management authority over these lands until they are purchased.

The Inventory always recommends that professionals familiar with Florida's flora and fauna conduct a site-specific survey to determine the current presence or absence of rare, threatened, or endangered species.

Please visit www.fnai.org/trackinglist.cfm for county or statewide element occurrence distributions and links to more element information.

The database maintained by the Florida Natural Areas Inventory is the single most comprehensive source of information available on the locations of rare species and other significant ecological resources. However, the data are not always based on comprehensive or site-specific field surveys. Therefore this information should not be regarded as a final statement on the biological resources of the site being considered, nor should it be substituted for on-site surveys. Inventory data are designed for the purposes of conservation planning and scientific research, and are not intended for use as the primary criteria for regulatory decisions.

Information provided by this database may not be published without prior written notification to the Florida Natural Areas Inventory, and the Inventory must be credited as an information source in these publications. FNAI data may not be resold for profit.

This report is made available at no charge due to funding from the Florida Department of Environmental Protection, Division of State Lands.

Thank you for your use of FNAI services. If I can be of further assistance, please contact me at (850) 224-8207 or at esachs@fnai.fsu.edu.

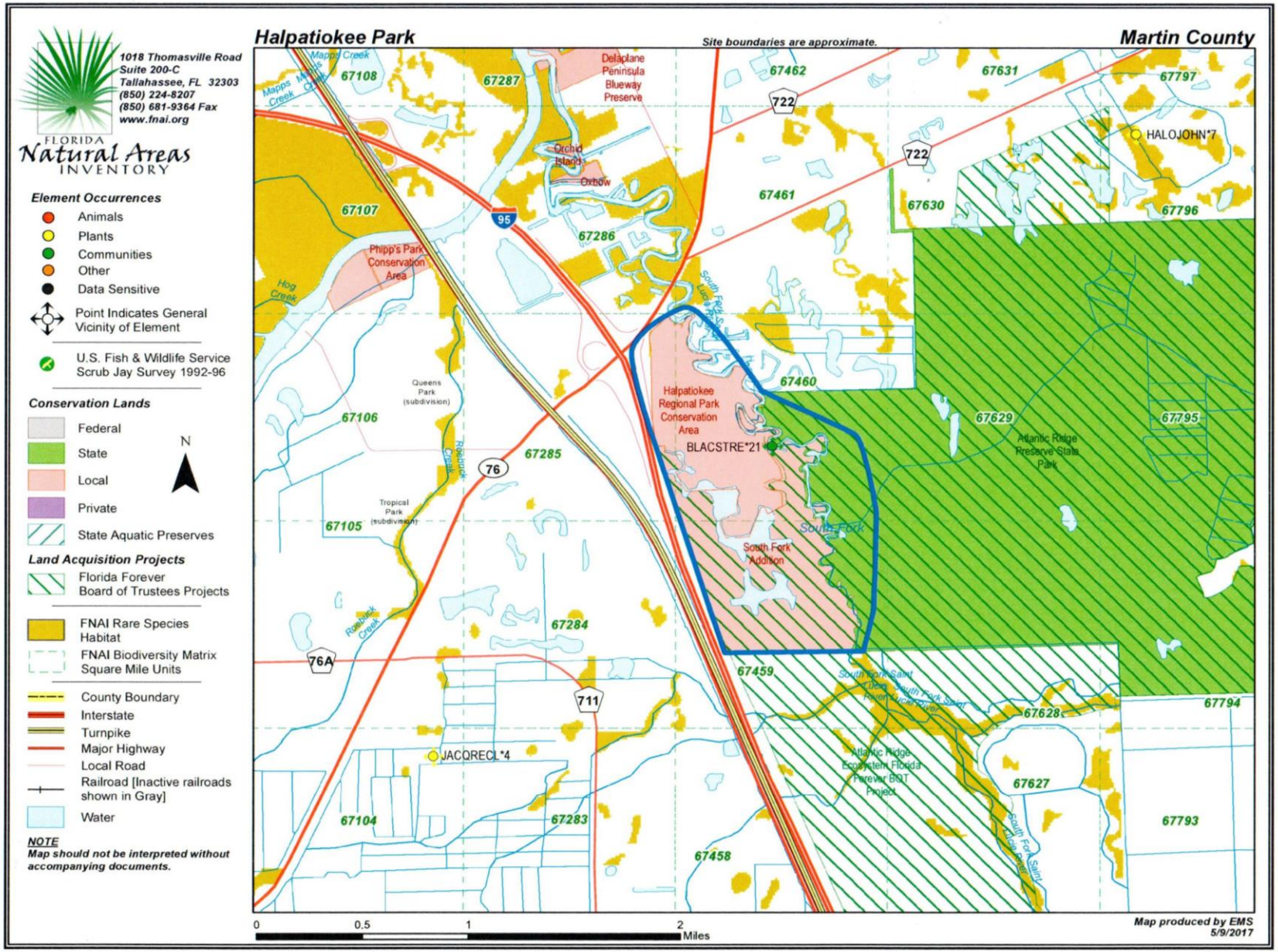
Sincerely,

Tracking Florida's Biodiversity

Elyse Sachs

Elyse Sachs
GIS / Data Services

Encl


Halpatiokee Park
Site boundaries are approximate.
Martin County
1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
(850) 224-8207
(850) 681-9364 Fax
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FLORIDA Natural Areas INVENTORY
Element Occurrences
Animals
Plants
Communities
Other
Data Sensitive
Point Indicates General Vicinity of Element
U.S. Fish & Wildlife Service Scrub Jay Survey 1992-96
Conservation Lands
Federal
State
Local
Private
State Aquatic Preserves
Land Acquisition Projects
Florida Forever Board of Trustees Projects
FNAI Rare Species Habitat
FNAI Biodiversity Matrix Square Mile Units
County Boundary
Interstate
Turnpike
Major Highway
Local Road
Railroad [Inactive railroads shown in Gray]
Water
NOTE
Map should not be interpreted without accompanying documents.
N
Mapps Creek
Delaplane Peninsula Blueway Preserve
Orchid Islands
Oxbow
Phipp's Park Conservation Area
Hog Creek
Queens Park (subdivision)
Roebuck Creek
Tropical Park (subdivision)
Halpatiokee Regional Park Conservation Area
BLACSTRE*21
South Fork Addition
South Fork
Atlantic Ridge Preserve State Park
HALOJOHN*7
JACORECL*4
Atlantic Ridge Ecosystem Florida Forever BOT Project
South Fork Saint Lucie River
67108
67287
67462
67631
67797
67107
67461
67630
67796
67286
67460
67629
67795
67106
67285
67105
67284
67459
67628
67794
67104
67283
67627
67793
67458
95
722
76
76A
711
0
0.5
1
2
Miles
Map produced by EMS
5/9/2017

1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
(850) 224-8207
(850) 681-9364 Fax
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FLORIDA Natural Areas INVENTORY

FNAI ELEMENT OCCURRENCE REPORT on or near

Halpatiokee Park

Map Label	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing	Observation Date	Description	EO Comments
BLACSTRE*21	Blackwater stream		G4	S3	N	N	2004	8 MI OF "UNTOUCHED SCENIC, STREAM W/ SUBTROPICAL FLORA & FAUNA".	2004: extant based on aerial photography (PNDJAC01FLUS). 1982-Pre: see U82NPS01FLUS.
HALOJOHN*7	*Halophila johnsonii*	Johnson's Seagrass	G2	S2	T	E	1959-03-10	No general description given	FAIRLY ABUNDANT IN FALL, LESSER AMOUNT IN MARCH; SUBSTRATE SAND TO MUD, DEPTH 6" AT LOW TIDE TO 6' AT HIGH TIDE.
JACQRECL*4	*Jacquemontia reclinata*	Beach Jacquemontia	G1	S1	E	E	1977-03	CYPRESS HEAD	IDENTITY QUESTIONABLE.

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(850) 224-8207
(850) 681-9364 Fax

FLORIDA Natural Areas INVENTORY

Florida Natural Areas Inventory

Biodiversity Matrix Report

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Matrix Unit ID: 67285					
Likely					
Blackwater stream		G4	S3	N	N
Mesic flatwoods		G4	S4	N	N
Mycteria americana	Wood Stork	G4	S2	LT	FT
Trichechus manatus	West Indian Manatee	G2	S2	LE, PT	FE
Potential					
Acipenser oxyrinchus oxyrinchus	Atlantic Sturgeon	G3T3	S1	LE	FE
Coelorachis tuberculosa	Piedmont Jointgrass	G3	S3	N	T
Conradina grandiflora	Large-flowered Rosemary	G3	S3	N	T
Ctenogobius stigmaturus	Spottail Goby	G2	S2	N	N
Elytraria caroliniensis var. angustifolia	Narrow-leaved Carolina Scalystem	G4T2	S2	N	N
Forestiera segregata var. pinetorum	Florida Pinewood Privet	G4T2	S2	N	N
Glandularia maritima	Coastal Vervain	G3	S3	N	E
Gopherus polyphemus	Gopher Tortoise	G3	S3	C	ST
Grus canadensis pratensis	Florida Sandhill Crane	G5T2T3	S2S3	N	ST
Halophila johnsonii	Johnson's Seagrass	G2	S2	LT	E
Jacquemontia reclinata	Beach Jacquemontia	G1	S1	LE	E
Lechea cernua	Nodding Pinweed	G3	S3	N	T
Linum carteri var. smallii	Small's Flax	G2T2	S2	N	E
Nemastylis floridana	Celestial Lily	G2	S2	N	E
Peucaea aestivalis	Bachman's Sparrow	G3	S3	N	N
Polygala smallii	Tiny Polygala	G1	S1	LE	E
Sceloporus woodi	Florida Scrub Lizard	G2G3	S2S3	N	N
Setophaga discolor paludicola	Florida Prairie Warbler	G5T3	S3	N	N
Trichomanes punctatum ssp. floridanum	Florida Filmy Fern	G4G5T1	S1	LE	E
Matrix Unit ID: 67286					
Likely					
Blackwater stream		G4	S3	N	N
Mycteria americana	Wood Stork	G4	S2	LT	FT
Trichechus manatus	West Indian Manatee	G2	S2	LE, PT	FE
Potential					
Acipenser oxyrinchus oxyrinchus	Atlantic Sturgeon	G3T3	S1	LE	FE
Coelorachis tuberculosa	Piedmont Jointgrass	G3	S3	N	T
Conradina grandiflora	Large-flowered Rosemary	G3	S3	N	T
Ctenogobius stigmaturus	Spottail Goby	G2	S2	N	N
Elytraria caroliniensis var. angustifolia	Narrow-leaved Carolina Scalystem	G4T2	S2	N	N
Eretmochelys imbricata	Hawksbill Sea Turtle	G3	S1	E	FE
Forestiera segregata var. pinetorum	Florida Pinewood Privet	G4T2	S2	N	N
Glandularia maritima	Coastal Vervain	G3	S3	N	E
Gopherus polyphemus	Gopher Tortoise	G3	S3	C	ST
Grus canadensis pratensis	Florida Sandhill Crane	G5T2T3	S2S3	N	ST
Halophila johnsonii	Johnson's Seagrass	G2	S2	LT	E
Jacquemontia reclinata	Beach Jacquemontia	G1	S1	LE	E
Lechea cernua	Nodding Pinweed	G3	S3	N	T

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
Likely - Rare species and natural communities likely to occur on this site based on suitable habitat and/or known occurrences in the vicinity.
Potential - This site lies within the known or predicted range of the species listed.

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Suite 200-C
Tallahassee, FL 32303
(850) 224-8207
(850) 681-9364 Fax

FLORIDA Natural Areas INVENTORY

Florida Natural Areas Inventory

Biodiversity Matrix Report

Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Linum carteri var. smallii	Small's Flax	G2T2	S2	N	E
Nemastylis floridana	Celestial Lily	G2	S2	N	E
Peucaea aestivalis	Bachman's Sparrow	G3	S3	N	N
Polygala smallii	Tiny Polygala	G1	S1	LE	E
Pteroglossaspis ecristata	Giant Orchid	G2G3	S2	N	T
Rallus longirostris scottii	Florida Clapper Rail	G5T3?	S3?	N	N
Rivulus marmoratus	Mangrove Rivulus	G4G5	S3	SC	SSC
Sceloporus woodi	Florida Scrub Lizard	G2G3	S2S3	N	N
Setophaga discolor paludicola	Florida Prairie Warbler	G5T3	S3	N	N
Trichomanes punctatum ssp. floridanum	Florida Filmy Fern	G4G5T1	S1	LE	E

Matrix Unit ID: 67459

Likely

Blackwater stream		G4	S3	N	N
Mesic flatwoods		G4	S4	N	N
Mycteria americana	Wood Stork	G4	S2	LT	FT
Scrub		G2	S2	N	N
Trichechus manatus	West Indian Manatee	G2	S2	LE, PT	FE

Potential

Coelorachis tuberculosa	Piedmont Jointgrass	G3	S3	N	T
Conradina grandiflora	Large-flowered Rosemary	G3	S3	N	T
Elytraria caroliniensis var. angustifolia	Narrow-leaved Carolina Scalystem	G4T2	S2	N	N
Forestiera segregata var. pinetorum	Florida Pinewood Privet	G4T2	S2	N	N
Glandularia maritima	Coastal Vervain	G3	S3	N	E
Gopherus polyphemus	Gopher Tortoise	G3	S3	C	ST
Grus canadensis pratensis	Florida Sandhill Crane	G5T2T3	S2S3	N	ST
Jacquemontia reclinata	Beach Jacquemontia	G1	S1	LE	E
Lechea cernua	Nodding Pinweed	G3	S3	N	T
Linum carteri var. smallii	Small's Flax	G2T2	S2	N	E
Nemastylis floridana	Celestial Lily	G2	S2	N	E
Peucaea aestivalis	Bachman's Sparrow	G3	S3	N	N
Podomys floridanus	Florida Mouse	G3	S3	N	SSC
Polygala smallii	Tiny Polygala	G1	S1	LE	E
Trichomanes punctatum ssp. floridanum	Florida Filmy Fern	G4G5T1	S1	LE	E

Matrix Unit ID: 67460

Likely

Blackwater stream		G4	S3	N	N
Mesic flatwoods		G4	S4	N	N
Mycteria americana	Wood Stork	G4	S2	LT	FT
Scrub		G2	S2	N	N
Trichechus manatus	West Indian Manatee	G2	S2	LE, PT	FE

Potential

Acipenser oxyrinchus oxyrinchus	Atlantic Sturgeon	G3T3	S1	LE	FE
Coelorachis tuberculosa	Piedmont Jointgrass	G3	S3	N	T
Conradina grandiflora	Large-flowered Rosemary	G3	S3	N	T

Definitions: *Documented - Rare species and natural communities documented on or near this site.*
Documented-Historic - Rare species and natural communities documented, but not observed/reported within the last twenty years.
Likely - Rare species and natural communities likely to occur on this site based on suitable habitat and/or known occurrences in the vicinity.
Potential - This site lies within the known or predicted range of the species listed.

Elements and Element Occurrences

An **element** is any exemplary or rare component of the natural environment, such as a species, natural community, bird rookery, spring, sinkhole, cave, or other ecological feature.

An **element occurrence (EO)** is an area of land and/or water in which a species or natural community is, or was, present. An EO should have practical conservation value for the Element as evidenced by potential continued (or historical) presence and/or regular recurrence at a given location.

Element Ranking and Legal Status

Using a ranking system developed by NatureServe and the Natural Heritage Program Network, the Florida Natural Areas Inventory assigns two ranks for each element. The global rank is based on an element's worldwide status; the state rank is based on the status of the element in Florida. Element ranks are based on many factors, the most important ones being estimated number of Element Occurrences (EOs), estimated abundance (number of individuals for species; area for natural communities), geographic range, estimated number of adequately protected EOs, relative threat of destruction, and ecological fragility.

FNAI GLOBAL ELEMENT RANK

G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
G2 = Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
G3 = Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
G4 = Apparently secure globally (may be rare in parts of range).
G5 = Demonstrably secure globally.
GH = Of historical occurrence throughout its range, may be rediscovered (e.g., ivory-billed woodpecker).
GX = Believed to be extinct throughout range.
GXC = Extirpated from the wild but still known from captivity or cultivation.
G#? = Tentative rank (e.g., G2?).
G#G# = Range of rank; insufficient data to assign specific global rank (e.g., G2G3).
G#T# = Rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species and the T portion refers to the specific subgroup; numbers have same definition as above (e.g., G3T1).
G#Q = Rank of questionable species - ranked as species but questionable whether it is species or subspecies; numbers have same definition as above (e.g., G2Q).
G#T#Q = Same as above, but validity as subspecies or variety is questioned.
GU = Unrankable; due to a lack of information no rank or range can be assigned (e.g., GUT2).
GNA = Ranking is not applicable because the element is not a suitable target for conservation (e.g. a hybrid species).
GNR = Element not yet ranked (temporary).
GNRTNR = Neither the element nor the taxonomic subgroup has yet been ranked.

FNAI STATE ELEMENT RANK

S1 = Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
S2 = Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
S3 = Either very rare and local in Florida (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
S4 = Apparently secure in Florida (may be rare in parts of range).
S5 = Demonstrably secure in Florida.
SH = Of historical occurrence in Florida, possibly extirpated, but may be rediscovered (e.g., ivory-billed woodpecker).
SX = Believed to be extirpated throughout Florida.
SU = Unrankable; due to a lack of information no rank or range can be assigned.
SNA = State ranking is not applicable because the element is not a suitable target for conservation (e.g. a hybrid species).
SNR = Element not yet ranked (temporary).

FEDERAL LEGAL STATUS

Legal status information provided by FNAI for information only. For official definitions and lists of protected species, consult the relevant federal agency.

Definitions derived from U.S. Endangered Species Act of 1973, Sec. 3. Note that the federal status given by FNAI refers only to Florida populations and that federal status may differ elsewhere.

C = Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.
E = Endangered: species in danger of extinction throughout all or a significant portion of its range.
E, T = Species currently listed endangered in a portion of its range but only listed as threatened in other areas
E, PDL = Species currently listed endangered but has been proposed for delisting.
E, PT = Species currently listed endangered but has been proposed for listing as threatened.
E, XN = Species currently listed endangered but tracked population is a non-essential experimental population.
T = Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.
PE = Species proposed for listing as endangered
PS = Partial status: some but not all of the species' infraspecific taxa have federal
PT = Species proposed for listing as threatened
SAT = Treated as threatened due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.
SC = Not currently listed, but considered a "species of concern" to USFWS.

STATE LEGAL STATUS

Provided by FNAI for information only. For official definitions and lists of protected species, consult the relevant state agency.

Animals: Definitions derived from "Florida's Endangered Species and Species of Special Concern, Official Lists" published by Florida Fish and Wildlife Conservation Commission, 1 August 1997, and subsequent updates.

C = Candidate for listing at the Federal level by the U. S. Fish and Wildlife Service
FE = Listed as Endangered Species at the Federal level by the U. S. Fish and Wildlife Service
FT = Listed as Threatened Species at the Federal level by the U. S. Fish and Wildlife Service
FXN = Federal listed as an experimental population in Florida
FT(S/A) = Federal Threatened due to similarity of appearance
ST = State population listed as Threatened by the FFWCC. Defined as a species, subspecies, or isolated population which is acutely vulnerable to environmental alteration, declining in number at a rapid rate, or whose range or habitat is decreasing in area at a rapid rate and as a consequence is destined or very likely to become an endangered species within the foreseeable future.
SSC = Listed as Species of Special Concern by the FFWCC. Defined as a population which warrants special protection, recognition, or consideration because it has an inherent significant vulnerability to habitat modification, environmental alteration, human disturbance, or substantial human exploitation which, in the foreseeable future, may result in its becoming a threatened species. (SSC* for Pandion haliaetus (Osprey) indicates that this status applies in Monroe county only.)
N = Not currently listed, nor currently being considered for listing.

Plants: Definitions derived from Sections 581.011 and 581.185(2), Florida Statutes, and the Preservation of Native Flora of Florida Act, 5B-40.001. FNAI does not track all state-regulated plant species; for a complete list of state-regulated plant species, call Florida Division of Plant Industry, 352-372-3505 or see: http://www.doacs.state.fl.us/pi/.

E = Endangered: species of plants native to Florida that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue; includes all species determined to be endangered or threatened pursuant to the U.S. Endangered Species Act.
T = Threatened: species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in number as to cause them to be Endangered.
N = Not currently listed, nor currently being considered for listing.

Element Occurrence Ranking

FNAI ranks of quality of the element occurrence in terms of its viability (EORANK). Viability is estimated using a combination of factors that contribute to continued survival of the element at the location. Among these are the size of the EO, general condition of the EO at the site, and the conditions of the landscape surrounding the EO (e.g. an immediate threat to an EO by local development pressure could lower an EO rank).

A = Excellent estimated viability
A? = Possibly excellent estimated viability
AB = Excellent or good estimated viability
AC = Excellent, good, or fair estimated viability
B = Good estimated viability
B? = Possibly good estimated viability
BC = Good or fair estimated viability
BD = Good, fair, or poor estimated viability
C = Fair estimated viability
C? = Possibly fair estimated viability
CD = Fair or poor estimated viability
D = Poor estimated viability
D? = Possibly poor estimated viability
E = Verified extant (viability not assessed)
F = Failed to find
H = Historical
NR = Not ranked, a placeholder when an EO is not (yet) ranked.
U = Unrankable
X = Extirpated

*For additional detail on the above ranks see: http://www.natureserve.org/explorer/eorankguide.htm

FNAI also uses the following EO ranks:

H? = Possibly historical
F? = Possibly failed to find
X? = Possibly extirpated

The following offers further explanation of the H and X ranks as they are used by FNAI:

The rank of H is used when there is a lack of recent field information verifying the continued existence of an EO, such as (a) when an EO is based only on historical collections data; or (b) when an EO was ranked A, B, C, D, or E at one time and is later, without field survey work, considered to be possibly extirpated due to general habitat loss or degradation of the environment in the area. This definition of the H rank is dependent on an interpretation of what constitutes "recent" field information. Generally, if there is no known survey of an EO within the last 20 to 40 years, it should be assigned an H rank. While these time frames represent suggested maximum limits, the actual time period for historical EOs may vary according to the biology of the element and the specific landscape context of each occurrence (including anthropogenic alteration of the environment). Thus, an H rank may be assigned to an EO before the maximum time frames have lapsed. Occurrences that have not been surveyed for periods exceeding these time frames should not be ranked A, B, C, or D. The higher maximum limit for plants and communities (i.e., ranging from 20 to 40 years) is based upon the assumption that occurrences of these elements generally have the potential to persist at a given location for longer periods of time. This greater potential is a reflection of plant biology and community dynamics. However, landscape factors must also be considered. Thus, areas with more anthropogenic impacts on the environment (e.g., development) will be at the lower end of the range, and less-impacted areas will be at the higher end.

The rank of X is assigned to EOs for which there is documented destruction of habitat or environment, or persuasive evidence of eradication based on adequate survey (i.e., thorough or repeated survey efforts by one or more experienced observers at times and under conditions appropriate for the Element at that location).

Appendix E

Florida Exotic Pest Plant Council 2017 List of Invasive Non-native Species

and

Plant Species present along the Treasure Coast that are designated for Early Detection and Rapid Response

CATEGORY II (continued)

Scientific Name**	Common Name	Gov. List	Zone
Tradescantia spathacea (*Rhoeo spathacea, Rhoeo discolor*)	oyster plant		C, S
Tribulus cistoides	puncture vine, burr-nut		N, C, S
Vitex trifolia	simple-leaf chaste tree		C, S
Washingtonia robusta	Washington fan palm		C, S
Wisteria sinensis	Chinese wisteria		N, C
Xanthosoma sagittifolium	malanga, elephant ear		N, C, S

Recent changes to plant names

Old Name	New Name
Aleurites fordii	*Vernicia fordii*
Aristolochia littoralis	*Aristolochia elegans*
Brachiaria mutica	*Urochloa mutica*
Hibiscus tiliaceus	*Talipariti tiliaceus*
Macfadyena unguis-cati	*Dolichandra unguis-cati*
Melaleuca viminalis	*Callistemon viminalis*
Panicum maximum	*Urochloa maxima*
Phymatosorus scolopendria	*Microsorum grossum*
Sapium sebiferum	*Triadica sebifera*
Wedelia trilobata	*Sphagneticola trilobata*

Current nomenclature can be found at florida.plantatlas.usf.edu

**Plant names are those published in "Guide to Vascular Plants of Florida Third Edition." Richard P. Wunderlin and Bruce F. Hansen. University of Florida Press. 2011. Plant names in parentheses are synonyms or misapplied names that have commonly occurred in the literature and/or indicate a recent name change. Not all synonyms are listed.

For more information on invasive exotic plants, including links to related web pages, visit www.fleppc.org

FLEPPC List Definitions: **Exotic** – a species introduced to Florida, purposefully or accidentally, from a natural range outside of Florida. **Native** – a species whose natural range includes Florida. **Naturalized exotic** – an exotic that sustains itself outside cultivation (it is still exotic; it has not "become" native). **Invasive exotic** – an exotic that not only has naturalized, but is expanding on its own in Florida native plant communities.

Abbreviations: **Government List (Gov. List):** Possession, propagation, sale, and/or transport of these plants is regulated by: F=Florida Department of Agriculture and Consumer Services; U=United States Department of Agriculture

Zone: **N** = north, **C** = central, **S** = south, referring to each species' general distribution in regions of Florida (not its potential range in the state). Please refer to the adjacent map.

Citation example

FLEPPC. 2017. List of Invasive Plant Species. Florida Exotic Pest Plant Council. Internet: www.fleppc.org

Daniel F. Austin and Daniel B. Ward

Daniel F. Austin (2015) and Daniel B. Ward (2016) recently passed away. Both Dans were instrumental in maintaining, managing, and providing insight into Florida's many invasive plants. They first volunteered for this effort before it was even formalized as the FLEPPC, participating from that beginning through retirement. Their sage comments and wit are missed.

The 2017 list was prepared by the FLEPPC Plant List Committee

Patricia L. Howell, Chair 2012-2017, Broward County Parks, Natural Resources and Land Management Section, phowell@broward.org

Stephen H. Brown, UF / IFAS Lee County Extension, Parks and Recreation Division, brownsh@leegov.com

Janice Duquesnel, Florida Park Service, Florida Department of Environmental Protection, janice.duquesnel@dep.state.fl.us

David W. Hall, Private Consulting Botanist and Author, tolkos@aol.com

Roger L. Hammer, Retired Naturalist and Author, kaskazi44@comcast.net

Colette C. Jacono, Florida Museum of Natural History, colettej@ufl.edu

Kenneth A. Langeland, Interim Chair, 2017, Professor Emeritus, University of Florida / IFAS, Center for Aquatic and Invasive Plants, gator8@ufl.edu

Chris Lockhart, Habitats Specialist, Inc., chris@lockharts.org

Jean McCollom, Natural Ecosystems, jeanm@naples.net

Gil Nelson, Professor Emeritus, Florida State University / iDigBio, gnelson@bio.fsu.edu

Jimi L. Sadle, Everglades National Park, jimi_sadle@nps.gov

Jessica Spencer, US Army Corp of Engineers, jessica.e.spencer@usace.army.mil

Arthur Stiles, Florida Park Service, Florida Department of Environmental Protection, arthur.stiles@dep.state.fl.us

Daniel B. Ward, Professor Emeritus, University of Florida Department of Botany (Deceased)

Richard P. Wunderlin, Professor Emeritus, University of South Florida, Institute for Systematic Botany, rwunder@usf.edu

Florida Exotic Pest Plant Council's 2017 List of Invasive Plant Species

The mission of the Florida Exotic Pest Plant Council is to support the management of invasive exotic plants in Florida's natural areas by providing a forum for the exchange of scientific, educational and technical information. www.fleppc.org

Note: The FLEPPC List of Invasive Plant Species is not a regulatory list. Only those plants listed as Federal Noxious Weeds, Florida Noxious Weeds, Florida Prohibited Aquatics Plants, or in local ordinances are regulated by law.

Purpose of the List

To provide a list of plants determined by the Florida Exotic Pest Plant Council to be invasive in natural areas of Florida and to routinely update the list based on information of newly identified occurrences and changes in distribution over time. Also, to focus attention on –

- the adverse effects exotic pest plants have on Florida's biodiversity and native plant communities,
- the habitat losses in natural areas from exotic pest plant infestations,
- the impacts on endangered species via habitat loss and alteration,
- the need for pest-plant management,
- the socio-economic impacts of these plants (e.g., increased wildfires or flooding in certain areas),
- changes in the severity of different pest plant infestations over time,
- providing information to help managers set priorities for research and control programs.

www.fleppc.org

CATEGORY I

Invasive exotics that are altering native plant communities by displacing native species, changing community structures or ecological functions, or hybridizing with natives. *This definition does not rely on the economic severity or geographic range of the problem, but on the documented ecological damage caused.*

Scientific Name**	Common Name	Gov. List	Zone
Abrus precatorius	rosary pea	F	C, S
Acacia auriculiformis	earleaf acacia		C, S
Albizia julibrissin	mimosa, silk tree		N, C
Albizia lebbeck	woman's tongue		C, S
Ardisia crenata	coral ardisia	F	N, C, S
Ardisia elliptica	shoebutton ardisia	F	C, S
Asparagus aethiopicus (*A. sprengeri, A. densiflorus*)	asparagus-fern		N, C, S
Bauhinia variegata	orchid tree		C, S
Bischofia javanica	bishopwood		C, S
Calophyllum antillanum (*C. calaba*)	Santa Maria, mast wood		S
Casuarina equisetifolia	Australian-pine	F	N, C, S
Casuarina glauca	suckering Australian-pine	F	C, S
Cinnamomum camphora	camphor tree		N, C, S
Colocasia esculenta	wild taro		N, C, S
Colubrina asiatica	lather leaf	F	S
Cupaniopsis anacardioides	carrotwood	F	C, S
Deparia petersenii	Japanese false spleenwort		N, C
Dioscorea alata	winged yam	F	N, C, S
Dioscorea bulbifera	air-potato	F	N, C, S
Eichhornia crassipes	water-hyacinth	F	N, C, S
Eugenia uniflora	Surinam cherry		C, S
Ficus microcarpa (*F. nitida* and *F. retusa* var. *nitida*)[1]	laurel fig		C, S
Hydrilla verticillata	hydrilla	F, U	N, C, S
Hygrophila polysperma	green hygro	F, U	N, C, S
Hymenachne amplexicaulis	West Indian marsh grass		N, C, S
Imperata cylindrica	cogon grass	F, U	N, C, S
Ipomoea aquatica	water-spinach	F, U	C
Jasminum dichotomum	Gold Coast jasmine		C, S
Jasminum fluminense	Brazilian jasmine		C, S
Lantana camara (*L. strigocamara*)	lantana, shrub verbena		N, C, S
Ligustrum lucidum	glossy privet		N, C
Ligustrum sinense	Chinese privet	F[3]	N, C, S
Lonicera japonica	Japanese honeysuckle		N, C, S
Ludwigia hexapetala	Uruguay waterprimrose		N, C
Ludwigia peruviana	Peruvian primrosewillow		N, C, S
Lumnitzera racemosa	black mangrove		S
Luziola subintegra	tropical American watergrass		S
Lygodium japonicum	Japanese climbing fern	F	N, C, S
Lygodium microphyllum	Old World climbing fern	F, U	N, C, S
Macfadyena unguis-cati (*Dolichandra unguis-cati*)	catclawvine		N, C, S
Manilkara zapota	sapodilla		S
Melaleuca quinquenervia	melaleuca, paper bark	F, U	C, S
Melinis repens (*Rhynchelytrum repens*)	Natal grass		N, C, S
*Microstegium vimineum**	Japanese stiltgrass,		N
Mimosa pigra	catclaw mimosa	F, U	C, S
Nandina domestica	nandina, heavenly bamboo		N, C
Nephrolepis brownii (*N. multiflora*)	Asian sword fern		C, S
Nephrolepis cordifolia	sword fern		N, C, S
Neyraudia reynaudiana	Burma reed	F	S
Nymphoides cristata	crested floating heart	F	C, S
Paederia cruddasiana	sewer vine	F	S
Paederia foetida	skunk vine	F	N, C, S
Panicum repens	torpedo grass		N, C, S
Pennisetum purpureum	Napier grass, elephant grass		N, C, S
Phymatosorus scolopendria (*Microsorum grossum*)	serpent fern, wart fern		S
Pistia stratiotes	water-lettuce	F	N, C, S
Psidium cattleianum (*P. littorale*)	strawberry guava		C, S
Psidium guajava	guava		C, S
Pueraria montana var. *lobata*	kudzu	F	N, C, S
Rhodomyrtus tomentosa	downy rose-myrtle		C, S
Ruellia simplex[2]	Mexican-petunia		N, C, S
Salvinia minima	water spangles		N, C, S
Sapium sebiferum (*Triadica sebifera*)	popcorn tree, Chinese tallow tree		N, C, S
Scaevola taccada (*S. sericea, S. frutescens*)	half-flower, beach naupaka		N, C, S
Schefflera actinophylla (*Brassaia actinophylla*)	schefflera, Queensland umbrella tree		C, S
Schinus terebinthifolius	Brazilian-pepper	F	N, C, S
Scleria lacustris	Wright's nutrush		C, S
Senna pendula var. *glabrata*	Christmas cassia, Christmas senna		C, S
Solanum tampicense	wetland nightshade	F, U	C, S
Solanum viarum	tropical soda apple	F, U	N, C, S
Sporobolus jacquemontii (*S. indicus* var. *pyramidalis*)	West Indian dropseed		C, S
Syngonium podophyllum	arrowhead vine		N, C, S
Syzygium cumini	Java-plum		C, S
Tectaria incisa	incised halberd fern		S
*Thelypteris opulenta**	jeweled maiden fern		S
Thespesia populnea	seaside mahoe		C, S
Tradescantia fluminensis	small-leaf spiderwort		N, C
Urena lobata	Caesar's weed		N, C, S
Urochloa mutica (*Brachiaria mutica*)	para grass		N, C, S
Vitex rotundifolia	beach vitex		N

CATEGORY II

Invasive exotics that have increased in abundance or frequency but have not yet altered Florida plant communities to the extent shown by Category I species. *These species may become ranked Category I if ecological damage is demonstrated.*

Scientific Name**	Common Name	Gov. List	Zone
Adenanthera pavonina	red sandalwood		S
Agave sisalana	sisal hemp		C, S
Aleurites fordii (*Vernicia fordii*)	tung-oil tree		N, C
Alstonia macrophylla	devil tree		S
Alternanthera philoxeroides	alligator-weed	F	N, C, S
Antigonon leptopus	coral vine		N, C, S
Ardisia japonica	Japanese ardisia		N
Aristolochia littoralis (*A. elegans*)	elegant Dutchman's pipe, calico flower		N, C, S
Asystasia gangetica	Ganges primrose		C, S
Begonia cucullata	wax begonia		N, C, S
Broussonetia papyrifera	paper mulberry		N, C, S
Bruguiera gymnorhiza	large-leaved mangrove		S
Callistemon viminalis (*Melaleuca viminalis*)	bottlebrush		C, S
Callisia fragrans	inch plant, spironema		C, S
Casuarina cunninghamiana	Australian-pine	F	C, S
Cecropia palmata	trumpet tree		S
Cestrum diurnum	day jessamine		C, S
Chamaedorea seifrizii	bamboo palm		S
Clematis terniflora	Japanese clematis		N, C
Cocos nucifera	coconut palm		S
Crassocephalum crepidioides	redflower ragleaf, Okinawa spinach		C, S
Cryptostegia madagascariensis	rubber vine		C, S
Cyperus involucratus (*C. alternifolius*)	umbrella plant		C, S
Cyperus prolifer	dwarf papyrus		C, S
Dactyloctenium aegyptium	Durban crowfoot grass		N, C, S
Dalbergia sissoo	Indian rosewood, sissoo		C, S
Elaeagnus pungens	silverthorn, thorny olive		N, C
Elaeagnus umbellata	silverberry, autumn olive		N
Epipremnum pinnatum cv. *Aureum*	pothos		C, S
Eulophia graminea	Chinese crown orchid		C, S
Ficus altissima	false banyan, council tree		S
Flacourtia indica	governor's plum		S
Hemarthria altissima	limpo grass		C, S
Heteropterys brachiata	red wing, Beechey's withe		S
Hyparrhenia rufa	jaragua		N, C, S
Ipomoea carnea ssp. *fistulosa* (*I. fistulosa*)	shrub morning-glory	F	C, S
*Kalanchoe x houghtonii**	mother-of-millions		N, C, S
Kalanchoe pinnata (*Bryophyllum pinnatum*)	life plant		C, S
Koelreuteria elegans	flamegold tree		C, S
Landoltia punctata	spotted duckweed		N, C, S
Leucaena leucocephala	lead tree	F	N, C, S
Limnophila sessiliflora	Asian marshweed	F, U	N, C, S
Livistona chinensis	Chinese fan palm		C, S
Macroptilium lathyroides	phasey bean		N, C, S
Melia azedarach	Chinaberry		N, C, S
Melinis minutiflora	molasses grass		C,S
Merremia tuberosa	wood-rose		C, S
Mikania micrantha	mile-a-minute vine	F, U	S
Momordica charantia	balsam apple		N, C, S
Murraya paniculata	orange-jessamine		S
Myriophyllum spicatum	Eurasian water-milfoil	F	N, C, S
Panicum maximum (*Urochloa maxima*)	Guinea grass		N, C, S
Passiflora biflora	two-flowered passion vine		S
Pennisetum setaceum	green fountain grass		S
*Pennisetum polystachion** (*Cenchrus polystachos*)	mission grass, West Indian Pennisetum		C, S
Phoenix reclinata	Senegal date palm		C, S
Phyllostachys aurea	golden bamboo		N, C
Pittosporum pentandrum	Taiwanese cheesewood		S
*Platycerium bifurcatum**	common staghorn fern		S
Praxelis clematidea	praxelis		C
Pteris vittata	Chinese brake fern		N, C, S
Ptychosperma elegans	solitaire palm		S
Richardia grandiflora	large flower Mexican clover		N, C, S
Ricinus communis	castor bean		N, C, S
Rotala rotundifolia	roundleaf toothcup, dwarf Rotala, redweed		S
Ruellia blechum (*Blechum brownei*)	green shrimp plant, Browne's blechum		N, C, S
Sansevieria hyacinthoides	bowstring hemp		C, S
Sesbania punicea	rattlebox		N, C, S
*Sida planicaulis**	mata-pasto		C, S
Solanum diphyllum	two-leaf nightshade		N, C, S
Solanum torvum	turkeyberry	F, U	N, C, S
Spermacoce verticillata	shrubby false buttonweed		C, S
Sphagneticola trilobata (*Wedelia trilobata*)	wedelia, creeping oxeye		N, C, S
Stachytarpheta cayennensis (*S. urticifolia*)	nettle-leaf porterweed		S
Syagrus romanzoffiana (*Arecastrum romanzoffianum*)	queen palm		C, S
Syzygium jambos	Malabar plum, rose-apple		N, C, S
Talipariti tiliaceum (*Hibiscus tiliaceus*)	mahoe, sea hibiscus		C, S
Terminalia catappa	tropical-almond		C, S
Terminalia muelleri	Australian-almond		C, S

continued

[1]Does not include *Ficus microcarpa* subsp. *fuyuensis*, which is sold as "Green Island Ficus"
[2]Many names are applied to this species in Florida because of a complicated taxonomic and nomenclatural history. Plants cultivated in Florida, all representing the same invasive species, have in the past been referred to as *Ruellia brittoniana, R. tweediana, R. caerulea*, and *R. simplex*.
[3]Chinese privet is a FLDACS Noxious Weed except for the cultivar 'Variegatum'
*Added to the FLEPPC List of Invasive Plant Species in 2017
**Plant names are those published in "Guide to Vascular Plants of Florida Third Edition." Richard P. Wunderlin and Bruce F. Hansen. University of Florida Press. 2011. Plant names in parentheses are synonyms or misapplied names that have commonly occurred in the literature or indicate a recent name change. Not all synonyms are listed.

TREASURE COAST CISMA

EDRR Species

Scientific Name	Common Name	Hyperlink
Azolla pinnata	feathered mosquito-fern	http://www.fnai.org/Invasives/Azolla_pinnata_FNAI.pdf
Calophyllum antillanum	Antilles calophyllum	http://www.fnai.org/Invasives/Calophyllum_antillanum_FNAI.pdf
Cestrum diurnum	day jessamine	http://www.fnai.org/Invasives/Cestrum_diurnum_FNAI.pdf
Cinnamomum camphora	camphortree	http://www.fnai.org/Invasives/Cinnamomum_camphora_FNAI.pdf
Cyperus entrerianus	deeprooted sedge	http://www.fnai.org/Invasives/Cyperus_entrerianus_FNAI.pdf
Dichrostachys cinerea subsp. africana	sickle pod, aroma	http://www.fnai.org/Invasives/Dichrostachys_cinerea_africana_FNAI
Eucalyptus grandis	grand eucalyptus	http://www.fnai.org/Invasives/Eucalyptus_grandis_FNAI.pdf
Jasminum dichotomum	Gold Coast jasmine	http://www.fnai.org/Invasives/Jasminum_dichotomum_FNAI.pdf
Jasminum fluminense	jazmin de trapo	http://www.fnai.org/Invasives/Jasminum_fluminense_FNAI.pdf
Ligustrum lucidum	glossy privet	http://www.fnai.org/Invasives/Ligustrum_lucidum_FNAI.pdf
Lygodium japonicum	Japanese climbing fern	http://www.fnai.org/Invasives/Lygodium_japonicum_FNAI.pdf
Mimusops coriacea	monkey's apple	http://www.fnai.org/Invasives/Mimusops_coriacea_FNAI.pdf
Myriophyllum spicatum	Eurasian water-milfoil	http://www.fnai.org/Invasives/Myriophyllum_spicatum_FNAI.pdf
Neyraudia reynaudiana	burmareed	http://www.fnai.org/Invasives/Neyraudia_reynaudiana_FNAI.pdf
Paederia foetida	skunk-vine	http://www.fnai.org/Invasives/Paederia_foetida_FNAI.pdf
Pyrostegia venusta	flamevine	http://www.fnai.org/Invasives/Pyrostegia_venusta_FNAI.pdf
Salsola kali	Russian thistle	http://www.fnai.org/Invasives/Salsola_kali_FNAI.pdf
Triadica sebifera	Chinese tallowtree	http://www.fnai.org/Invasives/Triadica_sebifera_2016.pdf
Trema orientalis	Oriental tremis	http://www.fnai.org/Invasives/Trema_orientalis_FNAI.pdf

Appendix F

Division of Historical Resources

FLORIDA DEPARTMENT OF STATE
Office of the Secretary
Office of International Relations
Division of Administrative Services
Division of Corporations
Division of Cultural Affairs

MEMBER OF THE FLORIDA CABINET
Division of Library & Information Services
Division of Historical Resources
Ringling Museum of Art
Division of Licensing
Division of Elections

FLORIDA DEPARTMENT OF STATE
DIVISION OF HISTORICAL RESOURCES

January 28, 2003

Gina Paduano
Environmental Lands Administrator
Martin County Parks and Recreation
2401 SE Monterey Rd.
Stuart, Fl. 34996

Dear Ms. Paduano:

In response to your inquiry of January 28th, 2003, the Florida Master Site File lists no previously recorded archaeological sites, two historical structures, and one field survey in the following parcels of Martin County:

T39S, R41E, Sections 4, 8, 9, 16

In interpreting the results of our search, please remember the following points:

- Areas which have not been completely surveyed, such as yours, may contain unrecorded archaeological sites or historical structures.
- While many of our records relate to historically significant properties, the entry of an archaeological site or an historical structure on the Florida Master Site File does not necessarily mean that the structure is significant.
- Since vandalism is common at Florida sites, we ask that you limit the distribution of location information on archaeological sites.
- **As you may know, federal and state laws require formal environmental review for some projects. Record searches by the staff of the Florida Master Site File do not constitute such a review. If your project falls under these laws, you should contact the Compliance Review Section of the Bureau of Historic Preservation at 850-487-2333 or at this address.**

If you have any further questions concerning the Florida Master Site File, please contact us as below.

Sincerely,

Patrick Gensler
Phone: 850-245-6331
Data Analyst, Florida Master Site File
Division of Historical Resources
R. A. Gray Building
500 South Bronough Street
Tallahassee, Florida 32399-0250

State SunCom: 277-2299
Fax line: 850-921-0372
Email: *fmsfile@mail.dos.state.fl.us*
Web: *http://www.dos.state.fl.us/dhr/msf/*

Appendix G

Plant and Animal Lists

Halpatiokee

The following species were observed and identified during assessments conducted at Halpatiokee Regional Park by Sustainable Ecosystems International on September 14, and 15, 2016. The list should be considered as preliminary, and that additional species would be identified if additional surveys were to be conducted during different times of the year, when other plants would be in bloom. Nomenclature follows the "Guide to the Vascular Plants of Florida' by Richard P. Wunderlin.

Family/Scientific Name	Common Name	FDACS	FWS	FLEPPC	FNAI	Native
PTERIDOPHYTES						
BLECHNACEAE						
Blechnum serrulatum	Swamp Fern, Toothed Midsorus Fern					√
Woodwardia virginica	Virginia Chain fern					√
DENNSTAEDTIACEAE						
Pteridium aquilinum	Tailed Bracken Fern					√
LYCOPODIACEAE						
Lycopodiella cernua	Nodding Club-moss	CE				√
NEPHROLEPIDACEAE						
Nephrolepis cordifolia	Tuberous Sword Fern			Cat I		
Nephrolepis exaltata	Boston fern					√
OSMUNDACEAE						
Osmunda cinnamomea	Cinnamon Fern	CE				√
Osmunda regalis	Royal Fern	CE				√
POLYPODIACEAE						
Phlebodium aureum	Golden Polypody					√
Platycerium bifurcatum	Staghorn Fern					
Pleopeltis polypodioides	Resurrection Fern					√
PSILOTACEAE						
Psilotum nudum	Whisk-fern					√
PTERIDACEAE						
Acrostichum danaeifolium	Giant Leather Fern					√
Ceratopteris thalictroides	Watersprite Fern					
SCHIZAEACEAE						
Lygodium microphyllum	Old World Climbing Fern			Cat I		
THELYPTERIDACEAE						
Thelypteris interrupta	Hottentot Fern					√
Thelypteris kunthii	Widespread Maiden fern					√
VITTARIACEAE						
Vittaria lineata	Shoestring fern					√
GYMNOSPERMS						
CUPRESSACEAE						
Taxodium distichum	Bald Cypress					√
PINACEAE						
Pinus elliottii	Slash Pine					√

Family/Scientific Name	Common Name	FDACS	FWS	FLEPPC	FNAI	Native
MONOCOTS						
AGAVACEAE						
Sansevieria hyacinthoides	African Bowstring Hemp			Cat II		
ALISMATACEAE						
Sagittaria latifolia	Broadleaf Arrowhead					√
AMARYLLIDACEAE						
Crinum americanum	String- lily					√
ARACEAE						
Epipremnum pinnatum	Golden Pothos					
Philodendron scandens	Philodendron ivy					
ARECACEAE (PALMAE)						
Arecastrum romazoofiana	Queen Palm					
Dypsis lutescens	Areca Palm					
Phoenix reclinata	Senegal Date Palm			Cat II		
Roystonea regia	Florida Royal Palm	E			S2	√
Sabal palmetto	Cabbage Palm					√
Serenoa repens	Saw Palmetto					√
Syagrus romanzoffiana	Queen Palm			Cat II		
Syngonium podophyllum	American Evergreen, Pothos			Cat I		
BROMELIACEAE						
Neoregilia sp.	Ornamental Bromeliad					
Tillandsia balbisiana	Northern Needleleaf Airplant	T				√
Tillandsia fasciculata	Cardinal Airplant	E				√
Tillandsia recurvata	Ball Moss					√
Tillandsia setacea	Southern Needleleaf					√
Tillandsia usneoides	Spanish Moss					√
Tillandsia utriculata	Giant Airplant	E				√
CANNACEAE						
Canna flaccida	Bandana-of-the-Eveglades					√
COMMELINACEAE						
Commelina diffusa	Common Dayflower					
CYPERACEAE						
Cyperus compressus	Poorland Flatsedge					√
Cyperus haspan	Haspan Flatsedge					√
Cyperus lanceolatus	Flatsedge					√
Cyperus ligularis	Swamp Flatsedge					√
Cyperus ovatus	Flatsedge					√
Cyperus surinamensis	Tropical Flatsedge					√
Elocharis cellulosa	Gulf Coast Spikerush					√
Fuirena brevisita	Umbrellasedge					√
Rhynchospora microcephala	Bunched Beaksedge					√
Schoenoplectus tabernaemontani	Softstem Bullrush					√

Family/Scientific Name	Common Name	FDACS	FWS	FLEPPC	FNAI	Native
ERIOCAULACEAE						
Eriocaulon decangulare	Tenangle Pipewort					√
HAEMODORACEAE						
Lachnanthes caroliana	Carolina redroot					√
HYPOXIDEAE						
Hypoxis juncea	Fringed Yellow Stargrass					√
LILIACEAE						
Lilium catesbaei	Catesby's Lily	T				√
MARANTACEAE						
Thalia geniculata	Alligator Flag, Fire flag					√
MUSACEAE						
Musa acuminata (x paradisiaca	Banana					
ORCHIDACEAE						
Encyclia tampensis	Florida Butterfly Orchid	CE				√
Eulophia alta	Wild Coco Orchid					√
Habenaria sp.	Reinorchid					√
Polystachya concreta	Greater Yellowspike Orchid	E				√
Vanilla mexicana	Mexican vanilla	E				√
POACEAE (GRAMINEAE)						
Amphicarpum muhlenbergianum	Blue maidencane					√
Andropogon virginicus glaucus	Chalky Bluestem					√
Andropogon glomeratus	Bushy Bluestem					√
Aristida purpurascens	Arrowfeather Threeawn					√
Aristida spiciformis	Bottlebrush Threeawn					√
Aristida stricta	Wiregrass					√
Bambusa vulgaris	Common Bamboo					
Cenchrus sp.	Sandspur					?
Ctenium aromaticum	Toothache Grass					√
Cynodon dactylon	Bermudagrass					
Echinocloa colona	Jungle rice					
Eustachys petraea	Pinewoods Finger Grass					√
Dactyloctenium aegyptium	Crowfoot Grass			Cat II		
Dichanthelium commutatum	Variable Witchgrass					√
Imperata cylindrica	Cogon Grass			Cat I		
Lasiacis divaricata	Wild Cane					√
Melinis repens	Rose Natalgrass			Cat I		
Panicum maximum	Guineagrass			Cat II		
Panicum repens	Torpedograss			Cat I		
Rhynchelytrum repens	Rose Natalgrass			Cat I		
Sacciolepis indica	Indain Cupscale					
Setaria parviflora	Yellow Bristlgrass					√

Family/Scientific Name	Common Name	FDACS	FWS	FLEPPC	FNAI	Native
PONTEDARIACEAE						
Pontederia cordata	Pickerelweed					√
SMILACEAE						
Smilax auriculata	Earleaf Greenbrier					√
Smilax laurifolia	Bamboo vine					√
TYPHACEAE						
Typha latifolia	Broadleaf Cattail					√
XYRIDACEAE						
Xyris ambigua	Coastalplain Yelloweyed Grass					√
Xyris caroliniana	Carolina Yelloweyed Grass					√
Xyris elliottii	Elliott's Yelloweyed Grass					√
DICOTS						
ACANTHACEAE						
Ruellia blechum	Brown's Blechum			Cat II		
AMARANTHACEAE						
Alternanthera philoxeroides	Alligatorweed			Cat II		
ANACARDIACEAE						
Rhus copallinum	Winged Sumac					√
Schinus terebinthifolia	Brazilian Pepper			Cat I		
Toxicodendron radicans	Poison Ivy					√
ANNONACEAE						
Annona glabra	Pond-apple					√
Asimina reticulata	Netted Pawpaw					√
APIACEAE						
Centella asiatica	Spadeleaf					√
Eryngium sp.	Rattlesnakemaster					√
Eryngium yuccifolium	Button Rattlesnakemaster					√
Tiedemannia(Oxypolis) filiforn	Water Cowbane					√
APOCYNACEAE						
Asclepias curassavica	Scarlet Milkweed					
Asclepias pedicillata	Savannah Milkweed					√
Funastrum clausum	White Twinevine					√
Nerium oleander	Oleander					
AQUIFOLIACEAE						
Ilex cassine	Dahoon Holly					√
Ilex glabra	Gallberry, Inkberry					√
ARALIACEAE						
Hydrocotyle umbellata	Marshpennywort					√
Schefflera actinophylla	Queensland Umbrella Tree			Cat I		
Schefflera arborica	Dwarf Schefflera					
ASTERACEAE						
Ambrosia artemisiifolia	Common Ragweed					√
Baccharis glomerulifolia	Silverling					√

Family/Scientific Name	Common Name	FDACS	FWS	FLEPPC	FNAI	Native
ASTERACEAE, Cont'd						
Baccharis halimifolia	Grounsel tree, Saltbush					√
Balduina angustifolia	Coastalplain Honeycombhead					√
Bidens alba	White Beggar-ticks					√
Bigelowia nudata	Pineland Rayless Goldenrod					√
Carphephorus carnosus	Pineland Chaffhead					√
Carphephorus corymbosus	Coastalplain Chaffhead					√
Chromolaena odorata	Jack-in-the-bush					√
Conoclinium coelestinum	Blue Mistflower					√
Conyza canadensis	Smooth Horseweed					√
Eclipta prostrata	False Daisy					√
Elephantopus alatus	Tall elephantsfoot					√
Emilia fosbergii	Fla (Red) Tasselflower					
Emilia sonchifolia	Lilac Tasselflower					
Erechtites hieraciifolius	Fireweed, American Burnweed					√
Erigeron vernus	Early Whitetop Fleabane					√
Eupatorium capillifolium	Dogfennel					√
Eupatorium serotinum	Lateflowering Thoroughwort					√
Flaveria linearis	Yellowtop					√
Gaillardia pulchella	Blanketflower					√
Mikania scandens	Climbing Hempvine					√
Pectis prostrata	Speading Cinchweed					√
Pluchea foetida	Stinking Camphorweed					√
Pluchea odorata	Sweetscent					√
Pterocaulon pycnostachyum	Blackroot					√
Sericocarpus tortifolius	Whitetop Aster					√
Solidago odora var chapmanii	Chapman's Goldenrod					√
Sphagneticola triloabata (Wede	Trailing Wedelia			Cat II		
Symphyotrichum carolinianum	Climbing Aster					√
BORAGINACEAE						
Cordia sebestena	Geiger Tree, Anaconda					√
BUDDLEJACEAE						
Polypremum procumbens	Rustweed					√
CACTACEAE						
Hylocereus undata	Night-blooming Cereus					
CHRYSOBALANACEAE						
Chrysobalanus icaco	Coco Plum					√
Licania michauxii	Gopher Apple					√
CISTACEAE						
Crocanthemum sp.	Frostweed					√
CLUSIACEAE						
Hypericum cistifolium	Roundpod St. Johnswort					√
Hypericum fasciculatum	Sandweed, Peelbark					√
Hypericum tetrapetalum	4-petal St Johns-wort					√

Family/Scientific Name	Common Name	FDACS	FWS	FLEPPC	FNAI	Native
CONVOLVULACEAE						
Dichondra carolinensis	Carolina ponysfoot					√
Ipomoea alba	Moonflower					√
Ipomoea cordatotriloba	Tievine					√
CUCURBITACEAE						
Melothria pendula	Creeping Cucumber					√
Momordica charantia	Balsampear			Cat II		
DROSERACEAE						
Drosera capillaris	Pink Sundew					√
ERICACEAE						
Bejaria racemosa	Tarflower					√
Lyonia fruticosa	Coastalplain Staggerbush					√
Lyonia lucida	Fetterbush					√
Vaccinium myrsinites	Shiny Blueberry					√
Vaccinium stamineum	Deerberry					√
ESCALLONIACEAE						
Itea virginica	Virginia willow					√
EUPHORBIACEAE						
Chamaesyce hyssopifolia	Hyssopleaf Sandmat					√
Codiaeum variegatum	Variegated laurel, Croton					
Croton glandulosus	Vente Conmigo					√
Euphorbia polyphylla	Lesser Florida Spurge					√
Phyllanthus tenellus	Mascarene Island Leafflower					
Triadica (Sapium) sebifera	Popcorn tree, Chinese Tallowtree			Cat I		
FABACEAE						
Abrus precatorius	Rosary pea			Cat I		
Acacia auriculiformis	Earleaf acacia			Cat I		
Apios americana	Groundnut					√
Chamaecrista nictitans	Partridge Pea					√
Crotalaria rotundifolia	Rabbitbells					√
Crotalaria pallida	Smooth Rattlebox					
Crotalaria spectabilis	Showy Rattlebox					
Croton glandulosus	Vente Conmigo					√
Dalbergia ecastaphyllum	Coinvine					√
Delonix regia	Royal Poinciana					
Desmodium incanum	Zarzabacoa Comun					
Galactia elliottii	Elliott's Milkpea					
Indigofera spicata	Trailing Indigo					
Macroptilium lathyroides	Wild Bushbean, Phasey bean			Cat II		
Mimosa (Schrankia) quadrivalv	Florida Sensitive Brier					√
Sesbania herbacea	Danglepod					√
Vigna luteola	Hairypod cowpea					√

Family/Scientific Name	Common Name	FDACS	FWS	FLEPPC	FNAI	Native
FAGACEAE						
Quercus chapmanii	Chapman's Oak					√
Quercus geminata	Sand Live Oak					√
Quercus laurifolia	Laurel Oak					√
Quercus minima	Dwarf Live Oak					√
Quercus virginiana	Live Oak					√
GENTIANACEAE						
Sabatia brevifolia	Shortleaf Rosegentian					√
Sabatia calycina	Coastal rosegentian					√
HALORAGACEAE						
Proserpinaca pectinata	Combleaf Mermaidweed					√
JUGLANDACEAE						
Carya aquatica	Water Hickory					√
LAMIACEAE						
Hyptis alata	Clustered Bushmint; Musky Mint					√
Piloblephis rigida	Wild Pennyroyal					√
Trichostema dichotomum	Forked Bluecurls					√
LAURACEAE						
Cassytha filiformis	Love Vine					√
Persea borbonia	Red Bay					√
LENTIBULARIACEAE						
Utricularia cornuta	Horned Bladderwort					√
Utricularia subulata	Zigzag Bladderwort					√
LINDERNIACEAE						
Lindernia crustacea	Malaysian False Pimpernel					
LOGANIACEAE						
Mitreola petiolata	Lax Hornpod					√
LYTHRACEAE						
Cuphea carthagenensis	Colombian waxweed					
Lagerstroemia indica	Crapemyrtle					
MALVACEAE						
Sida rhombifolia	Cuban Jute, Indian Hemp					√
Urena lobata	Caesarweed			Cat I		
MELASTOMATACEAE						
Rhexia mariana	Pale Medowbeauty; Maryland Medowbeauty					√
Rhexia nuttallii	Nuttall's Meadowbeauty					√
MORACEAE						
Ficus aurea	Golden Wild Fig					√
Morus rubra	Red Mulberry					√
MYRICACEAE						
Myrica cerifera	Wax Myrtle, So. Bayberry					√
MYRSINACEAE						
Myrsine cubana	Myrsine					√

Family/Scientific Name	Common Name	FDACS	FWS	FLEPPC	FNAI	Native
NYMPHAEACEAE						
Nuphar advena	Spatterdock, Yellow pondlily					√
Nymphaea odorata	American White Waterlily					√
OLACACEAE						
Ximenia americana	Tallow Wood, Hog Plum					√
OLEACEAE						
Fraxinus caroliniana	Carolina Ash					√
ONAGRACEAE						
Ludwigia peruviana	Primrose willow			Cat I		
PLANTAGINACEAE						
Gratiola hispida	Rough Hedgehyssop					√
Mecardonia acuminata	Axilflower					√
PLUMBAGINACEAE						
Plumbago auriculata	Cape Leadwort					
POLYGONACEAE						
Persicaria hydropiperoides	Mild waterpepper					√
Polygala lutea	Orange Milkwort					√
Polygala nana or smallii [1]	Candyroot, Small's Milkwort	E?	E?			√
Polygala rugelii	Yellow Milkwort					√
Polygonella ciliata	Hairy Jointweed					√
RHIZOPHORACEAE						
Rhizophora mangle	Red Mangrove					√
ROSACEAE						
Rubus trivialis	Southern Dewberry					√
RUBIACEAE						
Cephalanthus occidentalis	Buttonbush					√
Psychotria nervosa	Shiny Wild Coffee					√
Psychotria sulzneri	Shortleaf Wild Coffee					√
Richardia brasiliensis	Tropical Mexican Clover					
Richardia grandiflora	Largeflower Mexican Clover			Cat II		
Spermacoce verticillata	Shrubby False Buttonweed			Cat II		
SALICEAE						
Salix caroliniana	Carolina Willow					√
SAPINDACEAE						
Acer rubrum	Red Maple					√
SCROPHULARIACEAE						
Buchnera americana	American Bluehearts					√
SOLANACEAE						
Solanum diphyllum	Two-leaf Nightshade			Cat II		
URTICACEAE						
Boehmeria cylindrica	False Nettle					√

Family/Scientific Name	Common Name	FDACS	FWS	FLEPPC	FNAI	Native
VERBENACEAE						
Callicarpa americana	Beautyberry					√
Lantana camara	Lanatana			Cat I		
Phyla nodiflora	Turkey Tangle Fogfuit,					√
VERONICACEAE						
Bacopa monnieri	Herb-of-grace					√
VITACEAE						
Ampelopsis arborea	Peppervine					√
Parthenocissus quinquefolia	Virginia creeper, Woodbine					√
Vitis rotundifolia	Muscadine grape					√
Vitis shuttleworthii	Calloose grape					√

Legend & definitions

FDACS = Florida Department of Agriculture and Consumer Services

FWS - U.S. Fish and Wildlife Service

FLEPPC = Florida Exotic Pest Plant Council

FNAI = Florida Natural Areas Inventory

E = Endangered

T = Threatened

CE = Commercially Exploited

Cat I - FLEPPC Category I = Invasive exotics that are altering native plant communities by displacing nat species, changing community structures or ecological functions, or hybridizing with natives.

Cat II = FLEPPC Category II - Invasive exotics that have increased in abundance and frequency but have yet altered Florida plant communities to the extent shown by Category I species.

FNAI ranking definitions:

S1 = Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.

S2 = Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000 individuals) or because vulnerability to extinction due to some natural or man-made factor.

S3 = Either very rare and local in Florida (21-100 occurrences or less than 10,000 individuals) or found in a restricted range or vulnerable to extinction from other factors.

[1] Genus and species of orchid undetermined based upon stage of life cycle on the date of the investigatio

[2] Species of Polygala undetermined based upon stage of life cycle on the date of the investigation.

Faunal Species Documented at Halpatiokee Park

Common Name	Scientific Name
Gulf Fritillary Butterfly	*Agraulis vanilla nigrior*
Florida White Butterfly	Pieridae
Giant Swallowtail	*Heraclides cresphontes*
White Peacock Butterfly	*Anartia jatrophae guantanamo*
Zebra Longwing Butterfly	*Heliconius charitonius tuckeri*
Golden Silk Spider (aka Banana spider)	*Nephila clavipes*
Spiny Orb Weaver Spider	*Gasteracantha cancriformis*
Birds [1]	
Black-bellied Whistling-Duck	*Dendrocygna autumnalis*
Wood Duck	*Aix sponsa*
Mottled Duck	*Anas fulvigula*
Wild Turkey	*Meleagris gallopavo*
Northern Bobwhite	*Colinus virginianus*
Wood Stork	*Mycteria americana*
Double-crested Cormorant	*Phalacrocorax auritus*
Anhinga	*Anhinga anhinga*
Least Bittern	*Ixobrychus exilis*
Great Blue Heron	*Ardea herodias*
Snowy Egret	*Egretta thula*
Little Blue Heron	*Egretta caerulea*
Tricolored Heron	*Egretta tricolor*
Cattle Egret	*Bubulcus ibis*

Common Name	Scientific Name
Green Heron	*Butorides virescens*
Black-crowned Night-Heron	*Nycticorax nycticorax*
Yellow-crowned Night-Heron	*Nyctanassa violacea*
White Ibis	*Eudocimus albus*
Black Vulture	*Coragyps atratus*
Turkey Vulture	*Cathartes aura*
Osprey	*Pandion haliaetus*
Swallow-tailed Kite	*Elanoides forficatus*
Sharp-shinned Hawk	*Accipiter striatus*
Cooper's Hawk	*Accipiter cooperii*
Bald Eagle	*Haliaeetus leucocephalus*
Red-shouldered Hawk	*Buteo lineatus*
Short-tailed Hawk	*Buteo brachyurus*
Red-tailed Hawk	*Buteo jamaicensis*
King Rail	*Rallus elegans*
Sandhill Crane	*Grus canadensis*
Killdeer	*Charadrius vociferus*
Laughing Gull	*Leucophaeus atricilla*
Ring-billed Gull	*Larus delawarensis*
Rock Pigeon	*Columba livia* (nn)
Eurasian Collared-Dove	*Streptopelia decaocto* (nn)
Common Ground-Dove	*Columbina passerina*
White-winged Dove	*Zenaida asiatica*

Common Name	Scientific Name
Mourning Dove	*Zenaida macroura*
Yellow-billed Cuckoo	*Coccyzus americanus*
Barred Owl	*Strix varia*
Eastern Screech Owl	*Megascops asio*
Great Horned Owl	*Bubo virginianus*
Common Nighthawk	*Chordeiles minor*
Chimney Swift	*Chaetura pelagica*
Ruby-throated Hummingbird	*Archilochus colubris*
Belted Kingfisher	*Megaceryle alcyon*
Red-bellied Woodpecker	*Melanerpes carolinus*
Yellow-bellied Sapsucker	*Sphyrapicus varius*
Downy Woodpecker	*Picoides pubescens*
Hairy Woodpecker	*Picoides villosus*
Pileated Woodpecker	*Dryocopus pileatus*
American Kestrel	*Falco sparverius*
Merlin	*Falco columbarius*
Monk Parakeet	*Myiopsitta monachus* (nn)
Eastern Phoebe	*Sayornis phoebe*
Great Crested Flycatcher	*Myiarchus crinitus*
Loggerhead Shrike	*Lanius ludovicianus*
White-eyed Vireo	*Vireo griseus*
Blue-headed Vireo	*Vireo solitarius*
Blue Jay	*Cyanocitta cristata*

Common Name	Scientific Name
American Crow	*Corvus brachyrhynchos*
Fish Crow	*Corvus ossifragus*
Purple Martin	*Progne subis*
Tree Swallow	*Tachycineta bicolor*
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*
Barn Swallow	*Hirundo rustica*
House Wren	*Troglodytes aedon*
Carolina Wren	*Thryothorus ludovicianus*
Blue-gray Gnatcatcher	*Polioptila caerulea*
Wood Thrush	*Hylocichla mustelina*
Ruby-crowned Kinglet	*Regulus calendula*
American Robin	*Turdus migratorius*
Gray Catbird	*Dumetella carolinensis*
Brown Thrasher	*Toxostoma rufum*
Northern Mockingbird	*Mimus polyglottos*
European Starling	*Sturnus vulgaris* (nn)
Cedar Waxwing	*Bombycilla cedrorum*
Pine Warbler	*Setophaga pinus*
Ovenbird	*Seiurus aurocapilla*
Northern Waterthrush	*Parkesia noveboracenis*
Black-and-white Warbler	*Mniotilta varia*
Prothonotary Warbler	*Protonotaria citrea*
Yellow-rumped Warbler	*Setophaga coronata*

Common Name	Scientific Name
Orange-crowned Warbler	*Oreothlypis celata*
Yellow-throated Warbler	*Setophaga dominica*
Prairie Warbler	*Setophaga discolor*
Common Yellowthroat	*Geothlypis trichas*
American Redstart	*Setophaga ruticilla*
Cape May Warbler	*Setophaga tigrina*
Northern Parula	*Setophaga americana*
Magnolia Warbler	*Setophaga magnolia*
Blackpoll Warbler	*Setophaga striata*
Black-throated Blue Warbler	*Setophaga caerulescens*
Palm Warbler	*Setophaga palmarum*
Eastern Towhee	*Pipilo erythrophthalmus*
Summer Tanager	*Piranga rubra*
Northern Cardinal	*Cardinalis cardinalis*
Painted Bunting	*Passerina ciris*
Bobolink	*Dolichonyx oryzivorus*
Red-winged Blackbird	*Agelaius phoeniceus*
Common Grackle	*Quiscalus quiscula*
Boat-tailed Grackle	*Quiscalus major*
American Goldfinch	*Spinus tristis*
House Sparrow	*Passer domesticus* (nn)

[1] – Bird List generated using data retrieved from eBird records through May 2017 and incidental sightings by staff during other site visits. Nomenclature and order follow American Ornithologists' Union.

nn = non-native

Common Name	Scientific Name
Reptiles and Amphibians	
American Alligator	*Alligator mississippiensis*
Black Racer	*Coluber constrictor priapus*
Eastern Diamondback Rattlesnake	*Crotalus adamanteus*
Southern Ringneck Snake	*Diadophis punctatus punctatus*
Red Rat Snake	*Elaphe guttata guttata*
Banded Water Snake	*Nerodia fasciata fasciata*
Oak Toad	*Bufo quercicus*
Florida Cricket Frog	*Acris gryllus dorsalis*
Green Treefrog	*Hyla cinera*
Cuban Treefrog	*Osteopilus septentriolnalis*
Southern Leopard Frog	*Rana sphenocephala*
Green Anole	*Anolis carolinensis*
Brown Anole	*Anolis sagrei sagrei* *(nn)*
Florida Box Turtle	*Terrapene carolina bauri*
Gopher Tortoise	*Gopherus polyphemus*
Freshwater Fish & other aquatic species	
Lake Chubsucker	*Erimyzon sucetta*
Eastern Mosquitofish	*Gambusia holbrooki*
Brook Silverside	*Labidesthes sicculus*
Warmouth	*Lepomis gulosus*
Florida Gar	*Lepisosteus platyrhincus*
Bluegill	*Lepomis latrans*
Redear Sunfish	*Lepomis microlophis*
Largemouth Bass	*Micropterus salmoides*
American Eel	*Anguilla rostrata*

Mammals	
Coyote	*Canis latrans*
Bat	Chiroptera
Nine-banded Armadillo	*Dasypus novemcinctus*
Virginia Opossum	*Didelphis virginiana*
River Otter	*Lutra canadensis*
Bobcat	*Lynx rufus*
White-tailed Deer	*Odocoileus virginianus*
Raccoon	*Procyon lotor*
Eastern Gray Squirrel	*Sciurus carolinensis*
Eastern Cottontail	*Sylvilagus floridanus*
Marsh Rabbit	*Sylvilagus palustris*
Wild Hog	*Sus scrofa* *(nn)*
West Indian Manatee	*Trichechus manatus*
Gray Fox	*Urocyon cinereoargenteus*

Appendix H

FWC Summary of Freshwater Fish Investigation

Halpatiokee Regional Park Fishery Summary

Lee Grove
FWC Fisheries Biologist
Lee.Grove@myfwc.com
561-882-5722

Introduction

To start, I would like to thank you for taking an interest in the fisheries resources at Halpatiokee Regional Park and before we get into the results of our sampling efforts I need to explain a few of the population metrics we use to evaluate a fishery. We use a boat electrofisher that uses pulsed DC current to non-lethally stun any fish that are in range of the array (4 – 6 ft. off each boom). Collected fish are placed in a large tub containing lake water where they are measured and weighed before being returned to the lake. This process is conducted numerous times and the number of times changes depending the length of the lake's shoreline. We call these transects, and each consist of 15 minutes for Largemouth Bass specific electrofishing and 10 minutes for community electrofishing. Then, the collected data from each transect is compiled and we use the lengths, weights and number of fish collected from each transect to derive metrics that inform us about the population.

Catch-per-unit-effort or CPUE is one of the main metrics fisheries biologist can use to make inferences about fish abundance between years or different lakes. CPUE is calculated by dividing the total number of fish collected during each transect by the total time of each transect (effort). Proportional Stock Density (PSD) is a ratio of Largemouth Bass *Micropterus salmoides* greater or equal to quality size (12 inches) compared to the all fish collected greater than stock size (8 inches). Relative Stock Density (RSD) is similar to PSD and calculates ratios for larger size groups; preferred (15 inches), memorable (20 inches) and Trophy (24 inches plus). Finally, relative weight (Wr) uses length and weight relationships to create and index of condition or how fat the fish is compared to all other fish of the same species.

Community Sampling

Community sampling targets all fish present and was conducted on Halpatiokee Lake in October of 2015. Ten transects were conducted for a total of 6,000 seconds and were 10 minutes each. Brook Silverside *Labidesthes sicculus* had the highest CPUE (5.02 fish/minute) and was the most numerous species making up 67.42% of the fish community, but only 1% of the total biomass. Largemouth Bass were the second most abundant species which consisted 16.68% of all fish collected and composed the greatest portion of biomass at 64.73%. A total of 126 Largemouth Bass were sampled at a catch rate of 1.24 fish/minute. Redear Sunfish *Lepomis microlophus* CPUE was 0.2 fish/min and composed 2.69% of all fish collected and 6.32% of the total biomass. Bluegill *Lepomis macrochirus* CPUE was 0.73 fish/min and was the third most abundant species by number (9.83%) representing about 9.19% of the total biomass (Table 1). Other species present (in low numbers) included American Eel *Anguilla rostrata*, Florida Gar, Lake Chubsucker *Erimyzon sucetta*, Eastern Mosquitofish *Gambusia holbrooki*, and Warmouth *Lepomis gulosus*. No exotic fish species were not collected.

Table 1. Size range, relative abundance, and percent contribution by number and weight of fish species collected by 10 electrofishing transects from Halpatiokee Lake, October 2015. CPUE = Catch-per-unit-effort, SE = Standard error.

		CPUE		% Composition	
	Size range (mm)	Fish/min (SE)	Grams/min	Number	Weight
American Eel	354 - 408	0.02 (0.02)	1.99	0.27	0.81
Bluegill	10 - 210	0.73 (0.17)	22.59	9.83	9.19
Brook Silverside	-	5.02 (1.89)	2.64	67.42	1.07
Florida Gar	335 - 443	0.13 (0.04)	30.00	1.80	12.20
Lake Chubsucker	136 - 388	0.05 (0.02)	13.33	0.63	5.42
Largemouth Bass	97 - 413	1.24 (0.14)	159.1	16.68	64.73
Eastern Mosquitofish	-	0.01 (0.01)	<0.001	0.13	<0.01
Redear Sunfish	95 - 222	0.20 (0.05)	15.54	2.69	6.32
Warmouth	73 - 124	0.04 (0.02)	0.60	0.54	0.24

Largemouth Bass Sampling

The Largemouth Bass population at the Halpatiokee Park lakes was sampled in April 2017 using methodology established as part of the Small Lakes Stocking Study. A boat electrofisher was used to sample 14 randomly selected 15-minute transects on 5 different sampling dates. The Halpatiokee Lakes had a CPUE of 2.22 (0.23) fish/min with a total of 1068 bass collected (431 from the first sampling event were used to generate CPUE). The bass were in good condition with a relative weight of 84.45 (0.16). PSD was 13.75 which indicates there is a small proportion of quality or larger sized fish (Table 2). A CPUE of 2.17 fish/min is high compared to other Lakes across the State and in the Region. This would indicate that recruitment is not limiting the production of a quality bass fishery at Halpatiokee Regional Park.

There are plenty of fish, just very few above 200 mm, which is not an ideal angling size for Largemouth Bass anglers (Table 2; Figures 1 - 3). Based off biologist observations, the limiting factor is more likely the amount of available prey and we have partnered with FWRI to begin a forage stocking study in the lakes. Bluegill will be stocked in large quantities starting in the fall of 2017 and will continue annually for the next few years in an effort to enhance the forage base available to Largemouth Bass. This stocking study is aimed to enhance both the bream and Largemouth Bass fishing by increasing the abundance of Bluegill available to hook and line angling and to Largemouth Bass predation. Past habitat restoration projects by FWC staff have greatly improved the amount of emergent vegetation and the shoreline slope, but there is still a need to establish more submerged vegetation. Further habitat enhancement not only improves habitat for Largemouth Bass but also enhances habitat for the forage base. Moving forward, FWC staff will continue to work with ARES and consider possible future habitat restoration efforts. Currently, we are partnering with FWRI to examine the effects of forage stocking in the Halpatiokee Lakes. Also, the lakes at Halpatiokee Regional Park are good examples of lakes that may benefit from FWC's new Largemouth Bass regulations that were instated on July 1st, 2016, which should increase harvest of smaller sized Largemouth Bass and may improve condition and increase growth as more forage is available.

Table 1. Population metrics for Largemouth Bass sampled by electrofishing for 25 transects f Halpatiokee, April 2017. Catch-per-unit-effort (CPUE) is reported in fish per minute. SE = Standard error, PSD = Proportional stock density, RSD = Relative stock density.

Metric	Halpatiokee	North Lake	South Lake
N	1068	782	286
CPUE N	431	346	85
CPUE (SE)			
All Bass	2.22 (0.23)	2.59 (0.22)	1.41 (0.29)
Length Data			
Mean	212.49	219.01	194.66
Median	195	198.5	170
Range (min - max)	118 - 636	125 - 636	118 - 421
Stock Density			
PSD	13.75	12.18	20.21
RSD - Preferred	1.25	0.78	3.19
RSD - Memorable	0.00	0.00	0.00
RSD - Trophy	0.21	0.26	0.00
Relative Weight (SE)			
Wr	84.45 (0.16)	84.33 (0.17)	84.87 (0.34)

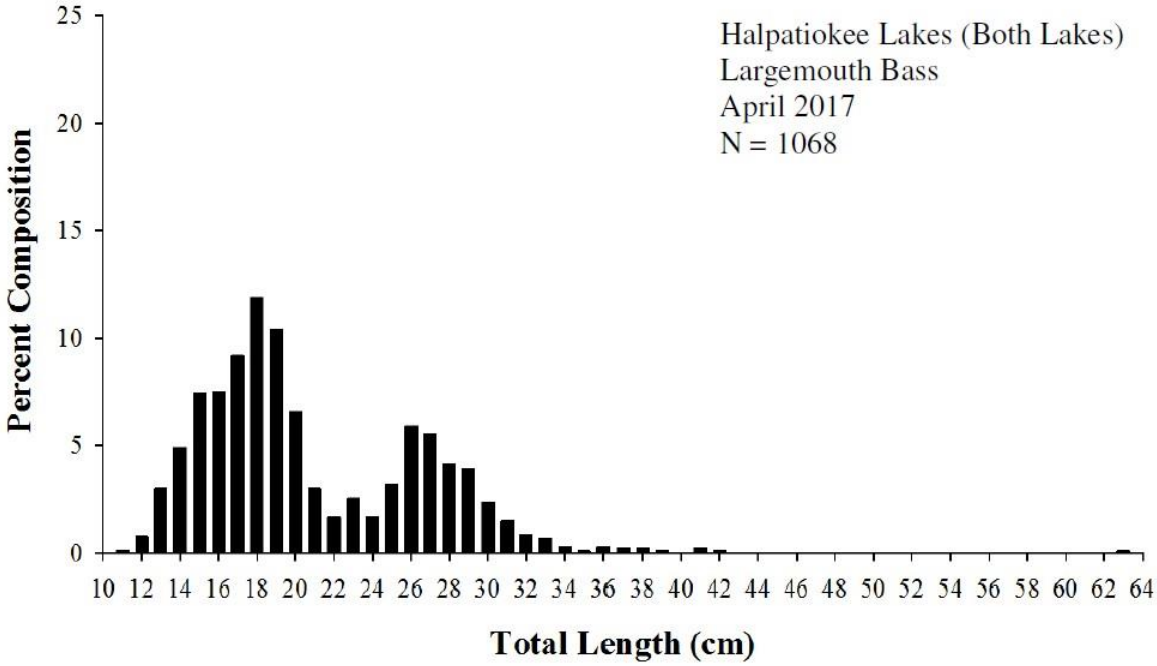


Figure 1. Length-frequency distribution of Largemouth Bass collected by electrofishing from both Halpatiokee Regional Park lakes, spring 2017.

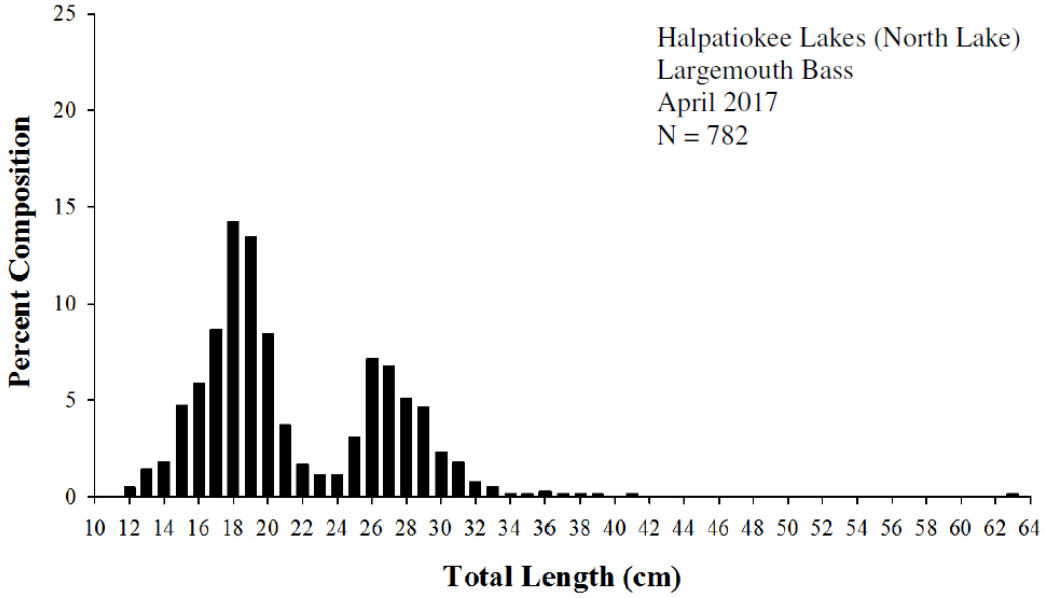


Figure 2. Length-frequency distribution of Largemouth Bass collected by electrofishing from the North lake at Halpatiokee Regional Park, spring 2017.

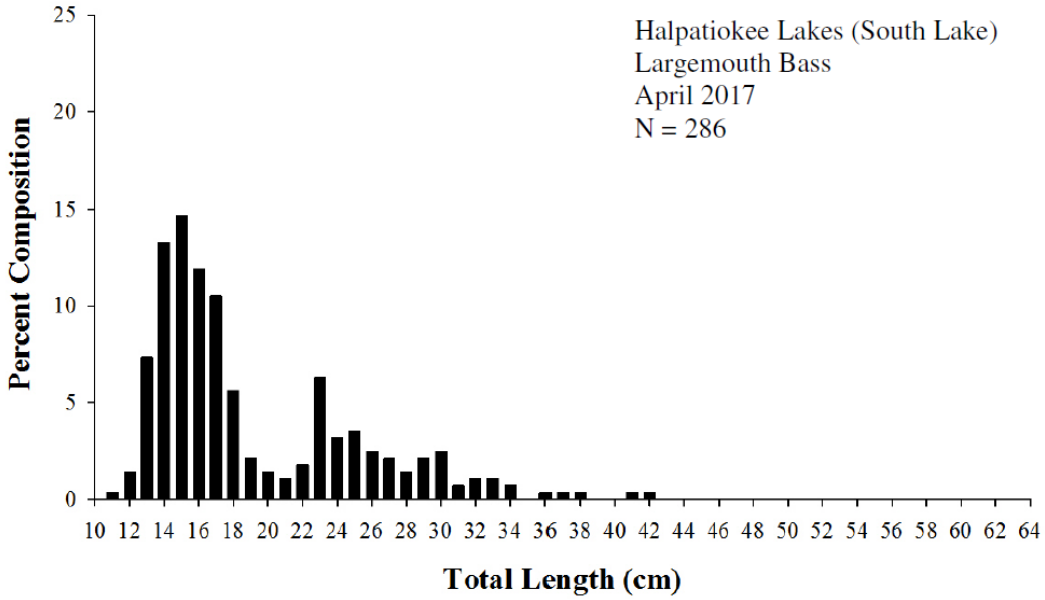


Figure 3. Length-frequency distribution of Largemouth Bass collected by electrofishing from the South lake at Halpatiokee Regional Park, spring 2017.

Appendix I

Water Quality Data for the “Hosford Park” site

Data Source: Florida Oceanographic Society

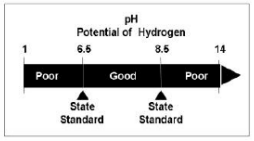
St. Lucie River Estuary
Water Quality Report

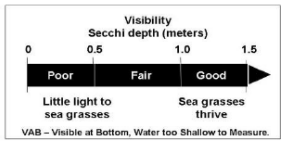
This information is provided by the Florida Oceanographic Society with support of the Marine Resources Council. It is collected by the Citizen Volunteer Water Quality Monitoring Network. For historical data go to our website at: http://www.floridaocean.org
For sample results related to bacteria levels go to:
http://martin.floridahealth.gov/programs-and-services/ and click on the Environmental Health link

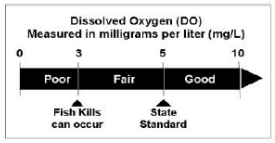
Posted: **05/25/17**

Overall Grade:	86%	B	GOOD

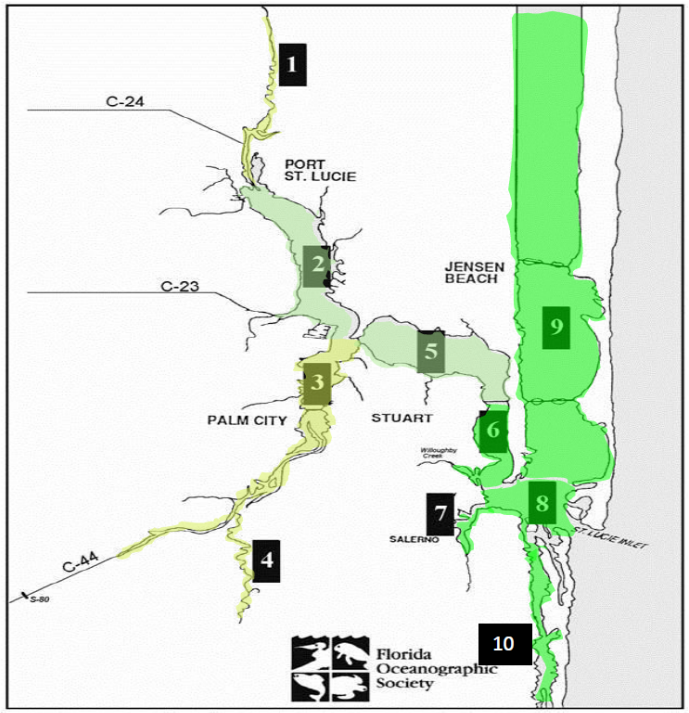
Zone/ Location	Water Temp. Deg. F	pH	Visibility (Secchi) Meters	Salinity ppt	Dissolved Oxygen mg/L	Location Score	Grade
1. Winding North Fork	85	7.8	0.57 Fair	9.7 Fair	4.4 Fair	71%	C Satisfactory
2. North Fork	82	8.2	0.63 Fair	24.3 Good	5.3 Good	87%	B Good
3. South Fork	84	8.1	0.45 Poor	22.5 Good	4.4 Fair	71%	C Satisfactory
4. Winding South Fork	86	8.1	0.75 Fair	9.5 Fair	5.2 Good	76%	C Satisfactory
5. Wide Middle River	84	8.2	0.70 Fair	28.5 Good	5.0 Fair	81%	B Good
6. Narrow Middle River	82	8.4	1.35 Good	35.5 Good	6.0 Good	97%	A Ideal
7. Manatee Pocket	86	8.3	1.10 Good	35.0 Good	4.8 Fair	92%	A Ideal
8. Inlet Area	82	8.3	1.25 Good	35.7 Good	4.9 Fair	92%	A Ideal
9. Indian River Lagoon	83	8.3	1.23 Good	35.6 Good	5.6 Good	97%	A Ideal
10. Intracoastal Waterway South	79	8.2	1.60 Good	35.0 Good	4.6 Fair	92%	A Ideal







Comment: The data above may indicate areas of concern in the St. Lucie Estuary. Citizens should call the Florida Department of Environmental Protection (DEP) at 871-7662 or the South Florida Water Management District (SFWMD) 223-2600 to ask about the quality of a specific area and report observations of pollution.



Overall Grading				
A	B	C	D	F
100-90	89-80	79-70	69-60	69-0
IDEAL	GOOD	SATISFACTORY	POOR	DESTRUCTIVE

Salinity (ppt) Grading				
Zones	description	GOOD	FAIR	POOR
1&4	upper north & south forks	2 - 8	1 - 2 or 8 - 15	< 1 or > 15
2 & 3	lower north & south forks	15 - 25	10 - 15 or > 25	< 10
5	wide middle river	> 20	15 - 20	< 15
6	narrow middle river	> 25	20 - 25	< 20
7	Manatee Pocket	> 27.5	20 - 27.5	< 20
8	inlet	> 30	25 - 30	< 25
6	IRL & Intracoastal W'wy	> 30	25 - 30	< 25

Sample Weekly Water Quality Report Summary, Source: Florida Oceanographic Society

DATE &	TIME	AIR Temp. C.	WATER Temp. C.	SECCHI Depth m.	SALINITY ppt.	pH	DO1 mg/L	DO2 mg/L
01/02/12	10:00	22	19	1.0	1	7.4		
01/02/12	10:00	22	19	1.0	1	7.4		
01/10/12	10:00	22	17	1.0	1	7.2	5.8	5.4
01/10/12	10:00	22	17	1.0	1	7.2	5.8	5.4
01/23/12	10:00	23	19	1.0	3	7.6	6.0	6.0
01/23/12	10:00	23	19	1.0	3	7.6	6.0	6.0
01/30/12	11:30	23	20	1.2	1	7.6	5.0	5.0
01/30/12	11:30	23	20	1.2	1	7.6	5.0	5.0
02/06/12	10:00	23	22	1.2	3	7.6	5.2	5.6
02/06/12	10:00	23	22	1.2	3	7.6	5.2	5.6
02/14/12	10:00	19	19	0.9	2	7.4	7.4	7.4
02/20/12	10:30	22	21	1.1	5	7.6	7.4	7.3
02/28/12	10:30	26	23	1.2	2	7.6	5.4	5.6
03/05/12	10:30	19	22	0.8	5	7.6	7.4	7.4
03/12/12	10:30	24	22	1.2	2	7.6	6.0	6.0
03/20/12	10:00	24	24	0.7	2	7.6	5.2	5.4
03/28/12	11:00	25	24	1.0	1	7.8	5.2	5.0
04/02/12	10:30	25	26	0.9	4	7.6	4.6	4.6
04/09/12	10:30	25	24	1.1	5	7.6	4.4	4.4
04/16/12	10:30	25	24	1.1	5	7.8	5.0	5.0
04/23/12	10:30	22	24	1.1	6	7.8	4.4	4.4
04/23/12	10:30	22	24	1.1	6	7.8	4.4	4.4
04/30/12	10:00	26	24	1.2	5	8.0	4.6	4.4
04/30/12	10:00	26	24	1.2	5	8.0	4.6	4.4
05/07/12	10:00	29	22	1.0	7	8.0	4.4	4.4
05/07/12	10:00	29	22	1.0	7	8.0	4.4	4.4
05/14/12	10:30	28	27	1.1	6	8.0	4.6	4.8
05/14/12	10:30	28	27	1.1	6	8.0	4.6	4.8
05/21/12	10:00	29	28	1.0	7	7.6	4.6	4.6
05/21/12	10:00	29	28	1.0	7	7.6	4.6	4.6
05/21/12	10:00	29	28	1.0	7	7.6	4.6	4.6
05/29/12	10:00	28	28	1.0	6	7.8	3.6	3.6
06/04/12	10:00	29	29	0.9	6	7.8	4.4	4.4
06/04/12	10:00	29	29	0.9	6	7.8	4.4	4.4
06/13/12	9:30	28	29	1.0	6	7.8	4.4	4.2
06/18/12	10:00	28	29	0.9	8	7.8	4.0	3.8
06/25/12	10:00	29	27	1.1	3	7.8	4.0	4.0
07/02/12	10:00	32	30	0.9	3	7.8	5.6	5.4
07/09/12	10:00	30	30	0.9	2	7.8	3.6	3.6
07/16/12	10:00	28	29	1.1	4	7.8	4.0	4.0
07/24/12	10:00	30	29	1.1	1	7.8	3.6	3.4
07/30/12	10:00	31	31	1.0	2	7.8	4.0	4.0
08/29/12	9:30	29	27	0.8	0	7.2	2.2	2.0
09/03/12	9:30	29	27	0.4	0	7.2	1.4	1.4
09/12/12	10:00	29	28	0.4	0	7.2	1.2	1.0

DATE &	TIME	AIR Temp. C.	WATER Temp. C.	SECCHI Depth m.	SALINITY ppt.	pH	DO1 mg/L	DO2 mg/L
09/25/12	10:00	27	26	0.4	0	7.2	1.4	1.6
10/03/12	10:00	28	27	0.4	0	6.0	2.8	2.6
10/09/12	10:00	27	26	0.3	0	7.2	2.8	2.8
10/15/12	10:00	28	25	0.5	0	7.4	2.8	3.0
10/23/12	10:00	27	25	0.4	1	7.2	2.6	2.4
10/29/12	10:30	17	21	n/a	2	7.4	3.0	3.0
11/06/12	10:00	n/a	n/a	0.8	0	7.4	2.6	2.6
11/14/12	10:00	n/a	n/a	0.8	0	7.2	3.6	3.8
11/14/12	10:00	n/a	n/a	0.8	0	7.2	3.6	3.8
11/21/12	10:00	21	20	0.7	0	7.4	3.4	3.4
11/28/12	9:30	22	19	0.9	0	7.4	4.0	3.8
12/03/12	10:00	23	20	0.9	0	7.4	4.0	3.8
12/10/12	10:00	25	22	0.8	0	7.4	4.0	4.0
12/17/12	10:00	23	22	0.6	0	7.4	4.0	4.0
12/26/12	10:00	24	18	0.7	0	7.4	4.0	4.0
04/08/11	10:00	22	23	0.8	6	7.8	6.4	6.4
12/31/12	10:00	21	18	0.9	1	7.4	4.6	4.4
01/07/13	10:00	23	21	1.0	1	7.6	4.2	4.4
01/14/13	10:00	22	22	0.8	1	7.4	4.0	4.2
01/23/13	10:00	20	20	0.9	1	7.4	4.0	3.8
01/30/13	10:00	22	20	0.8	1	7.6	4.6	4.4
02/04/13	11:00	18	18	1.1	1	7.6	5.8	5.4
02/11/13	11:00	22	22	1.1	5	7.6	5.8	6.0
02/20/13	10:00	21	17	0.7	2	7.4		
02/27/13	10:00	24	23	0.9	2	7.6		
03/05/13	10:00	17	18	0.9	2	7.6		
03/12/13	10:00	22	19	1.0	4	7.6	6.4	6.2
03/18/13	10:30	24	20	1.1	2	7.8		
03/25/13	10:00	21	23	1.0	5	7.8	6.4	6.2
04/01/13	10:00	24	21	1.0	3	7.8	6.4	6.4
04/15/13	10:00	27	26	0.9	2	7.8	5.0	5.0
04/24/13	10:00	25	26	0.8	5	7.8	5.0	5.0
04/29/13	10:00	27	26	0.8	2	7.6	5.6	5.4
05/06/13	10:00	24	25	0.8	1	7.4	3.6	3.8
05/13/13	10:00	27	26	0.7	0	7.4	5.4	5.0
05/20/13	10:00	25	26	0.8	0	7.6	3.8	3.8
05/27/13	10:00	27	27	0.8	0	7.6	5.0	5.0
06/03/13	10:30	29	27	0.8	0	7.4	4.4	4.4
06/10/13	10:00	29	27	0.5	0	7.4	3.4	3.6
06/17/13	10:30	30	29	0.5	0	7.2	2.0	2.0
07/01/13	10:30	30	28	0.7	0	7.4	3.4	3.4
07/09/13	10:00	28	28	0.6	0	7.4	3.4	3.2
07/16/13	10:00	28	25	0.4	0	7.4	3.4	3.2
07/23/13	10:00	26	28	0.4	0	7.4	2.6	2.4
07/31/13	10:30	30	28	0.5	0	7.4	2.0	1.8

DATE &	TIME	AIR Temp. C.	WATER Temp. C.	SECCHI Depth m.	SALINITY ppt.	pH	DO1 mg/L	DO2 mg/L
08/07/13	10:00	29	28	0.6	0	7.2	1.6	1.6
08/12/13	10:00	30	29	0.6	0	7.2	1.6	1.4
08/19/13	9:30	30	30	0.6	0	7.6	2.6	2.8
08/26/13	9:30	28	29	0.6	0	7.8	3.4	3.2
09/02/13	10:00	28	26	0.7	0	7.4	3.4	3.2
09/09/13	10:00	28	27	0.6	0	7.6	2.2	2.2
10/09/13	10:00	25	26	0.7	0	7.8	2.4	2.2
10/14/13	10:00	27	26	0.7	1	7.6	2.6	2.6
10/21/13	10:00	28	26	0.7	1	7.6	2.8	2.4
10/28/13	10:30	26	24	0.8	1	7.6	3.0	3.0
11/04/13	10:00	27	24	0.8	2	7.6	4.4	4.2
11/11/13	10:00	27	24	1.2	2	8.0	3.6	3.4
11/18/13	10:00	26	23	1.0	3	8.0	4.0	4.0
11/26/13	10:30	28	23	1.2	1	8.0	4.4	4.4
12/02/13	10:00	21	20	1.1	2	8.0	4.6	4.6
12/09/13	10:00	24	21	0.9	1	7.8	3.8	3.6
12/16/13	10:30	22	21	1.1	2	8.0	4.4	4.2
12/30/13	10:30	22	22	1.2	4	8.0	5.2	5.0
01/06/14	10:00	24	21	1.3	2	8.0	5.0	5.0
01/14/14	10:00	23	21	0.6	0	7.4	4.6	4.6
01/20/14	10:30	17	15	0.7	2	7.4	5.0	5.2
01/27/14	10:00	23	17	0.7	1	7.6	5.0	5.2
02/03/14	10:00	24	22	0.6	0	7.4	3.4	3.4
02/10/14	10:00	22	22	0.6	0	7.6	3.6	3.8
02/17/14	10:00	20	19	0.9	1	7.8	4.0	4.0
02/25/14	10:30	24	23	0.8	1	7.8	3.4	3.2
03/03/14	9:30	22	22	0.8	1	7.8	3.0	3.2
03/10/14	10:00	21	22	0.8	1	7.8	5.0	5.2
03/17/14	10:30	25	22	0.7	1	8.0	4.4	4.6
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05/12/14	10:00	28	28	0.9	5	8.4	4.4	4.2
05/26/14	10:00	29	28	0.8	5	8.4	4.8	4.8
06/02/14	10:00	26	27	1.0	4	8.2	4.8	4.6
06/10/14	10:00	32	29	0.7	5	8.4	4.8	4.8
06/16/14	10:00	27	25	0.7	0		3.4	3.4
06/25/14	9:30	29	29	0.4	0	7.4		
07/01/14	10:00	27	27	0.6	0	7.4	2.0	2.0
07/07/14	10:00	30	27	0.6	0	7.4	2.2	2.0
07/15/14	10:00	30	28	0.3	0	7.4	2.4	2.4

DATE &	TIME	AIR Temp. C.	WATER Temp. C.	SECCHI Depth m.	SALINITY ppt.	pH	DO1 mg/L	DO2 mg/L
07/22/14	10:30	29	28	0.5	0	7.2	1.8	1.8
07/28/14	10:00	31	29	0.5	0	7.2	1.8	1.8
08/04/14	10:00	28	28	0.7	0	7.2	1.8	1.8
08/12/14	10:00	30	28	0.6	0	7.2	2.4	2.4
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09/15/14	10:00	27	26	0.6	0	7.2	3.0	3.0
09/22/14	10:00	29	26	0.5	0	7.2	2.4	2.4
09/29/14	10:00	29	28	0.4	0	7.2	2.0	2.2
10/06/14	10:00	25	26	0.5	0	7.4	2.8	2.8
10/13/14	10:00	28	26	0.5	0	7.4	2.2	2.2
10/20/14	10:00	25	25	0.7	0	7.4	3.0	2.8
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11/17/14	10:00	26	22	0.8	0	7.2	3.4	3.4
11/25/14	10:00	28	23	0.9	0	7.2	3.0	3.0
12/01/14	10:00	25	21	0.9	0	7.2	4.4	4.2
12/08/14	11:00	23	21	1.1	4	7.4	4.4	4.6
12/15/14	10:30	20	17	1.0	3	7.4	4.6	4.6
12/22/14	10:00	24	19	1.0	4	7.4	5.8	5.8
12/29/14	10:30	25	21	1.2	3	8.0	4.6	4.4
8?26/14	10:00	29	29	0.6	0	7.2	2.8	2.8
12/28/15	0:00	25	24	0.5	0	7.8	3.8	4.0
12/15/15	0:00	26	23	0.4	0	7.6	3.6	3.8
12/07/15	0:00	23	23	0.5	0	7.6	4.4	4.6
11/30/15	0:00	25	22	0.8	0	8.2	4.0	4.2
11/23/15	0:00	22	24	1.1	2	8.2	4.0	4.0
11/16/15	0:00	26	25	0.9	1	8.2	3.6	3.8
11/09/15	0:00	28	27	0.8	3	8.2	3.6	3.6
11/09/15	0:00	28	27	0.8	3	8.2	3.6	3.6
11/02/15	0:00	29	26	0.8	0	8.0	3.0	2.8
10/19/15	0:00	25	24	0.5	0	7.8	2.4	2.6
10/15/15	0:00	25	26	0.4	4	7.6	1.6	1.6
10/07/15	0:00	26	26	0.4	0	7.6	1.0	0.8
09/23/15	0:00	28	28	0.3	0	7.2	1.2	1.2
09/14/15	0:00	29	28	0.5	0	7.8	2.0	2.0
09/08/15	0:00	29	28	0.5	0	7.8	2.0	2.0
08/31/15	0:00	29	27	0.5	0	7.6	3.4	3.2
08/25/15	0:00	31	30	0.6	0	7.8	2.0	2.0
08/18/15	0:00	30	29	0.6	0	7.8	2.0	2.0
08/10/15	0:00	29	29	0.7	0	7.8	2.0	2.2
08/03/15	0:00	29	27	0.6	0	7.8	3.0	3.0
07/27/15	0:00	29	29	0.9	2	8.4	3.8	4.2

DATE &	TIME	AIR Temp. C.	WATER Temp. C.	SECCHI Depth m.	SALINITY ppt.	pH	DO1 mg/L	DO2 mg/L
07/13/15	0:00	31	31	0.8	4	8.2	5.4	5.4
07/07/15	0:00	28	28	0.9	0	8.2	5.0	5.0
06/29/15	0:00	30	30	0.7	0	8.2	5.2	5.2
06/15/15	0:00	31	30	0.8	0	8.2	4.6	4.4
06/08/15	0:00	29	28	0.6	0	8.2	4.4	4.4
06/01/15	0:00	29	29	0.6	0	8.2	4.0	4.0
05/27/15	0:00	30	29	0.6	0	8.4	4.4	4.6
05/18/15	10:00	29	29	0.7	0	8.4	4.8	4.8
05/11/15	11:00	32	27	0.6	1	8.4	4.8	5.0
05/04/15	10:00	27	25	0.7	1	8.4	4.8	4.8
04/28/15	10:00	26	27	0.9	1	8.4	5.0	4.8
04/20/15	10:30	28	28	0.6	0	8.2	4.6	4.6
04/13/15	10:00	28	27	0.7	0	8.2	4.0	4.0
03/16/15	10:00	25	25	0.7	0	7.6	3.2	3.0
03/09/15	10:00	22	22	0.5	0	7.6	3.6	3.8
03/02/15	10:00	25	23	0.5	0	7.4	4.6	4.4
02/23/15	10:30	23	18	0.9	0	8.4	5.6	5.8
02/16/15	10:30	21	18	0.9	1	8.2	7.0	7.2
02/09/15	10:00	21	18	0.9	1	8.4	6.0	6.0
02/03/15	11:00	21	18	0.9	1	8.4	7.0	7.0
01/28/15	10:30	16	17	0.9	1	7.8	7.0	7.0
01/20/15	10:30	18	19	0.9	3	7.6	5.8	5.6
01/13/15	10:00	23	21	1.1	2	7.6	5.0	5.0
01/05/15	10:00	24	23	0.9	3	7.6	4.0	4.0
01/05/16	0:00	20	21	0.5	0	7.6	4.6	4.4
01/11/16	0:00	18	19	0.8	0	8.2	5.0	4.8
01/18/16	0:00	17	19	0.6	0	7.8	5.2	5.0
02/01/16	0:00	21	19	0.6	0	7.4	5.4	5.6
02/08/16	0:00	17	18	0.5	0	7.6	4.8	4.8
02/15/16	0:00	22	17	0.5	0	7.8	5.4	
02/15/16	0:00	22	17	0.5	0	7.8	5.4	
02/22/16	0:00	23	20	0.7	0	7.8	4.0	4.0
03/01/16	0:00	21	18	0.8	0	7.8	4.6	4.4
03/07/16	0:00	22	21	0.6	0	7.8	4.6	4.2
03/16/16	0:00	20	20	0.7		7.8		
03/21/16	0:00	18	23	0.7	0	7.8	4.4	4.6
03/30/16	0:00	22	23	0.7	0	8.0	3.4	3.4
06/21/16	9:39	27	27	0.6	0	7.8	2.8	2.8
07/05/16	10:00	31	29	0.5	0	7.8	2.0	2.0
07/12/16	10:00	31	31	0.6	0	7.6	2.6	2.6
08/15/16	10:10	30	29	0.6	0	7.8	1.6	1.4
08/22/16	15:12	32	32	0.5	0	7.8	5.0	5.0
08/29/16	10:00	30	29	0.5	0	7.8	2.0	2.2
09/05/16	10:00	27	28	0.5	0	7.4	2.6	2.6
09/12/16	10:00	29	29	0.6	0	7.6	1.8	2.0

DATE &	TIME	AIR Temp. C.	WATER Temp. C.	SECCHI Depth m.	SALINITY ppt.	pH	DO1 mg/L	DO2 mg/L
09/19/16	10:30	30	29	0.5	0	7.6	1.6	1.6
09/26/16	10:00	29	22	0.6	0	7.8	2.0	2.0
10/03/16	10:00	28	28	0.5	0	7.6	2.6	2.8
10/11/16	10:30			0.4	0	7.6	2.0	2.0
10/17/16	10:00			0.4	0	7.8	1.6	1.6
10/24/16	10:00	24	25	0.5	0	7.6	2.0	2.0
10/31/16	10:00	25	25	0.6	0	7.8	2.6	2.8
11/15/2016	10:00	23	23	0.5	1	8.2	3.4	3.2
11/21/2016	10:30	21	21	0.9	1	8.0	4.0	4.0
11/28/2016	10:00	24	23	0.7	1	8.2	5.2	5.1
12/5/2016	10:00	25	24	0.8	1	8.0	4.2	4.2
12/12/2016	10:00	25	24	0.8	5	8.2	4.0	3.8
12/19/2016	10:00	26	24	0.8	2	8.4	4.0	4.0
1/9/2017	10:00	18	19	0.8	10	8.6	5.5	5.5
1/16/2017	10:30	23	21	0.9	7	8.5	5.2	5.4
1/30/2017	10:30	18	19	0.9	9	8.6	5.2	5.4
2/6/2017	10:00	24	22	0.8	6	8.6	5.0	5.2
2/13/2017	11:00	23	22	0.8	6	8.4	6.0	6.0
2/22/2017	10:00	24	23	0.8	8	8.4	5.6	5.6
2/27/2017	10:30	26	25	0.8	9	8.4	6.0	5.8
3/6/2017	10:00	24	22	0.8	2	8.2	5.4	5.6
3/13/2017	11:00	25	24	0.7	6	8.2	6.0	5.8
3/20/2017	10:00	21	21	0.8	5	8.4	6.4	6.2
3/27/2017	10:39	23	22	0.7	9	8.2	5.6	5.4
4/5/2017	11:30	33	28	0.6	6	8.2	5.0	5.2
4/10/2017	10:30	28	25	0.9	11	8.2	5.0	5.0
4/17/2017	10:00	25	25	0.9	9	8.2	5.6	5.4
4/24/2017	10:00	25	26	0.9	10	8.4	5.2	5.0
5/1/2017	10:30	30	28	0.7	5	8.2	4.6	4.8
5/8/2017	10:30	25	26	0.7	5	8.0	5.6	5.6
5/15/2017	10:30	30	29	0.7	5	8.2	6.0	6.0
5/22/2017	10:30	30	30	0.7	9	8.2	4.6	4.8
5/31/2017	10:00	30	30	0.8	8	8.2	4.4	4.4
6/6/2017	12:30	28	27	0.8	1	8.4	4.6	4.2
6/12/2017	10:30	30	29	0.4	0	7.4	1.8	1.8
6/19/2017	10:30	28	27	0.4	0	7.6	3.4	3.8

Legend

Red	Poor
Yellow	Fair
Green	Good

Appendix J

Public Meeting Summary, Advisory Group List and Report

Summary of the Public Meeting

The public meeting was held from 5:00 to 7:00 PM on Thursday, June 22, 2017 in the Wolf High Technology Auditorium on the campus of Indian River State College on Salerno Road in Stuart. The facility is approximately four miles from Halpatiokee Regional Park and is readily accessible to Halpatiokee users.

A Prospectus summarizing the development of the Management Plan was posted for viewing on the County's website on May 9, 2017. Notice of the public meeting was announced at the meeting of the County Commission May 23, 2017, and a link to download a copy of the Draft Management Plan was posted prominently under the "Hot Topics' page of the County website from the period from June 8 through June 30th.

Approximately 30 members of the public attend the open-house style public meeting. Attendees were asked to sign in upon entry and to identify the user group they represented, if applicable. Participants included members of several community groups, including the Airborne Mountain Bike Club, the Martin County chapter of the Florida Native Plant Society, Audubon of Martin County, the Florida Trails Association and staff from Martin County's Metropolitan Planning Organization (MPO) and Parks and Recreation Department.

Two tables were set up to allow one-on-one interactions with individuals knowledgeable about the Draft Management Plan. One table focused on ecological issues and included large-size print outs of the maps of vegetative communities, historical aerial photographs and the Hydrology Assessment areas. The second table had large-size print-outs of the trails and improvements Master Plan and was staffed by individuals knowledgeable about the public use elements of the Draft Plan. Blank comment sheets were available at both tables so that attendees could either complete them and leave them at the tables or take them home, complete them and return them to the County before the June 30 deadline for public comment. Hard copies of the complete Draft Management Plan and business cards with the project manager's and Division director's contact information were provided.

A 15 slide PowerPoint presentation summarizing existing conditions and the recommendations contained in the Draft Management Plan began at 5:30.

Attendees were then given the opportunity to complete a Public Comment Card and provide oral comments at the podium. Members of the Airborne Mountain Bike Club, the MPO and several individuals not aligned with any specific user groups provided comments, most of which focused on the public use component of the Plan. Key points mentioned included:

- Concerns that re-introduction of fire would adversely affect recreational use,
- The need to improve trail signage to increase user safety by more effectively separating incompatible trail users (i.e., bicyclists and hikers),
- The need to increase law enforcement presence to deter thefts from vehicles and increase compliance with existing park rules, and
- The desire to integrate existing trails into a network by connecting them with other

bike and pedestrian trails in the area and in adjoining Atlantic Ridge Preserve State Park.

After accepting comments from all individuals who wanted to provide them, a Question and Answer and discussion session followed. Topics/issues identified included:

- Concerns about impacts of management burns on trails and trial users and collateral damage to flora and fauna,
- The desirability of developing and implementing a fire awareness/education program, including the use of social media and roadside "message boards' in addition to traditional media outlets (i.e., newspapers, radio) to notify nearby residents and park users in advance of proposed burns,
- The desirability of allowing night-time use of biking and hiking trails on a pre-arranged schedule, and
- The need to increase the visible presence of law enforcement in order to increase safety, reduce vandalism, address use of off-road vehicles and prevent other violations of park rules.

Following the Q & A and discussion, attendees were thanked for their participation in the process and reminded of the June 30 deadline for submitting comments for consideration prior to revisions of the draft Management Plan.

Summary of the Meeting of the Advisory Group

The meeting of the Advisory Group was held from 9:30 AM to 3:00 PM on Friday, June 23, 2017 in the 4th floor conference room of Martin County's Administrative Center located at 2401 SE Monterey Road, In Stuart. The facility is approximately eight miles from Halpatiokee Regional Park and is readily accessible to Halpatiokee users.

The Prospectus summarizing the development of the Management Plan was provided electronically to members of the Advisory Group on May 9, 2017, at which time members were invited to attend the meeting that would be held on June 23rd. A link to download a copy of the Draft Management Plan was provided to members of the Advisory Group on June 8th, and a reminder of the meeting was sent electronically to all members on June 22nd.

Copies of the sign-in sheet, Agenda and notes from the meeting follow.

Advisory Team MtG.: Halpatiokee Mgmt. Plan

MEETING SIGN-IN SHEET

Project: Halpatiokee Management Plan

Facilitator: Martin County BOCC-Ecosystem Restoration & Mgmt.

Name	Address	Email Address	Pref. Contact #	Group Representing (if applicable)	Comments:
Greg Braun	Jupiter	gregbraun@aol.com	561 758-3417	MC SFaMI)	
BJ Kattel	SFWMD	bjkattel@sfwmd.gov	561-682-6640		
Josh wilsey	FWC	josh.wilsey@myfwc.com	561-625-5122	FWC	
Ellen Brokovich	~~EATES~~ Jensen Beach	elenbee@comcast.net	772 485 1386	FNTS	
JAY LEVITT	FLA. CLUB	JAYL12@BELLSOUTH.NET	E-MAIL	FTA	
TRAVIS BAILER	Airborne MTB	ambcpres@gmail.com	←	Airborne MTB	
Ed Stout	South River Outfitters	sriveroutfitters@gmail.com	←	S.R.O	
Mike Spadavecchia	MC PARKS	mspadave@martin.fl.us	772-801-8060	MC PARKS.	
Comm Ed Fielding	MC				
Deb Drum	Martin County	ddrum@martin.fl.us	772-463-3263	Martin County	

Martin County Ecosystem Restoration & Management Division

Halpatiokee Management Plan Update
Advisory Team Meeting
June 23, 2017 from 9:30 a.m. - 3 p.m.

Martin County Administration Building
2401 SE Monterey Road, Stuart, Florida 34996

AGENDA

9:30-9:45 a.m.	Welcome and Introductions (Deb Drum)
9:45-10:15 a.m.	Presentation: overview of management plan process (Michael Yustin)
10:15-10:30 a.m.	Break
10:30 a.m.-12 noon	Advisory Team Discussion on Plan (overview of Table of Contents; receive any specific input)
12 noon-12:45 p.m.	Lunch Break
12:45-1 p.m.	Recap of morning discussion
1:00-2:30 p.m.	Continue Advisory Team Discussion / receive input on Plan
2:30-3:00 p.m.	Wrap-up and Adjourn

Main Issues Raised by Public

① Prescribed Fire
- → no moonscapes / preserve canopy
- → trail maintenance
- → proper notification

② Security
- → parking lot break-ins
- → need for security cameras
- → ATV illegal use

③ Enhance User Group Compatability (education; resources; high quality signage)!
- → willingness of user groups to help ~~w~~ • things to improve.

Identified things missing in plan

1) saw palmetto harvesting > need to add language prohibiting all harvesting & hunting.

Pg. 1

Concern – w/ higher temp w/ fire

Tavi's

Concern w/ 1st burn
get it right
don't overburn

moving away fr. wooden structures
& now interlocking pavers
" fire-resistant materials "

Incorporate pre-chopping w/ fire,

Jay – address more on need for fire, how used, how it should be handled in Halpat.

* educ.
x notification of neighborhood

* strategies we will employ to min ↑ risk & address concerns

Pg. 2

6/23/17 Comments fr. Advisory Board - Halpat.

Ellen B. opportunity to answer questions w/ QR codes on signs

Travis - Fire education
robust ability to reach out to a lot of 350 pg. members members.
* work w/ stakeholders on education & outreach.

Ellen - guided tours of natural areas.
County has video production unit.
capture her (Maggy) talking about Maggy's Hammock.

B - audubon leads tours.
create mechanism where staff doesn't need to be there.
informal agreements - ? * agreements examples

Fire - general strategy for when & how

Comm. Fielding - put prescription into statute - give Sheriff more ability to enforce.
Talk to LEG. about statute for ty to have Sheriff take action.
Devel. surveillance tech. beyond what anyone else has - broadband & wifi.

PG. 3

Comm. Fielding comments

consortium - reluctant to enter contracts but more of an MOU w/ responsibilities / roles.

Have good people.

BJ may have examples of agreements "Trail Patrol program"?

Josh - ATFERES on board to improve habitat.

Connection between north & south Lakes improve by clearing kayak landing stabilize substrate.
design ATFERES project for submittal.

New kayak Access point on Atlantic Ridge side?
best location?

Island - needs to be cleared out
new landing?
too expensive to build anything?

Travis - how to link Halpat to Atl. Ridge?
Tie JD to AR to Halpat —

Bigger idea that would take alot of coordination.

Expense of bridging S. Fork would be quite high.

Pg. 4

6/23/17

Ellen B. – current access that is not allowed.
How to control? Signage
No prohibition fr. carrying Kayak down to water.
Impossible to enforce.
50% of people accessing fr. Hosford Park. → Kevin A. resistant?
* put educ./rules signs at that Park.
↓ Make this half-way landing spot.

Ed Stout – closed Sundays.
Hosford Park is official put-in for Park.

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* Check on status of MOU w/ Mtn. Biking Club (went to PEG along w/ Spoil Island vol. agreement)

* Talk to Parks about signs (consistency) appropriate for Hosford.

* meet w/ owners of new ATV/dirt bike shop.

* Revise/create conservation landes to prohibit e-bikes on ~~dirt~~ trails (human powered only)
Safety hazards – blind turns