

Doris Leeper Spruce Creek Preserve

Management Plan

PREPARED FOR:

*THE BOARD OF TRUSTEES OF THE
INTERNAL IMPROVEMENT TRUST
FUND OF THE STATE OF FLORIDA
AND THE COUNTY
OF VOLUSIA*

PREPARED BY:

*COUNTY OF VOLUSIA
RESOURCE STEWARDSHIP
DIVISION AND
YOUNG BEAR ENVIRONMENTAL
CONSULTING*

June 21, 2022

LAND MANAGEMENT PLAN EXECUTIVE SUMMARY (2022)

Lead Agency: Volusia County Location: Volusia County, Florida

Common Name of Property: Doris Leeper Spruce Creek Preserve (DLSCP)

Acreage Total: 1932.26 acres

Acreage Breakdown:

Land Cover Classification	Acres	Percent
Blackwater Stream	25.84	1.3%
Bottomland Forest	61.69	3.2%
Coastal Hydric Hammock	7.48	0.4%
Developed	2.53	0.1%
Impoundment	5.01	0.3%
Improved Pasture	2.88	0.1%
Mangrove Swamp	8.95	0.5%
Maritime Hammock	166.38	8.6%
Mesic Flatwoods	257.78	13.3%
Mesic Hammock	103.56	5.4%
Salt Marsh	475.35	24.6%
Scrub	231.63	12.0%
Scrubby Flatwoods	185.71	9.6%
Spoil Area	3.44	0.2%
Successional Hardwood Forest	27.48	1.4%
Wet Flatwoods	176.05	9.1%
Wet Prairie	14.76	0.8%
Xeric Hammock	175.74	9.1%
Total:	1932.26	100%

Lease/Management Agreement No.: 4195 (Appendix A)

Use: Single: _____ Multiple: X Management Responsibilities: Agency: Volusia County

Responsibilities: Resource restoration, management, protection, law enforcement, user group management

Designated Land Use: Conservation Sublease (s): None Encumbrances: Yes

Type Acquisition: Conservation and Recreation Lands (CARL) Program and Florida Forever Program.

Unique Features: Contains imperiled habitats, scrub, scrubby flatwoods, maritime hammock, and listed species. Eighteen (18) habitat types.

Archaeological/Historical: There are 34 documented (includes non-state lands) archaeological/historical sites including two on the National Register of Historic Places.

Management Needs: Habitat restoration and maintenance; user group management; hydrological preservation; exotic and invasive species maintenance; listed species habitat maintenance.

Acquisition Needs: 2,734 acres in optimal boundary; 2,473 acres acquired; 358 acres left for acquisition in optimal boundary Surplus Lands: none

Public Involvement: DSL Land Management Review; Management Plan Advisory Group, Public Hearing.

DO NOT WRITE BELOW THIS LINE (FOR DIVISION OF STATE LANDS USE ONLY)

ARC Approval Date: _____ BTITF Approval Date: _____

Comments: _____

LAND MANAGEMENT PLAN COMPLIANCE

CHECKLIST

→ Required for State-owned conservation lands over 160 acres ←

Instructions for managers:

Complete each item and fill in the applicable correlating **page numbers and/or appendix** where the item can be found within the land management plan (LMP). If an item does not apply to the subject property, please describe that fact on a correlating page number of the LMP. Do not mark an "N/A" for any items below.

For more information, please visit the stewardship portion of the Division of State Lands' website at: <http://www.dep.state.fl.us/lands/stewardship.htm>.

Section A: Acquisition Information Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
1.	The common name of the property.	18-2.018 & 18-2.021	1
2.	The land acquisition program, if any, under which the property was acquired.	18-2.018 & 18-2.021	4, Ap. C
3.	Degree of title interest held by the Board, including reservations and encumbrances such as leases.	18-2.021	4-5, Ap. A
4.	The legal description and acreage of the property.	18-2.018 & 18-2.021	1, Ap. A
5.	A map showing the approximate location and boundaries of the property, and the location of any structures or improvements to the property.	18-2.018 & 18-2.021	2-3, Ap. C,E
6.	An assessment as to whether the property, or any portion, should be declared surplus. <i>Provide Information regarding assessment and analysis in the plan, and provide corresponding map.</i>	18-2.021	47
7.	Identification of other parcels of land within or immediately adjacent to the property that should be purchased because they are essential to management of the property. <i>Please clearly indicate parcels on a map.</i>	18-2.021	7-8, Ap. C, E
8.	Identification of adjacent land uses that conflict with the planned use of the property, if any.	18-2.021	71-72
9.	A statement of the purpose for which the lands were acquired, the projected use or uses as defined in 253.034 and the statutory authority for such use or uses.	259.032(10)	4, Ap. C
10.	Proximity of property to other significant State, local or federal land or water resources.	18-2.021	5-6

Section B: Use Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
11.	The designated single use or multiple use management for the property, including use by other managing entities.	18-2.018 & 18-2.021	48-49
12.	A description of past and existing uses, including any unauthorized uses of the property.	18-2.018 & 18-2.021	49-50
13.	A description of alternative or multiple uses of the property considered by the lessee and a statement detailing why such uses were not adopted.	18-2.018	49-50
14.	A description of the management responsibilities of each entity involved in the property's management and how such responsibilities will be coordinated.	18-2.018	50
15.	Include a provision that requires that the managing agency consult with the Division of Historical Resources, Department of State before taking actions that may adversely affect archeological or historical resources.	18-2.021	43, Ap. H
16.	Analysis/description of other managing agencies and private land managers, if any, which could facilitate the restoration or management of the land.	18-2.021	82
17.	A determination of the public uses and public access that would be consistent with the purposes for which the lands were acquired.	259.032(10)	44, 46-47

18.	A finding regarding whether each planned use complies with the 1981 State Lands Management Plan, particularly whether such uses represent "balanced public utilization," specific agency statutory authority and any other legislative or executive directives that constrain the use of such property.	18-2.021	47, 83
19.	Letter of compliance from the local government stating that the LMP is in compliance with the Local Government Comprehensive Plan.	BOT requirement	Ap. M
20.	An assessment of the impact of planned uses on the renewable and non-renewable resources of the property, including soil and water resources, and a detailed description of the specific actions that will be taken to protect, enhance and conserve these resources and to compensate/mitigate damage caused by such uses, including a description of how the manager plans to control and prevent soil erosion and soil or water contamination.	18-2.018 & 18-2.021	85
21.	*For managed areas larger than 1,000 acres, an analysis of the multiple-use potential of the property which shall include the potential of the property to generate revenues to enhance the management of the property provided that no lease, easement, or license for such revenue-generating use shall be entered into if the granting of such lease, easement or license would adversely affect the tax exemption of the interest on any revenue bonds issued to fund the acquisition of the affected lands from gross income for federal income tax purposes, pursuant to Internal Revenue Service regulations.	18-2.021 & 253.036	48
22.	If the lead managing agency determines that timber resource management is not in conflict with the primary management objectives of the managed area, a component or section, prepared by a qualified professional forester, that assesses the feasibility of managing timber resources pursuant to section 253.036, F.S.	18-021	55, Ap. J
23.	A statement regarding incompatible use in reference to Ch. 253.034(10).	253.034(10)	49-50

*The following taken from 253.034(10) is not a land management plan requirement; however, it should be considered when developing a land management plan: The following additional uses of conservation lands acquired pursuant to the Florida Forever program and other state-funded conservation land purchase programs shall be authorized, upon a finding by the Board of Trustees, if they meet the criteria specified in paragraphs (a)-(e): water resource development projects, water supply development projects, storm-water management projects, linear facilities and sustainable agriculture and forestry. Such additional uses are authorized where: (a) Not inconsistent with the management plan for such lands; (b) Compatible with the natural ecosystem and resource values of such lands; (c) The proposed use is appropriately located on such lands and where due consideration is given to the use of other available lands; (d) The using entity reasonably compensates the titleholder for such use based upon an appropriate measure of value; and (e) The use is consistent with the public interest.

Section C: Public Involvement Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
24.	A statement concerning the extent of public involvement and local government participation in the development of the plan, if any.	18-2.021	9, Ap.D
25.	The management prospectus required pursuant to paragraph (7)(c) shall be available to the public for a period of 30 days prior to the public hearing.	259.032(8)(b)	9, Ap. C
26.	LMPs and LMP updates for parcels over 160 acres shall be developed with input from an advisory group who must conduct at least one public hearing within the county in which the parcel or project is located. <i>Include the advisory group members and their affiliations, as well as the date and location of the advisory group meeting.</i>	259.032(10)	Ap. D
27.	Summary of comments and concerns expressed by the advisory group for parcels over 160 acres	18-2.021	Ap. D
28.	During plan development, at least one public hearing shall be held in each affected county. Notice of such public hearing shall be posted on the parcel or project designated for management, advertised in a paper of general circulation, and announced at a scheduled meeting of the local governing body before the actual public hearing. <i>Include a copy of each County's advertisements and announcements (meeting minutes will suffice to indicate an announcement) in the management plan.</i>	253.034(5) & 259.032(10)	Ap. D
29.	The manager shall consider the findings and recommendations of the land management review team in finalizing the required 10-year update of its management plan. <i>Include manager's replies to the team's findings and recommendations.</i>	259.036	83, Ap. L

30.	Summary of comments and concerns expressed by the management review team, if required by Section 259.036, F.S.	18-2.021	83, Ap. L
31.	If manager is not in agreement with the management review team's findings and recommendations in finalizing the required 10-year update of its management plan, the managing agency should explain why they disagree with the findings or recommendations.	259.036	No disagreement

Section D: Natural Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
32.	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding soil types. <i>Use brief descriptions and include USDA maps when available.</i>	18-2.021	12-15
33.	Insert FNAI based natural community maps when available.	ARC consensus	16, Ap. E
34.	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding outstanding native landscapes containing relatively unaltered flora, fauna and geological conditions.	18-2.021	38-43
35.	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding unique natural features and/or resources including but not limited to virgin timber stands, scenic vistas, natural rivers and streams, coral reefs, natural springs, caverns and large sinkholes.	18-2.018 & 18-2.021	16-26, Ap. K
36.	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding beaches and dunes.	18-2.021	16-26
37.	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding mineral resources, such as oil, gas and phosphate, etc.	18-2.018 & 18-2.021	12
38.	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding fish and wildlife, both game and non-game, and their habitat.	18-2.018 & 18-2.021	28-30, Ap. F
39.	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding State and Federally listed endangered or threatened species and their habitat.	18-2.021	31-38
40.	The identification or resources on the property that are listed in the Natural Areas Inventory. <i>Include letter from FNAI or consultant where appropriate.</i>	18-2.021	Ap. E
41.	Specific description of how the managing agency plans to identify, locate, protect and preserve or otherwise use fragile, nonrenewable natural and cultural resources.	259.032(10)	9-11
42.	Habitat Restoration and Improvement	259.032(10) & 253.034(5) ↓	51-52
42-A.	Describe management needs, problems and a desired outcome and the key management activities necessary to achieve the enhancement, protection and preservation of restored habitats and enhance the natural, historical and archeological resources and their values for which the lands were acquired.		51-52
42-B.	Provide a detailed description of both short (2-year planning period) and long-term (10-year planning period) management goals, and a priority schedule based on the purposes for which the lands were acquired and include a timeline for completion.		65-68
42-C.	The associated measurable objectives to achieve the goals.		52
42-D.	The related activities that are to be performed to meet the land management objectives and their associated measures. <i>Include fire management plans - they can be in plan body or an appendix.</i>		Ap. I, J, P
42-E.	A detailed expense and manpower budget in order to provide a management tool that facilitates development of performance measures, including recommendations for cost-effective methods of accomplishing those activities.		80-82
43.	***Quantitative data description of the land regarding an inventory of forest and other natural resources and associated acreage. <i>See footnote.</i>	253.034(5)	Ap. J

44.	Sustainable Forest Management, including implementation of prescribed fire management	18-2.021, 253.034(5) & 259.032(10) ↓	55, Ap. I, J
44-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).		55, 69, Ap. J
44-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		55, 66
44-C.	Measurable objectives (see requirement for #42-C).		55, 66, 73
44-D.	Related activities (see requirement for #42-D).		Ap. I
44-E.	Budgets (see requirement for #42-E).		80-82
45.	Imperiled species, habitat maintenance, enhancement, restoration or population restoration	259.032(10) & 253.034(5) ↓	31-33, 43, Ap. E&P
45-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).		42-43
45-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		56-59, 66-67
45-C.	Measurable objectives (see requirement for #42-C).		59-60
45-D.	Related activities (see requirement for #42-D).		Ap. P
45-E.	Budgets (see requirement for #42-E).		80-82
46.	***Quantitative data description of the land regarding an inventory of exotic and invasive plants and associated acreage. <i>See footnote.</i>	253.034(5)	55
47.	Place the Arthropod Control Plan in an appendix. If one does not exist, provide a statement as to what arrangement exists between the local mosquito control district and the management unit.	BOT requirement via lease language	Ap. N
48.	Exotic and invasive species maintenance and control	259.032(10) & 253.034(5) ↓	55-56
48-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).		55-56
48-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		56
48-C.	Measurable objectives (see requirement for #42-C).		56, 66
48-D.	Related activities (see requirement for #42-D).		Ap. I, J, P
48-E.	Budgets (see requirement for #42-E).		80-82

Section E: Water Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
49.	A statement as to whether the property is within and/or adjacent to an aquatic preserve or a designated area of critical state concern or an area under study for such designation. <i>If yes, provide a list of the appropriate managing agencies that have been notified of the proposed plan.</i>	18-2.018 & 18-2.021	Not an Aquatic Preserve
50.	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding water resources, including water classification for each water body and the identification of any such water body that is designated as an Outstanding Florida Water under Rule 62-302.700, F.A.C.	18-2.021	54
51.	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding swamps, marshes and other wetlands.	18-2.021	27, 54
52.	***Quantitative description of the land regarding an inventory of hydrological features and associated acreage. <i>See footnote.</i>	253.034(5)	16, Ap. P
53.	Hydrological Preservation and Restoration	259.032(10) & 253.034(5) ↓	54
53-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).		54, 85
53-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		54, 65

53-C.	Measurable objectives (see requirement for #42-C).		54
53-D.	Related activities (see requirement for #42-D).		Ap. P
53-E.	Budgets (see requirement for #42-E).		80-82

Section F: Historical, Archeological and Cultural Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
54.	**Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding archeological and historical resources. <i>Include maps of all cultural resources except Native American sites, unless such sites are major points of interest that are open to public visitation.</i>	18-2.018, 18-2.021 & per DHR's request	43, 60-62
55.	***Quantitative data description of the land regarding an inventory of significant land, cultural or historical features and associated acreage.	253.034(5)	60
56.	A description of actions the agency plans to take to locate and identify unknown resources such as surveys of unknown archeological and historical resources.	18-2.021	60-62
57.	Cultural and Historical Resources	259.032(10) & 253.034(5) ↓	43,60
57-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).		60-62
57-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		67
57-C.	Measurable objectives (see requirement for #42-C).		62
57-D.	Related activities (see requirement for #42-D).		60-62 Ap. H
57-E.	Budgets (see requirement for #42-E).		80-82

**While maps of Native American sites should not be included in the body of the management plan, the DSL urges each managing agency to provide such information to the Division of Historical Resources for inclusion in their proprietary database. This information should be available for access to new managers to assist them in developing, implementing and coordinating their management activities.

Section G: Facilities (Infrastructure, Access, Recreation)

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
58.	***Quantitative data description of the land regarding an inventory of infrastructure and associated acreage. <i>See footnote.</i>	253.034(5)	46
59.	Capital Facilities and Infrastructure	259.032(10) & 253.034(5) ↓	62-63, Ap. O
59-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).		62-63, Ap. O
59-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		67
59-C.	Measurable objectives (see requirement for #42-C).		62-63
59-D.	Related activities (see requirement for #42-D).		Ap. K, O
59-E.	Budgets (see requirement for #42-E).		80-82
60.	*** Quantitative data description of the land regarding an inventory of recreational facilities and associated acreage.	253.034(5)	46
61.	Public Access and Recreational Opportunities	259.032(10) & 253.034(5) ↓	63-64
61-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).		63
61-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		68
61-C.	Measurable objectives (see requirement for #42-C).		63-64
61-D.	Related activities (see requirement for #42-D).		Ap. K
61-E.	Budgets (see requirement for #42-E).		80-82

Section H: Other/ Managing Agency Tools

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
62.	Place this LMP Compliance Checklist at the front of the plan.	ARC and managing agency consensus	Front
63.	Place the Executive Summary at the front of the LMP. Include a physical description of the land.	ARC and 253.034(5)	Front
64.	If this LMP is a 10-year update, note the accomplishments since the drafting of the last LMP set forth in an organized (categories or bullets) format.	ARC consensus	Front
65.	Key management activities necessary to achieve the desired outcomes regarding other appropriate resource management.	259.032(10)	51
66.	Summary budget for the scheduled land management activities of the LMP including any potential fees anticipated from public or private entities for projects to offset adverse impacts to imperiled species or such habitat, which fees shall be used to restore, manage, enhance, repopulate, or acquire imperiled species habitat for lands that have or are anticipated to have imperiled species or such habitat onsite. The summary budget shall be prepared in such a manner that it facilitates computing an aggregate of land management costs for all state-managed lands using the categories described in s. 259.037(3) which are resource management, administration, support, capital improvements, recreation visitor services, law enforcement activities.	253.034(5)	80-82
67.	Cost estimate for conducting other management activities which would enhance the natural resource value or public recreation value for which the lands were acquired, include recommendations for cost-effective methods in accomplishing those activities.	259.032(10)	80-82
68.	A statement of gross income generated, net income and expenses.	18-2.018	80-82

*** = The referenced inventories shall be of such detail that objective measures and benchmarks can be established for each tract of land and monitored during the lifetime of the plan. All quantitative data collected shall be aggregated, standardized, collected, and presented in an electronic format to allow for uniform management reporting and analysis. The information collected by the DEP pursuant to s. 253.0325(2) shall be available to the land manager and his or her assignee.

Doris Leeper Spruce Creek Accomplishments (2012-2022)

Exotics

- Bayou Bay Bamboo removal project- Staff, August 2020 (ongoing)
- Sleepy Hollow Brazilian Pepper Treatment by contractor-18 acres, August 2020, Inwood consulting firm.
- Rosebay Brazilian Pepper Treatment by contractor-19 acres, June 2020, Legacy Forestry Services.
- Australian Pine Treatment-Staff, 2017-present
- Trapped 29 hogs on DLSCP.

Recreation

- Rerouted the bike trail that was near the Spruce Creek Mound, to help eliminate erosion from bicycles-2017
- Established approximately 5 more miles of bike trails on the west side of the bridge at Martins Dairy.-2016
- Establishing an additional 3 miles on the Stanaki property that we manage for the City of Port Orange.-2020
- Turnbull canoe/kayak landing-2020
- Turnbull primitive camp site – 2020

Infrastructure

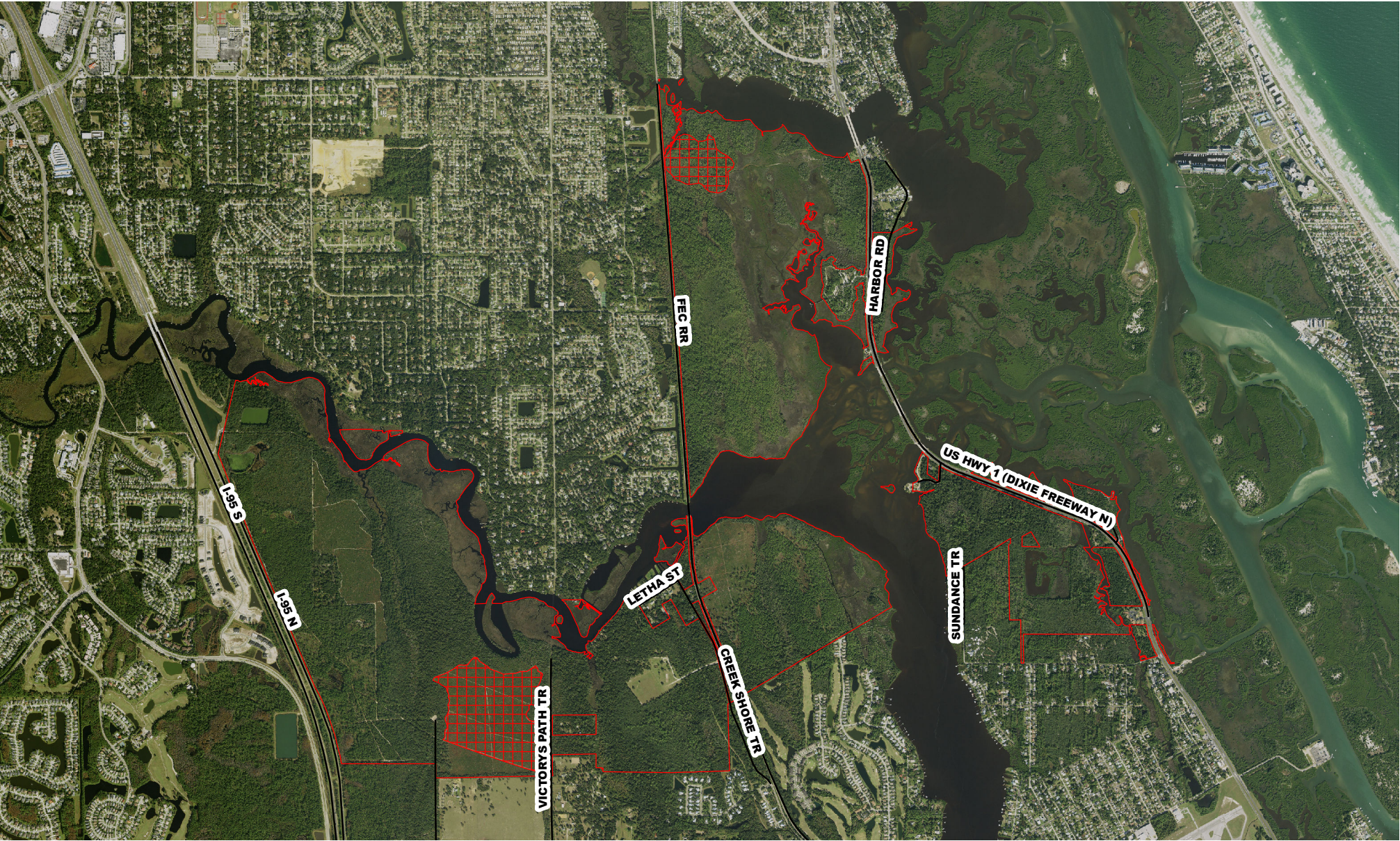
- Continue to maintain the wooden overlooks at Martins Dairy and Spruce Creek.
- Provide interpretive signage in the main trailhead at Martins Dairy 2018.
- Place additional signage stating that Doris Leeper Spruce Creek Preserve is a culturally sensitive site, and that, by law, no features or artifacts should be disturbed July 2021.

Mechanical

- Mechanically treated 526 acres through combination of chopping and heavy mowing- Staff, 2017 and 2020
 - 303 acres scrub
 - 207 acres scrubby flatwoods
 - 12 acres mesic hammock
 - 4 acres mesic flatwoods

Burning

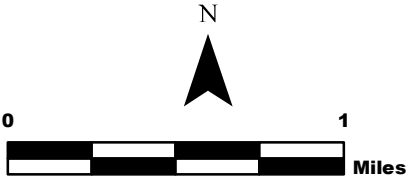
- Prescribe burned 98 acres after mechanical treatment- Staff, Dec. 2020
 - 95 acres scrub
 - 3 acres mesic hammock
- Maintained approximately 4 miles of firelines

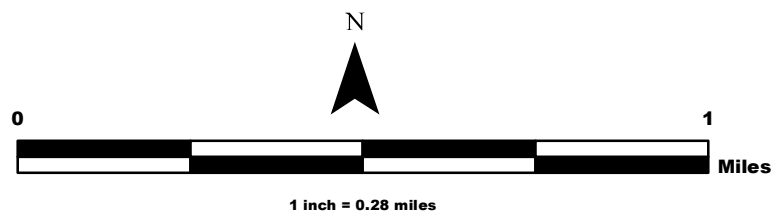
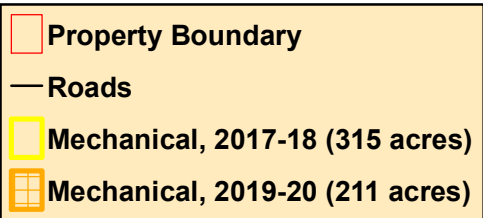
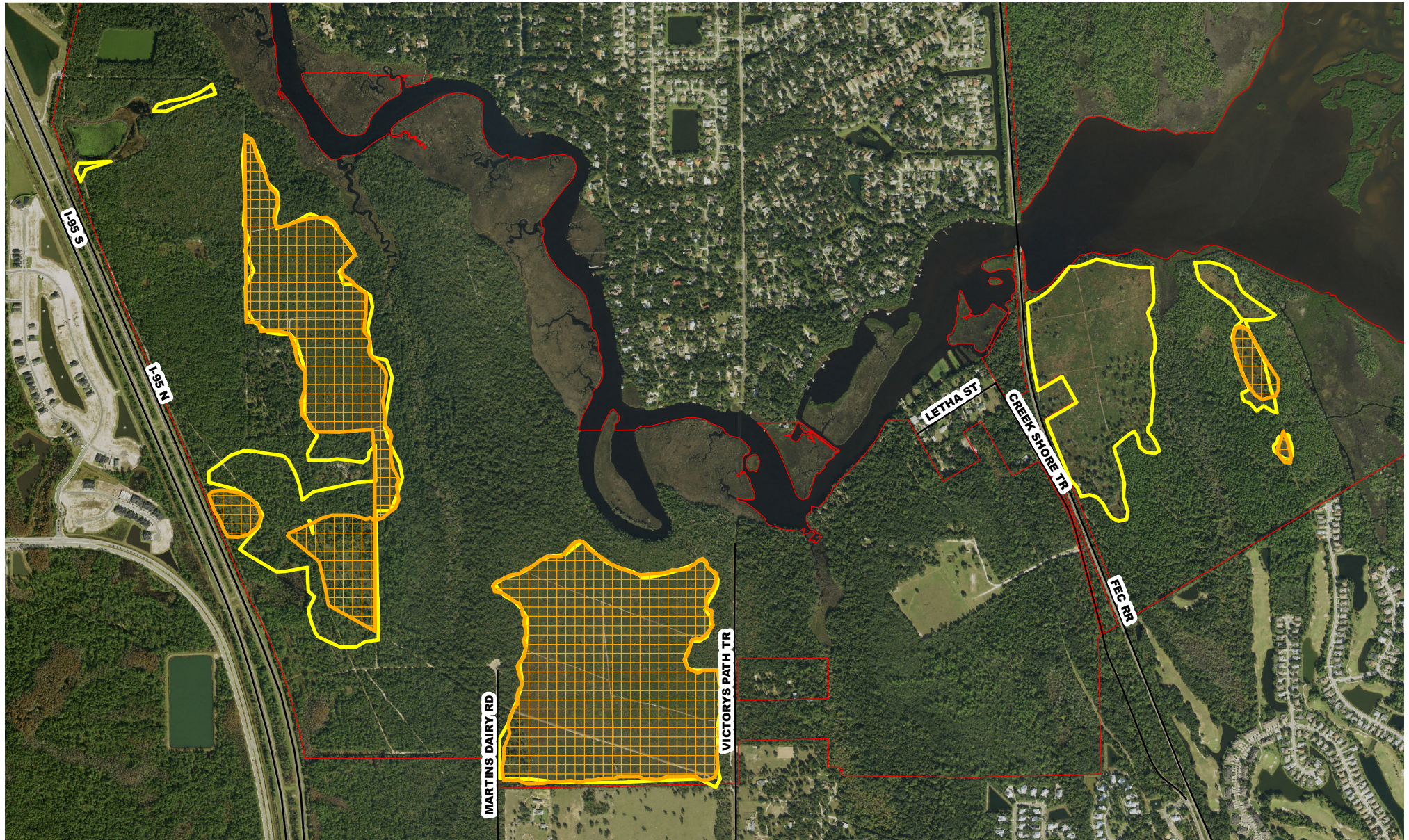


Property Boundary

Roads

Burn, 130 acres





Doris Leeper Spruce Creek Preserve

Management Plan

PREPARED FOR:
THE BOARD OF TRUSTEES OF THE INTERNAL
IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA
AND THE COUNTY OF VOLUSIA

PREPARED BY:
COUNTY OF VOLUSIA
RESOURCE STEWARDSHIP DIVISION AND
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June 21, 2022

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I. GENERAL INFORMATION

The following updated and revised management plan is submitted for review to the Board of Trustees of the Internal Improvement Trust Fund (BOT) of the State of Florida through the Department of Environmental Protection, Division of State Lands (DSL), in compliance with paragraph eight of Lease No. 4195 (Appendix A). The plan is intended to meet the requirements of Sections 253.034 and 259.032, Florida Statutes, Chapter 18-2, Florida Administrative Code, and intended to be consistent with the State Lands Management Plan. With approval, this management plan will replace the Plan approved by FDEP's Acquisition and Restoration Council (ARC) in July 2012. All development and resource alteration encompassed in this plan is subject to the granting of appropriate permits, easements, licenses, and other required legal instruments. Approval of the management plan does not constitute an exemption from complying with the appropriate local, state or federal agencies. The Plan has been formatted and content were drafted in accordance with ARC requirements for management plans and the model plan outline provided by the staff of DSL.

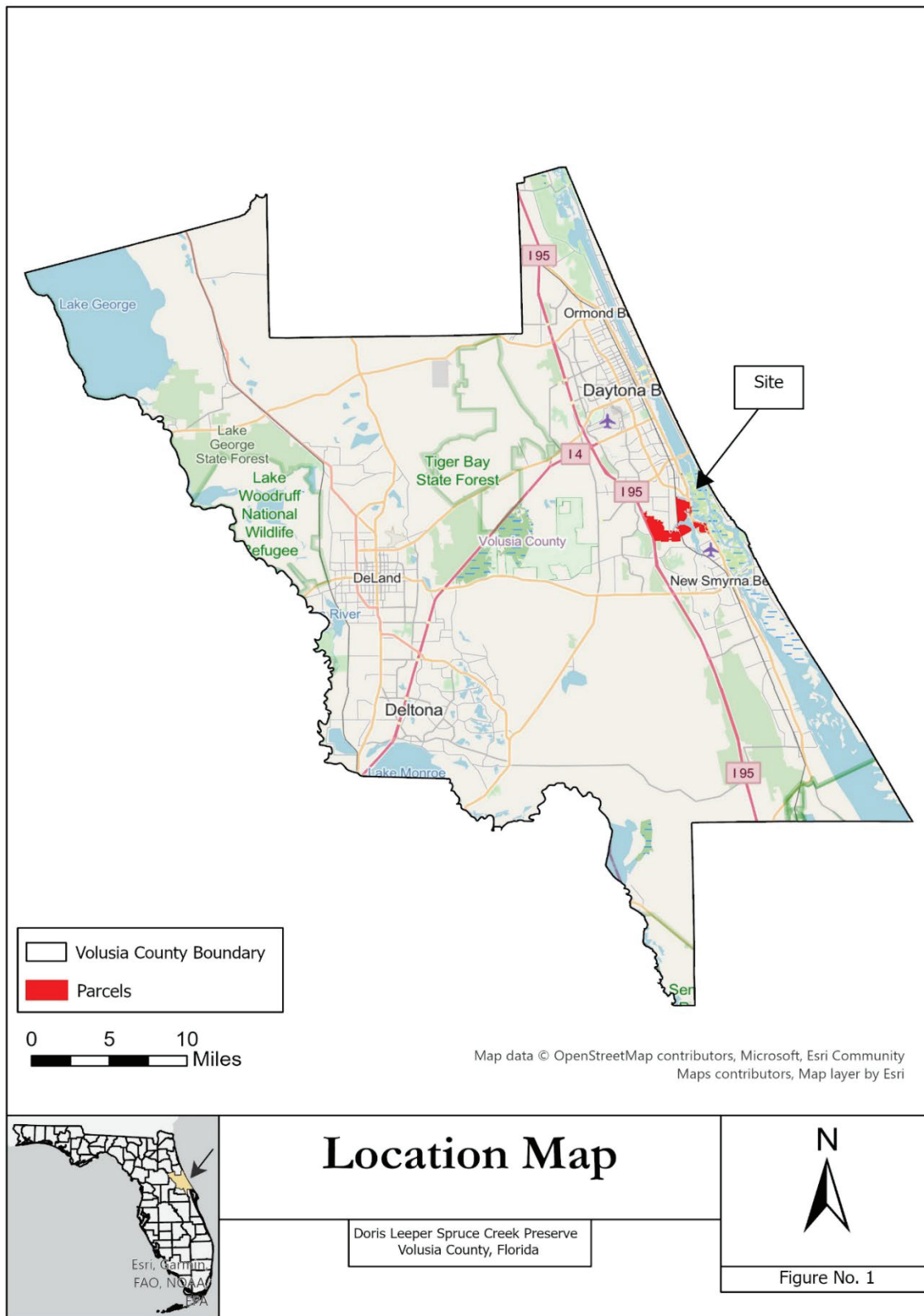
The Doris Leeper Spruce Creek Preserve contains many parcels that are not under state ownership. The total Preserve lands under public ownership is 2,513 acres. The reader of this Plan should note the intended/required purpose is to demonstrate the County is appropriately managing state-owned lands (titles held in fee simple or less than fee simple by the BOT; 1,932 acres) as required by Florida Statutes and Florida Administrative Code. The focus of this Plan is on those particular state-owned parcels, and use of words such as "site" or "property" will refer to the state-owned parcels. It is realized that the Preserve as a whole is larger than these state-owned lands and for the purpose of management, the County considers the entire Preserve as one complete managed area (Appendix O).

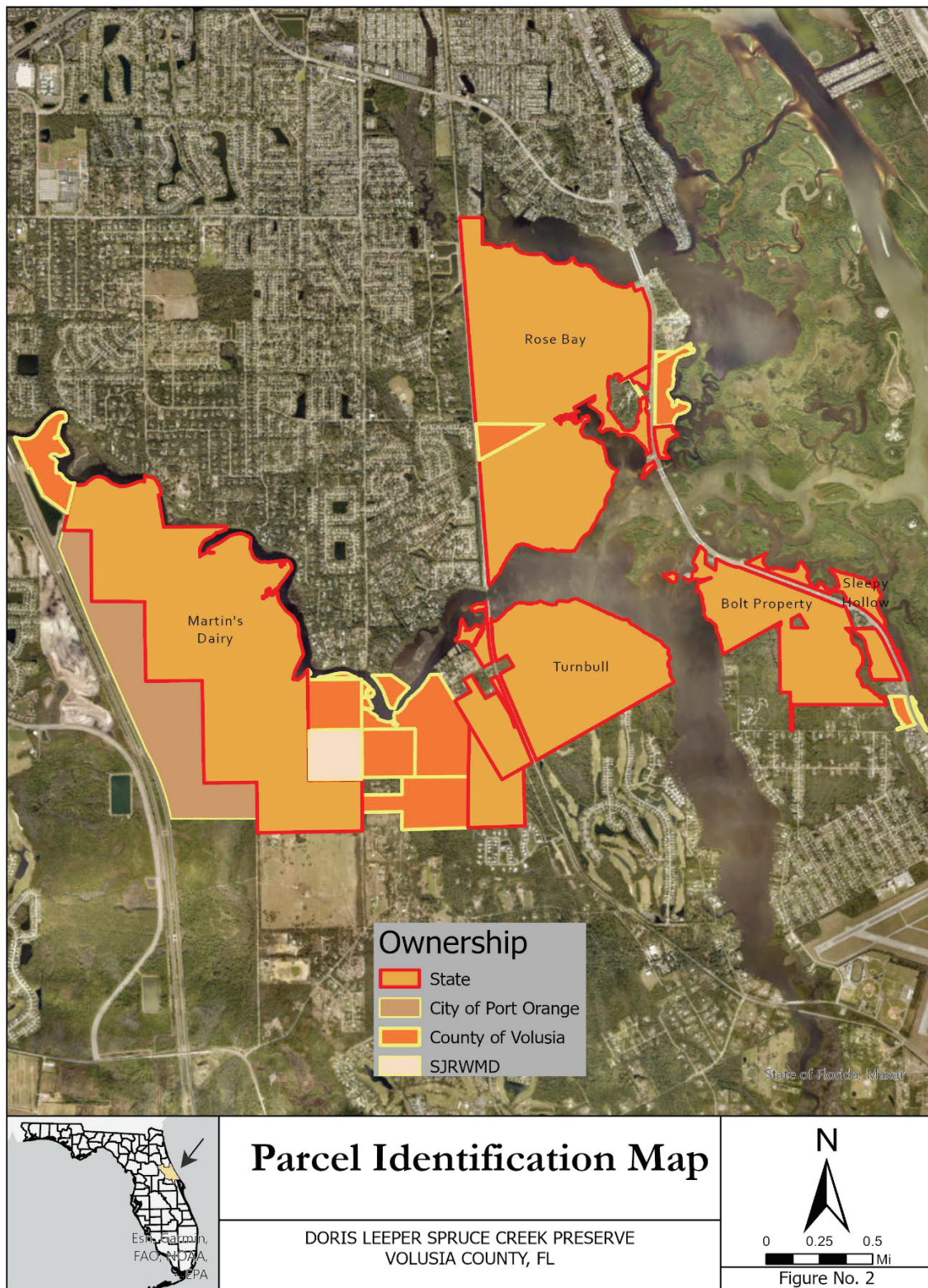
The Volusia County Council named the Spruce Creek Preserve in honor of Doris Leeper, a nationally recognized artist, founder of Atlantic Center for the Arts, and the driving force in the establishment of Canaveral National Seashore. She was the founder of Friends of Spruce Creek Preserve and pushed for protection of this important area. Her pioneering conservation efforts led to the preservation of thousands of acres of protected parks and public land. Her home in Eldora was listed on the National Register of Historic Places in late 2020 in recognition of her life's work in the arts and environment. A National Park Service article further illustrating her legacy is included as Appendix Q.

A. Land Acquisition

1. Location

Doris Leeper Spruce Creek Preserve consists of 1,932 acres of state owned land within the Preserve in Volusia County, lying in Sections 22, 23, 25, 28, 29, 33, 34, 35, 36, and 38, Township 16 South, Range 33 East. Other adjacent, non-state owned conservation lands increase the total area to 2,513 acres. DLSCP is approximately 8 miles southeast of Daytona Beach and 43 miles northeast of Orlando. The property lies within three (3) local jurisdictions that include the City of Port Orange, the City of New Smyrna Beach, and Volusia County. DLSCP is generally bordered on the north by Spruce Creek and Rose Bay, on the west by public lands along Interstate 95 on the south by developed and undeveloped private residential lands, and on the east by US Hwy 1, although some parcels do occur east of US 1. Several city and county owned forested properties are contiguous to and abut the DLSCP on several of its boundaries. The Preserve consists of tracts separated by Spruce Creek, Strickland Bay, Turnbull Bay, Murray Creek and US 1. For communication purposes, these tracts are referred to by individual name as shown on the Parcel Identification Map. See Appendix B for legal description.





2. Purchase

The acquisition of DLSCP began in the mid-1980s, and involved several individuals, conservancy groups, and state and local governments and agencies. The Preserve was purchased through a joint effort with Volusia County and the State's Conservation and Recreation Lands (CARL) Program. Volusia County manages the land, although the State of Florida owns the property.

The purpose of the acquisition as described here is summarized from DEP's Management Prospectus (Appendix C). One of the primary reasons for acquisition was to protect one of the largest undeveloped tracts in the region. Undeveloped land is rapidly disappearing due to the expanding development of adjacent urban areas. Additionally, the acquisition was sought to help maintain water quality of the adjacent creeks and bays, and would provide protection to important historical resources, including portions of the Andrew Turnbull plantation.

3. Management Authority

Volusia is the designated lead managing agency for DLSCP under the authority granted by Lease Number 4195.

4. Management Directives

This Management Plan is to guide the appropriate development of facilities that will provide access to the Preserve, while preserving the integrity of its natural and cultural resources. The plan identifies the objectives, criteria, and standards that guide preserve development, administration and management and is intended to meet the requirements of Section 253.034, Florida Statutes and Chapter 18-2, Florida Administrative Code.

Florida Statutes, subsection 253.023(11) directs the County to manage the leased premises only for the conservation and protection of natural and historical resources and resource-based, public outdoor recreation which is compatible with the conservation and protection of these public lands.

Thus, the fundamental goal of the County as the managing agency is the protection and preservation of the natural and cultural historic resources of the Preserve and serves as the goal guiding management of the Preserve and its associated uses. In order to accomplish this goal, the County manages the Preserve in a two-tiered approach. The Volusia County Parks, Recreation & Culture Division, in combination with the Resource Stewardship Division, are responsible for natural resource protection and preservation, including management activities noted within this Plan. The Volusia County Parks, Recreation and Culture Division is responsible for user group management, related to secondary user activities identified in Section III of this Plan. The division managers and individual staff communicate on a regular basis to ensure proper protection and preservation of the natural resources remains the primary goal. This division of labor allows the most equipped staff to handle appropriate management activities, from controlled burns to gate maintenance.

The Management Policy Statement from the Management Prospectus is as follows:

The primary goals of management of the Spruce Creek project are to conserve, protect, manage, or restore important ecosystems, landscapes, and forests, in order to enhance or protect significant surface water, coastal, recreational, timber, fish or wildlife resources which local or state regulatory programs

cannot adequately protect; to provide areas, including recreational trails, for natural- resource-based recreation; and to preserve significant archaeological or historical sites.

5. Title Interest and Encumbrances

The Board of Trustees of the Internal Improvement Trust Fund of the State of Florida (Lessor) holds title to DLSCP, as State-owned lands. In January 2001, the Lessor entered into a lease agreement with Volusia County as lessee and lead manager of DLSCP (Appendix A). The term of this lease is 50 years.

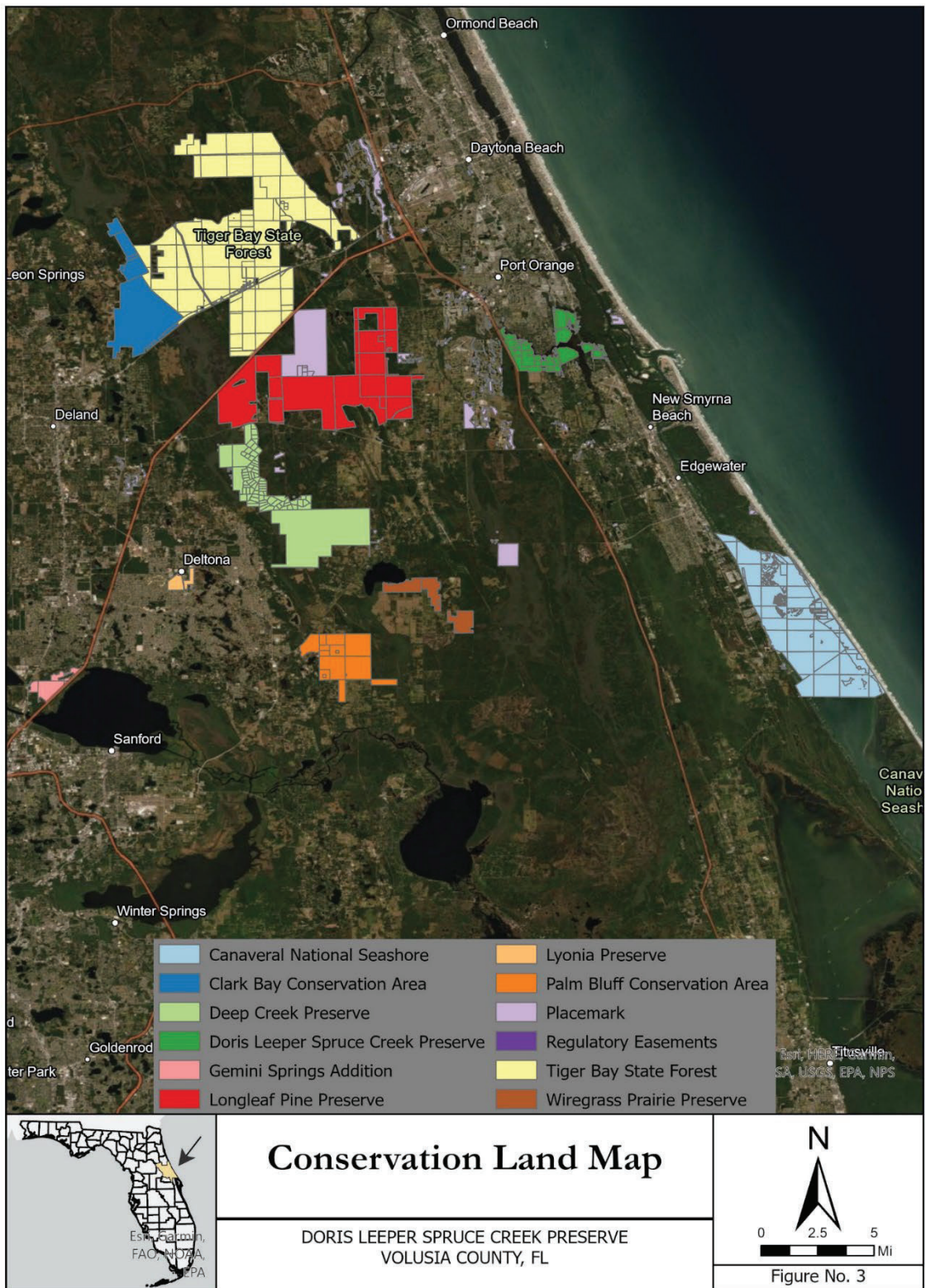
B. Proximity to Other Public Properties

State owned lands within DLSCP are contiguous with a number of publicly owned conservation areas that are managed by Volusia County. The entire conglomerate of publicly owned and managed lands is considered the Preserve. As noted above, the region in which DLSCP located has experienced significant development pressure. As such, DLSCP does not have any direct land connections with other public lands. It does have numerous connections via waterways, including county and city owned parks and managed lands to the east and west. Additionally, numerous parcels that have been placed under Conservation Easements granted to regulatory agencies (primarily the St. Johns River Water Management District) have hydrologic connections via swamps and other watercourses that connect to Spruce Creek.

A map of conservation lands within a 10-mile radius of the Preserve is displayed below in the Public Conservation Lands Map. Volusia County is the managing agency for the publicly owned lands that are adjacent to BOT lands within DLSCP.

Some of the notable lands in the region along with the associated manager / owner include:

- Tiger Bay State Forest (includes Rima Ridge Wildlife Management Area): Florida Forest Service
- Port Orange Mitigation Bank: City of Port Orange
- Longleaf Pine Preserve: Volusia County
- Gamble Place: Non-Profit Organization
- Ponce Preserve: City of Ponce Inlet
- Lighthouse Point: Volusia County
- Smyrna Dunes Park: Volusia County
- Farmton Mitigation Bank: Mitigation Associates, Inc.
- Turnbull Hummock: CARL Project – St. Johns River Water Management District



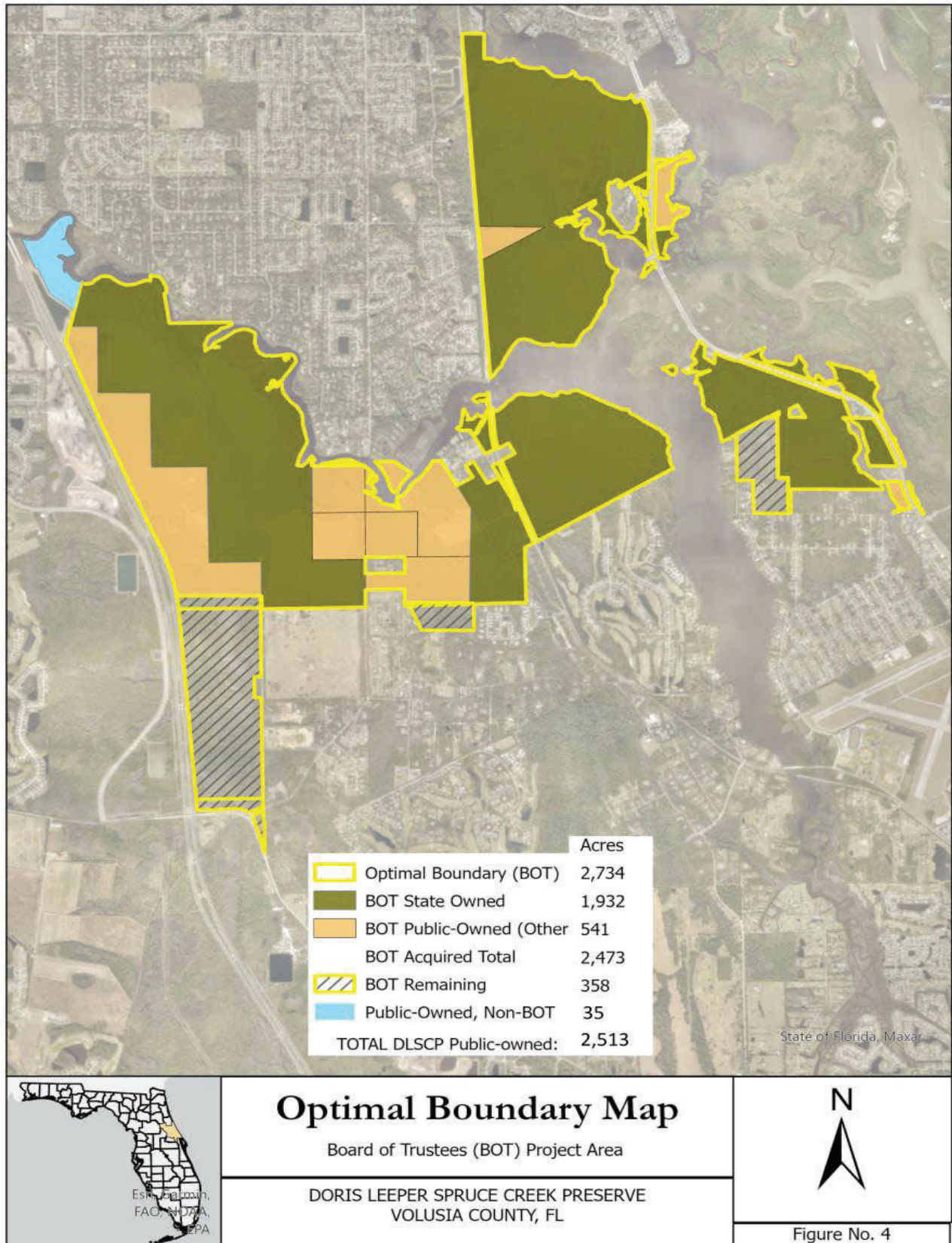
C. Optimal Boundary

The optimum boundary is identified in Figure 4. This boundary is provided by Florida Forever BOT. This map is on the DEP approved Management Prospectus, which is provided in its entirety in Appendix C. The purpose of the optimal boundary is to guide acquisition of parcels towards those parcels that would promote the Florida Forever goals and the goals listed within this Plan. Adjustments to the boundary and may add or remove parcels depending upon current conditions. If parcels that were formerly within an optimum boundary are developed, they may be removed from essential parcels list. Note that inclusion within this boundary does not equate to ownership. It is a guide to acquiring additional lands for public ownership and management.

The County, in partnership with others, has been able to acquire a significant portion of the properties within the Optimal Boundary. The acquisition of these lands is a significant focus of Volusia County's Resource Stewardship Division. The acquisition of these properties directly promotes the primary objective of the management directive noted above. The remaining properties include lands adjacent to the exterior boundaries of the overall publicly owned lands. As part of the management strategy, adjacent and contiguous lands are continuously reviewed and evaluated for potential incorporation into the Preserve's CARL/Florida Forever boundary. In 2008, with approval by ARC, six privately owned parcels totaling 96.97 acres were removed from the Optimal Boundary. This change reflected which properties should be targeted for acquisition; no parcels have been removed or sold from public ownership. These properties were reviewed by the Office of Environmental Services as part of a study to determine whether properties should be removed from the optimum boundary that have been disturbed by development and no longer desirable for state acquisition. The six parcels were found to contain residential and/or commercial infrastructure and /or buildings.

The Doris Leeper Spruce Creek Preserve has been one of the several priority areas of the county's land acquisition programs, including Volusia Forever. The Volusia Forever program provides for the acquisition and management of environmentally sensitive and outdoor recreation lands. The program, created by the county's voters in 2000 and renewed in 2020, is funded through annual ad valorem assessment for a period of twenty years. Potential future acquisitions through this program, which is for willing sellers only, is dependent upon available funding.

The Volusia Forever program is administered by the County's Resource Stewardship Division. The responsibility for final decisions regarding property acquisition resides with the County Council.



D. Public Involvement

A public workshop was held on January 31, 2022. The purpose of this meeting was to present this draft management plan to the public. Comments from public input were considered and where logistical and not contrary to the primary purpose and goals of this Plan, were incorporated. The Florida Statute calls for the minimum of one public hearing. See meeting minutes in Appendix D. Additionally, the draft plan and executive summary was available online December 2021 through March 2022 for public review and input.

Following review and input of the Plan at the public workshop, a Management Plan Advisory Group (MPAG) meeting was held on February 2, 2022. The Volusia County Council, in accordance with Section 259.032, Florida Statutes, established an advisory group that provided input into this Plan. The advisory group members consisted of representatives from the lead and co-managing agency, a local property owner, the soil and water conservation district, a local conservation organization, and a local elected official. The Florida Fish and Wildlife Conservation Commission and Florida Forestry Service were also on the board due to state property having imperiled habitat. The Council approved the formation of an advisory group for the purpose of reviewing and commenting on the Plan at the December 14, 2021 regularly scheduled public meeting.

II. NATURAL AND CULTURAL RESOURCES

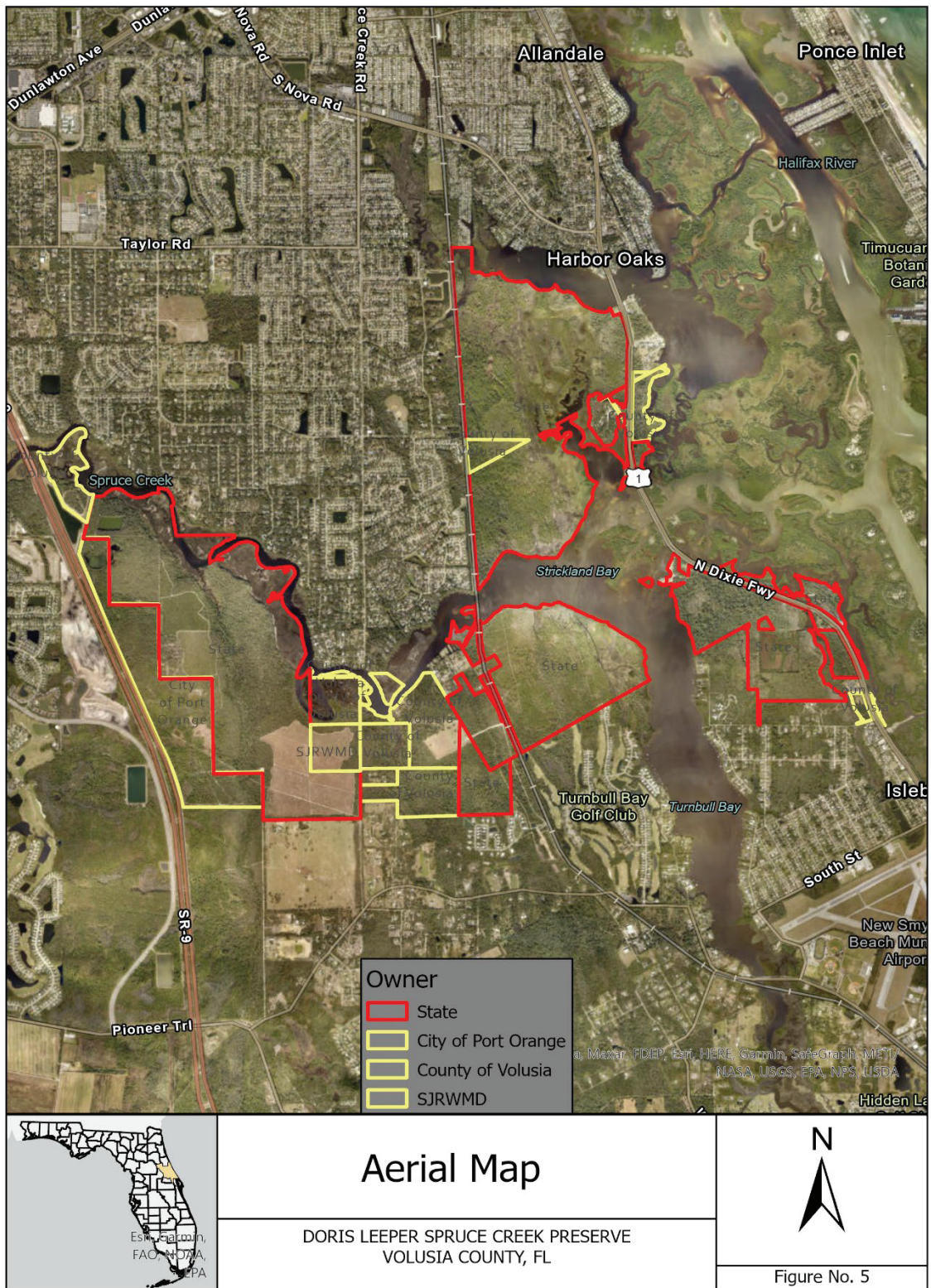
A. Physiography

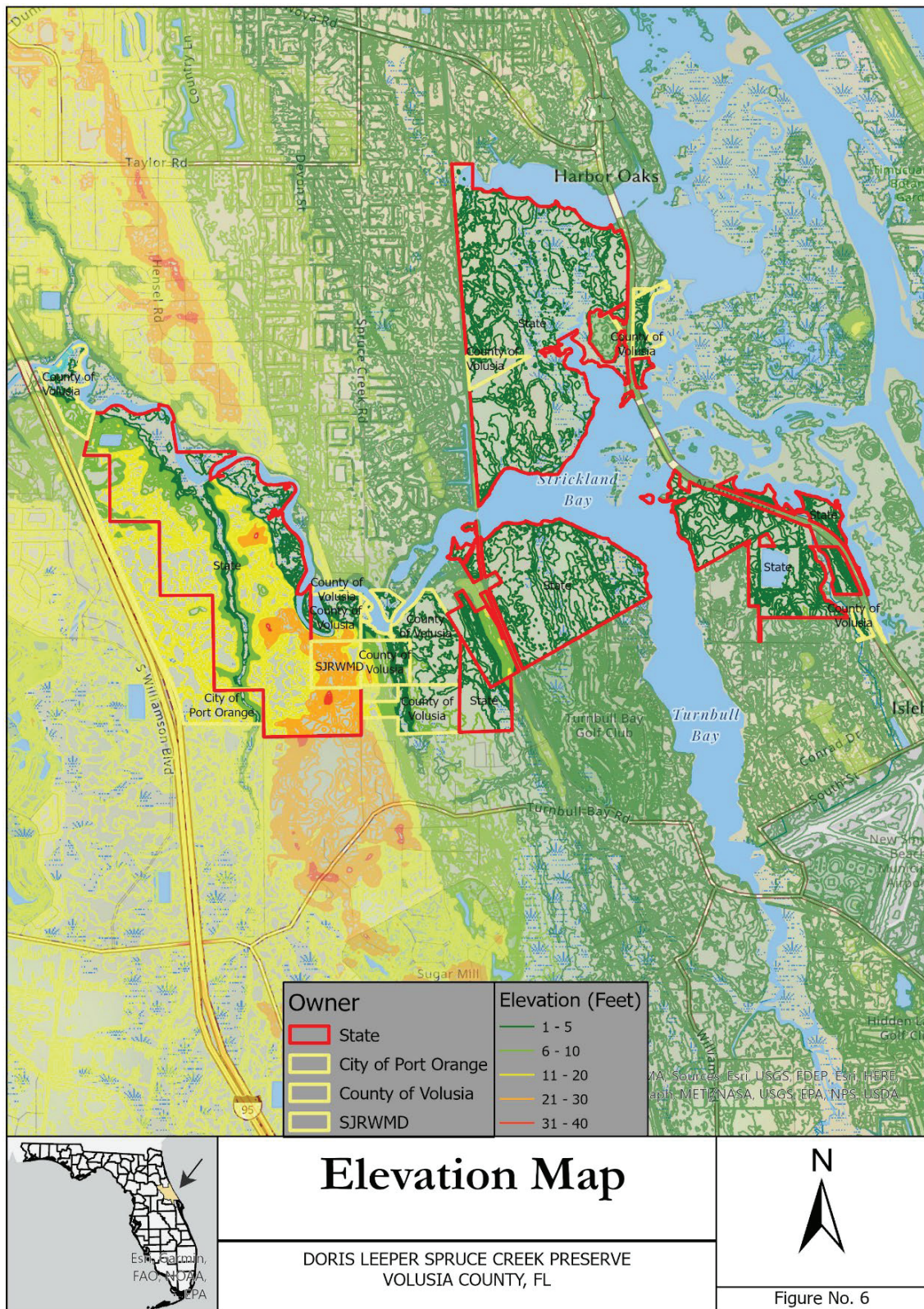
The following section provides a description and assessment of existing natural and cultural resources found in the Preserve. An Aerial Map (Figure 5) and other supporting figures are provided in this section.

1. Topography

Elevations on this site range from 0 feet NGVD along the margins of Spruce Creek, Strickland Bay, Turnbull Bay and along the mangrove and marsh islands to 40 feet NGVD at the top of the Spruce Creek archeological mound and the bluffs along Spruce Creek. Higher elevations on the project site are associated with scrub, aboriginal shell mound deposits and bluffs along Spruce Creek, while lower elevations on the project site are associated with the margins of Spruce Creek and adjacent salt marsh and mangrove areas (Figure 6)

During the planning of recreational activities slope is a more important concern than actual elevations with regard to minimizing ecological impacts. On the project site, the steepest slopes are associated with the aboriginal shell mound areas and bluff areas in the western portion of the project site. Multi-use trails proposed in proximity to these areas should be field verified to avoid excessively sloped areas. This will minimize sedimentation and erosion problems in the future and protect surface water quality.





2. Soils

According to the United States Department of Agriculture (USDA) Soil Conservation Service Soil Survey of Volusia County (1980) (now the Natural Resource Conservation Service – NRCS), there are eighteen (18) soil map units that occur within the Preserve. These soil types, along with a brief description are listed in Table 1 below and displayed on the Soils Map (Figure 7). Revenue-generating mineral resources, such as oil, gas and phosphate, are not known to occur within the Preserve.

Soils on the project site provide insight into historic vegetation patterns, potential land uses, and appropriate plant selections for restoration areas. The dominant soil types in the uplands on the eastern portion of the site are Myakka fine sand and Smyrna fine sand, while the soils of the uplands on the western portion of the site are dominated by Paola fine sand, 0-8% slopes and Astatula fine sands, 0-8% slopes. The predominant wetland soil on the site, Turnbull muck, underlies the extensive salt marsh areas adjacent to Spruce Creek.

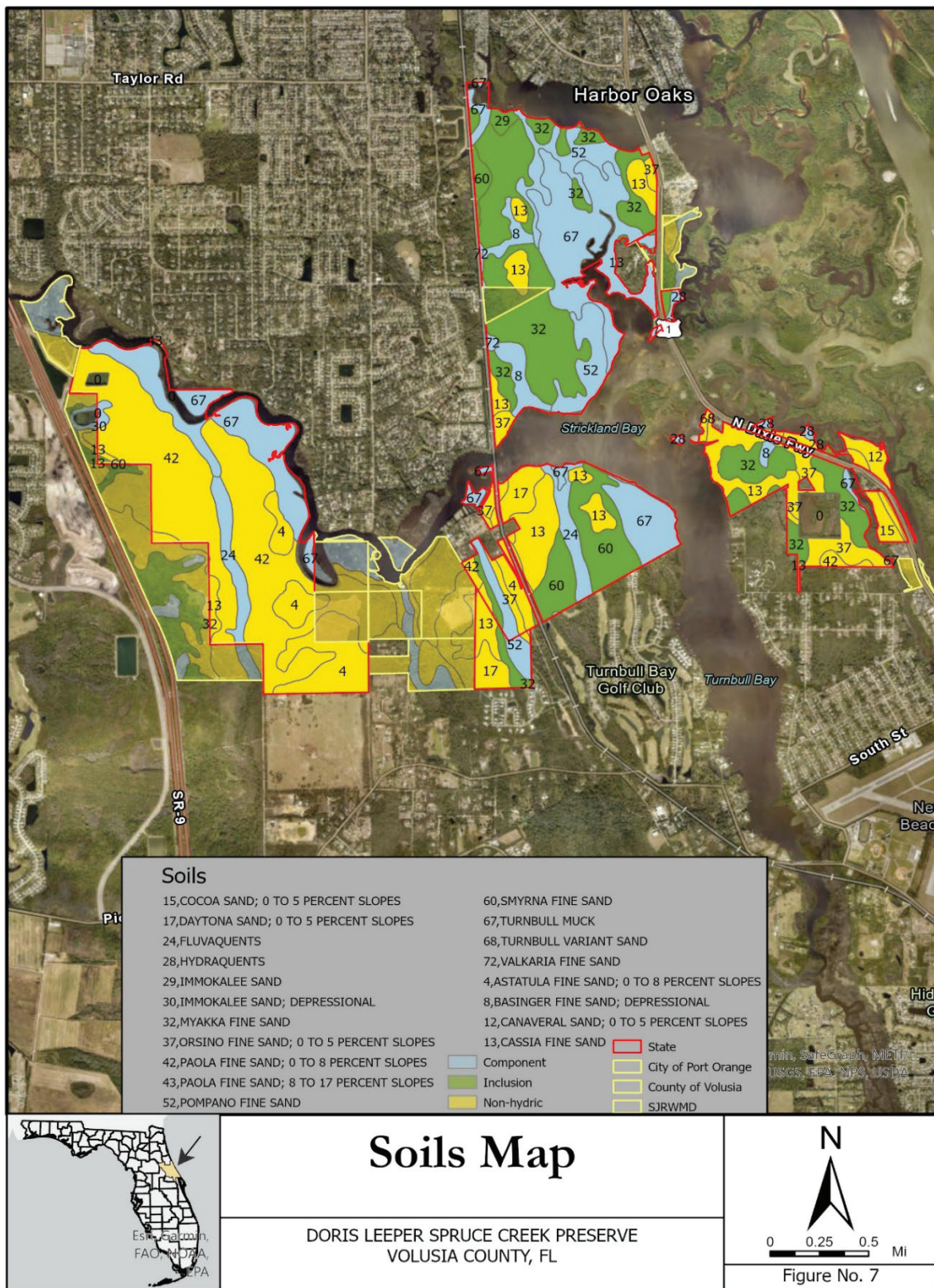
In Table 1 below, the hydric status of the soil is listed as Component, Inclusion, or Xeric. The purpose of the rating is to understand, relative to the map unit, the extent of the hydric nature of the soil. Hydric component soils are those map units where the majority of the map unit is comprised of a hydric soil. Hydric inclusion soils are those where a minority percentage of the map unit consists of hydric soils. Xeric soils are those that have no hydric soils included within the map unit. These can also be considered in terms of hydric, mesic, and xeric across the landscape. Note that the use of terms *component* and *inclusion* are from terminology appearing in the 3rd Edition of the *Hydric Soils of Florida Handbook*, although the actual rating below are based on the 4th edition.

Table 1 Soil Types and Descriptions occurring on Doris Leeper Spruce Creek Preserve Project Site, Volusia County, Florida.

Soil Name and Map Symbol	Brief Soil Description	Seasonal High Water Table		Historic Vegetation	Hydric Status
		Depth (in)	Duration (mo)		
Astatula fine sand, 0-8% slopes (4)	Excessively drained; nearly level to sloping	>80	12	Sand pine, turkey oak, sand live oak, longleaf pine, wiregrass, gopher apple, saw palmetto	Xeric
Basinger fine sand, depression (8)	Poorly drained, nearly level	At or above the surface	1-3	St. Johns wort. Maidencane, pond pine	Component
Canaveral sand, 0-5% slopes (12)	Moderately well drained to poorly drained; nearly level to gently sloping	10-40	2-4	Saw palmetto, scrub oaks	Xeric

Soil Name and Map Symbol	Brief Soil Description	Seasonal High Water Table		Historic Vegetation	Hydric Status
		Depth (in)	Duration (mo)		
Cassia fine sand (13)	Somewhat poorly drained; nearly level to gently sloping	15-40	6	Slash pine, longleaf pine, sand pine, scrubby oaks, saw palmetto, wiregrass	Xeric
Cocoa sand, 0-5% slopes (15)	Well drained; nearly level to gently sloping	>80	12	Live oak, laurel oak, magnolia, cabbage palm	Xeric
Daytona sand, 0-5% slopes (17)	Moderately well drained; nearly level to gently sloping	40-50	1-4	Sand pine, scrub oak, longleaf pine, rosemary, turkey oak, fetterbush, saw palmetto	Xeric
Fluvaquents (24)	Poorly drained and frequently flooded, nearly level	At or above surface	12	Red maple, cypress, sweetgum, cabbage palm, sedges	Component
Hydraquents (28)	Mangrove islands	Tidally influenced	12	Red mangrove, black mangrove	Component
Immokalee sand (29)	Poorly drained, nearly level	>10	1-2	Slash pine, longleaf pine, saw palmetto, wiregrass, runner oak	Inclusion
Immokalee sand, depressional (30)	Poorly drained, nearly level	<10	>6	Maidencane, St. Johns wort, cordgrass, pickerelweed	Component
Myakka fine sand (32)	Poorly drained, nearly level	<12	6	Slash pine, longleaf pine, saw palmetto, wiregrass	Inclusion
Orsino fine sand, 0-5% slopes (37)	Moderately well drained, nearly level to gently sloping	40-60	3-6	Sand pine, rosemary, saw palmetto	Xeric
Paola fine sand, 0-8% slopes (42)	Excessively drained, nearly level to sloping	>72	12	Sand pine, scrub oak, rosemary, saw palmetto	Xeric
Paola fine sand 8-17% slopes (43)	Excessively drained, strongly sloping to moderately steep	>72	12	Sand pine, scrub oak, rosemary, saw palmetto	Xeric
Pompano fine sand (52)	Poorly drained, nearly level	<10	2-6	Cordgrass, maidencane, St. Johns wort	Inclusion

Soil Name and Map Symbol	Brief Soil Description	Seasonal High Water Table		Historic Vegetation	Hydric Status
		Depth (in)	Duration (mo)		
Smyrna Fine sand (60)	Poorly drained, nearly level	<10	1-4	Slash pine, runner oak, saw palmetto, wiregrass	Inclusion
Turnbull muck (67)	Very poorly drained, nearly level	Tidally influenced	12	Needlegrass rush, smooth cordgrass, sea-oxeye, glasswort, saltgrass	Component
Turnbull variant sand (68)	Dredged material	<40	12	Prickly-pear cactus, wax myrtle, cabbage, palm, pickerelweed, glasswort, spartina	Xeric



B. Natural Communities

The system of classifying natural communities employed in this plan was developed in accordance with the Florida Natural Areas Inventory (FNAI) *Guide to the Natural Communities of Florida – 2010 Edition*. The premise of this system is that physical factors, such as climate, geology, soil, hydrology and fire frequency generally determine the species composition of an area, and that areas which are similar with respect to these factors will tend to have natural communities with similar species compositions. Obvious differences in species composition can occur, despite similar physical conditions. In other instances, physical factors are substantially different, yet the species compositions are quite similar. For example, coastal strand and scrub—two communities with similar species compositions—generally have quite different environments and necessitate different management programs.

The Preserve contains 18 communities (Figure 8) including altered cover types. Preserve specific assessments of the existing natural communities are provided in the narrative below and a summary of the communities and their relative cover and acreages is provided in Table 2 below. The descriptions below summarize the generalized condition of the community, followed by details of the specific community occurring within the Preserve. Details such as fire return intervals, timber thinning, and other specific restoration details are provided in separate plans within the Appendices.

Table 2. DLSCP Land Cover and Associated Fire Return Interval

Land Cover Classification	State Owned Acres	% Area	Fire Interval (years) FNAI Per Plan (typical for habitat)	Fire Interval (years) per Prescribed Burn Plan Appendix I
Blackwater Stream	25.84	1.3	--	
Bottomland Forest	61.69	3.2	--	
Coastal Hydric Hammock	7.48	0.4	--	
Developed	2.53	0.1	--	
Impoundment	5.01	0.3		
Improved Pasture	2.88	0.1	--	
Mangrove Swamp	8.95	0.5	--	
Maritime Hammock	166.38	8.6	--	
Mesic Flatwoods	257.78	13.3	2-4	2-4
Mesic Hammock	103.56	5.4	--	
Salt Marsh	475.35	24.6	--	
Scrub	231.63	12.0	5-20	5-7
Scrubby Flatwoods	185.71	1.4	5-15	5-15
Spoil Area	3.44	9.6	--	
Successional Hardwood Forest	27.48	1.4		
Wet Flatwoods	176.05	9.1	5-7	4-7
Wet Prairie	14.76	0.8	2-4	**
Xeric Hammock	175.74	9.1	5-20	
Total	1,932.26	100.0		

** Dependent upon adjacent habitats.

Hardwood Forested Uplands

1. Mesic Hammock

Mesic Hammock – Mesic hammocks are well-developed hardwood and/or palm forests on rarely inundated soils. The canopy is typically closed and dominated by live oak (*Quercus virginiana*), cabbage palm (*Sabal palmetto*), southern magnolia (*Magnolia grandiflora*), and pignut hickory (*Carya glabra*).

The mesic hammocks found at the Preserve are dominated by a closed canopy of the trees mentioned above. The understory consists of saw palmetto (*Serenoa repens*), American beautyberry (*Callicarpa americana*), gallberry (*Ilex glabra*), sparkleberry (*Vaccinium arboreum*), yaupon holly (*Ilex vomitoria*) as well as some scrub oak species found in the adjacent xeric habitats (these scrub oaks may be remnants of a historical condition, as described below). The mesic hammocks found on the Preserve, like many throughout central and northeast Florida, are very healthy and functioning at optimum levels. The most common disturbance in this habitat is logging, understory clearing, cattle grazing, and introduction of feral hogs. The disturbances mentioned above have not occurred at the Preserve.

The mesic hammocks located on the Martin's Dairy tract are located along a bluff bordering the bottomland forest / creek systems and extend east to the bluff along Spruce Creek. These areas are within natural fire shadows and have trended towards a mesic setting. Based on the underlying soil map unit (42, Paola fine sand) the areas above the bluffs may have been historically more xeric in appearance and vegetational composition. Soils within these specific hammocks indicate an intermediate condition of these two communities (xeric vs. mesic). Void of natural processes such as fire, xeric hammocks drift towards mesic hammocks. As the canopy closes, large canopy oaks become resistant to fire, hardwoods like southern magnolia encroach, and the growing layer of leaf litter increase organics and cover open sand patches associated with xeric hammocks. As such, mesic hammocks are not considered fire-adapted communities due to their resistance to fire. Evidence of some hammock in these areas is visible on the 1943 aerials (Figure 9).

Based on these conditions, portions of the mesic hammock on the Martin's Dairy tract will be maintained as is and is not considered a fire dependent community.

High Pine and Scrub

2. Scrub

Scrub – The Scrub is a community composed of evergreen shrubs, with or without a canopy of pines, and found on dry, infertile, sandy ridges.

Scrub within the Preserve is dominated by myrtle oak (*Quercus myrtifolia*), sand live oak (*Quercus geminata*), Chapman's oak (*Quercus chapmanii*), and rusty lyonia (*Lyonia ferruginea*) within the shrub and subcanopy strata. There are a few remnant stands of sand pine (*Pinus clausa*) in the canopy, but these appear to be declining in abundance. The oaks form a dense cover interspersed with few patchy openings that consist of bare sand with a sparse cover of herbs, particularly threeawns (*Aristida* spp.), hairsedges (*Bulbostylis* spp.), sandyfield beaksedge (*Rhynchospora megalocarpa*), pinweeds (*Lechea* spp.), and ground lichens (*Cladonia* spp.). Saw palmetto (*Serenoa repens*) is common but not dominant within the scrub. The majority of the existing scrub, located on Martins Dairy portion, has received

numerous disturbance treatments consisting of roller chopping followed by prescribed fire. Because of these restoration treatments, staff considers the scrub to be in maintenance condition, within the desired future conditions (DFC) requirements for scrub. There is a portion of scrub proposed for restoration northwest of the restored scrub areas on the western portion of the preserve. Florida scrub is home to a multitude of rare animals. This includes the Florida scrub-jay (*Aphelocoma coerulescens*), scrub lizard (*Sceloporus woodi*), gopher tortoise (*Gopherus polyphemus*), Florida mouse (*Peromyscus floridanus*), short-tailed snake (*Stilosoma extenuatum*), gopher frog (*Rana capito*), and many other species. Protected species found within the scrub are discussed in Section D.

While scrub is a fire-maintained community, it is not easily ignited. Scrub is thought to have burned less frequently than communities with a more easily ignited grassy groundcover, such as sandhill or mesic flatwoods. Scrub oak dominated scrub, as found within the Preserve, likely burned naturally at intervals between 5 and 20 years (based on the habitat requirements of the Florida scrub-jay). Oak height is a critical limiting factor for Florida scrub-jays which have been documented to abandon territories where the oaks reached >3 meters. A minimum five-year fire return interval appears to be the time required for re-sprouting oak stems to reach acorn-bearing height, an important food source for jays.

Growth rates of scrub oaks are related to burn history and environmental conditions onsite. Long unburned oak scrub, which is found on the Preserve, may attain heights unsuitable for scrub-jays up to 50 percent faster after fire than regularly burned oak scrub and thus may at first require shorter burn intervals to maintain optimum heights following restoration of burning. The small, patchy sand pockets that are common in scrub habitats may need to be artificially restored by piling up fuel to create hotspots that kill the roots of the oaks.

Details on fire return intervals and mechanical harvesting of woody material are provided in the Prescribed Burn Plan (Appendix I) and Timber Assessment / Timber Plan (Appendix J).

Pine Flatwoods and Dry Prairie

3. Wet Flatwoods

Wet Flatwoods – Wet flatwoods are pine forests with a sparse or absent midstory and a dense groundcover of hydrophytic grasses, herbs, and low shrubs.

The wet flatwoods within the Preserve consists of a closed canopy of large slash pine (*Pinus elliottii*) and pond pine (*P. serotina*), with the latter being the dominant species. The subcanopy consists of loblolly bay (*Gordonia lasianthus*), swamp bay (*Persea palustris*), dahoon holly (*Ilex cassine*), and wax myrtle. The shrub layer is dominated by gallberry (*Ilex glabra*), shiny lyonia (*Lyonia lucida*), and saw palmetto (*Serenoa repens*). This habitat has been long unburned and saw palmetto forms a dense thicket and has low plant richness. The herbaceous species are found primarily in breaks in the shrub layer, along field roads or game trails and consists of wiregrass (*Aristida stricta*), blue maidencane (*Amphicarpum muhlenbergianum*), Carolina redroot (*Lachnanthes carolina*), beaksedges (*Rhynchospora* spp.), and maidencane (*Panicum hemitomon*). Due to this site being fire suppressed, the shrub layer is more abundant compared to the herbs. This community is found entirely within the Rose Bay Tract and is not considered to be within habitat maintenance conditions. The shrub layer has become less dominant and the herbaceous layer has improved due to wildfires on the Rosebay Tract.

Wet flatwoods tend to have a longer fire interval than upland pine flatwoods in the order of 5 to 7 years. If the interval is too long, 7 to 10 years, it can lead to an increase in woody species cover and a decline in grasses and forb cover (or palmetto cover, as evidenced in this habitat on DLSCP). Many factors other than frequency of fire, such as season of fire, pre- and post-fire soil moistures, groundwater levels, weather, plant size or age at the time of fire, can greatly influence tree mortality and vegetation response to fire. Fire in the growing season can reduce the composition of woody vegetation, particularly hardwoods and prevent increases in shrub densities, as well as promote flowering of herbaceous groundcover.

4. Mesic Flatwoods

Mesic Flatwoods – Mesic flatwoods are generally characterized by an open canopy of tall pines and dense ground cover including shrubs, grasses, and forbs. Historically this community's canopy was dominated by longleaf pine (*Pinus palustris*). Today the majority of mesic flatwoods found throughout central and northeastern Florida are dominated by dense stands of slash pine due to the pine silviculture industry and furthermore by prolonged periods of fire exclusion.

The canopy found within the mesic flatwoods of the Preserve is comprised primarily of slash pine; however, longleaf pine does occur throughout much of this habitat on DLSCP. The ground cover is dominated by a heavy cover of saw palmetto and gallberry, and has low plant species richness compared to optimal conditions. In its natural state, mesic flatwoods herbaceous cover is dominated by wiregrass, dropseeds (*Sporobolus* spp.), panicgrasses (*Dichanthelium* spp.), and broomsedges (*Andropogon* spp.). Limited areas of wiregrass, and these other herbaceous species, are found within the mesic flatwoods of the Preserve due to fire exclusion. The herbaceous species that do occur are found along existing trails or other disturbances that have removed some of the extensive shrub layer. The mesic flatwoods found on the Turnbull Tract are the closest to maintenance condition due to mechanical treatment and prescribed fire. However, it will still require mechanical treatments prior to fire implementation in areas that have not yet been treated. The remaining mesic flatwoods, occurring mainly in the Rosebay Tract, are not in maintenance condition, but are trending in that direction due to wildfires and some limited mechanical treatment.

Mesic flatwoods require frequent fire (2 to 4 year intervals). Longleaf pines have thick bark to protect them from fire and their seeds need the mineral soil and open sunlight that fire provides to germinate. Longleaf pine during the grass stage is fire resistant. Several species require fire to reproduce. Wiregrass requires fire to flower, along with a number of other characteristic herbs. The need for frequent fire to control hardwoods, shrub thickets and unnaturally dense pine stands has been documented for many years. It is also well documented that fire stimulates flowering in many flatwoods herbs and that frequent fire increases species richness and abundance. Controlled burns in mesic flatwoods also indirectly determine the fire frequency and season for all the adjacent natural communities. Statistics from lightning caused fires suggest that most areas in Florida would naturally burn at the beginning of the lightning season. Growing season fires (April to mid-August) are known to be necessary for flowering and seed set in wiregrass.

5. Scrubby Flatwoods

Scrubby Flatwoods – Scrubby flatwoods have an open canopy of widely spaced pine trees and a low, shrubby understory dominated by scrub oaks and saw palmetto. Scrubby flatwoods differ from the aforementioned scrub in the presence of wiregrass, a greater abundance of saw palmetto, and/or the

presence of typical flatwoods shrubs such as gallberry and fetterbushes. Structurally it differs from scrub in its lack of a continuous cover of scrubby oaks.

The scrubby flatwoods at the Preserve have a canopy of longleaf pine, slash pine, and sand pine (*Pinus clausa*). The understory consists of a closed cover of sand live oak, myrtle oak, Chapman's oak, saw palmetto, gallberry, rusty Lyonia and fetterbush. Some instances of grasses were found which include wiregrass, broomsedge bluestem (*Andropogon virginicus*), and shiny blueberry (*Vaccinium myrsinites*). The majority of the scrubby flatwoods found within the Preserve has a closed canopy of scrub oaks in the 3 to 4 meter range in height due to the lack of fire. Approximately 50% of the scrubby flatwoods may be considered in a maintenance condition because of mechanical treatment (e.g., roller chopping). Overall, the scrubby flatwoods will still need mechanical treatment followed by prescribed fire to facilitate the habitat maintenance condition.

Scrubby flatwoods are often associated with scrub and/or mesic flatwoods. Many of the rare species associated with the aforementioned scrub are also likely to inhabit scrubby flatwoods.

Scrubby flatwoods have a more continuous ground cover and more pine needle leaf litter than scrub. Scrubby flatwoods have historically have burned more readily than scrub. However, due to less ground cover grasses, scrubby flatwoods tend to burn less readily than mesic flatwoods. Scrubby flatwoods historically have burned at a frequency intermediate of the two, most likely in the 5 to 15 year range. Light ground fires in the surrounding mesic flatwoods tend to enter scrubby flatwoods and extinguish, leading to a patchwork of recently burned and unburned portions, a situation which has been found to be favorable for scrub-jays. Therefore, variability in season and frequency of prescribed fires to produce a mosaic of burned and unburned patches would be the most desirable for maintaining high biotic diversity within this community.

Coastal Uplands

6. Maritime Hammock

Maritime Hammock – Maritime hammock is predominantly evergreen hardwood forest growing on stabilized coastal dunes lying at varying distances from the shore.

The maritime hammocks found within the Preserve have a closed canopy dominated by live oak, cabbage palm, southern magnolia, and pignut hickory. The subcanopy is dominated by red cedar (*Juniperus virginiana*), yaupon holly (*Ilex vomitoria*), saw palmetto, Brazilian pepper (*Schinus terebinthifolius*), red bay (*Persea borbonia*), wild coffee (*Psychotria nervosa*), wax myrtle, and wild orange (*Citrus* spp.). The invasive exotic Australian pine (*Casuarina equisetifolia*) was also noted within the maritime hammock communities of the Preserve, although it is limited in occurrence. Aside from continual threat of invasive exotics along the perimeter (especially along U.S. 1 and former field roads which have been closed), this system is considered good quality and in maintenance condition. No large stands of exotics are present and no major restoration activities appear necessary.

Fire is naturally rare in this community. Fire could weaken the canopy trees making them more susceptible to damage by other coastal stresses. Invasion by exotic species such as Brazilian pepper (*Schinus terebinthifolius*) and Australian pine following storm and wind disturbance is an ongoing threat to the community. Also, the composition of maritime hammock is in danger to be has been affected by the Laurel Wilt Disease, which is fatal to red bays over 1 inch in DBH. This disease is caused by an

exotic wood-boring beetle (*Xyleborus glabratus*). The loss of red bays within the subcanopy could potentially lead to further invasion by Brazilian pepper (*Schinus terebinthifolius*).

Freshwater Non-Forested Wetlands

7. Wet Prairie

Wet Prairie – Wet prairie is an herbaceous community found on continuously wet, occasionally inundated, soils on somewhat flat or gentle slopes between lower lying depression marshes, shrub bogs, or dome swamps and within slightly higher wet or mesic flatwoods, or dry prairies.

The wet prairies found within the Preserve are small depressions within wet flatwoods and mesic flatwoods. The groundcover consists primarily of yellow-eyed grass (*Xyris* spp.), St. John's wort (*Hypericum fasciculatum*), maidencane, panic and witch grasses (*Panicum* spp, and *Dichanthelium* spp.), beaksedges, and Carolina redroot. Woody / shrubby species such as wax myrtle (*Myrica cerifera*) and Carolina willow are encroaching from perimeter; however, the central portions remain open, herbaceous pockets that appear healthy despite lack of fire.

Natural fires likely entered wet prairies from surrounding pine flatwoods and burned through them when they were dry enough to carry fire. It is estimated that wet prairies found adjacent to pine flatwoods historically had a fire interval of 2 to 4 years. In absence of fire, shrubs and trees invade wet prairie and shade out the light-loving herbaceous species. Further evidence of fire interval is the necessity of many of the dominant grasses that require fire to stimulate flowering. Wet prairies are sensitive to relatively slight physical alterations to the soil surface which can permanently alter the hydrology. Such disturbances include soil rutting by human disturbance or hog rooting. These disturbances can cause major changes in species composition that require expensive restoration to repair.

Freshwater Forested Wetlands

8. Coastal Hydric Hammock

Coastal Hydric Hammock – Coastal hydric hammock is an evergreen hardwood and/or palm forest with a variable understory typically dominated by palms and ferns occurring on moist soils, often with limestone very near the surface. While species composition varies, the community generally has a closed canopy of oaks and palms, an open understory, and a sparse to a moderate groundcover of grasses and ferns.

The coastal hydric hammock found within the Preserve has a canopy that is 100% cabbage palm. The subcanopy consists of swamp bay, wax myrtle, and saw palmetto. The herbaceous cover is dominated by Virginia chain fern (*Woodwardia virginica*), cinnamon fern (*Osmunda cinnamomea*), and royal fern (*Osmunda regalis* var. *spectabilis*).

Fire is not considered an important component of coastal hydric hammock dynamics; however, they do burn occasionally. Due to this coastal hydric hammock being dominated by old growth cabbage palm fire most likely occurred historically. Cabbage palms are fire tolerant and intense fires favor the species. Feral hogs tend to be the most common cause of disturbance to this habitat. Thus, feral hog trapping and removal has been a high priority on DLSCP and populations have been greatly reduced.

9. Bottomland Forest

Bottomland Forest – Bottomland forest is a deciduous, or mixed deciduous/evergreen closed-canopy forest within riverine floodplains and in shallow depressions.

The dominant canopy species found within this community at the Preserve include laurel oak (*Quercus laurifolia*), sweetbay (*Magnolia virginiana*), cabbage palm, swamp tupelo (*Nyssa sylvatica* var. *biflora*), water oak (*Quercus nigra*), sugarberry (*Celtis laevigata*), American elm (*Ulmus americana*), sweetgum (*Liquidambar styraciflua*) and red maple (*Acer rubrum*). The understory consists of blue beech (*Carpinus caroliniana*), swamp dogwood (*Cornus foemina*), dahoon holly (*Ilex cassine*), swamp bay, shiny lyonia (*Lyonia lucida*), buttonbush (*Cephalanthus occidentalis*) and wax myrtle. Common groundcover species include witchgrasses, woodoats (*Chasmanthium* sp.), and cinnamon fern (*Osmunda cinnamomea*). Overall, the bottomland forests within the Preserve are in excellent condition, have closed, mature canopies, do not appear to suffer from hydrologic impacts related to upstream development and have little exotic species present.

There are three bottomland forests occurring within the Preserve, two of which occur within state owned lands. One of these, located within the Martin's Dairy tract, borders a narrow blackwater creek that extend southward beyond the tract, with a drainage basin extending beyond the limits of the optimal boundary. The bottomland forest here occurs along a minor bluff extending from the creek upwards in elevation to various xeric and mesic habitats. The plant species composition, likewise, extends from more hydrophytic to mesophytic in nature as this increase in elevation occurs. The shrub layer is moderate in abundance as is the groundcover layer. Open ground, covered in leaf litter, is visible throughout much of this habitat.

The community on the Turnbull Tract occurs along a drainage pathway. An ill-defined channel exists throughout the northern two-thirds of this habitat, but does not have the appearance or regular flow of a creek. This forest does not have the same geographic relief, so the transition from hydrophytic to mesophytic vegetation is less notable. The shrub layer is thicker in this system, and the herbaceous groundcover species tend to occur in small depressional pockets. Bottomland forests are a preferred habitat for the Florida black bear (*Ursus americanus floridanus*) as they roam along the banks of streams and riverine systems.

Bottomland forests are not considered fire-adapted communities. The most common disturbance of bottomland forest is logging and introduction of feral hogs. The bottomland forests found within the Preserve do not appear to have been logged in the past and the presence of hogs is rare. Other disturbances such as manmade dikes or dams, which do not allow for adequate drainage also, can cause considerable damage to bottomland forests. No damming or diking has occurred within the Preserve.

Marine and Estuarine Vegetated Wetlands

10. Salt Marsh

Salt Marsh – Salt marsh is a largely herbaceous community that occurs in the portion of the coastal zone affected by tides and seawater and protected from large waves, either by the broad, gently sloping topography of the shore, by a barrier island, or by location along a bay or estuary. The dominant species are smooth cordgrass (*Spartina alterniflora*) and needle rush (*Juncus roemerianus*). The landward edge of the marsh consists of sawgrass (*Cladium jamaicense*), saltmeadow cordgrass (*Spartina patens*), marsh elder (*Iva frutescens*), sea oxeye daisy (*Borrchia frutescens*), and christmasberry (*Lycium*

carolinianum). The salt marshes within the Preserve also have sporadic black mangroves (*Avicennia germinans*).

Salt marshes, along with mangrove swamps, are some of the most biologically productive natural communities in the world. The base of the food chain is supplied not only by the rooted plant matter, but also by the algae and detritus found on the stems of plants, on the sediment surface, and suspended in the water column of pools and tidal creeks. Fire is known to occur in salt marshes, although sporadically, either by spreading from adjacent uplands or from lightning strikes in the marsh itself.

The overall quality of the salt marshes through the Preserve is high. There are some impacts that have occurred, however. Ditch/canal features are found in a portion of the salt marshes on the Preserve. The ditching is consistent to what occurred in the area in the 1950's and 1960's, which is referred to as dragline ditching. The purpose of the ditches was to interrupt the life cycle of saltmarsh mosquitoes (*Aedes taeniorhynchus*, *A. sollicitans*) by altering their breeding sites. Saltmarsh mosquitoes lay their eggs on moist soils. These eggs hatch in huge numbers when the marsh is flooded by tides or rain. Dragline ditching converts large acreages to ditch and spoil piles while altering the hydrology of the remaining wetland and providing access for mosquito-eating fish. The ditches are mostly open water due to the depth. Nuisance species such as Brazilian pepper (*Schinus terebinthifolius*), cattail (*Typha* spp.) and Carolina willow (*Salix caroliniana*) may invade along these edges, but this has occurred on a limited basis within the Preserve. Backfilling of these historic mosquito ditches has been a very successful form of salt marsh restoration throughout the state. This effort is occurring on the Preserve as well (refer to Section IV, Hydrologic Preservation and Restoration for additional details). In regards to the exotic species just mentioned, these also continue to invade the upper elevation of these systems along border between the salt marsh and the adjacent terrestrial community. The most common species is Brazilian pepper (*Schinus terebinthifolius*). County staff, assisted by their Mosquito Control Program, continues to monitor and treat these areas. The percentage of salt marsh infested by nuisance species is low (ca. <5%).

11. Mangrove Swamp

Mangrove Swamp – Mangrove swamps are dense forests occurring along relatively flat, low wave energy, marine and estuarine shorelines. Four species of mangroves occur in Florida consisting of red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*), and buttonwood (*Conocarpus erectus*). The four species can occur either in mixed stands or often in differentiated, monospecific zones that reflect varying degrees of tidal influence, levels of salinity, and types of substrate. Red mangroves often dominate the lowest (deep water) zone, followed by black mangroves, then white, and finally buttonwoods that are normally found within the transition zone between the upland and wetland limits.

The mangrove swamps on DLSCP are primarily dominated by black mangroves, although both red and white mangroves occur as well. Many of the mangrove systems are bordered by salt marsh on the waterward edge. Some areas, typically near US Hwy 1, continue to be invaded by Brazilian pepper (*Schinus terebinthifolius*), a topic addressed in later sections of this Plan.

Mangrove swamps often exist with no understory, although in some open areas species such as sea-oxeye daisy, marsh elder, saltwort (*Batis maritima*), and giant leatherfern (*Acrostichum danaeifolium*) may be found. Both conditions exist within DLSCP.

The biological importance of mangrove swamps is well documented as numerous marine and estuarine organisms depend on the swamps for a portion of their life cycle. The continuous shedding of mangrove leaves and other plant components also produce as much as 80 percent of the total organic material available in the aquatic food web. Mangrove swamps are considered one of the most productive forest systems in the world. Mangrove swamps provide important habitat for many rare and endangered flora and fauna and functions as nursery grounds for many of Florida's commercially and recreationally important fish and shellfish.

Mangroves continue to face survival pressure resulting from oil spills, altered tidal flows, and changes in the quantity, quality, and timing of the fresh water input as a result of development of adjacent uplands. Mangrove swamps are sensitive to colonization by exotic species such as Brazilian pepper (*Schinus terebinthifolius*) and Australian pine (*Casuarina equisetifolia*). Both of the above species have been observed within the Preserve. Management of the mangrove swamps within the Preserve includes the removal of the above exotic species found within the existing mangrove swamps and excluding recreational access to the adjacent open waters through intact mangrove areas.

Rivers and Streams (Riverine)

12. Blackwater Stream

Blackwater Stream - Blackwater streams are flowing waters from their source to the downstream limits of tidal influence and bounded by channel banks.

The open water areas within the Preserve include the waters of Spruce Creek where they cross through property boundaries. There is also a creek on Martin's Dairy tract that is considered a small blackwater stream. These creek systems, due to proximity to the Ponce Inlet, provide extremely valuable habitat for commercial marine species that spend all or part of their life cycle in tidal creeks which include mullet (*Mugil* spp.), spot (*Leiostomus xanthurus*), blue crabs (*Callinectes sapidus*), oysters (*Crassostrea virginica*), and shrimp (*Penaeus* spp.). The smaller minnows and juvenile fish in the tidal creeks provide food for many recreationally important, predatory fish, such as tarpon (*Megalops atlanticus*), snook (*Centropomus undecimalis*), red drum (*Sciaenops ocellatus*), and spotted seatrout (*Cynoscion nebulosus*). In addition to these saltwater species, the creeks provide habitat for numerous common freshwater species as well.

Altered Landcover Types

13. Spoil Area

Spoil Area – Spoil areas are open habitats where vegetation has been removed or eliminated by various natural and unnatural activities.

Located in the northeast portion of the Preserve on the Rose Bay tract was an area damaged by a wildfire in 2006. The dead trees were removed and the area is now reseeding to a more natural mesic pine flatwood. Because the area was open, Brazilian pepper (*Schinus terebinthifolius*) became established. In 2020, a contractor treated the Brazilian pepper (*Schinus terebinthifolius*) and county staff is conducting retreatment of any regrowth. Due to the catastrophic nature of the wildfire and the efforts required to control the fire, this area is disturbed and does not have an obvious target community as of yet. It is being managed to control exotic species. The area may be restored to saltmarsh depending on

state funding and approval.

14. Impoundment/Artificial Pond

Impoundment/Artificial Pond – Impoundments are generally described as areas of water retention or borrow pits. Two impoundments occur within the Preserve. One is a large human made pond (approximately 35 acres) found on the eastern side of the Preserve. The pond is tidally influenced and appears to be shallow across. Ponds of this nature were created in the past as duck ponds for hunters to use during the duck migrations in the spring and fall. This pond may have also been created in combination with US1 for road fill. This impoundment has been largely colonized by mangrove and salt marsh vegetation. Because of the obvious human-induced shape, and the berm that surrounds it, the entire area has been classified as an impoundment. The open water connection to Murray Creek makes this a highly valuable habitat. Treatment of the exotic plant, Brazilian pepper (*Schinus terebinthifolius*), will be the main focus for this location. A smaller freshwater borrow pond is located on the western side of the Preserve. This pond was used as a dirt mine in the past for use as fill. The side slopes drop dramatically and only a small littoral shelf is present.

15. Improved Pasture

Improved pasture – Improved pasture is defined as an area dominated by planted non-native or domesticated native forage species and evidence of current or recent pasture activity and/or cultural treatments (mowing, grazing, burning, fertilizing). Improved pastures have been cleared of their native vegetation. Most improved pastures in Florida are planted with bahiagrass (*Paspalum notatum*) and to a lesser extent with Bermudagrass (*Cynodon dactylon*) or pangolagrass (*Digitaria eriantha*). Weedy native species are often common in improved pastures in Florida and include dogfennel (*Eupatorium capillifolium*), many species of flatsedge (*Cyperus* spp.), carpetgrasses (*Axonopus* spp.), crabgrasses (*Digitaria* spp.), and rustweed (*Polypremum procumbens*) among many others.

A small portion of improved pasture is included within the Preserve. This area consists of primarily bahiagrass (*Paspalum notatum*), although the species noted above do occur here as well. This area is used for public access including vehicular and equestrian trailer parking. This small portion of improved pasture is connected to a larger, square shaped pasture dominated by bahiagrass. A large pavilion is located just west of the state owned boundary. The parking area must be regularly monitored for use by gopher tortoises, especially for signs of any burrows.

16. Successional Hardwood Forest

Successional Hardwood Forest – Successional hardwood forests are best described as closed- canopied forest dominated by fast growing hardwoods. These forests are either invaded natural habitat due to lengthy fire-suppression or old fields that have succeeded to forest. The subcanopy and shrub layers of these forests are often dense and dominated by smaller individuals of the canopy species.

This habitat is found along a canal, which was historically draglined through a wetland hardwood forest. The existing vegetation consists of a canopy of laurel oak, slash and longleaf pine, cabbage palm, sugarberry, and southern magnolia. This community is expected to reach a climax community similar to the mesic hammocks described above, through natural succession.

17. Developed

Developed – Developed can be described in numerous ways but ultimately is defined as parking lots, buildings, maintained lawns (as part of recreational, business, or residential areas), campgrounds, recreational, industrial, and residential areas.

This habitat is found on the north end of the Bolt tract and consists of paved and gravel drives used for access to a single family private residence west of this habitat and to active recreational areas on the northern tip. The other recreational uses provided here include fishing from shore, mowed parking areas and picnic benches.

18. Xeric Hammock

Xeric hammock is a well-developed evergreen hardwood and/or palm forest on soils that are rarely inundated. The canopy is typically closed and dominated by live oak (*Quercus virginiana*), with cabbage palm (*Sabal palmetto*) generally common in the canopy and subcanopy. Southern magnolia (*Magnolia grandiflora*) and pignut hickory (*Carya glabra*) may be occasional in the subcanopy. Xeric hammock is located in fire shadow areas, culturally sensitive area, and in compromise areas to provide for outdoor recreation. Hammocks represent the late successional stage and shall be managed as is. It should not be considered a fire dependent community and is not targeted for restoration.

C. Fish and Wildlife

Wildlife observations, both direct and indirect (indirect observations of their presence include remnants, tracks, burrows, calls, scat, etc.), are made by management staff during regular visits. A list of species observed is provided in Table 3 below. This list is comprised of observations from County staff, Project IBIS and user groups. For more information on Project IBIS go to <https://tinyurl.com/projectIBIS> or see Appendix F for a complete list of species.

Table 3 Wildlife species observed on the Doris Leeper Spruce Creek Preserve in Volusia County, Florida.

Taxa	Common Name	Scientific Name	Listed Species*
Reptiles/Amphibians			
	Eastern indigo snake	<i>Drymarchon corais couperi</i>	Yes
	Green anole	<i>Anolis carolinensis</i>	No
	Five-lined skink	<i>Eumeces fasciatus</i>	No
	Southern toad	<i>Anaxyrus terrestris</i>	No
	Green tree frog	<i>Hyla cinerea</i>	No
	Southern black racer	<i>Coluber constrictor priapus</i>	No
	Florida box turtle	<i>Terrapene carolina bauri</i>	No
	Gopher tortoise	<i>Gopherus polyphemus</i>	Yes
	Florida softshell turtle	<i>Apalone ferox</i>	No
	American alligator	<i>Alligator mississippiensis</i>	Yes
Birds			
	Anhinga	<i>Anhinga anhinga</i>	No
	Wood stork	<i>Mycteria americana</i>	No
	Brown pelican	<i>Pelecanus occidentalis</i>	No
	Osprey	<i>Pandion haliaetus</i>	No
	Roseate spoonbill	<i>Ajaia ajaja</i>	Yes
	Tricolored heron	<i>Egretta tricolor</i>	Yes
	White ibis	<i>Eudocimus albus</i>	No
	Cattle egret	<i>Bubulcus ibis</i>	No
	Great blue heron	<i>Ardea herodias</i>	No
	Great egret	<i>Ardea alba</i>	No
	Mottled duck	<i>Anas fulvigula</i>	No
	Belted kingfisher	<i>Ceryle alcyon</i>	No
	Ruby-throated hummingbird	<i>Archilochus colubris</i>	No
	Carolina chickadee	<i>Poecile carolinensis</i>	No
	Carolina wren	<i>Thryothorus ludovicianus</i>	No
	Grey catbird	<i>Dumetella carolinensis</i>	No
	Downy woodpecker	<i>Picoides pubescens</i>	No
	Pileated woodpecker	<i>Dryocopus pileatus</i>	No
	Red bellied woodpecker	<i>Melanerpes carolinus</i>	No
	Blue jay	<i>Cyanocitta cristata</i>	No
	Florida scrub-jay	<i>Aphelocoma coerulescens</i>	Yes
	Mockingbird	<i>Mimus polyglottos</i>	No
	Loggerhead shrike	<i>Lanius ludovicianus</i>	No
	Red-winged blackbird	<i>Agelaius phoeniceus</i>	No
	Tufted titmouse	<i>Baeolophus bicolor</i>	No

	White-eyed vireo	<i>Vireo griseus</i>	No
	Brown thrasher	<i>Toxostoma rufum</i>	No
	Northern cardinal	<i>Cardinalis cardinalis</i>	No
	Common ground dove	<i>Columbina passerine</i>	No
	Mourning dove	<i>Zenaida macroura</i>	No
	Wild turkey	<i>Meleagris gallopavo</i>	No
	American crow	<i>Corvus brachyrhynchos</i>	No
	Boat-tailed grackle	<i>Quiscalus major</i>	No
	Black vulture	<i>Coragyps atratus</i>	No
	Red-shouldered hawk	<i>Buteo jamaicensis</i>	No
	Bald Eagle	<i>Haliaeetus leucocephalus</i>	No
Mammals	Nine-banded armadillo	<i>Dasypus novemcinctus</i>	No
	Southeastern pocket gopher	<i>Geomys pinetis</i>	No
	Raccoon	<i>Procyon lotor</i>	No
	Florida manatee	<i>Trichechus manatus</i>	Yes
	Bobcat	<i>Felis rufus</i>	No
	Grey squirrel	<i>Sciurus carolinensis</i>	No
	White-tailed deer	<i>Odocoileus virginianus</i>	No
	Feral hog*	<i>Sus scrofa</i>	No, nuisance

*Feral hog is a common nuisance species throughout the region. While acorns are their favorite food, they will eat almost anything, including dead animals. When natural foods are scarce or inaccessible, hogs will forage on tree seeds, seedlings, and herbaceous vegetation, causing significant damage in forests and marsh systems. In Florida and the Southeast, this may be a problem in regenerating long-leaf pine forests. In addition to the effects of consuming, knocking down and trampling large amounts of native vegetation, the rooting behavior of wild hogs causes significant damage. Rooting, digging for foods below the surface of the ground, destabilizes the soil surface, uprooting or weakening native vegetation, damaging systems and causing erosion. Wallowing destroys pond and stream banks, which may affect water quality.

Eradication efforts have been underway since management activities commenced. The hog population on the Preserve is low, and they are not causing major harm in any known locations. Because hogs are prolific breeders, having up to 3 litters per year and due to the extent of forests, dense vegetation, and abundant water in the area, there is no way to completely eliminate them. Therefore, regular efforts to monitor and trap hogs continue, in a manner similar to that of monitoring and removal of exotic nuisance plant species.

Table 4. Fish survey results from Project IBIS, Volusia County Schools Environmental Education Program

COMMON NAME	GROUP	COMMON NAME	GROUP
Bay Anchovy	Anchovies	Mosquitofish	Livebearers
Striped Anchovy	Anchovies	Sailfin Molly	Livebearers
Great Barracuda	Barracudas	Inshore Lizardfish	Lizardfish

COMMON NAME	GROUP	COMMON NAME	GROUP
Hairy Blenny	Blennies	Spanish Mackerel	Mackerel
Bluefish	Bluefish	Irish Pompano	Mojarra
Gafftopsail Catfish	Catfish	Silver Jenny	Mojarra
Hardhead Catfish	Catfish	Spotfinned Mojarra	Mojarra
Skillet Fish	Clingfishes	Striped Mojarra	Mojarra
Atlantic Cutlass fish	Cutlassfish	Striped Mullet	Mullet
Atlantic Croaker	Drum	White Mullet	Mullet
Black Drum	Drum	Atlantic Needlefish	Needlefish
Red Drum (Redfish)	Drum	Redfin Needlefish	Needlefish
Silver Perch	Drum	Lined Seahorse	Pipefish and Seahorses
Spot	Drum	Pipefish spp	Pipefish and Seahorses
Spotted Seatrout	Drum	Pinfish	Porgy
Star Drum	Drum	Sheepshead	Porgy
American Eel	Eels	Spottail Pinfish	Porgy
Planehead Filefish	Filefish	Checkered Puffer	Puffers
Bay Whiff	Flat Fish	Southern Puffer	Puffers
Blackcheek Tonguefish	Flat Fish	Striped Burrfish	Puffers
Gulf Flounder	Flat Fish	Atlantic Stingray	Ray
Hogchoker	Flat Fish	Smooth butterfly Ray	Ray
Southern Flounder	Flat Fish	Southern Stingray	Ray
Freshwater Goby	Goby	Bighead Searobin	Searobins
Frill Finned Goby	Goby	Atlantic Sharp Nose Shark	Shark
Goby spp	Goby	Bonnet Head Shark	Shark
Naked Goby	Goby	Lemon Shark	Shark
Black Sea Bass	Grouper	Atlantic Silverside	Silversides
Pigfish	Grunt	Lane Snapper	Snapper
Atlantic Menhaden	Herrings	Mangrove Snapper	Snapper
Atlantic Thread Herring	Herrings	Common Snook	Snook
Atlantic Bumper	Jack	Atlantic Spadefish	Spadefish
Crevalle Jack	Jack	Southern Stargazer	Stargazers
Florida Pompano	Jack	Ladyfish	Tarpon
Leather Jacket	Jack	Oyster Toadfish	Toadfish
Lookdown	Jack	Sea Grape	Tunicates and Sea Squirts
Permit	Jack	Sea Pork	Tunicates and Sea Squirts
Gulf Killifish	Killifish	Sea Squirt	Tunicates and Sea Squirts
Marsh Killifish	Killifish	Whiting spp	
Mummichog	Killifish		
Sheepshead Minnow	Killifish		
Striped Killifish	Killifish		

D. Listed Resources

A background literature search was conducted to compile a list of state and federally protected animal and plant species that could occur on-site. The four primary sources of literature reviewed include the Florida Fish and Wildlife Conservation Commission's (FWC) *Florida's Endangered Species, Threatened Species, And Species of Special Concern*, the United States Fish and Wildlife Service's (FWS) database, the Florida Natural Areas Inventory (FNAI), and the Florida Department of Agriculture and Consumer Services (FDACS), Division of Plant Industry's (DPI) *Notes on Florida's Endangered and Threatened Plants*. During regular maintenance and monitoring activity staff notes occurrences of listed species.

Florida Natural Areas Inventory was queried for a list of elemental occurrences on or near the Preserve. FNAI's provided their findings in a letter report which is provided in Appendix E.

1. Endangered, Threatened and Species of Special Concern

Listed Wildlife Species

The listed animal species with at least some likelihood of occurrence are listed in Table 5, below. The estimated likelihood of occurrence of each species is noted in the table and those species with at least a moderate likelihood of occurrence are discussed following the table.

Table 5: Listed animal species with the potential to occur on the Doris Leeper Spruce Creek Preserve in Volusia County, Florida.

Scientific Name	Common Name	Status	Ranking	Likelihood of Occurrence
<i>Accipiter cooperii</i>	Cooper's hawk	N	G5/S3	Documented
<i>Ajaia ajaja</i>	Roseate spoonbill	S-SSC	G5/S2	Documented
<i>Alligator mississippiensis</i>	American alligator	S-SSC/FT(S/A)	G5/S4	Documented
<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	FT	G2?	Historic
<i>Ardea alba</i>	Great egret	N	G5/S4	Documented
<i>Crotalus adamanteus</i>	Eastern diamondback rattlesnake	N	G4/S3	Documented
<i>Drymarchon corais couperi</i>	Eastern indigo snake	ST/FT	G3/S3	Documented
<i>Egretta caerulea</i>	Little blue heron	S-SSC	G5/S4	Documented
<i>Egretta rufescens</i>	Reddish egret	S-SSC	G4/S2	Documented
<i>Egretta thula</i>	Snowy egret	S-SSC	G5/S3	Documented
<i>Egretta tricolor</i>	Tricolored heron	S-SSC	G5/S4	Documented
<i>Elanoides forficatus</i>	Swallow-tailed kite	N	G5/S3	Documented
<i>Eudocimus albus</i>	White ibis	S-SSC	G5/S4	Documented
<i>Falco columbarius</i>	Merlin	N	G5/S2	Documented
<i>Gopherus polyphemus</i>	Gopher Tortoise	ST/FC	G3	Documented
<i>Grus canadensis pratensis</i>	Florida sandhill crane	ST	G5T2/S2	Documented
<i>Haliaeetus leucocephalus</i>	Bald Eagle	BGPA	G3	Documented
<i>Mycteria americana</i>	Wood stork	SE/FE	G4/S2	Documented
<i>Nycticorax nycticorax</i>	Black-crowned night-heron	N	G5/S3	Documented
<i>Pandion haliaetus</i>	Osprey	N	G5/S4	Documented
<i>Pelecanus occidentalis carolinensis</i>	Eastern brown pelican	S-SSC	G4/S3	Documented
<i>Picoides villosus</i>	Hairy woodpecker	N	G5/S3	Documented
<i>Trichechus manatus</i>	Florida manatee	SE/FE	G2/S2	Documented
<i>Aramus guarana</i>	Limpkin	S-SSC	G5/S3	Likely
<i>Falco peregrinus</i>	Peregrine falcon	N	G4/S2	Likely
<i>Ixobrychus exilis</i>	Least bittern	N	G5/S4	Likely
<i>Lampropeltis getula</i>	Common kingsnake	N	G5/S2	Likely
<i>Laterallus jamaicensis</i>	Black rail	N	G4/S2	Likely
<i>Lithobates capito</i>	Gopher frog	S-SSC	G3/S3	Likely
<i>Nerodia clarkii taeniata</i>	Atlantic salt marsh snake	ST/FT	G4T1/S1	Likely
<i>Nyctanassa violacea</i>	Yellow-crowned night- heron	N	G5/S3	Likely
<i>Pituophis melanoleucus mugitus</i>	Florida pine snake	S-SSC	G4T3/S3	Likely
<i>Plegadis falcinellus</i>	Glossy Ibis	N	G5/S3	Likely
<i>Podomys floridanus</i>	Florida mouse	S-SSC	G3/S3	Likely
<i>Ursus americanus floridanus</i>	Florida black bear	ST	G2/S2	Likely
<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon	FE	G3T3	Potential
<i>Aimophila aestivalis</i>	Bachman's Sparrow	N	G3/S3	Potential
<i>Buteo brachyurus</i>	Short-tailed hawk	N	G4/S1	Potential
<i>Dendroica kirtlandii</i>	Kirtland's warbler	SE/FE	G1/S1	Potential
<i>Falco sparverius paulus</i>	Southeastern American kestrel	ST	G5T4/S3	Potential
<i>Haematopus palliatus</i>	American oystercatcher	S-SSC	G5/S2	Potential
<i>Heterodon simus</i>	Southern Hognose Snake	N	G2	Potential

Scientific Name	Common Name	Status	Ranking	Likelihood of Occurrence
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	N	G5T3?	Potential
<i>Neofiber alleni</i>	Round-tailed Muskrat	N	G2	Potential
<i>Peucaea aestivalis</i>	Bachman's Sparrow	N	G3	Potential
<i>Picoides borealis</i>	Red-cockaded woodpecker	ST/FE	G3/S2	Potential
<i>Rynchops niger</i>	Black skimmer	S-SSC	G5/S3	Potential
<i>Sciurus niger shermani</i>	Sherman's fox squirrel	S-SSC	G5T3/S3	Potential
<i>Sterna antillarum</i>	Least tern	ST	G4/S3	Potential
<i>Sterna caspia</i>	Caspian tern	N	G5/S2	Potential
<i>Sterna maxima</i>	Royal tern	N	G5/S3	Potential
<i>Sterna sandvicensis</i>	Sandwich tern	N	G5/S2	Potential
<i>Vireo altiloquus</i>	Black-whiskered vireo	N	G5/S3	Potential

Abbreviations:

SSC: Species of Special Concern, **T:** Threatened, **E:** Endangered, **N:** Not Listed

FNAI Rank Definitions:

- **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 or 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
- **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).
- **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 or 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.

The species listed in Tables 5 were generated by compiling data from the 2012 DLSCP Management Plan, the 2021 FNAI Elemental Occurrence Report Summary, County staff observations, YBE observations, and online database resources including the Florida Plant Atlas and eBird. The likelihood of occurrence was based on site specific knowledge of County and YBE staff. The four categories for this column were adapted from the FNAI report and defined as follows:

- **Documented** – The species has been observed within the Preserve boundaries and likely to use the Preserve for some portion of its life history.

- **Historic** – The species has been observed within the Preserve boundaries, but observations occurred more than 10 years ago. (Note: FNAI defines historic as observations older than 20 years)
- **Likely** – The species is reasonably anticipated to occur 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

Note that the likelihood of occurrence was based on County and YBE evaluations and may differ from database summaries (i.e., FNAI summary report). Species that are documented onsite and historical are considered as factors in land management decisions. Species considered likely to occur are to increase awareness of staff and user groups during surveys and inventories.

Description of Listed Wildlife Species:

The American alligator (*Alligator mississippiensis*) is listed as threatened by the FWS and as a Species of Special Concern by the FWC. The American alligator was observed in the pond found in the northwest corner of the Preserve. American alligators are known to move into the brackish waters of tidally influenced creek systems for forage and during the mating season. The habitat quality in the Preserve utilized by the American alligator is suitable and this species presents little management implications by its presence.

Gopher tortoise (*Gopherus polyphemus*) burrows were identified on the subject property. Multiple gopher tortoises were observed foraging. The gopher tortoise, listed as Threatened by the FWC, is a key component in the determination of habitat suitability for other protected species because of the large number of other animals that will use tortoise burrows for one or more of their life requisites. The density of gopher tortoises within the Preserve is in suitable habitat and appears to be increasing. This is due to the habitat management of scrubby flatwoods and scrub habitats.

Four listed snake species has the potential to utilize the habitats found within the Preserve and two others have been observed within the Preserve. The Florida pine snake (*Pituophis melanoleucus mugitus*), listed as a Species of Special Concern by FWC and is known to occupy pine flatwoods and old fields. During low water conditions, pine snakes seek open habitats with adjacent wetlands. The Florida pine snake is also a gopher tortoise commensal species and has been documented to utilize both tortoise burrows and the tunnels of southeastern pocket gophers, both of which occur in the Preserve.

The eastern indigo snake (*Drymarchon corais couperi*) is also a gopher tortoise commensal species and is listed as Threatened by the FWS and FWC. Indigo's have a broad range of habitats, from scrub and sandhill to wet prairies and mangrove swamps. In northern part of range, they often winter in gopher tortoise burrows in sandy uplands, but forage in more hydric habitats. They require very large tracts to survive. This species has been observed on various tracts within the Preserve and up to six individuals were observed by County staff on the Turnbull tract.

The eastern diamondback rattlesnake (*Crotalus adamanteus*), which is not listed by FWC or FWS, but is ranked by FNAI, has been observed by County staff within the Preserve. The occurrence of this species is relatively common within coastal upland habitats such as those found on the Preserve.

The Atlantic salt marsh snake (*Nerodia clarkii taeniata*), which is listed as Threatened by FWS and FWC, is restricted to coastal Volusia County in its range. The Atlantic salt marsh snake is further restricted by habitat only being observed in estuarine habitats, which include coastal salt marshes, mangrove swamps, tidal creeks, pools, and ditches. Protection of salt marshes, mangrove swamps, and tidal creeks and rivers of Volusia County, such as those found within the Preserve, from drainage, ditching, impoundment, and pollution are the most valuable forms of conservation for this species. The Preserve contains extensive amounts of high quality, suitable saltmarsh for this species. In addition, the County is working with other government agencies to remove existing mosquito ditching and conduct wetland restoration and enhancement projects where feasible. This activity and the maintenance of the saltmarsh habitat, especially through the continued control of exotic invasive species like Brazilian pepper (*Schinus terebinthifolius*) will continue to promote the long-term likelihood of occurrence and success of this species.

While the listed sea turtle species have a low likelihood of occurrence within the Preserve, they are likely to utilize the open waters that dissect and are adjacent to the several tracts of the Preserve. The Atlantic loggerhead sea turtle (*Caretta caretta*) is listed as Threatened by both the FWS and the FWC. Atlantic green sea turtles (*Chelonia mydas mydas*) are listed as Threatened by both the FWS and the FWC. Juvenile loggerhead and green sea turtles are known to use the estuary systems of Florida for forage and protection from larger predators. The other listed sea turtle species are less likely to utilize these interior coastal waters, however, Atlantic hawksbill sea turtles (*Eretmochelys imbricata imbricata*) have been observed in the Intracoastal Waterway near inlets open to the Atlantic Ocean (namely Sebastian Inlet, about 90 miles south of Ponce Inlet). The nearest edge of the Preserve to the nearest open ocean inlet, Ponce Inlet, is about 3.7 miles. Continued management of the Preserve to protect water quality and quantity and management of user groups are important elements to the protection of adjacent estuarine waters.

Several listed wading birds species utilize the saltmarsh and other wetland habitats onsite. Those known to be present and considered to have at least a moderate likelihood of occurrence on the Preserve are listed below and management goals of the property assumes their presence. .

The little blue heron (*Egretta caerulea*), snowy egret (*Egretta thula*), tricolored heron (*Egretta tricolor*), roseate spoonbill (*Ajaia ajaja*), great egret (*Ardea alba*), reddish egret (*Egretta rufescens*), glossy ibis (*Plegadis falcinellus*), least bittern (*Ixobrychus exilis*), limpkin (*Aramus guarana*), yellow-crowned night-heron (*Nyctanassa violacea*), black-crowned night-heron (*Nycticorax nycticorax*), and white ibis (*Eudocimus albus*) may utilize the impoundments, saltmarshes, and shoreline for foraging and potentially use the forested areas for roosting. No nesting rookeries are known to occur on the Preserve. Available rookery database information provided in the *Florida Atlas of Breeding Sites for Herons and Their Allies, Updated 1986 – 89* shows that there were no known rookeries in the area at the time of publication. The nearest known rookery occurs 3 miles north of the Preserve on a spoil island along the ICWW just south of the Dunlawton Avenue Bridge. The least bittern nests in marsh habitats, not in breeding rookeries as many of the other listed species.

Wood storks (*Mycteria americana*), listed as Threatened by FWS and FWC, were observed within the Preserve and wood storks have been observed routinely throughout the area. Wood storks forage mainly in shallow water in freshwater marshes, swamps, lagoons, ponds, tidal creeks, flooded pastures and ditches, where they are attracted to falling water levels that concentrate food sources (mainly fish). No wood stork nesting rookeries were observed or are listed by FWS within the Preserve. The Preserve is also not located within a FWS Core Foraging Area.

The black rail (*Laterallus jamaicensis*) is listed as threatened by FWS and FWC. . The black rail is a secretive, year-round resident of marshes along much of the upper Gulf and Atlantic Coasts. They also winter in south Florida and migrants may be encountered statewide. The Preserve provides optimum habitat for the black rail within the salt marshes found on the property.

The American oystercatcher (*Haematopus palliatus*), black skimmer (*Rynchops niger*), piping plover (*Charadrius melodus*), least tern (*Sterna antillarum*), caspian tern (*Sterna caspia*), royal tern (*Sterna maxima*), and sandwich tern (*Sterna sandvicensis*) are each closely tied to coastal habitats. They nest on beaches and coastal islands and feed on small marine vertebrates and invertebrates.

The implications of these listed bird species is in the management of saltmarshes, adjacent shorelines and wetland habitats in regards to protection and preservation, as discussed in detail in Section IV.

The Florida sandhill crane (*Grus canadensis pratensis*) has a moderate likelihood of occurrence at the Preserve. The Florida sandhill crane is listed as Threatened by the FWC. Their preferred habitats are prairies, freshwater marshes, and pasture lands. They will frequent agricultural areas like feed lots and crop fields, and also golf courses and other open lawns, especially in winter and early spring. Nesting occurs in marshy depressional ponds with herbaceous wetland vegetation. No Florida sandhill cranes or nests were observed during site visits to the Preserve. Preferred habitat is limited on the Preserve. This species has been observed nesting within one mile of the Preserve in suboptimal (cleared scrub) habitat. The limited presence of suitable habitat results in minimal implication for management strategies; however, the anomaly of nesting in scrub nearby requires regular observation for this species.

The bald eagle (*Haliaeetus leucocephalus*) has been removed from the FWC and FWS protected species lists, but is still listed by FNAI and is protected by the Bald and Golden Eagle Protection Act (BGEPA). Two active bald eagle nests are located within the Preserve and two are in close proximity. Bald eagle habitat most commonly includes areas close to coastal areas, bays, rivers, lakes, or other bodies of water that provide concentrations of food sources, including fish, waterfowl, and wading birds. They usually nest in tall trees, mostly live pines that provide clear views of the surrounding area.

The osprey (*Pandion haliaetus*) and swallow-tailed kite (*Elanoides forficatus*) are both ranked species by FNAI. The osprey was observed utilizing the open waters of the Preserve. No nests have been recorded within the Preserve. The swallow-tailed kite is a common migrant of the area and has been observed flying over the Preserve. No swallow-tailed kite nesting areas were observed during the site investigations.

The southeastern American kestrel (*Falco sparverius paulus*), listed as Threatened by the FWC, has a moderate potential to inhabit the Preserve. The southeastern American kestrel is normally found in open pine habitats, woodland edges, prairies, and pastures throughout much of Florida. Availability of suitable nesting sites is key during breeding season. Nest sites include tall dead trees or utility poles generally with an unobstructed view of surroundings. Sandhill habitats seem to be preferred, but may also occur in flatwoods settings. Open patches of grass or bare ground are needed in flatwoods settings, since thick palmettos prevent detection of prey. Although the species has not been observed, snags should be left standing where feasible.

The peregrine falcon (*Falco peregrinus*), short-tailed hawk (*Buteo brachyurus*), merlin (*Falco columbarius*), and Cooper's hawk (*Accipiter cooperii*), all ranked by FNAI, have a moderate potential to inhabit the Preserve. No particular management strategies are connected to the potential presence of these species.

The Florida scrub-jay (*Aphelocoma coerulescens coerulescens*), listed as Threatened by FWC and FWS, was observed years ago within the Preserve at the southern border and occurrences have been documented on the Martin's Dairy Tract and to the south of the property. The Florida scrub-jay inhabits fire dominated, low-growing, oak scrub habitat found on well-drained sandy soils. They may persist in areas with sparser oaks or scrub areas that are overgrown, but at much lower densities and with reduced survivorship. The mesic flatwoods, scrubby flatwoods, and scrub found within the Preserve provide the potential for valuable acreage which could be utilized by local scrub-jay families and offspring. Canopy and mid-story biomass reduction within the above habitats is essential to re-establish these areas as optimum Florida scrub-jay habitats. A discussion on the restoration of these habitats is presented in Sections IV and V below.

YBE and Volusia County staff conducted a Florida scrub-jay survey in May 2021 in accordance with guidelines provided by the FWS North Florida Field Office, in their document, *Scrub-Jay Survey Guidelines*, which was adapted from Fitzpatrick *et. al.*, (1991). No scrub-jays were observed during the 5-day survey. See Appendix G for completed survey.

Translocation is one tool for conserving Florida Scrub-jay. Adherence to the following guidelines the USFWS and FWC put together must be followed for conducting translocation:

- Conservation of genetic heterogeneity
- Source population
- Recipient site/population
- Capture, transportation, hacking, and release
- Monitoring

Once the land management practices have provided ideal habitat for suitable scrub-jay translocation, FWC will be contacted for procedures to move forward.

The Florida manatee (*Trichechus manatus latirostris*), listed as, Threatened by FWS is an aquatic mammal that utilizes the adjacent brackish habitats of the Preserve. The manatee winters in warm springs and other warm water outfalls along the central and southern Florida coasts. Manatees also are known to traverse the shallow waters of the ocean along our entire coastline. Management strategies as listed for the sea turtles above apply to this management of this species.

Listed Plant Species

The listed plant species with some potential to occur on the subject property are listed in Table 6.

Table 6: Listed plant species with the potential to occur on the Doris Leeper Spruce Creek Preserve in Volusia County, Florida.

Scientific Name	Common Name	FDACS	FWS	FNAI Rank	Likelihood of Occurrence
Scientific Name	Common Name	Family	Status	Ranking	Likelihood of Occurrence
<i>Encyclia tampensis</i>	FLORIDA BUTTERFLY ORCHID	ORCHIDACEAE	CE	N	Documented
<i>Epidendrum conopseum</i>	GREEN-FLY ORCHID	ORCHIDACEAE	CE	N	Documented
<i>Nolina atopocarpa</i>	FLORIDA BEARGRASS ERECT PRICKLYPEAR; SHELL-MOUND	RUSCACEAE	ST	G3/S3	Documented
<i>Opuntia stricta</i>	PRICKLYPEAR	CACTACEAE	ST	G2/S2	Documented
<i>Osmunda cinnamomea</i>	CINNAMON FERN	OSMUNDACEAE	CE	N	Documented
<i>Osmunda regalis</i>	ROYAL FERN	OSMUNDACEAE	CE	N	Documented
<i>Serenoa repens</i>	SAW PALMETTO	ARECACEAE	CE	N	Documented
<i>Zamia pumila</i>	COONTIE	ZAMIACEAE	CE	N	Documented
<i>Conradina grandiflora</i>	LARGEFLOWER FALSE ROSEMARY	LAMIACEAE	ST	G3/S3	Historic
<i>Lechea divaricata</i>	DRYSAND PINWEED; SPREADING PINWEED	CISTACEAE	SE	G2/S2	Historic
<i>Matelea floridana</i>	FLORIDA MILKVINE; FLORIDA SPINY POD	APOCYNACEAE	SE	G2/S2	Historic
<i>Ophioglossum palmatum</i>	HAND FERN	OPHIOGLOSSACEAE	SE	G4/S2	Historic
<i>Calopogon multiflorus</i>	MANYFLOWERED GRASSPINK	ORCHIDACEAE	ST	G2G3/S2 S3	Likely
<i>Garberia heterophylla</i>	GARBERIA	ASTERACEAE	ST	N	Likely
<i>Lilium catesbaei</i>	CATESBY'S LILY; PINE LILY	LILIACEAE	ST	N	Likely
<i>Lycopodiella cernua</i>	NODDING CLUB-MOSS; STAGHORN CLUB-MOSS	LYCOPODIACEAE	CE	N	Likely
<i>Matelea pubiflora</i>	TRAILING MILKVINE; SANDHILL SPINY POD TWINBERRY; SIMPSON'S	APOCYNACEAE	SE	N	Likely
<i>Myrcianthes fragrans</i>	STOPPER	MYRTACEAE	ST	N	Likely
<i>Orthochilus ecristatus</i>	GIANT ORCHID; NON- CRESTED EULOPHIA WIDESPREAD POLYPODY; WIDESPREAD ROCKCAP	ORCHIDACEAE	ST	G2G3/S2	Likely
<i>Pecuma dispersa</i>	FERN PLUME POLYPODY; PLUMED ROCKCAP	POLYPODIACEAE	SE	G5/S2	Likely
<i>Pecuma plumula</i>	FERN COMB POLYPODY; SWAMP PLUME	POLYPODIACEAE	SE	G5/S2	Likely
<i>Pecuma ptilota</i> var. <i>bourgeauana</i>	POLYPODY; PALMLEAF ROCKCAP FERN	POLYPODIACEAE	SE	G5/S2	Likely

<i>Pogonia ophioglossoides</i>	ROSE POGONIA; SNAKEMOUTH ORCHID	ORCHIDACEAE	ST	N	Likely
<i>Sarracenia minor</i>	HOODED PITCHERPLANT	SARRACENIACEAE	ST	N	Likely
<i>Tillandsia fasciculata</i>	CARDINAL AIRPLANT; COMMON WILD PINE; STIFF-LEAVED WILD PINE	BROMELIACEAE	SE	N	Likely
<i>Tillandsia utriculata</i>	GIANT AIRPLANT; GIANT WILD PINE	BROMELIACEAE	SE	N	Likely
<i>Verbesina heterophylla</i>	DIVERSELEAF CROWNBEARD	ASTERACEAE	SE	G2/S2	Likely
<i>Adiantum tenerum</i>	BRITTLE MAIDENHAIR	PTERIDACEAE	SE	G5/S3	Potential
<i>Asclepias curtissii</i>	CURTISS' MILKWEED	APOCYNACEAE	SE	N	Potential
<i>Asimina rugelii</i>	RUGEL'S FALSE PAWPAW; YELLOW SQUIRREL-BANANA TOOTHED	ANNONACEAE	FE/SE	G1/S1	Potential
<i>Asplenium dentatum</i>	SPLEENWORT; SLENDER SPLEENWORT	ASPLENIACEAE	SE	G5/S1S2	Potential
<i>Asplenium erosum</i>	EARED SPLEENWORT; AURICLED SPLEENWORT	ASPLENIACEAE	SE	G5/S2	Potential
<i>Asplenium pumilum</i>	DWARF SPLEENWORT; CHERVIL SPLEENWORT	ASPLENIACEAE	SE	G5/S1	Potential
<i>Asplenium serratum</i>	WILD BIRDNEST FERN; BIRD'S-NEST SPLEENWORT	ASPLENIACEAE	SE	G4/S1	Potential
<i>Calamintha ashei</i>	ASHE'S CALAMINT; ASHE'S CALAMINTHA	LAMIACEAE	ST	G3/S3	Potential
<i>Carex chapmannii</i>	CHAPMAN'S SEDGE	CYPERACEAE	ST	G3/S3	Potential
<i>Centrosema arenicola</i>	PINELAND BUTTERFLY PEA; SAND BUTTERFLY PEA	FABACEAE	SE	G2/S2	Potential
<i>Chrysophyllum oliviforme</i>	SATINLEAF	SAPOTACEAE	ST	N	Potential
<i>Coelorachis tuberculosa</i>	FLORIDA JOINTTAILGRASS; PIEDMONT JOINTGRASS	POACEAE	ST	G3/S3	Potential
<i>Dendrophylax porrectus</i>	NEEDLEROOT AIRPLANT ORCHID; THREADROOT ORCHID	ORCHIDACEAE	ST	N	Potential
<i>Drypetes lateriflora</i>	GUIANA PLUM	PUTRANJIVACEAE	ST	N	Potential
<i>Eugenia confusa</i>	REDBERRY STOPPER; REDBERRY EUGENIA	MYRTACEAE	SE	G4G5/S2 S3	Potential
<i>Euphorbia cumulicola</i>	COASTAL DUNE SANDMAT; SAND DUNE SPURGE	EUPHORBIACEAE	SE	N	Potential
<i>Glandularia maritima</i>	COASTAL MOCK VERVAIN	VERBENACEAE	SE	G3/S3	Potential
<i>Glandularia tampensis</i>	TAMPA MOCK VERVAIN	VERBENACEAE	SE	G2/S2	Potential
<i>Gonolobus suberosus</i>	ANGULARFRUIT MILKVINE; ANGLE POD	APOCYNACEAE	ST	N	Potential
<i>Harrisia fragrans</i>	CARIBBEAN APPLECACTUS; INDIAN RIVER PRICKLY-APPLE; SIMPSON'S APPLECACTUS	CACTACEAE	FE/SE	G1/S1	Potential

<i>Hartwrightia floridana</i>	HARTWRIGHTIA LAKESIDE SUNFLOWER; FLATWOODS	ASTERACEAE	ST	G2/S2 G1G2/S1	Potential
<i>Helianthus carnosus</i>	SUNFLOWER SPIKED CRESTED	ASTERACEAE	SE	S2	Potential
<i>Hexalectris spicata</i>	CORALROOT YELLOW ANISETREE;	ORCHIDACEAE	SE	N	Potential
<i>Illicium parviflorum</i>	STAR ANISE NODDING PINWEED;	SCHISANDRACEAE	SE	G2/S2	Potential
<i>Lechea cernua</i>	SCRUB PINWEED TROPICAL	CISTACEAE	ST	G3/S3	Potential
<i>Marsilea ancylopoda</i>	WATERCLOVER FLORIDA KEYS LADIESTRESSES; GRAY LADIESTRESSES; FT. GEORGE	MARSILEACEAE	ST	N G4G5/S1	Potential
<i>Mesadenus lucayanus</i>	LADIESTRESSES GODFREY'S	ORCHIDACEAE	SE	S2	Potential
<i>Mononeuria paludicola</i>	STITCHWORT; GODFREY'S SANDWORT	CARYOPHYLLACEA E	SE	G1/S1	Potential
<i>Monotropsis reynoldsiae</i>	PIGMYPIPES CELESTIAL LILY; FALLFLOWERING IXIA;	ERICACEAE	SE	G1Q/S2	Potential
<i>Nemastylis floridana</i>	HAPPYHOUR FLOWER SOUTHERN	IRIDACEAE	SE	G2/S2	Potential
<i>Neottia bifolia</i>	TWAYBLADE	ORCHIDACEAE	ST	N	Potential
<i>Peperomia humilis</i>	LOW PEPEROMIA	PIPERACEAE	SE	G5/S2	Potential
<i>Peperomia obtusifolia</i>	FLORIDA PEPEROMIA; BABY RUBBERPLANT BLUEFLOWER	PIPERACEAE LENTIBULARIACEA	SE	G5/S2	Potential
<i>Pinguicula caerulea</i>	BUTTERWORT YELLOW BUTTERWORT; YELLOW-FLOWERED	E LENTIBULARIACEA	ST	N	Potential
<i>Pinguicula lutea</i>	BUTTERWORT	E	ST	N	Potential
<i>Platanthera blephariglottis</i> var. <i>conspicua</i>	WHITE FRINGED ORCHID YELLOW FRINGED ORCHID	ORCHIDACEAE	ST	N	Potential
<i>Platanthera ciliaris</i>	CRESTED YELLOW ORCHID; CRESTED FRINGED ORCHID	ORCHIDACEAE	ST	N	Potential
<i>Platanthera cristata</i>	SOUTHERN TUBERCLED ORCHID; PALEGREEN ORCHID; GYPSY-SPIKES	ORCHIDACEAE	ST	N	Potential
<i>Platanthera flava</i>	SNOWY ORCHID	ORCHIDACEAE	ST	N	Potential
<i>Platanthera nivea</i>	FLORIDA MOUNTAINMINT	LAMIACEAE	ST	G3/S3	Potential
<i>Pycnanthemum floridanum</i>	NEEDLE PALM SWEET PINXTER	ARECACEAE	CE	N	Potential
<i>Rhapidophyllum hystrix</i>	AZALEA; MOUNTAIN AZALEA LEAFLESS BEAKED LADIESTRESSES;	ERICACEAE	CE	N	Potential
<i>Sacoila lanceolata</i> var. <i>lanceolata</i>	LEAFLESS BEAKED ORCHID BEACHBERRY;	ORCHIDACEAE	ST	N	Potential
<i>Scaevola plumieri</i>	INKBERRY; GULLFEED	GOODENIACEAE	ST	N	Potential
<i>Schwalbea americana</i>	CHAFFSEED FLORIDA PINKROOT;	OROBANCHACEAE	FE/SE	G2G3/S1	Potential
<i>Spigelia loganioides</i>	LEVY PINKROOT	LOGANIACEAE	SE	G2Q/S2	Potential

<i>Spiranthes brevilabris</i>	TEXAS LADIESTRESSES; SMALL LADIESTRESSES	ORCHIDACEAE	SE	G1/S1	Potential
<i>Spiranthes laciniata</i>	LACELIP LADIESTRESSES LONGLIP	ORCHIDACEAE	ST	N	Potential
<i>Spiranthes longilabris</i>	LADIESTRESSES; GIANTSPIRAL LADIESTRESSES	ORCHIDACEAE	ST	N	Potential
<i>Spiranthes tuberosa</i>	LITTLE LADIESTRESSES; LITTLE PEARL-TWIST	ORCHIDACEAE	ST	N	Potential
<i>Sporobolus vaseyi</i>	FLORIDA SANDREED; CURTISS' SANDGRASS	POACEAE	ST	N	Potential
<i>Tephrosia angustissima</i> var. <i>curtissii</i>	CURTISS' HOARYPEA	FABACEAE	SE	G1T1/S1	Potential
<i>Zephyranthes atamasca</i> var. <i>treatiae</i>	TREAT'S ZEPHYRLILY; TREAT'S RAINLILY REDMARGIN	AMARYLLIDACEAE	ST	N	Potential
<i>Zephyranthes simpsonii</i>	ZEPHYRLILY; SIMPSON'S ZEPHYRLILY	AMARYLLIDACEAE	ST	G2G3/S2 S3	Potential

Abbreviations:

CE: Commercially Exploited, **T:** Threatened, **E:** Endangered, **N:** Not Listed

FNAI Rank Definitions:

- **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
- **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).
- **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 or 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.

The large expanses of xeric uplands that occur in the Preserve make it a potential site for numerous listed plant species. Much of the upland areas on the project site have been fire-suppressed for many years, leading to a closed canopy structure and overgrown conditions. Several listed plant species may

occur within the scrub and scrubby flatwoods. Species such as the large-flowered rosemary (*Conradina grandiflora*), garberia (*Gabieria heterophylla*), pinweeds (*Lechea cernua* and *L. divaricata*), sand butterfly pea (*Centrosema arenicola*), sand dune spurge (*Chamaesyce cumulicola*), wild coco (giant orchid - *Pteroglossaspis ecristata*) and shellmound pricklypear (*Opuntia stricta*) are species that are likely to occur in the xeric habitats following disturbance (such as fire or clearing) and along existing breaks such as trails and power lines. Florida beargrass (*Nolina atopocarpa*) was sighted by FNAI staff in 2004 in a general location west of the blackwater creek on Martin's Dairy tract. This location is not within state-owned lands; however, similar scrubby habitat does exist within state owned land boundaries. This species, like the others discussed, becomes crowded out of the xeric community as shrubs take over following prolonged periods without fire or other disturbances. The implication of the potential presence of these species is related to user group management and xeric habitat restoration and implementation of fuel reduction and open space creation efforts. Monitoring of the restored scrub areas of Martins Dairy for the abovementioned plants will be performed by staff and volunteers on regular property inspections.

Commercially exploited species, such as Giant leather fern (*Acrostichum danaeifolium*), royal fern (*Osmunda regalis*), cinnamon fern (*Osmunda cinnamomea*), needle palm (*Rhapidophyllum hystrix*), greenfly orchid (*Epidendrum conopseum*), butterfly orchid (*Encyclia tampensis*) and coontie (*Zamia pumila*) have either been observed or have high potential for occurrence on the property. These species, especially the latter three, have a high threat for collection. They are relatively conspicuous in the environment and easily harvested. As the site is bordered by navigable waterways, public and private roads and properties, the implication for management is again tied to user groups. This includes managing access points and internal trail networks that do not call attention or lead to easily accessible areas where these species are present, especially in abundance.

Several species are common in the county, in high acid wet flatwoods, but will occur along borders of any of the wetlands on the Preserve. These include Catesby's lily (*Lilium catesbaei*), hooded pitcher plant (*Sarracenia minor*), and fall-flowering ixia (*Nemastylis floridana*). Managing the wet flatwoods for open mid-story and shrub layers, including reducing and preventing woody thickets are successful measures in managing for these species.

The presence of aboriginal shell mounds on the site may also harbor listed plant species such as the reddish peperomia (*Peperomia humilis*), brittle maidenhair fern (*Adiantum tenerum*), and shell mound prickly-pear (*Opuntia stricta*), although many of these species are still considered to have a low likelihood of occurrence. Preservation efforts to limit foot-traffic and the introduction of fire would benefit plant species that occur on shell mounds. In addition, when the archaeological sites are monitored by County staff, a biologist should accompany the visits where possible to review for the presence of these species.

Continued preservation efforts that protect onsite hammocks is beneficial to several listed species including Simpson's stopper (*Myrcianthes fragrans*), Florida milkweed (*Matelea floridana*), several of the above CE listed species and species still considered to have a low likelihood of occurrence including hand fern (*Ophioglossum palmatum*), widespread polypody (*Pecluma dispersa*), and plume polypody (*Pecluma plumula*). The polypody ferns are known to occur in similarly situated hammocks in Flagler County, but require live oaks larger in diameter than those observed on DLSCP.

The occurrence or potential occurrence of listed plant and wildlife species does not directly preclude public use of this site. The presence of listed species provides environmental education opportunities

for the general public. However, user group management is an important component of these species continued existence or restoration efforts. Several species occur in habitats in need of restoration efforts. Where and when feasible, surveys for listed species will occur following management activities, including any land clearing or fires (prescribed or otherwise). These surveys may be conducted by County staff or coordinated with local volunteer groups such as the FNPS.

2. Imperiled Natural Communities

Three (3) natural communities on the Preserve are listed by FNAI as Imperiled Natural Communities. Maritime hammock, scrub, and scrubby flatwoods each are considered 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 manmade factor. The Preserve includes 166.3 acres of maritime hammock, 231.63 acres of scrub and 185.71 acres of scrubby flatwoods. As described previously within Section B the maritime hammock within the Preserve is functioning at an optimum level.

Management activities include protection from illegal access related to dumping and off-road vehicle (ORV) use and prevention of invasion by invasive exotic species. The scrub and scrubby flatwoods require restorative land management activities to allow them to function as required to host the flora and fauna species that historically reside within the community.

E. Archaeological and Historic Resources

Archaeological resources located within the Preserve are remnants of two significant occupations — the native people who used the extensive waterways for transportation and sustenance and the British Period Andrew Turnbull “New Smyrna” settlement (1766—1777). There are no historic structures located within the Preserve. While no known historic structures exist on the DLSCP preserve, there is a known Turnbull era complex of structures located on adjacent Volusia County owned property. This site, called, “Blanchette” (VO-02580), has structures identified as a Turnbull indigo operation. As funding allows, more research should be conducted to establish any connection to the state owned portion of DLSCP. Kings Road is another significant cultural feature known to exist in this area, while the exact location is unknown, portions of this road could possibly traverse sections of the state owned property. Volusia County will continue to seek additional funding and partnerships with other agencies and educational institutions to promote research within the Preserve. This research would study the prehistory and history of the Doris Leeper Spruce Creek Preserve and the surrounding area. Along with this research, Land Management will develop new educational kiosks in the hopes of improving public awareness and encourage protection and stewardship of the cultural resources at DLSCP. The land management activity has budgeted for the development and installation of additional interpretive signage, kiosks, trail markers, and other amenities to improve education and user experience on the preserve. In addition, staff follows the Guidelines for Management of Archaeological and Historical Resources in Appendix H and will consults the Division of Historical Resources before taking action that may adversely affect these resources.

Spruce Creek Mound (8V099) is listed on the National Register of Historic Places. The prehistoric earthen mound is the largest in East Central Florida. The mound was used as a ceremonial, social, and political center for the Timucuan and their predecessors that inhabited the lower Spruce Creek basin. The site was still being used when Europeans arrived in the early 1500’s. Interpretation of this resource along with the other lesser mounds and shell middens scattered through the surrounding areas is a key component to the educational programs proposed for the Preserve.

Sleepy Hollow (8VO7142) was included in the National Register of Historic Places in 2008, one of multiple properties associated with the archaeological resources of the Eighteenth Century Smyrna Settlement of Dr. Andrew Turnbull. The site is depicted in a 1767 map as being occupied

by William Watson, a carpenter contracted by Turnbull to construct settlement facilities prior to the arrival of Turnbull's party of indentured servants.

There are 16 documented sites on state lands, and there are 18 recorded sites on adjacent conservation lands. The vast majority of these sites are new sites recorded by registered public archaeologists retained by local governments with field investigations and reports completed in 1986, 1989, 1990, 1996, 1997, 1999 and 2006. These studies have systematically addressed areas of most probable resources. For management purposes, the entire preserve is considered to be archaeologically sensitive and investigation is undertaken prior to any site disturbance or recreational uses with potential for ground disturbance. All known cultural sites on DLSCP are monitored on an annual basis and action taken if necessary. Staff will develop appropriate remedial stabilization plans in conjunction with the Division of Historical Resources (DHR) and the Bureau of Natural and Cultural Resources (BNCR) for earthen mounds, mainly Spruce Creek Mound (8V099), and interpret using informational kiosks.

To protect these resources, it is the County's policy not to provide the general public with information regarding location of these sites, with the exception of the Spruce Creek Mound Complex, where an interpretive kiosk is planned. Protection of these identified cultural resources is a key management objective for the Preserve.

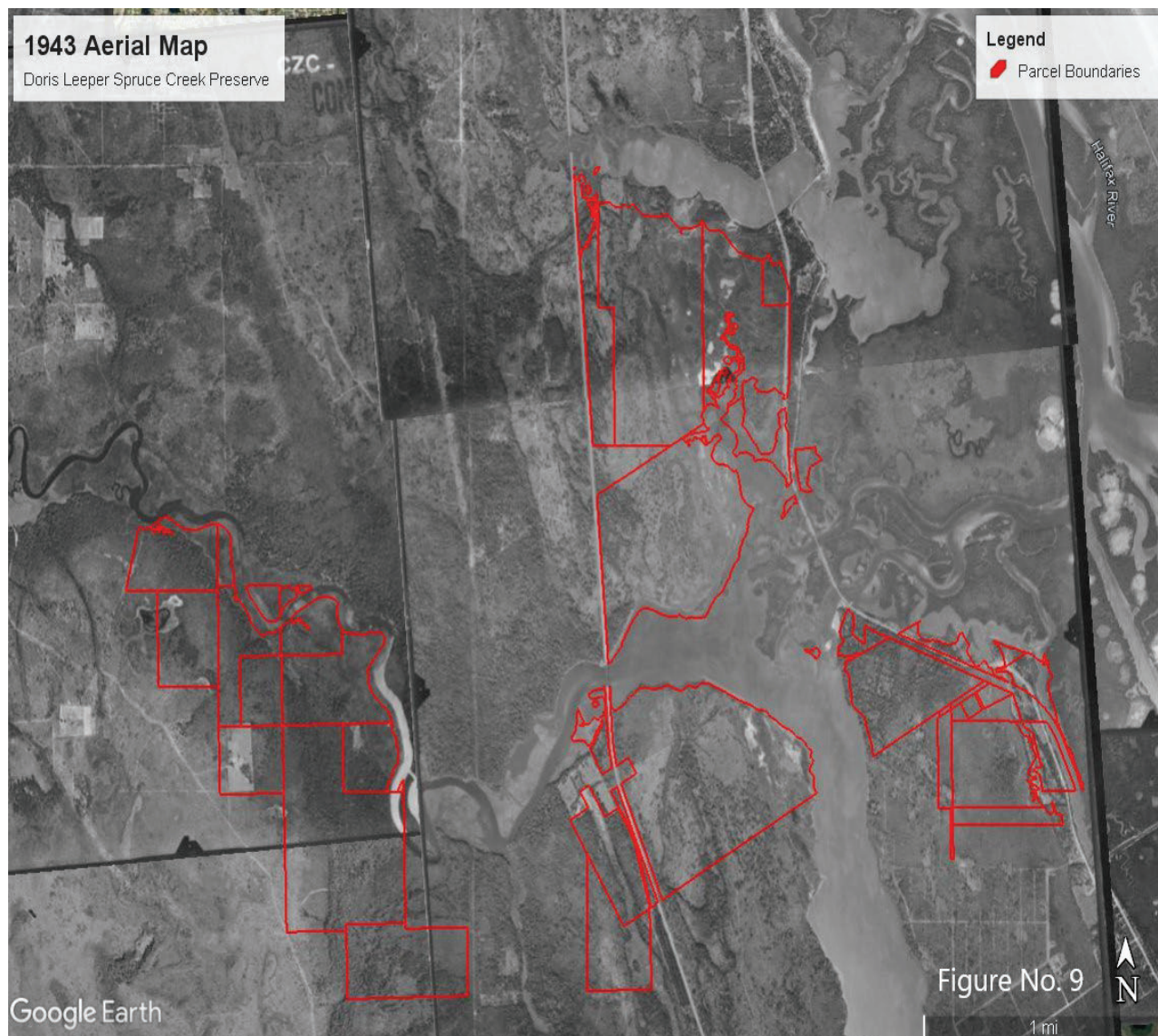
III. USAGE OF THE PROPERTY

A. Previous Use and Development

The first European permanent occupation was related to Andrew Turnbull's New Smyrna Settlement during the British Colonial Period of Florida's history (1763-1777). During the second Spanish period, portions of the project site and vicinity were awarded to numerous individuals in the form of land grants. However, development in the vicinity of the site stagnated with the event of the Seminole wars and the Civil War. The project site and neighboring lands were not intensely developed or utilized until the turn of the 20th century.

A portion of the project site, located on the southern and northern shores of Strickland Bay, was subdivided and eventually timbered by the Nordman Land and Timber Company. The preferred timber was cypress and pine. Effects of the early timbering activities are evident due to the age of the overstory trees on the project site. The Nordman Company also raised cattle on the project site. Intensified free-range cattle operations became more prominent in the early 20th Century and were the main activities on the project site until the late 1970s.

Since the property has been in public ownership by the State of Florida and Volusia County, it has been used by residents for passive and active recreation activities. One of the adjacent properties owned by the County is developed as a recreation area, Spruce Creek Park, with camping, hiking, fishing, and picnicking opportunities. Multiple use, unpaved trails have been developed on the western portion of the Preserve. In addition, portions of the Preserve, specifically Spruce Creek, are listed in Florida's Greenways and Trails by the Florida Department of Transportation. The remainder of the Preserve has minimal public access.



B. Current Use and Development

Current uses at the Preserve are primarily related to public access and outdoor recreation. Public access is provided to all tracts and supported by adjacent parcels within the Preserve. Table 7 depicts uses and infrastructure that exist within or adjacent to each tract.

Table 7. Inventory of Doris Leeper Spruce Creek Preserve recreational and access facilities, January 2022

Current Use / Infrastructure	Trac				
	Martin's Dairy	Turnbull	Bolt	Sleepy Hollow	Rose Bay
Access Point	4	1	1	1	2, 1*
Parking Area	1	0	1	1	1, 1*
Information Kiosk	3	0	1	1	3*
Trails**(H,B,E,V)***	H B E V	H B	H B V	H V	H B
Pavilion	1 ****		1	1	1, 1*
Boardwalk					1
Observation Tower					1*
Camp Sites (Special use – permit required)		1			17*
Fishing Access			1	1	1*
Canoe/Kayak Landing/ Launch		2	1	1	1*
Picnic Area	1	1	1	1	3
Playground					1*
Restroom/Port-O-Let	1		1		2*
Historic Site Open to Public	1				

*Located on adjacent Spruce Creek Park for Rose Bay.

**The 5 tracts contain approximately 84 miles of public and restricted use trails.

***H,B,E,V = Hiking, Biking, Equestrian, Vehicle. Vehicle trails are for staff and approved use only. Equestrian use on Turnbull is for the west portion only.

****Located on adjacent public land between Turnbull and Martin's Dairy Tracts.

The tracts with gated access are generally open during daylight hours. Primitive group camping is allowed with a permit from the County. Vehicular parking is provided for all tracts except Turnbull, and Rose Bay is provided for via the adjacent Spruce Creek Campground. Refer to the Recreation Plan in Appendix K for details on locations of existing infrastructure and uses.

C. Purposes for Acquisition of the Property

The acquisition of DLSCP began in the mid-1980's, and involved several individuals, conservancy groups, and state and local governments and agencies. The Preserve was purchased through a joint effort with Volusia County and the State's Conservation and Recreation Lands (CARL) Program. The purpose of the acquisition through the CARL program was the protection, conservation and management of natural and cultural resources along while providing for public access and recreation.

D. Assessment of the Impact of Planned Use

Determination of public uses that are consistent with acquisition purposes followed the parameters outlined below. The parameters are a summary of the objectives and goals for management of the Preserve as they relate to purpose for acquisitions under the CARL program.

1. To conserve and protect environmentally unique and irreplaceable lands that contain native, relatively unaltered flora and fauna representing a natural area unique to, or scarce within, a region of Florida or a larger geographic area, including FNAI listed imperiled habitats;
2. To conserve and protect native species habitats that support or could support with appropriate management techniques state and federally listed species or species considered imperiled by FNAI;
3. To conserve, protect, manage, or restore important ecosystems, landscapes, and forests, if the protection and conservation of such lands are necessary to enhance or protect significant surface water, ground water, coastal, recreational, timber, or fish or wildlife resources which cannot otherwise be accomplished through local and state regulatory programs.
4. To provide areas, including recreational trails, for natural resource based recreation and other outdoor recreation on any part of any site compatible with conservation purposes.

The primary goal here is to provide a diversity of outdoor recreational opportunities that are environmentally, culturally, outdoor or educationally oriented where such activities do not adversely impact the long-term well-being of the natural and cultural resources for which the property was acquired or for which it is being managed. Public needs and desires, as well as assessment of the impact of planned activities on natural and cultural resources, are considered in the development of recreational opportunities and represent "balanced public utilization." Uses planned for the Doris Leeper Spruce Creek Preserve are in compliance with the Conceptual State Lands Management Plan.

E. Acreage that should be Declared Surplus

The County evaluated all state-owned parcels identified within this plan to determine if any of the parcels include lands that are not being used for the purpose for which they were originally leased. It was determined that all lands within DLSCP are being managed and utilized for the primary purpose of protection and conservation of natural resources and allow for public access and outdoor recreation and education where compatible with the primary purpose. Thus, no portion of DLSCP should be considered or declared surplus.

F. Proposed Single or Multiple-Use Potential

DLSCP will be managed under the multiple-use concept. The Preserve will allow for natural resource-based recreation and educational opportunities, while keeping protection of the natural and historical resources found in the area as the primary goal and objective.

G. Analysis of Multiple-Use Potential

It is Volusia County's goal to manage the property in such a way as to protect the site's natural and historical resources, while also providing opportunities for compatible, resource-based recreation and education. During the planning process, all potential outdoor recreation uses were considered. Those found appropriate are discussed within this plan. Exceptions are evaluated on a case-by-case basis for compatibility with the Preserve's outdoor recreation and resource preservation purposes.

The potential of generating revenue to fund management was also analyzed. Some revenues may be generated by user and concession fees at different recreation sites adjacent to the Preserve. Use of portions of the area as mitigation for development elsewhere may also yield revenues. Finally, revenues may be generated through sale of forest products generated during management. Any revenues generated through the sale of these timber products will be used for future management of the property.

The use of private land managers to facilitate restoration and management of this unit was also analyzed. Decisions regarding this type of management (such as mitigation projects, removal of timber for resource protection or restoration, etc.) will be made on case-by-case bases as necessity dictates.

Table 8: Summary of activities and uses that were analyzed for compliance with the goals and objectives of the DLSCP Management Plan.

Activity	Status of Use*		
	Approved	Conditional	Rejected
Protection of listed species	✓		
Ecosystem maintenance	✓		
Soil and water conservation	✓		
Hunting			✓
Fishing		✓	
Wildlife Observation	✓		
Hiking		✓	
Bicycling		✓	
Equestrian use		✓	
Mining			✓
Silviculture (timber harvesting)		✓	
Cattle grazing / range management			✓
Primitive Camping		✓	
Canoe / kayak landings		✓	
Ecotourism		✓	
New Linear Facilities	✓		
Off Road Vehicle Use			✓
Survey and Mapping	✓		
Environmental Education	✓		
Citriculture or other agriculture / row crops			✓
Cultivation of native species for seed banks or propagation		✓	
Preservation of cultural sites	✓		
Preservation of historical sites	✓		
Apiaries		✓	
Vehicular Access and Parking		✓	
Aircraft			✓
Outdoor Learning Center		✓	
Disc Golf		✓	

Approved = A use considered to be in compliance with goals and objectives with the Plan.

Conditional = A use that is considered in compliance with Plan goals and objectives given certain conditions are met (e.g., timing, location of use, intensity, etc.)

Rejected = A use considered not in compliance with goals and objectives of the Plan.

The majority of uses and decisions on acceptability are clear. Those worth further discussion are explained in further detail here. It is important to note that the list is primarily geared towards user groups; however, activities performed by the lead agency may appear contradictory and thus are discussed below.

Ecosystem maintenance includes any of the management activities noted in Section IV below. Note that some activities may result in soil surface disturbance. These activities will be analyzed on a case-by-case basis, and will consider alternative methods, goals being met that require the activity and presence within the Preserve in regards to known or potential cultural resources. Another ecosystem maintenance activity

includes the eradication of nuisance wildlife species (namely feral hog) by trapping and eradication. This activity should not be considered hunting, and is performed by County staff or licensed trappers contracted by the County. Another activity involved in ecosystem maintenance includes access to all parts of the Preserve by management equipment, including off road vehicles. The rejection of this use is again applied to public user groups.

Silviculture is applied in the context of sustainable forestry management and its identification as an approved use is solely as a support mechanism to natural resource restoration and management and maintenance. The identification of this practice ensure the ability of the lead agency to properly conduct timber harvests, prescribed burns and other activities regularly associated with silviculture that often require such a label to obtain approvals by local municipalities and other regulatory agencies. The purpose here is not for revenue generation, but revenue occurring as a result of activities is encouraged to assist in funding of restoration and management activities.

Hiking, equestrian use and biking are limited to use on trails and are currently allowed in designated areas on the Preserve with equestrian use and biking primarily limited to the Martin's Dairy tract. These are on-going and popular activities and result in the greatest daily use of the Preserve. These activities have been designated as a Conditional Use as these are active uses and do result in some impacts to natural resources and historical sites. They are controlled by trail and access management.

Linear facilities, including gas and power lines, already occur within the limits of the Preserve and were in place prior to acquisition. The approval of this use is limited to existing linear projects.

The Recreation Plan, provided in Appendix K, discusses the implementation of these uses, and provides for guidance of public use management in the context of the two-prong approach to natural resource protection and public access.

H. Cooperating Agencies Responsibilities

No other agencies are directed by the lease or other agreements as a cooperating partner in the management of DLSCP. A list of agencies that have participated in achieving the goals within this Plan follows:

Florida Communities Trust – Land Acquisition
Florida Forestry Service – Prescribed and Wildfire Control Assistance
Project IBIS – Education, Environmental Monitoring, Resource Inventory
St. Johns River Water Management District – Land Acquisition; Salt marsh restoration
City of Port Orange – Land Acquisition; Future Land Use Planning/ Development Encroachment
City of New Smyrna Beach – Future Land Use Planning/ Development Encroachment
Florida Natural Areas Inventory – Natural Resource Inventory – (Rare, Listed Species)
Volusia County Mosquito Control – Invasive / nuisance species control
Florida Fish and Wildlife Conservation Commission – Eagle Nest Monitoring; Hunting Analysis
Division of Historical Resources – Historical and Archaeological Inventory / Database
SE Volusia Historical Society – Historical and Cultural Resource Programs
Florida Public Archaeology Network – Historical and Cultural Resource Programs
Atlantic Center for the Arts – Education; Public Meetings
Florida Native Plant Society – Flora Lists

IV. MANAGEMENT GOALS AND OBJECTIVES

Volusia County has implemented resource and user group management programs for the purpose of preserving the significant natural and cultural resources under its directive as lead agency. The goals and objectives have been developed for DLSCP to meet the purpose for which the property was acquired. The specific goals and objectives to meet that purpose are the culmination of goals and objectives developed cooperatively by County, user groups, and other stakeholders. Target dates for completion of objectives are classified as short-term (within the next two years) or long-term (up to ten years from plan date to implementation). Successful completion of each of these objectives is contingent upon adequate funding.

The Resource Management Objectives for Doris Leeper Spruce Creek Preserve are identified as the following:

- Preserve and protect the expansive freshwater marsh wetland system and water resources on-site;
- Maintain the ecological integrity of existing upland vegetative communities through sound innovative management practices in order to provide for a more healthy & productive ecosystem;
- Continue utilizing a prescribed burn program;
- Continue exotic species removal and maintenance program;
- Protect and manage areas for the listed wildlife species that may occur on-site which includes:
 - Protection and maintenance of existing wetland and upland habitats,
 - Maintaining restored scrub habitat at a young stage of vegetation to promote optimal Scrub Jay habitat.
 - Maintain restored scrubby flatwoods using mechanical methods and prescribed fire,
 - Protect identified and high potential historical and archeological resources,
- Continue to monitor and protect property, environmental, historical and archaeological resources;
- Maintain use of existing facilities;
- Continue recreational nature based programs and infrastructure
- Continue environmental educational programs and infrastructure

A. Habitat Restoration and Improvement

Goal: Restore / improve native habitats trending away from optimal conditions

Objective: Implement techniques to trend towards Desired Future Conditions (DFCs)/ habitat maintenance condition

Prescribed fire in the appropriate habitats is an important abiotic factor in the restoration and improvement of many habitats. Other abiotic factors affecting habitat quality include hydrologic preservation and protection, and infrastructure management to protect habitats from potential multiple-use impacts. With the use of mechanical treatment and prescribed fire, scrub and scrubby flatwood habitats are mostly within the desired future condition as outlined in the restoration plan. Land management techniques will continue to be implemented to restore all remaining areas of these habitat types.

There is an area that, after much discussion, will be allowed to remain a climax community of xeric oak hammock. Although previously targeted for restoration, the 50 year absence of fire has led to the development of this new community type.

Important biotic factors in the restoration and improvement of extant habitats include control of invasive exotic species and sustainable forestry resource management. Each of these are discussed below as specific goals.

Objectives:

- ☐ Update Habitat Restoration Plan, as needed
- ☐ Continue Restoration Plan where applicable
- ☐ Continue Fire Management Plan
- ☐ Continue Timber Assessment / Timber Plan

Land management and restoration require clear ecological goals with Desired Future Conditions (DFCs) which are found in the Habitat Restoration Plan found in Appendix P. These goals are essential to successful ecosystem management and restoration. It is essential to provide a clear vision of future conditions that can be communicated to the management staff and the public, establish a guide for conservation and management actions, establish priorities for proposed activities, and integrate proper monitoring criteria that can evaluate resource management. Specific to the Preserve, there are 18 identified vegetative communities with numerous protected wildlife and plant species that require land management activities to function at peak ecological levels.

Measurable Parameters (may be extended beyond those listed here):

- List of acreages by habitat requiring specific restoration treatment techniques
- Identify parameters that define Desired Future Conditions (per habitat)
- Acres receiving fire surrogate treatments (by habitat and year)
- Acres burned (incl. wild and prescribed fires, with follow up assessment)
- Post-burn (immediate and 1-4 mos.) analysis
 - Fire intensity
 - Crown scorch / canopy mortality
 - Duff / soil litter consumed
- Acres / board feet harvested per tract per habitat
- Estimate of total pre and post Basal Areas per tract

B. Fire Management

Goal: Maintain disturbance intervals in appropriate habitats

Objective: Continue the Prescribed Burn Plan

The majority of the fire dependent communities have been either roller chopped and/or burned and will be placed in the proper fire rotation. The following statements summarize the general benefits of a properly developed and implemented prescribed fire program:

- Reduces fuel hazards;
- Improves accessibility for fire fighters, public and wildfire mitigation;
- Controls competing vegetation, forest diseases and insects in order to provide for a more

- healthy and productive forest;
- Improves forage for wildlife;
- Removes dead materials and returns nutrients to soils;
- Improves aesthetics by increasing new understory and overstory forest growth.

Fire is a historically important disturbance within several plant communities and can be very important for reproduction and production of species endemic to the vegetation communities found on the project site. Average fire return intervals of 2-8 years (depending upon hydrologic setting) were common historically within the flatwoods communities. Scrub habitat historically underwent fire return intervals ranging from 8-20 years. Variability of the fire return intervals, extent of areas burned, and seasonality, duration and intensity of burns within burn management units are important aspects included in the burn prescription plan to maintain diversity and promote “patchiness” within habitats. A burn zone map is included in the Prescribed Burn Plan in Appendix I.

The ultimate goal in a typical burning program is to allow for growing season burns to occur within the fire-dependent communities and to reach a stage where fire is being utilized as a habitat maintenance tool, rather than a restoration tool.

Many of the areas on the project site do not require management by fire, including the mesic hammocks, mangrove areas, salt marsh, and bottomland hardwood communities on the property. Although some areas, such as the salt marshes and the ecotones adjacent to the mesic hammocks, may benefit from periodic prescribed burns, other concerns including access constraints and muck fires would limit the viability of prescribed fire for these areas.

Several constraints exist that influence how and when prescribed fire can be implemented. These constraints are discussed in Section V, below. The constraints surrounding prescribed burning at DLSCP are numerous and significant. Prescribed burning may prove to be unfeasible or impracticable, either temporally, spatially, or logistically for portions of the Preserve. Where/when these circumstances occur, other management options will be considered. One management strategy would be to conduct hand removal and/or mechanical removal of the canopy to reduce the coverage of xeric oaks and pines. Other management strategies including roller chopping and forestry mowing reduce competition in the shrub and groundcover strata. Several methods are available as fire surrogates, but none have proven to be as ecologically effective as fire. However, many of these fire surrogate activities are necessary prior to safe fire implementation. In these cases, mechanical and other fire surrogate activities are crucial in the eventual re-introduction of fire.

There are several listed species whose occurrence and population health are directly related to fire / fire surrogate activities. Where the specifics of a particular species are well known, they are discussed in the imperiled species section below.

Objectives:

- ☐ Continue utilizing Fire Management Plan

Measurable Parameters (may be extended beyond those listed here):

- List of acreages suitable for fire implementation (or surrogate) by habitat / tract
- Acres receiving fire surrogate treatments (by habitat and year)
- Acres burned (incl. wild and prescribed fires, with follow up assessment)
- Post-burn (immediate and 1-4 mos.) analysis
 - Fire intensity

- Crown scorch / canopy mortality
- Duff / soil litter consumed
- Dominance of shrub layer pre and post treatment per treatment unit
- Canopy extent (by percent) pre and post treatment per treatment unit

C. Hydrological Preservation and Restoration

Goal: Protect water quality and quantity, restore hydrology to the extent feasible, and maintain the restored condition.

Spruce Creek is designated as a Class III and an Outstanding Florida Water (OFW). This designation restricts development in certain areas of the adjacent uplands; includes some areas as Riparian Habitat Protection Zone under state regulation (Section 11.5.4, ERP Applicant's Handbook). Management activities on the property such as burning and mechanical treatments would be compatible with the OFW designation and would not decrease water quality. However, care must be taken to not create a potential erosion problem along a topographic gradient where siltation into the adjacent water could occur. Recreational uses such as fishing, canoeing, and trail use are compatible with this designation. Again, special care must be used in placement of trails, especially equestrian and bike trails, to avoid potential erosion issues along topographic changes that could result in silt or sediment discharges to Spruce Creek or other adjacent waters. No direct discharge into Spruce Creek will be allowed from any development on the project site. Canoe landings would be considered an allowed activity and would not result in water quality degradation, but would require permitting through state and federal agencies.

The condition of the wetlands adjacent to Spruce Creek and its tributaries and salt marshes around the area will be evaluated prior to any development (canoe landings, trail creation/ relocation, etc.) on the project site. Existing or historic field road crossings through wetland areas should be evaluated to determine if they should be removed or retrofitted with culverts for use in the trail system of the project to restore natural water movement within impacted wetland areas. In areas that the trail system is proposed to cross over wetland areas, consideration will be given to placing the alignment over the retrofitted road crossings and/or using boardwalks.

There are several mosquito ditches present in the salt marsh areas. Modification of these mosquito control ditches and the removal of associated spoil are not feasible at this time due to cultural concerns. Funding will be pursued if archeological concerns are mitigated.

Objectives:

- ☐ Research potential hydrological restoration projects where feasible / necessary
- ☐ Inventory / monitor trails and infrastructure and manage trails to avoid erosion problems
- ☐ Consider boardwalks or similar for wetland / water crossings or access (canoe/ kayak launch, etc.)

Measurable Parameters (may be extended beyond those listed here):

- List of acreages of wetland habitats onsite
- Identification by habitat / acreage of areas requiring restoration vs. protection
- Number / linear measurement of boardwalks proposed / existing (per year basis, per entire Preserve – must identify acreage with BOT lands)

D. Sustainable Forest Management

Goal: Manage timber resources for resource conservation and habitat restoration, enhancement, and maintenance.

Objective: Practice a stewardship ethic that embraces sustainable forest management practices.

DLSCP has multiple forested habitats. The ability to use sustainable forestry management practices to assist in habitat management is an invaluable tool. The timber stands that exist on DLSCP have been assessed. This assessment and the resulting timber management plan are provided in Appendix J.

Objectives:

- Implement the Timber Assessment/Timber Plan

Measurable Parameters (may be extended beyond those listed here):

- List of acreages by habitat requiring specific restoration treatment techniques
- Acres receiving fire surrogate treatments (by habitat and year)
- Acres burned (incl. wild and prescribed fires, with follow up assessment)
- Post-burn (immediate and 1-4 mos.) analysis
- Crown scorch / canopy mortality
- Acres / board feet harvested per tract per habitat
- Estimate of total pre and post Basal Areas per tract
- Revenue per annum generated / spent / applied to

E. Exotic and Invasive Species Maintenance and Control

Goal: Remove exotic and invasive plants and animals to the maximum extent practicable and conduct ongoing maintenance as needed.

Some of the more invasive, exotic plants that occur on the project site include Australian pine (*Casuarina equisetifolia*), cogongrass (*Imperata cylindrica*), and Brazilian pepper (*Schinus terebinthifolius*). Except for Brazilian pepper (*Schinus terebinthifolius*), all invasive exotic species occur at low levels (<5% of any given habitat) while Brazilian pepper (*Schinus terebinthifolius*) continues to exist at about 5% of the salt marsh habitat. Cogongrass is only known to occur in limited isolated areas, which are less than 0.1 acres in size and have been treated. These areas are monitored for regrowth.

Because of these species invasive nature and potential to disrupt natural communities by dominating native wetland and/or upland communities, these plants are targeted for removal using chemical and/or mechanical control methods. As populations of these plants are found, regular maintenance events are scheduled to eliminate or reduce these particular exotic species. Where feasible, volunteer organizations can be used to monitor the preserve for invasive and exotic species and could perform some of the control of these species in cooperation with regularly scheduled maintenance events.

There have been three exotic species removal projects that Volusia County Land Management contracted out because of the large size of the project. The Sleepy Hollow Brazilian pepper (*Schinus terebinthifolius*) treatment (18 Acres), Bayou Bay bamboo treatment (1 acre) and the Rosebay Brazilian pepper (*Schinus terebinthifolius*) treatment (15 Acres). After initial treatment of the pepper with herbicide, land management staff will continue to treat any exotics that re-grow.

Because of the location of the preserve along a major water area, the opportunistic nature of terrestrial species to spread via human use and the known natural history of the exotic species in the area, it is a reality that invasive and exotic species will continue to invade the shorelines, salt marshes, and all habitats. Those areas easily accessed such as shorelines, property boundaries marked by clearing or fencing, field roads, trails and natural breaks are the most likely to be invaded by such species and will be regularly monitored for any invasive species. The species of primary importance during monitoring include species listed as Level I or II invasive exotics by the Florida Exotic Pest Plant Council (FLEPPC or EPPC). Monitoring will consist of visual reconnaissance during all other onsite activities. Discovery of new species or locations will be recorded by species, location and size of infestation and regularly monitored until eradicated or in a maintenance level condition.

Of the invasive exotic animal species, feral hogs (*Sus scrofa*) create the greatest visible impact to the onsite natural communities and create large disturbed areas that disrupt natural vegetative processes and promote the introduction of invasive / weedy species. The hog population is relatively low at this time and impacts from this species are minor. Numerous other exotic animals may be present, from terrestrial to aquatic. Species such as Cuban tree frog (*Osteopilus septentrionalis*) are outcompeting local native treefrogs. However, these smaller more inconspicuous species are not readily or easily controlled through land management practices. Education of such species, including proper disposal, may be a potential tool to assist in identification and control of less visible species.

The County has developed an Arthropod Control Plan to evaluate the necessity of control. This is provided in Appendix N.

Objectives:

- ☐ Continue to inventory and control invasive exotic plant and animal species
- ☐ Conduct inventories for exotic plant species following habitat disturbances
- ☐ Remove known invasive, exotic species utilizing appropriate measures
- ☐ Practices to control exotic and invasive species will be designed and conducted in such a manner as to minimize the impacts upon native plant and animal species.

Measurable Parameters (may be extended beyond those listed here):

- List of invasive species by location and treatment required
- Estimate of existing invasive plant species (by percentage)
- Estimate of area treated per year per area
- List / amount of chemical or other treatments applied
- Number of hogs trapped / removed per year

F. Imperiled Species Habitat Maintenance, Enhancement, Restoration or Population

Restoration

Goal: Maintain, improve, or restore listed and imperiled species populations and habitats.

Doris Leeper Spruce Creek Preserve supports numerous listed wildlife and plant species. Where a particular species occurrence has an implication to resource management, it is discussed below. Those that occur due to existence of high quality habitat or that are benefited by existing proposed management goals and objectives are not discussed specifically in this section.

Proper management of the project site for listed wildlife and plant species is based on locations of known populations (extant or otherwise) on the property. Therefore, inventory to determine presence/absence of species with specific management objectives is necessary. Surveys will be focused in areas that have the highest likelihood of occurrence for listed species, based on habitat requirements of the species, and should follow events creating disturbances within the communities, including controlled (roller chopping, prescribed fires) and uncontrolled (wildfires, tornadoes) events.

With the addition of GIS mapping tools, gopher tortoise(s) and their burrows are documented when witnessed in the field. The density of gopher tortoises (*Gopherus polyphemus*) within the Preserve appears to be minimal, but increasing in past 10 years. It appears that this species is lower than carrying capacities set by the Florida Fish and Wildlife Conservation Commission (FWC) in determining whether a site would be a suitable recipient site for tortoises relocated from to-be-developed lands. The County does not currently offer mitigation for this species or other natural resources to outside private interests. However, the use of DLSCP as a gopher tortoise-recipient site can be a source of revenue and can be utilized by other County development projects that may occur within occupied tortoise habitat. Therefore, tortoise relocation to DLSCP is identified as suitable management tool, but is not a mandated objective by this Plan. As noted elsewhere, vegetation reduction, preferably through prescribed fire is essential to increase suitability of gopher tortoise habitats and therefore increase density and total population, which meets the goal stated above. Those habitats that are too overgrown to successfully carry a safe fire will be thinned mechanically. Any activity promoting thinning of woody vegetation and thereby an increase in open space and herbaceous vegetation in the upland habitats will be critical to the stated goal for this species.

Cox *et. al.* stated that fire used as a management tool on gopher tortoise habitat is more beneficial than other techniques because it reduces the amount of ground litter, quickly reduces nutrients bound in plant materials, and does not disturb soil conditions and wildlife to the same extent as other management techniques. Furthermore, there is strong evidence to suggest that burning, particularly during the growing season, has several other beneficial effects on gopher tortoise populations. Prescribed burning during this period reduces the growth of deciduous shrubs and trees, thereby reducing canopy cover and stimulating herbaceous ground cover. Fire during this period also removes dead litter and tall standing plant stems at a time when hatchling tortoises are first ready to disperse from their nests and establish their first burrows. Summer burns expose mineral soil that may be necessary for burrow excavation by hatchlings. Since this species is adapted to upland plant communities in which fire is a natural and recurring feature, it is reasonable to assume applying a “natural” fire regime with respect to frequency and season will result in a habitat matrix suited to the needs of this species.

The presence of highly visible, listed snake species, the eastern indigo snake (*Drymarchon corais couperi*) and the eastern diamondback rattlesnake (*Crotalus adamanteus*), has implications to user group management as much as natural resource management. The natural resource management goals and objectives listed elsewhere in this section will meet the goal established for imperiled species within this subsection. However, user groups should be made aware of these species presence for their own safety as well as for that of the species. Identification of the species and notification that the law protects them, and an important part of the ecosystem should be a major point of education as it relates to these species. This education can be accomplished through kiosks, brochures, and/ or internet resources made available to user groups. Warnings against the taking of these or any wildlife species should be included in such educational materials.

The Atlantic salt marsh snake (*Nerodia clarkii taeniata*) is restricted to coastal Volusia County in its range and is further restricted by habitat to estuarine habitats. Protection of salt marshes, mangrove swamps, and tidal creeks within the Preserve from drainage, ditching, impoundment, and pollution are the most valuable forms of conservation for this species. In addition, the County is working with other government agencies to remove existing mosquito ditching and conduct wetland restoration and enhancement projects where feasible. This activity and the maintenance of the saltmarsh habitat, especially through the continued control of exotic invasive species like Brazilian pepper (*Schinus terebinthifolius*) meet the goals and objectives for this imperiled species.

The implications of the listed bird species is in the management of saltmarshes, adjacent shorelines and wetland habitats. Efforts to continually eradicate, or minimize the presence of exotic invasive species in these habitats, namely Brazilian pepper (*Schinus terebinthifolius*), is an important management tool for the continued health of the habitat utilized by these species. In addition, fire prevention in high organic wetland hammocks is another important goal. One method to avoid fire encroachment is by fuel consumption/ reduction in adjacent fire-dependent habitats.

The bald eagle (*Haliaeetus leucocephalus*) was removed from the federal list of Threatened and Endangered Species in 2007, Bald eagles are still protected by both state and federal laws. Their current threats include habitat and nest destruction, collision with vehicles, and territorial fights. With continuing land development, many eagles are choosing to nest on manmade structures such as power lines and communication towers. These non-natural nest sites can present many hazards to the young eaglets when they fledge. FNAI still considers the bald eagle protected. There is a nest on the Bolt tract within maritime hammock where fire is not a proposed management tool The Audubon EagleWatch Program monitors nests, the County will not specifically develop a monitoring plan. The County will monitor the activity / presence of these nests during the course of regular site visits as well as prior to and during land management activities that will occur near the nests that may have an adverse impact on the nest tree or use of the nest. The Audubon EagleWatch Program will be notified of any new information regarding the nest.

The southeastern American kestrel (*Falco sparverius paulus*) utilizes nest sites that include tall dead trees or utility poles generally with an unobstructed view of surroundings. Although the species has not been observed, snags should be left standing where feasible.

The Florida scrub-jay (*Aphelocoma coerulescens coerulescens*) is a species with great implication in regards to management of scrub communities within the Preserve. The Florida scrub-jay inhabits low-growing, oak scrub habitat found on well-drained sandy soils. They may persist in areas with sparse oaks or scrub areas that are overgrown, but at much lower densities and with reduced survivorship. It should be noted that jays utilize not just scrub, but also habitats adjacent to scrub. Thus, the mesic flatwoods, scrubby flatwoods, and scrub found within the Preserve provides the potential for valuable acreage that could be utilized by local scrub-jay families and offspring. Canopy and mid-story biomass reduction within the above habitats is essential and has been performed in the optimum Florida scrub-jay habitat, mainly within the Martins Dairy scrub and scrubby flatwoods and the Turnbull bay scrubby flatwoods portion.

The possibility of the Florida scrub-jay to utilize and return to the restored areas will depend on preservation and long-term management of suitable scrub habitat. While scrub is a fire-maintained community, it is not easily ignited, nor is it an easily controlled fire. Scrub is thought to have burned

less frequently than communities with a more easily ignited grassy groundcover, such as sandhill or mesic flatwoods. Scrub oak dominated scrub, as found within the Preserve, likely burned naturally at intervals between 5 and 20 years based on the habitat requirements of the Florida scrub-jay. Oak height is a critical limiting factor for Florida scrub-jays which have been documented to abandon territories where the oaks reached >3 meters. However, a minimum 3 to 5 year return interval appears critical based on the time required for re-sprouting oak stems to reach acorn-bearing height in the eastern Atlantic scrub. Acorn production provides an important food source for jays.

Growth rates of scrub oaks are related to burn history and environmental conditions onsite. Long unburned oak scrub, as found on the Preserve, may attain heights unsuitable for scrub-jays up to 50 percent faster after fire than regularly burned oak scrub and thus may at first require shorter burn intervals to maintain optimum heights following restoration of burning. In addition, small openings, needed by Florida scrub-jays for caching acorns, may need to be artificially restored in long unburned scrub by piling up fuel to create hotspots that kill the roots of the oaks. Currently, breaks in the scrub, created by the power line adjacent to the east boundary of Martina's Dairy tract, and trails provide suitable open space. Similar activities may continue to serve as fire surrogate methods to create open space. Variability in season and frequency of prescribed fires to produce a mosaic of burned and unburned patches would be the most desirable for maintaining high biotic diversity within the scrub and scrubby flatwoods.

The above considerations, and the resulting objectives below, mirror FWC's "Scrub Management Guidelines for Peninsular Florida: Using the Scrub-Jay as an Umbrella Species" (2009). These guidelines should be evaluated as a method of restoration and management of the DLSCP scrub. The restoration activities discussed that promote Desired Future Conditions and those activities discussed thus far within this subsection are activities that promote the maintenance, enhancement and restoration of the listed and imperiled plant species populations and habitats. As discussed in Section III, user group management and education to prevent harassment (wildlife), or collecting (plants) or to assist in appropriate inventory and management activities also promote these goals.

Objectives:

- ☐ Inventory for listed species that may utilize DLSCP, but have not been confirmed
- ☐ Partner with learning institutions / agencies / conservation groups to accomplish inventories for imperiled / listed species
- ☐ Conduct inventories for protected plant species following habitat disturbances
- ☐ Continue habitat restoration (incl. fire / forestry techniques as appropriate)
- ☐ Educate visitors and public of presence and importance of listed species
- ☐ Protect bald eagle nest trees and area; from harassment, prescribed fire, etc.
- ☐ In cooperation with FWC, Volusia County will consider developing a Wildlife Management Strategy in concert with preparation of the Habitat Restoration Plan.

Measurable Parameters (may be extended beyond those listed here):

- List of known imperiled species by habitat / location
- Estimate of listed species populations (may include simple presence/absence estimates per habitat per location)
- Identification of gopher tortoise densities (below, at or above K (carrying capacity); per habitat per tract)
- Habitat restoration, enhancement and maintenance parameters (see above)
- Estimate of herbaceous vegetation in upland habitats
- Number, type and location of educational information

G. Imperiled Natural Communities

Goal: Protect and maintain, where necessary imperiled natural communities

Three (3) natural communities, maritime hammock, scrub, and scrubby flatwoods on the Preserve are listed by FNAI as Imperiled Natural Communities. The Preserve includes 166.38 acres of maritime hammock, 231.63 acres of scrub, and 185.71 acres of scrubby flatwoods. Management activities include protection from illegal access related to dumping and off-road vehicle (ORV) use, prevention, and maintenance of invasion by invasive exotic species.

Objectives:

- ☐ Identify and remove debris piles located within maritime hammock
- ☐ Update Restoration Plan where applicable

Measurable Parameters (may be extended beyond those listed here):

- Acreage of imperiled habitats
- Identify existing and DFC parameters for each
- Amount of debris removed / remaining and location in maritime hammock

H. Cultural and Historical Resources

Goal: Identify, protect, preserve, and maintain the cultural resources of DLSCP

There are no historic buildings located within the boundaries of the Preserve. Cultural resource management activities focus on archaeological resources in accordance with *Best Management Practices: An Owners Guide to Protecting Archaeological Sites and Management Procedures for Archaeological and Historical Sites and Properties on State-owned or Controlled Lands (revised August, 1995)*. On-going management activities include 1) site documentation, 2) preservation and interpretation, 3) biennial monitoring, and 4) continuing study and interpretation of these sites through partnerships with the Florida Public Archaeology Network, SE Volusia Historical Society, and others.

Site Documentation

There are 34 archaeological sites within the boundaries of the Preserve that are recorded in the Florida Master Site Files, including two National Register sites—Spruce Creek Mound (8VO99) and Sleepy Hollow (8VO7142), listed in 2008. The documentation of these sites has been accomplished through field investigation systematically addressing areas of most probable resources. In partnership with other local governments and grant assistance through the State of Florida, Division of Historical Resources, surveys and reports were completed in 1986, 1989, 1990, 1996, 1997, 1999, 2006, and 2008. New sites shall be similarly documented. National Register nominations will be prepared for sites meeting those criteria. Any naturally occurring fire in the preserve is an opportunity for investigation and documentation. When appropriate, we may take advantage of opportunity for additional investigation using ground-penetrating radar equipment and expertise through the Florida Public Archaeology Network. Either artifacts collected on site, by our staff or cultural resource management firms are properly documented.

Preservation and Interpretation

For management purposes, the entire Preserve is considered archaeologically sensitive and investigation is undertaken prior to any site disturbance or recreational uses with potential for ground disturbance, including vehicular, equestrian or pedestrian traffic. Staff members have received Archaeological Resources Management Training (ARM) sponsored by the Bureau of Archaeological Research (BAR) and Volusia County has continuing services agreements with Cultural Resource Management Firms for situations requiring services of a registered public archaeologist.

State law allows for the location of these sites to be undisclosed to the public, in order to protect the sites in the more remote areas of the Preserve from looting and vandalism. We have permitted the surrounding vegetation to camouflage these sites to make it more difficult for potential vandals to locate these sites and to reduce erosion. Law enforcement officers are encouraged to participate in Training for Archaeological Resource Protection (TARP). Kiosks at trailheads post notices informing visitors that archaeological sites should not be disturbed and that artifacts should not be collected. Resource Stewardship will seek funding for historical surveys to document the prehistory and history of DLSCP.

Particular protections efforts have been focused on the Spruce Creek Mound Complex (8VO99). Prior to Volusia County management, this resource was severely impacted. Early 19th century professional and amateur archaeologists excavated here, preceded and followed by pottery hunters through the years. In modern times, prior to public ownership/management, it was used “unofficially” as a bike “ramp.” Under Volusia County’s management, this site has been successfully secured with fencing and alternative trail routes that do not impact cultural resources have been provided. There has been no discernable impact to this site since the fencing was installed and the site is regularly monitored. A plan is in place to stabilize the site by introducing sterile fill on top of a barrier cloth. This plan has been discussed in the field with Bureau of Archaeological Research (BAR) staff who concur with this strategy.

An interpretive kiosk is planned for this site, as well as limited interpretative programming through partnership with Florida Public Archaeology Network. Providing appropriate public access to the mound via a stairway and platform with exhibit panels is under consideration. If logistical, permitting and funding issues can be addressed. This would serve as both a protective measure and an interpretive feature. By increasing visitation and building greater awareness for the value of the site, we hope to engage the public to help us monitor and protect the sites.

Presently, interpretation for the Smyrna Settlement British Colonial history and archaeology is provided in partnership with the Southeast Historical Society’s museum exhibits and archaeology lab in New Smyrna Beach. Public attention is not directed toward these sites in order to protect them from looting. This is particularly important as most of these fragile features were discovered upon noting surface deposits.

Monitoring

Site conditions are regularly reviewed, checking for any damage caused by natural erosion, impacts from fallen trees, animal damage, impacts from vehicles, horses, bikes or pedestrians, and looting activity. The two most significant sites (Sleepy Hollow and Spruce Creek Mound) and sites more easily accessible to the public are more frequently monitored. Appropriate actions shall be taken to correct/reduce impacts noted during regular monitoring. Monitoring notes are reviewed to determine

any patterns of impact that may be prevented or mitigated. With assistance from Dot Moore of Southeast Volusia Historical Society, the County conducts monitoring of these known sites.

Objectives:

- ☐ Trained staff continue maintenance of cultural resource information
- ☐ Continue to monitor, and protect and preserve resources
- ☐ Submit new finds to SHPO for inclusion on the Florida Master Site File
 - ☐ Implement protection measures to protect Spruce Creek Mound from further erosion
 - ☐ Monitor user group trails for exposure of new resources and adverse impacts to cultural resources; reroute or close trails accordingly.
 - ☐ Work with land management and park staff in protection and monitoring of known resources
- ☐ Apply best management practices for preservation
- ☐ Upkeep regulatory signage regarding laws protecting the resources from damage, harvest, etc.
- ☐ Continue study and interpretation of these sites through partnerships with the Florida Public Archaeology Network, SE Volusia Historical Society, and others.

Measurable Parameters (may be extended beyond those listed here):

- Number and location of known, new and recorded sites
- Status of each site per monitoring event
- Status (% complete) of Spruce Creek Mound protection measures
- Number / linear measure of trails closed or re-routed
- Acreage of habitat surveyed following habitat restoration treatments
- Number and location of regulatory and education signage
- Dates / data of studies or other cooperative efforts with public groups

I. Facilities and Infrastructure

Goal: Develop and Maintain/Improve the capital facilities and infrastructure necessary to meet the goals and objectives of this management plan.

The facilities and infrastructure on DLSCP are numerous and are supported by additional facilities and infrastructure on adjacent County-managed lands within the Optimal Boundary of DLSCP. For the purpose of DLSCP facility and infrastructure management, the County considers the entire managed area, regardless of ownership, as one complete unit (Appendix O). Overall, the facilities and infrastructure currently available and in operation are sufficient to meet the stated goal. The utilization of two Divisions within the County improves the effectiveness of meeting this goal. The Volusia County Parks, Recreation and Culture Division is particularly qualified in managing facilities and infrastructure, which allows the Resource Stewardship Division staff to focus on natural and conservation resources management. Where the objectives overlap, coordination between the Divisions will be necessary to determine how to most effectively meet said objective.

Objectives:

- Continue to monitor, maintain and relocate as necessary a system of multi-use trails
- Continue to use existing facilities on adjacent County managed lands for support of DLSCP state-owned lands
- Maintain gates at appropriate locations to regulate traffic and visitation
- Construct, maintain and update signage, public parking areas and kiosks
- Monitor existing facilities for illegal activities and vandalism

- Consider the development of additional facilities/infrastructure for security purposes
- Acquire additional land within the Optimal Boundary as funding allows

Measurable Parameters (may be extended beyond those listed here):

- Linear measure and location of trails, including breakdown by:
 - Total
 - Final approved
 - Closed / rerouted
 - Allowed use
- Number, location of signage, kiosks, etc.
- Inventory of existing and proposed infrastructure (identify new infrastructure by date completed; identify infrastructure occurring on adjacent, non-state owned managed lands)
- Number, location and estimate of spaces provided for public parking
- Record of maintenance on infrastructure, include cost where appropriate
- Reports from caretaker on incidents requiring involvement
- Acreage of acquired tracts, include cost

J. Public Access, Recreational and Educational Opportunities

Goal: Provide public access, recreational and educational opportunities.

Much of the infrastructure and facilities discussed above are provided to support the goal established in this subsection. The management of user groups to prevent misuse of the site's resources is an important objective in allowing continued use of the Preserve.

The County, as lead management agency, is able to supplement the goals and objectives identified here though multiple ongoing recreational and educational programs enacted countywide. Kiosks and signage have been established and are maintained at key locations to aid in proper access and use by different recreational user groups. The County has collaborated with the Volusia County School system to provide space for an onsite environmental resource teacher, located on the Spruce Creek campground site, which is encompassed by the Rose Bay tract. This resource teacher provides environmental educational opportunities on the Preserve and leads Project IBIS, which monitors the water quality conditions of Rose Bay and other waters adjacent to the Preserve.

The Preserve provides recreational activities including mountain biking, equestrian access, hiking, birding, boardwalks, canoeing, fishing, pavilions, picnic areas, observation towers, canoe and kayak launches and landings. Restrooms are also available.

Specifics regarding access, facilities, and uses are provided by tract in the Recreation Plan.

Objectives:

- Utilize a Recreation and Land Use Concept Plan to include but not limited to:
 - Managing user groups / user impacts
 - Existing abuse
 - Enforcement (incl. methods)
 - Carrying Capacity
 - Approved trail system / uses / locations
 - Primitive camping
 - Canoe launch / landing

- Educational signage
 - Regulatory signage
 - Use mix / conflicts
 - Resource (cultural and natural) impact
 - Coordination with partners / local jurisdictions
- ☐ Cooperate with other agencies, cities, stakeholders, to provide educational and recreational opportunities
 - ☐ Educate the public on the presence of protected resources and the importance of preservation
 - ☐ Monitor and maintain a system of multi-use trails
 - ☐ Exclude off-road vehicle (ORV) use
 - ☐ Provide and enhance interpretive/education programs (i.e., website, kiosk, guides)
 - ☐ Continue to support Project IBIS
 - ☐ Provide additional recreational and educational facilities as funding allows

Measurable Parameters (may be extended beyond those listed here):

- Linear measure and location of trails, including breakdown by:
 - Total
 - Final approved
 - Closed / rerouted
 - Allowed use
- Number, location of signage, kiosks, parking, access, etc.
- Number, location, type of security measures (gate, security personnel, signage...)
- Record / reports of abuse, vandalism, user group conflicts, user group impacts (incl. dates, description of event, estimated cost, actual cost in repairs or solutions)
- Dates / data of studies or other cooperative efforts with public groups
- Efforts provided to support Project IBIS (money provided, facilities provided, incl. size, etc.)

K. Conservation Acquisition and Stewardship Partnerships

Goal: Enhance resources and management through development of an optimal boundary that identifies potential important habitats, landscape-scale linkages, wildlife corridors, operational/resource management and access needs by continuing to identify and pursue acquisition needs and conservation stewardship partnerships.

Goal: Develop stewardship partners to achieve management objectives

Beginning with the initial land acquisition program from the mid-1980's, the County, in conjunction with its partners, has been successful in identifying and acquiring additional lands to protect critical habitats and to increase the availability of resources. These partnerships have included municipalities, state agencies, and the St. Johns River Water Management District (SJRWMD).

The County's current program, Volusia Forever, provides for the acquisition and management of environmentally sensitive and outdoor recreation lands. The program, created in 2000 reinstated in 2020. Volusia Forever is funded through annual ad valorem assessment for a period of twenty years. A portion of this annual revenue is set aside for the management of conservation lands located across the county.

Where feasible, volunteer organizations are utilized to conduct and/or assist the County in the above stated objectives. Objectives that are being accomplished include volunteer efforts by the local Pawpaw Chapter of the Florida Native Plant Society to inventory the plant species occurring on DLSCP.

Objectives:

- ☐ Acquire additional land within the Optimal Boundary as funding allows
- ☐ Develop and maintain a GIS shapefile and other necessary data to facilitate nominations for additions or deletions to the optimal boundary and to assist the County's and State's programs
- ☐ Identify potential non-governmental organization partnerships and grant program opportunities
- ☐ Develop partnerships with other agencies, municipalities, institutions and conservation organizations to achieve stated goals and objectives

Measurable Parameters (may be extended beyond those listed here):

- Acreage of acquired tracts, include cost
- Acreage of tracts remaining for acquisition
- Acreage and identification of tracts to be added / removed from optimal boundary
- List of potential partnerships and funding sources, including amount of funding available
- List of partnerships and activities completed to meet stated goals

Table 9 Summarizing Goals and Objectives for DLSCP

Goals	Description	Term (Long v. Short)	Priority	Status
A	Habitat Restoration and Improvement			
Goal	Restore/ improve native habitats trending away from optimal conditions			
Obj. 1	Update Habitat Restoration Plan, as needed	Short	Low	Ongoing
Obj. 2	Continue Restoration, Fire Management and Timber Plan where applicable	Long	Moderate	Maintenance Condition
B	Fire Management			
Goal	Maintain disturbance intervals in appropriate habitats			
Obj. 1	Continue utilizing Fire Management Plan	Long	Moderate	Ongoing
C	Hydrological Preservation and Restoration			
Goal	Protect water quality and quantity, restore hydrology to the extent feasible, and maintain the restored condition			
Obj. 1	Research potential hydrological restoration projects where feasible/necessary	Long	Low	Ongoing
Obj. 2	Inventory trails and infrastructure and manage trails to avoid erosion problems			Complete
Obj. 3	Monitor trails and infrastructure and manage trails to avoid erosion problems	Long	Low	Ongoing
Obj. 4	Consider boardwalks or similar for wetland / water crossings or access (canoe/ kayak launch, etc.)			Complete

Goals	Description	Term (Long v. Short)	Priority	Status
D	Sustainable Forest Management			
Goal	Practice a stewardship ethic that embraces sustainable forest management practices			
Obj. 1	Implement Timber Assessment/Timber Plan			Complete
Obj. 2	Continue practices of Timber Assessment / Timber Plan	Long	Low	Ongoing
E.	Exotic and Invasive Species Maintenance and Control			
Goal	Remove exotic and invasive plants and animals to the maximum extent practicable and conduct ongoing maintenance as needed			
Obj. 1	Continue to inventory and control invasive exotic plant and animal species	Short	High	Ongoing
Obj. 2	Conduct inventories for exotic plant species following habitat disturbances	Short	High	Ongoing
Obj. 3	Remove known invasive, exotic species utilizing appropriate measures	Short	High	Ongoing
Obj. 4	Practices to control exotic and invasive species will be designed and conducted in such a manner as to minimize the impacts upon native plant and animal species.	Short	High	Ongoing
F	Imperiled Species Habitat Maintenance, Enhancement, Restoration or Population Restoration			
Goal	Maintain, improve, or restore listed and imperiled species populations and habitats			
Obj. 1	Inventory for listed species	Long	Moderate	Ongoing
Obj. 2	Partner with learning institutions / agencies / conservation groups to accomplish inventories for imperiled / listed species	Long	Low	Ongoing
Obj. 3	Conduct inventories for protected species following habitat disturbances	Long	High	Ongoing
Obj. 4	Implement habitat restoration (incl. fire/forestry techniques as appropriate)			Complete
Obj. 5	Continue habitat restoration per plan (incl. fire / forestry techniques as appropriate)	Long	Low	Ongoing
Obj. 6	Educate visitors and public of presence and importance of listed species	Long	Moderate	Ongoing
Obj. 7	Protect bald eagle nest, nesting tree and surrounding area from harassment, prescribed fire, etc.	Long	High	Ongoing
Obj. 8	In cooperation with FWC, Volusia County will consider developing a Wildlife Management Strategy in concert with preparation of the Habitat Restoration Plan	Long	Low	Ongoing

Goal	Description	Term (Long v. Short)	Priority	Status
G	Imperiled Natural Communities			
Goal	Protect, maintain and restore, where necessary, imperiled natural communities			
Obj. 1	Identify and remove debris piles located within maritime hammock	Long	Low	Ongoing
Obj. 2	Update Restoration Plan where/when applicable	Long	Moderate	Ongoing
H	Cultural and Historical Resources			
Goal	Identify, protect, preserve, and maintain the cultural resources of DLSCP			
Obj. 1	Trained staff continue maintenance of cultural resource information			Complete
Obj. 2	Continue to monitor, protect and preserve resources			Complete
Obj. 3	Submit new finds to SHPO for inclusion on the Florida Master Site File			Complete
Obj. 4	Submit new finds to SHPO for inclusion on the Florida Master Site File	Short	High	Ongoing
Obj. 5	Implement protection measures to protect Spruce Creek Mound from further erosion			Complete
Obj. 6	Monitor user group trails for exposure of new resources and adverse impacts to cultural resources; reroute or close trails accordingly	Short	High	Ongoing
Obj. 7	Apply best management practices for preservation	Long	High	Ongoing
Obj. 8	Upkeep regulatory signage regarding laws protecting the resources from damage, harvest, etc.	Short	Moderate	Ongoing
I	Facilities and Infrastructure			
Goal	Develop and Maintain/Improve the capital facilities and infrastructure necessary to meet the goals and objectives of this management plan			
Obj. 1	Continue to monitor, maintain and relocate as necessary, a system of multi-use trails	Long	Low	Ongoing
Obj. 2	Continue to use existing facilities on adjacent County managed lands for support of DLSCP state-owned lands.	Long	Low	Ongoing
Obj. 3	Construct, maintain and update signage, public parking areas, and kiosks	Long	Moderate	Ongoing
Obj. 4	Maintain gates at appropriate locations to regulate traffic and visitation	Long	Moderate	Ongoing
Obj. 5	Monitor existing facilities for illegal activities and vandalism	Short	Moderate	Ongoing
Obj. 6	Consider the development of additional facilities/infrastructure for security purposes	Long	Low	Ongoing
Obj. 7	Acquire additional land within the Optimal Boundary as funding allows	Long	Moderate	Ongoing

Goal	Description	Term (Long v. Short)	Priority	Status
J	Public Access, Recreational and Educational Opportunities			
Goal	Provide public access, recreational and educational opportunities			
Obj. 1	Implement a Recreation and Land Use Concept Plan			Complete
Obj. 2	Utilize a Recreation and Land Use Concept Plan	Long	Low	Ongoing
Obj. 3	Cooperate with other agencies, cities, stakeholders, to provide educational and recreational opportunities	Long	Low	Ongoing
Obj. 4	Educate the public on the presence of protected resources and the importance of preservation	Short	Moderate	Ongoing
Obj. 5	Monitor and maintain a system of multi-use trails	Long	Moderate	Ongoing
Obj. 6	Exclude off-road vehicle (ORV) use			Ongoing
Obj. 7	Provide and enhance interpretive/education programs (i.e., website, kiosk, guides website)	Long	Moderate	Ongoing
Obj. 8	Continue to support Project IBIS	Short	Moderate	Ongoing
Obj. 9	Provide additional recreational facilities as funding allows	Long	Low	Ongoing
K	Conservation Acquisition and Stewardship Partnerships			
Goal 1	Enhance resources and management through development of an optimal boundary that identifies potential important habitats, landscape-scale linkages, wildlife corridors, operational/resource management and access needs by continuing to identify and pursue acquisition needs and conservation stewardship partnerships.			
Goal 2	Develop stewardship partners to achieve management objectives.			
Obj. 1	Acquire additional land within the optimal boundary as funding allows	Long	Moderate	Ongoing
Obj. 2	Identify potential non-governmental organization partnerships and grant program opportunities	Long	Low	Ongoing
Obj. 3	Develop and maintain a GIS shapefile and other necessary data to facilitate nominations for additions or deletions to the OB and to assist the County's and State's programs			Complete
Obj. 4	Develop partnerships with other agencies, municipalities, institutions and conservation organizations to achieve stated goals and objectives	Long	Moderate	Ongoing

V.MANAGEMENT CHALLENGES AND STRATEGIES

A. Law Enforcement / Historic Resources

Challenge: Potential for impacts to environmental and historic resources due to public use.

Situated amid an urban/suburban area experiencing significant growth pressures, there presently exists a significant demand for access and use by the public to the Preserve. As the adjacent region continues to grow, it is anticipated that the demand by the public for access to the Preserve will dramatically increase. Addressing this demand in a responsible manner that ensures proper stewardship of the Preserves' environmental and archaeological resources will be a continuing challenge. The protection and preservation of the sensitive environmental and cultural resources (archaeological sites) of the Preserve will remain the fundamental goal guiding management of the Preserve. The Preserve is regularly monitored to identify adverse impacts associated with public use, and where necessary, formulate and implement mitigating or corrective measures. For example, particular effort has been focused on the Spruce Creek Mound Complex (8VO099) which is listed on the National Register of Historic Places. Under Volusia County management this site has been successfully secured with fencing and alternative trail routes that do not impact cultural resources have been provided. For management purposes, the entire preserve is considered archaeologically sensitive and investigation is undertaken prior to any site disturbance or recreational uses with potential for ground disturbance, including frequent pedestrian traffic. The general policy is not to provide the location of these sites to the public. This is a legitimate and effective tool to protect the sites in the more remote areas of the preserve from looting. The County has also permitted the surrounding vegetation to camouflage these sites, making it more difficult for potential looters to locate the sites. It is our intent to continue to provide the public with appropriate opportunities to use and enjoy the Preserve. However, these activities are to be offered in a way that is compatible with and furthers the over-arching strategy of providing proper protection of the Preserves' significant and sensitive environmental and archaeological resources.

Strategy:

- 1) Establish / maintain the presence of a caretaker who resides within or near the Preserve,
- 2) Ensure the caretaker's responsibilities include the entire Preserve
- 3) Continue to maintain gates at locations with limited access
- 4) Implement barriers to use of culturally sensitive resources

B. Habitat Management

Challenge: Many years of fire suppression has altered the strata of the fire dependent communities and reduced the potential suitability of the site for upland listed wildlife species.

Management issues related to the sandhill, scrub, scrubby flatwoods and shell mound communities create a challenge. The mosaic of natural communities within the Preserve is comprised of a wide variety of habitats, including several that are rare. These communities are of varying quality and stages of maturity/succession. Several of the communities also present challenging management opportunities, especially given the location of the Preserve. For example, several communities are dependent upon a comparably frequent fire interval. The use of prescribed fire within the Preserve is fraught with practical difficulties.

Given concerns for ecological values and mitigation of hazard to adjacent developments, a prescribed fire plan will be implemented subsequent to final approval. Due to smoke sensitive areas, such as Interstate 95, US Hwy 1, New Smyrna Beach Airport and surrounding residential communities, the plan will address challenges such as the substantial difficulty in sustaining a sufficient fire frequency to maintain healthy ecosystems and the protection of archaeological resources, and possible solutions such as mechanical alternatives to prescribed fire. The Preserve is situated amid an urban/suburban area that is experiencing significant growth pressures. While pockets of residential use have existed for years adjacent to the Preserve, residential development at the periphery of the Preserve has significantly increased in recent years in response to the heightened demand associated with the region's population growth. Aside from adjacent residential land use, the Preserve is also bounded or traversed by the regional thoroughfares of Interstate 95 and U.S. 1. A primary railroad line also traverses the Preserve. In addition, the New Smyrna Beach airport is located a short distance from the Preserve. In addition to being adjacent to the aforementioned "smoke-sensitive areas", the wind pattern of this region also complicates the use of prescribed fire. The prevailing wind pattern in this portion of the county is an easterly/westerly direction. However, the narrow smoke corridor that may be acceptable for prescribed burning is oriented in a north to south direction. Regardless of these concerns, it is noted that the County, like public agency land managers across the state, has experienced conditions that have significantly hindered efforts to undertake a consistent program of prescribed burning.

Strategy:

- 1) Implement the Prescribed Fire Plan
- 2) Conduct mechanical and other fire surrogate activities where necessary

C. Prescribed Fire

Challenge: The use of prescribed fire as a management tool at the Preserve is hindered by several outside variables.

Several constraints exist that influence how and when prescribed fire can be implemented at the Preserve. These constraints include residential housing to the north and northeast, I-95 to the west, US Highway 1 to the east, residential development, the golf course and New Smyrna Beach Airport to the south. These surrounding land uses have implications for smoke management in association with prescribed burning. Smoke management must be considered for the major highway areas to maintain safe driving conditions for these thoroughfares. Similar concerns exist for the New Smyrna Beach Airport, where visibility for incoming and outgoing air traffic must be maintained. In addition to smoke management constraints, the railroad right-of-way imposes an access constraint for workers and equipment to conduct prescribed fires in certain areas. Attention to weather conditions, proper management techniques, and education of surrounding residents can reduce some of these conflicts.

Another constraint is that in overgrown scrub conditions as found at the Preserve, extreme conditions must exist for the scrub to burn, such as high temperatures, high winds, low humidity's, and low fuel moistures. These conditions result in fires which are hot, intense, move quickly through the crown and can be hard to contain in small units.

Resistance to the use of prescribed fire as a management tool has been encountered within residential and commercial developments adjacent to managed lands. This is largely a result of smoke management issues and perceived damages to the environmental setting.

Strategy:

1) In association with the prescribed burn plan, awareness and education may be provided to the public and users of the project site. This is accomplished by public announcements and the like. This could include elements such as smoke management, the scheduling of prescribed fires, aesthetic value of the burn, the long-term protection of adjacent properties, and the importance of fire for wildlife and plant habitat.

D. Development Encroachment

Challenge: Adjoining lands are at risk for future development or other land use changes. Such changes could compromise carrying out the necessary management and thus reduce the quality and integrity of the natural systems at the Preserve.

One of the attributes of the Preserve, and also one of the challenges presented to management, is its location. The Preserve is situated amid an urban/suburban area that is experiencing significant growth pressures. This population growth has heightened the demand for residential uses. As a result, residential development at the periphery of the Preserve has increased in recent years. Much of this activity has occurred since development of the management plan. This development and growth has, and will continue to, present a range of challenges related to stewardship of the Preserve. These issues include the ability to perform certain resource management activities and increased user demand/expectations. Adding to this complexity is the configuration of the Preserve boundaries (increased edge) and that the lands adjoining the Preserve are within three different jurisdictions – County of Volusia (unincorporated) and the municipalities of Port Orange and New Smyrna Beach. Decisions regarding use(s) of lands adjoining the Preserve reside with the appropriate jurisdiction. The staff is aware of these concerns and strives to appropriately address the issues associated with this dynamic environment. The County, using established procedures, strives to cooperate with adjacent jurisdictions to minimize potential land use conflicts.

For example, the County, its partners, and the City of Port Orange worked to preclude adjacent development impacts by acquiring title to eight separate ownerships comprising approximately 514 acres of in-holdings and additions since the year 2000. The costs associated with these acquisitions collectively total approximately \$14.5 million, including the contributions of our agency partners. The City of Port Orange has also acquired 225 acres, with a cost of approximately \$5.6 million. These acquisitions facilitate comprehensive management of the Preserve and have eliminated the potential for adverse impacts that may have otherwise be associated with development of the affected properties had each remained in private ownership. The management review team specifically commended the County on these efforts. Additional protection has been sought for the valuable resources encompassed by the Preserve from the potential impacts associated with development of adjacent properties by successfully amending the boundaries to encompass additional area. Subsequently, acquisitions of the properties within this expanded area are a priority. A potential partner in this effort has been the Division of State Lands. Concerns associated with adjacent land uses are also monitored on a more routine level. For example, staff has worked with a resident to assure that public demand for access to the shoreline adjacent to his residence is provided in a balanced, responsible, manner.

Strategy:

- 1) Identify-adjoining parcels with meaningful natural resource values and willing sellers which may be considered for possible future acquisition.
- 2) Establish and maintain positive rapport with adjoining landowners and jurisdictions.
- 3) With concurrence of municipalities with jurisdiction and Volusia County, pursue agreement relating to management and encroachment adjacent to preserve and land use changes
- 4) Should the County partner with another jurisdiction for the acquisition of land within the Preserve, a mutually acceptable management agreement is to be prepared.

E. Timber Resources

Challenge: Minimal areas within the Preserve provide merchantable timber and access is limited.

Portions of the Rose Bay property contain slash pine stands with value as timber. The constraint to utilizing this area is that vehicular access to this area is very limited. The Rose Bay property is bound to the east by salt marsh, the north and south by open water, and to the west by railway.

Strategy:

- 1) A timber assessment / timber plan will be completed for those areas which provide potential for timber harvest.

F. Scrub Management Costs

Challenge: Locating funding for the costs associated with the planning of the management of the scrub habitats and the construction costs to complete the land management activities.

Strategy:

- 1) Restoration is performed by County staff due to habitat is nearing maintenance condition
- 2) Funding for upland restoration will be pursued

VI. PRIORITY SCHEDULING, COST ESTIMATES AND FUNDING SOURCES FOR CONDUCTING MANAGEMENT ACTIVITIES**A. Priority Scheduling**

The short and long-term goals established in Section IV above, along with their designated priority levels were used to develop a Priority Schedule. The schedule is divided into three chronological sections: 1-2 years, 2-5 years, and 6-10 years. The schedule will be used to develop costs estimates for land management activities.

Table 10 Priority Scheduling - Schedule of Events Years 1 -2:

Section / Objectives		Parameter(s)
A	Habitat Restoration and Improvement	
	Develop and implement Habitat Restoration Plan	Complete
	Implement Fire Management Plan	Complete
Section / Objectives		Parameter(s)
B	Fire Management	
	Maintain fire return intervals utilizing mechanical and prescribed fire methods	Min. 50 ac total – Per year Scrub/Scrubby flatwoods
C	Hydrological Preservation and Restoration	
	Inventory / monitor trails and infrastructure and manage trails to avoid erosion problems	Recurring task
	Permit boardwalks / water crossings or access	Planning, Exemption from DEP. Permit from ACOE. Need building/wetland permit from LG
D	Sustainable Forest Management	
	Restore Longleaf Pine where appropriate	Recurring task
E	Exotic and Invasive Species Maintenance and Control	
	Continue to inventory and control invasive exotic plant and animal species	Recurring task
	Conduct inventories for exotic plant species following habitat disturbances	Recurring task
	Remove known invasive, exotic species utilizing appropriate measures	Recurring task
F	Imperiled Species Habitat Maintenance, Enhancement, Restoration or Population Restoration	
	Conduct inventories for protected plant species following habitat disturbances	Recurring Task
	Implement habitat restoration (incl. fire / forestry techniques as appropriate)	Complete
	Protect and monitor bald eagle nest, nesting trees and area from harassment, prescribed fire, etc.	Recurring Task
G	Imperiled Natural Communities	
	Identify, monitor, and remove debris piles located within maritime hammock	Recurring Task/Amount TBD in the field
	Develop and Implement Restoration Plan where applicable	Min 50 ac. Scrub Scrubby flatwoods – Per year
	Maintain Natural Communities as outlined in DFC's	Recurring task
	Monitor and control invasive species	Recurring task
H	Cultural and Historical Resources	
	Staff shall continue maintenance of cultural resource information	Recurring task

	Continue to monitor, and protect and preserve resources	Recurring task
	Submit new finds to Land Management Staff for inclusion on the Florida Master Site File	Recurring task
	Monitor user group trails; reroute or close trails accordingly	Recurring task
	Apply best management practices for preservation	Recurring task
	Maintain regulatory signage regarding laws protecting the resources from damage, harvest, etc.	Recurring task
	Continue study and interpretation of these sites through partnerships with the Florida Public Archaeology Network, SE Volusia Historical Society, and others	Recurring task
.I	Facilities and Infrastructure	
	Continue to monitor, maintain and relocate as necessary a system of multi-use trails	Recurring task
	Monitor existing facilities for illegal activities and vandalism	Recurring task
J	Public Access, Recreational and Educational Opportunities	
	Educate the public on the presence of protected resources and the importance of preservation	Recurring Task; provide educational classes at least twice a year
	Exclude off-road vehicle (ORV) use	Recurring task
	Continue to support the IBIS Program	Recurring task
K	Conservation Acquisition and Stewardship Partnerships	
	Develop partnerships with other agencies, municipalities, institutions and conservation organizations to achieve stated goals and objectives	Recurring task- partnerships have been developed.

Table 10 Priority Scheduling - Schedule of Events Years 3-5:

Goals / Objectives		Parameter(s)
A	Habitat Restoration and Improvement	
	Implement Restoration Plan where applicable	Min 50 ac. Scrub or Scrubby Flatwoods /– Per year
	Implement Fire Management Plan (incl. fire or surrogate techniques as appropriate)	Min. 50 ac total – Per year; Minimum 285 acres by end of year 5 Completed
	Continue utilizing Fire Management Plan	Min 50 ac. Scrub or Scrubby Flatwoods /– Per year
B	Fire Management	
	Implement Fire Management Plan (incl. fire or surrogate techniques as appropriate)	Min. 25 ac total – Per year; Minimum 225 acres by end of year 5 - Completed

	Continue utilizing Fire Management Plan (incl. fire or surrogate techniques as appropriate)	Min 50 ac. Scrub or Scrubby Flatwoods /– Per year
C	Hydrological Preservation and Restoration	
	Inventory / monitor infrastructure and manage trails to avoid erosion problems	Recurring task
D	Sustainable Forest Management	
	Restore Longleaf Pine where appropriate	Recurring Task
E	Exotic and Invasive Species Maintenance and Control	
	Continue to inventory and control invasive exotic plant and animal species	Recurring task
	Conduct inventories for exotic plant species following habitat disturbances	Recurring task
	Remove known invasive, exotic species utilizing appropriate measures	Recurring task
F	Imperiled Species Habitat Maintenance, Enhancement, Restoration or Population Restoration	
	Inventory for listed species that may utilize DLSCP, but have not been confirmed	Recurring Task - Utilize FNAI or other partnerships as available
	Partner with institutions / groups to accomplish inventories	Partner with FNAI / FNPS and similar organizations
	Conduct inventories for protected plant species following habitat disturbances	Min 50 ac. Scrub or Scrubby Flatwoods /– Per year
	Implement habitat restoration (incl. fire / forestry techniques as appropriate)	Complete
	Educate visitors and public of presence and importance of listed species	Recurring task
	Protect bald eagle nest, nesting trees and area from harassment, prescribed fire, etc.	Recurring task
G	Imperiled Natural Communities	
	Develop and Implement Restoration Plan where applicable	Min 50 ac. Scrub or Scrubby Flatwoods – Per Year
	Continue habitat restoration (incl. fire / forestry techniques as appropriate)	Intent to manage as Natural Community Maintenance
H	Cultural and Historical Resources	
	Trained Staff shall continue maintenance of cultural resource information	Recurring task
	Continue to monitor, protect, and preserve resources	Recurring task
	Submit new finds to SHPO for inclusion on the Florida Master Site File	Recurring task
	Implement and continue to apply protection measures to protect Spruce Creek Mound from further erosion	Protection measures utilized, will continue to monitor

	Pursue interpretive trails, signs/kiosk and raised walkway over mound	Planning
	Monitor trails for exposure of, and impacts to resources; reroute or close trails accordingly	Recurring task
	Apply best management practices for preservation	Recurring task
	Erect and Maintain regulatory signage	Recurring task
	Continue study of sites through partnerships	Recurring task
I	Facilities and Infrastructure	
	Continue to monitor, maintain and relocate as necessary a system of multi-use trails	Recurring task
	Continue to use existing facilities on adjacent County managed lands for support of DLSCP state-owned lands	Recurring task
	Construct, maintain and update signage, public parking areas, and kiosks	Provided on an as-needed basis & based on Recreation Plan
	Maintain gates at appropriate locations to regulate traffic and visitation	Provided on an as-needed basis & based on Recreation Plan
	Monitor existing facilities for illegal activities and vandalism	Recurring task
	Acquire additional land within the Optimal Boundary	As funding allows
J	Public Access, Recreational and Educational Opportunities	
	Implement a Recreation and Land Use Concept Plan	Complete
	Cooperate with other agencies, cities, stakeholders, to provide educational and recreational opportunities	Host public meeting / advisory group/phone communication/e-mails etc.
	Monitor and maintain a system of multi-use trails	Recurring task
	Exclude off-road vehicle (ORV) use	Recurring task
	Provide and enhance interpretive/education programs (i.e., website, kiosk, guides website)	Recurring task
	Continue to support the Project IBIS	Recurring task
K	Conservation Acquisition and Stewardship Partnerships	
	Acquire additional land within the Optimal Boundary as funding allows	As funding allows
	Identify potential non-governmental organization partnerships and grant program opportunities	Planning task
	Develop partnerships with other agencies, municipalities, institutions and conservation organizations to achieve stated goals and objectives	Recurring task

Table 10 Priority Scheduling - Schedule of Events Years 6-10

Goals / Objectives		Parameter(s)
A	Habitat Restoration and Improvement	
	Implement Restoration Plan where applicable	Complete
	Implement Fire Management Plan (incl. fire or surrogate techniques as appropriate)	Based on previous acreages burned – acreage should be sufficient to maintain fire return intervals – minimum 285 acres total burned by end of year 10
	Implement Timber Assessment / Timber Plan	Complete
	Update Timber Assessment/Timber Plan	Conduct in 5 year intervals; Tighter timber assessment on Scrubby, Mesic and Wet Flatwoods to determine loss from storms and potential reforestation areas.
B	Fire Management	
	Return fire to appropriate habitats in DLSCP	Recurring task
	Implement Fire Management Plan (incl. fire or surrogate techniques as appropriate)	Maintain fire return intervals as outlined by DFC
C	Hydrological Preservation and Restoration	
	Prioritize hydrologic restoration needs in relation to other restoration goals and threat to health of the overall natural community and/or imperiled species	Seek alternate funding for restoration project working with other agencies, as well as within the county.
	Implement hydrological restoration projects where feasible / necessary	Based on work with SJRWMD and other partnerships
	Inventory / monitor trails and infrastructure and manage trails to avoid erosion problems	Recurring task
	Consider boardwalks or similar for wetland / water crossings or access (canoe/ kayak launch, etc.)	Kayak launch/landings installed. Continue maintenance.
D	Sustainable Forest Management	
	Implement Timber Assessment / Timber Plan	Complete
	Utilize Timber Assessment/Timber Plan	Recurring task
E	Exotic and Invasive Species Maintenance and Control	
	Continue to inventory and control invasive exotic plant and animal species	Recurring task
	Conduct inventories for exotic plant species following habitat disturbances	Recurring task
	Remove known invasive, exotic species utilizing appropriate measures	Recurring task

F	Imperiled Species Habitat Maintenance, Enhancement, Restoration or Population Restoration	
	Inventory for listed species that may utilize DLSCP, but have not been confirmed	Recurring task; update list of observed species and locations; determine target survey areas; monitor known sites; use Survey123 app
	Partner with learning institutions / agencies / conservation groups to accomplish inventories for imperiled / listed species	Recurring task; update list of observed species and locations; determine target survey areas; monitor known sites; use Survey123 app
	Conduct inventories for protected plant species following habitat disturbances	Recurring task; update list of observed species and locations; determine target survey areas; monitor known sites; use Survey123 app
	Protect bald eagle nest trees and area; from harassment, prescribed fire, etc.	Recurring task
G	Imperiled Natural Communities	
	Develop and Implement Restoration Plan where applicable	Complete
	Maintain Natural Communities as outlined in DFC	Recurring task
H	Cultural and Historical Resources	
	Trained staff shall continue maintenance of cultural resource information	Recurring task
	Continue to monitor, protect and preserve resources	Recurring task
	Submit new finds to Land Management trained staff for inclusion on the Florida Master Site File	Recurring task
	Implement protection measures to protect Spruce Creek Mound from further erosion	Complete
	Monitor user group trails for exposure of new resources and adverse impacts to cultural resources; reroute or close trails accordingly	Recurring task
	Apply best management practices for preservation	Recurring task
	Maintenance as necessary for regulatory signage regarding laws protecting the resources from damage, harvest, etc.	As needed basis
	Continue study and interpretation of these sites through partnerships with the Florida Public Archaeology Network, SE Volusia Historical Society, and others	Recurring task
I	Facilities and Infrastructure	
	Continue to monitor, maintain and relocate as necessary a system of multi-use trails	Recurring task

	Continue to use existing facilities on adjacent County managed lands for support of DLSCP state-owned lands	Recurring task
	Construct, maintain and update signage, public parking areas, and kiosks	Recurring Task
	Maintain gates at appropriate locations to regulate traffic and visitation	Recurring task
	Monitor existing facilities for illegal activities and vandalism	Recurring task
	Consider the development of additional facilities/infrastructure for security purposes	TBD
	Acquire additional land within the Optimal Boundary as funding allows	As funding allows
J	Public Access, Recreational and Educational Opportunities	
	Implement a Recreation and Land Use Concept Plan	Completed
	Cooperate with other agencies, cities, stakeholders, to provide educational and recreational opportunities	Recurring task
	Monitor and maintain a system of multi-use trails	Recurring task
	Exclude off-road vehicle (ORV) use	Recurring task
	Provide and enhance interpretive/education programs (i.e., website, kiosk, guides website)	Update as necessary
	Continue to support Project IBIS	Recurring task
	Provide additional recreational facilities as funding allows	Recurring task
K	Conservation Acquisition and Stewardship Partnerships	
	Acquire additional land within the Optimal Boundary as funding allows	Recurring task
	Develop and maintain a GIS shapefile and other necessary data to facilitate nominations for additions or deletions to the optimal boundary and to assist the County's and State's programs	Assist State with update
	Maintain a list of properties which could be used for possible addition to the optimal boundary or potential acquisition, depending upon the willingness of the affected landowner(s) and available funding	Assist State with update
	Identify potential non-governmental organization partnerships and grant program opportunities	Planning task
	Develop partnerships with other agencies, municipalities, institutions and conservation organizations to achieve stated goals and objectives	Recurring task

B. Cost Estimates

The cost estimates provided here reflect the costs necessary to achieve the goals stated above, and organized in a manner consistent with the Land Management Uniform Accounting Council, Chapter 259.037(3)(a) as provided below. Specific management activities and costs must initially be grouped, at a minimum, within the following categories: 1) Resource management, 2) administration, 3) support, 4) capital improvements, 5) recreation and visitor services, 6) law enforcement activities.

Table 11 - Short Term Annual Expenditure Estimate (Years 1 - 2):

1. Resource management	Annual Cost
Habitat restoration	
Prescribed burning	
Exotic species control	
Listed species survey and protection	
Cultural resource management	
Timber Management	
Hydrological Management	
Other	
Subtotal	\$37,726
2. Administration	
General Administration	\$5,120
3. Support	
Resource Management Planning	
Land Management Review	
Training / Staff Development	
Vehicle / Equipment Operation & Maintenance	\$15,423
Other	
Subtotal	
4. Capital improvements	
New construction	
Facility/ infrastructure maintenance	
Subtotal	\$25,000
5. Recreation visitor services	
Signage; operations; programs	
Public meetings	
Subtotal	\$8,100
6. Law enforcement activities	
Resource protection	\$2,000
TOTAL	\$93,369

Table 12 - Long Term Annual Expenditure Estimate (Years 3 - 10):

1. Resource management	Annual Cost
Habitat restoration	
Prescribed burning	
Exotic species control	
Listed species survey and protection	
Cultural resource management	
Timber Management	
Hydrological Management	
Other	
Subtotal	\$50,000
2. Administration	
General Administration	\$5,430
3. Support	
Resource Management Planning	
Land Management Review	
Training / Staff Development	
Vehicle / Equipment Operation & Maintenance	
Other	
Subtotal	\$18,000
4. Capital improvements	
New construction	
Facility/ infrastructure maintenance	
Subtotal	\$16,000
5. Recreation visitor services	
Signage; operations; programs	
Public meetings	
Subtotal	\$10,000
6. Law enforcement activities	
Resource protection	\$2,000
TOTAL	\$91,430

C. Estimated Revenue Sources

Revenue resources for accomplishing the above goals come from different sources depending upon the Division. Any revenue received by either Division, represents only a small fraction of the costs associated with management of the property.

Thus the revenue falls short of meeting all stated objectives. The County will follow the priority schedule to achieve high priority items first. Additional sources of revenue, and working with partners will be sought to fill the gaps where funding is not adequate. The partnerships have been listed above. Revenue from timber is discussed in the Timber Assessment / Timber Plan, but is expected to be nominal at best. Mitigation revenue, related to wetland and/or protected species, is not included as the County does not currently accept mitigation on their public lands. This may be re-evaluated in the long term. Additionally, grants will be explored for funding specific tasks.

VII. ANALYSIS OF POTENTIAL FOR CONTRACTING PRIVATE VENDORS FOR RESTORATION AND MANAGEMENT

The following management and restoration activities have been considered for outsourcing to private entities. It has been determined that items selected as “approved” below are those that Volusia County either does not have in-house expertise to accomplish or which can be done at less cost by an outside provider of services. Those items selected as “rejected” represent those for which Volusia County has in-house expertise and/or which the agency has found it can accomplish at less expense than through contracting with outside sources. “Conditional” items are those that could be done either by an outside provider or by the agency at virtually the same cost or with the same level of competence:

Table 13: Potential Contracted Services

Activity	Approved	Conditional	Rejected
Road/Trail Development and Maintenance		X	
Mosquito Ditch Removal		X	
Prescribed Burning		X	
Vegetation Inventories		X	
Timber Harvest Activities	X		
Mechanical Restoration Activities		X	
Public Contact and Educational Facilities Development		X	
Exotic Species Control		X	
Management Plan Development		X	
Imperiled Species Survey / Monitoring		X	
Habitat Restoration Plan Development		X	

VIII. LAND MANAGEMENT REVIEW

In compliance with Chapter 259.036, F. S. the Department of Environmental Protection (DEP) Division of State Lands (DSL) conducted a review of DLSCP to determine whether conservation, preservation, and recreation lands owned by the state Board of Trustees of the Internal Improvement Trust Fund (Board) are being managed properly. In compliance with directives of the statute the DEP to established a land management review team in 2020 that evaluated the extent to which the existing management plan provided sufficient protection to threatened or endangered species, unique or

important natural or physical features, geological or hydrological functions, and archaeological features. The team also evaluated the extent to which the land is being managed for the purposes for which it was acquired and the degree to which actual management practices, including public access, are in compliance with the adopted management plan. A complete report of the review team findings and the County's responses to items addressed by the Review Team is provided in Appendix L.

The team provided both commendations and a recommendation for the implementation of the management plan update (which were discussed at Preserve during time of review):

1. The review team recommends that regular spraying of the Art Center boundary fence to prevent further vine/vegetation encroachment.

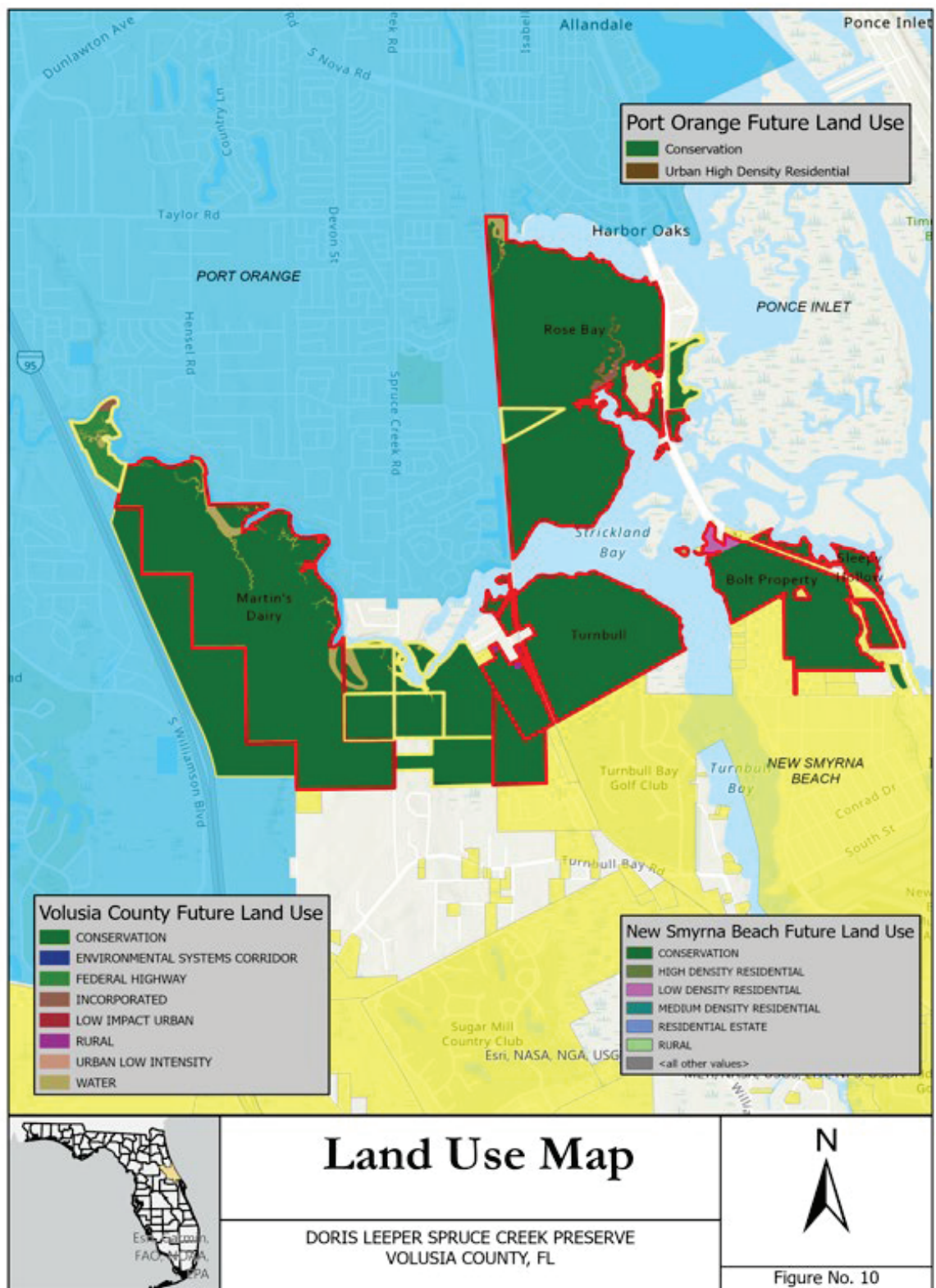
Managing Agency Response: Land Management will add the boundary fence in the spraying rotation.

IX. COMPLIANCE WITH STATE, FEDERAL AND LOCAL GOVERNMENT REQUIREMENTS

The proposed activities within this Plan are in accordance with state, federal and local government requirements and regulations. Some activities proposed may require permits from these agencies prior to implementation. This is primarily related to infrastructure and facility construction. Any such proposed construction activities will be reviewed with the appropriate agencies. This will include, but not necessarily limited to, Florida Department of Environmental Protection, St. Johns River Water Management District, Army Corps of Engineers, City of New Smyrna Beach, City of Port Orange, Volusia County, Florida Department of Transportation, etc.

Where practicable, all facilities are designed and constructed to comply with the American Disabilities Act (Public Law 101-336). The universal access requirements of this law are followed in all cases except where the law allows for reasonable exceptions, such as when handicap access is structurally impractical or when providing access fundamentally changes the purpose / character of the facility.

Uses planned for DLSCP are in compliance with the Conceptual State Lands Management Plan and its requirement for "balanced public utilization," and are in compliance with the eight Florida Forever goals, as well as the guidance and directives of Chapters 372, 253, 259, 327, 370, 403, 870, 373, 375, 378, 487, and 597 FS. This plan is also in conformance with the Local Government Comprehensive Plan for Volusia County, Florida, as approved and adopted. The letter confirming compliance is contained in Appendix M.



IX. SOIL AND WATER RESOURCE CONSERVATION

The County will continue to employ best management practices for activities and projects that potentially impact soil and water in order to minimize soil erosion and protect water quality. Soil disturbing activities will be conducted only in areas that present the least likelihood of causing erosion problems, avoiding the steepest slopes, streamside management zones and impacts to cultural resources. Soil disturbing activities will follow landform contours to the extent practicable and will not occur without assessment against potential impacts to cultural resources and supervision during such activities by trained staff (ARM training). On areas that have been discovered that may prevent erosion problems, an assessment will be made to determine if soil erosion is occurring, and if so, appropriate measures will be implemented to stop or control the effects of this erosion. An example of such measures was the fencing, trail relocation and tree removal along the bluff trail along Spruce Creek on the Martin's Dairy tract where users groups were utilizing a rope swing and causing erosion when climbing the bank back to the trail. These items are more specifically addressed in Section IV, above.

I. X. LITERATURE CITED

Technical Literature References

- Best Management Practices: An Owners Guide to Protecting Archaeological Sites.* [Division of Historical Resources](https://files.floridados.gov/media/30904/handbook.pdf), Bureau of Archaeological Research <https://files.floridados.gov/media/30904/handbook.pdf> Tallahassee, Florida. 2005
- Chafin, L.G. 2000. *Field Guide to the Rare Animals of Florida*. Florida Natural Areas Inventory, Tallahassee, Florida.
- Coile, Nancy C. & Garland, Mark A. 20031998. *Notes of Florida's Endangered and Threatened Plants*. (Rule 5B- 40 Florida's Regulated Plant Index), Botany Contribution 38, 2nd Ed. Florida Department of Agriculture and Consumer Services, Division of Plant Industry, Gainesville, Florida. 119 pp.
- Cox, Jeffrey. A. 1987 *Status and Distribution of the Florida Scrub-Jay*. Florida Ornithological Society. Special Publication No. 3, Gainesville, Florida. 110 pp.
- Cox, James, D. Inkley, R. Kautz. 1987. *Ecology and Habitat Protection Needs of Gopher Tortoise (Gopherus polyphemus) Populations Found on Lands Slated for Large-Scale Development in Florida*. Florida Game and Freshwater Fish Commission, Nongame Wildlife Program. Technical Report No. 4. Tallahassee, Florida. 69 pp.
- eBird. 2021. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: <http://www.ebird.org>. (Accessed: July 6, 2022).
- Florida Fish and Wildlife Conservation Commission *Gopher Tortoise Management Plan*, revised 2020 <https://myfwc.com/media/1819/gt-management-plan.pdf>
- Deyrup, Mark, Franz, Richard 1994. *Rare and Endangered Biota of Florida, Volume IV Invertebrates*. Special Committee on Invertebrates, Florida Committee on Rare and Endangered Plants and Animals.
- Division of Endangered Species. *Threatened and Endangered Species System*. Web Page Address: <http://ecos.fws.gov/>. United States Fish and Wildlife Service, Denver, Colorado.
- Environmental Laboratory, Wetlands Research Program. 1987. *Corps of Engineers*

Wetlands Delineation Manual. Technical Report Y-87-1. Department of the Army, Vicksburg, Mississippi.

Florida Exotic Pest Plant Council. 2019. *List of Florida's Invasive Species*. Internet: <https://floridainvasivespecies.org/plantlist2019.cfm>. Florida Exotic Pest Plant Council. Florida Fish and Wildlife Conservation Commission. 2021. *Florida's Endangered Species, Threatened Species, and Species of Special Concern*. Web Page Address: <https://myfwc.com/media/1945/threatened-endangered-species.pdf>

Florida Natural Areas Inventory. 202108. FNAI Tracking List. Florida State University, Tallahassee, Florida, USA. <http://www.fnai.org/bioticssearch.cfm> <https://www.fnai.org/species-communities/tracking-main> .

Gilbert, Carter R., 1992. Rare and Endangered Biota of Florida, Volume II Fishes.

Gilbert, K.M., J.D. Tobe, R.W. Cantrell, M.E. Sweeley, J.R. Cooper. 1995. The Florida Wetlands Delineation Manual. Florida Department of Environmental Protection, South Florida Water Management District, St. Johns River Water Management District, Suwannee River Water Management District, Southwest Florida Water Management District, and Northwest Florida Water Management District. 198 pp.

Hipes, D. D.R. Jackson, K. NeSmith, D. Printiss, K. Brandt. 2001. Field Guide to the Rare Animals of Florida. Florida Natural Areas Inventory, Tallahassee, Florida.

Humphrey, Stephen R., 1992. Rare and Endangered Biota of Florida, Volume I. Mammals. Special Committee on Mammals, Florida Committee on Rare and Endangered Plants and Animals.

Kent, Adam, 2009. Scrub Management Guidelines for Peninsular Florida: Using the Scrub-Jay as an Umbrella Species. Florida Fish and Wildlife Conservation Commission, Division of Habitat and Species Conservation. Gainesville, FL, USA

Management Procedures For Archaeological And Historical Sites And Properties On State -- Owned Or Controlled Lands. Compliance Review Section Bureau of Historic Preservation, Division of Historical Resources. Tallahassee, Florida. 20211995

Menges, Eric S. and Gordon, Doria R. Should Mechanical Treatments and Herbicides Be Used as Fire Surrogates to Manage Florida's Uplands? A Review. Archbold Biological Station, Lake Placid, FL

Miller, Randall H. 202107. Best Management Practices, Integrated Vegetation Management. International Society of Arboriculture. 36pp.

Moler, Paul E., 1992. Rare and Endangered Biota of Florida, Volume III Amphibians and Reptiles. Special Committee on Amphibians and Reptiles Florida Committee on Rare and Endangered Plants and Animals.

Myers, Ronald L., Ewel, John J. 1990. Ecosystems of Florida. University of Central Florida Press, Orlando, Florida.

Norman, Elaine M., 2007. The False Pawpaws, History, Biology and Conservation of *Deeringothamnus*. Palmetto, The Quarterly Journal of the Florida Native Plant Society, Volume:24 Number4, Fall 2007.

Natural Resource Conservation Service (Soil Conservation Service at time of publication). Circa 198077. Soil Survey of Indian River Volusia County, Florida. United States Department of Agriculture.

NatureServe. 2021. NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Available <https://explorer.natureserve.org/>. (Accessed: July 7, 2021). Robbins, Louise and Ronald L. Myers. 1992. Seasonal Effects of Prescribed Burning in Florida: A Review. Tall Timbers Research, Inc., Miscellaneous Publication No. 8.

Rogers, James A. Jr., Kale, Herbert W. III, Smith, Henry T. 1996. Rare and

Endangered Biota of Florida Volume V. Birds. Special Committee on Birds Florida Committee on Rare and Endangered Plants and Animals.

Surveying and Mapping Office, Thematic Mapping Section. Department of Transportation. 1999. Florida Land Use, Cover and Forms Classification System 3rd ed. State of Florida, Department of Administration. 81 pp.

Wade, Dale D. 1989. A Guide for Prescribed Fire in Southern Forests. United States Department of Agriculture, Forest Service, Technical Publication R8-TP-11.

Wunderlin, Richard P. 1998. Guide to the Vascular Plants of Florida. University Press of Florida. 804 pp.

Wunderlin, R. P., and B. F. Hansen. 202204. Atlas of Florida Vascular Plants (<http://www.plantatlas.usf.edu/>).[S. M. Landry and K. N. Campbell (application development), Florida Center for Community Design and Research.] Institute for Systematic Botany, University of South Florida, Tampa.

Appendix A:

Lease Agreement Number 4195

4195

OAL2

BOARD OF TRUSTEES OF THE INTERNAL
IMPROVEMENT TRUST FUND OF THE
STATE OF FLORIDA

LEASE AGREEMENT
SPRUCE CREEK

Lease No. 4195

THIS LEASE AGREEMENT, made and entered into this 12th day
of January 2001, by and between the BOARD OF TRUSTEES OF
THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA
hereinafter referred to as "LESSOR", and VOLUSIA COUNTY, FLORIDA
hereinafter referred to as "LESSEE".

LESSOR, for and in consideration of mutual covenants and
agreements hereinafter contained, does hereby lease to said
LESSEE, the lands described in paragraph 2 below, together with
the improvements thereon, and subject to the following terms and
conditions:

1. DELEGATIONS OF AUTHORITY: LESSOR'S responsibilities and
obligations herein shall be exercised by the Division of State
Lands, Department of Environmental Protection.
2. DESCRIPTION OF PREMISES: The property subject to this
lease, is situated in the County of Volusia, State of Florida and
is more particularly described in Exhibit "A" attached hereto and
hereinafter called the "leased premises".
3. TERM: The term of this lease shall be for a period of fifty
(50) years commencing on January 12, 2001 and ending on
January 11, 2051 unless sooner terminated pursuant to the
provisions of this lease.
4. PURPOSE: LESSEE shall manage the leased premises only for
the conservation and protection of natural and historical
resources and for resource based public outdoor activities and
education which are compatible with the conservation and
protection of these public lands, as set forth in subsection
259.032(11), Florida Statutes, along with other related uses

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necessary for the accomplishment of this purpose as designated in the Management Plan required by paragraph 8 of this lease.

5. QUIET ENJOYMENT AND RIGHT OF USE: LESSEE shall have the right of ingress and egress to, from and upon the leased premises for all purposes necessary to the full quiet enjoyment by said LESSEE of the rights conveyed herein.

6. UNAUTHORIZED USE: LESSEE shall, through its agents and employees, prevent the unauthorized use of the leased premises or any use thereof not in conformity with this lease.

7. ASSIGNMENT: This lease shall not be assigned in whole or in part without the prior written consent of LESSOR, which consent shall not be unreasonably withheld. Any assignment made either in whole or in part without the prior written consent of LESSOR shall be void and without legal effect.

8. MANAGEMENT PLAN: LESSEE shall prepare and submit a Management Plan for the leased premises in accordance with subsection 18-2.021(4), Florida Administrative Code, within twelve months of the effective date of this lease. The Management Plan shall be submitted to LESSOR for approval through the Division of State Lands, Department of Environmental Protection. The leased premises shall not be developed or physically altered in any way other than what is necessary for security and maintenance of the leased premises without the prior written approval of LESSOR until the Management Plan is approved. LESSEE shall provide LESSOR with an opportunity to participate in all phases of preparing and developing the Management Plan for the leased premises. The Management Plan shall be submitted to LESSOR in draft form for review and comments within ten months of the effective date of this lease. LESSEE shall give LESSOR reasonable notice of the application for and receipt of any state, federal or local permits as well as any public hearings or meetings relating to the development or use of the leased premises. LESSEE shall not proceed with development of said

leased premises including, but not limited to, funding, permit applications, design or building contracts until the Management Plan required herein has been submitted and approved. Any financial commitments made by LESSEE which are not in compliance with the terms of this lease shall be done at LESSEE'S own risk. The Management Plan shall emphasize the original management concept as approved by LESSOR at the time of acquisition which established the primary public purpose for which the leased premises were acquired. The approved Management Plan shall provide the basic guidance for all management activities and shall be reviewed jointly by LESSEE and LESSOR at least every five years. LESSEE shall not use or alter the leased premises except as provided for in the approved Management Plan without the prior written approval of LESSOR. The Management Plan prepared under this lease shall identify management strategies for exotic species, if present. The introduction of exotic species is prohibited, except when specifically authorized by the approved Management Plan.

9. EASEMENTS: All easements including, but not limited to, utility easements are expressly prohibited without the prior written approval of LESSOR. Any easement not approved in writing by LESSOR shall be void and without legal effect.

10. SUBLEASES: This lease is for the purposes specified herein and subleases of any nature are prohibited without the prior written approval of LESSOR, which approval shall not be unreasonably withheld. Any sublease not approved in writing by LESSOR shall be void and without legal effect.

11. RIGHT OF INSPECTION: LESSOR or its duly authorized agents, representatives or employees shall have the right to reasonably inspect the leased premises and the works and operations of LESSEE in any matter pertaining to this lease.

12. PLACEMENT AND REMOVAL OF IMPROVEMENTS: All buildings, structures and improvements shall be constructed in accordance

with plans that are in accordance with the approved Management Plan or shall require the prior written approval of LESSOR as to purpose, location and design which approval shall not be unreasonably withheld. Further, no trees, other than non-native species, shall be removed or major land alterations done without the prior written approval of LESSOR. Removable equipment and removable improvements placed on the leased premises by LESSEE which do not become a permanent part of the leased premises will remain the property of LESSEE and may be removed by LESSEE before or upon termination of this lease.

13. INSURANCE REQUIREMENTS: During the term of this lease LESSEE shall procure and maintain policies of fire, extended risk, and liability insurance coverage. The extended risk and fire insurance coverage shall be in an amount equal to the full insurable replacement value of any improvements or fixtures located on the leased premises. The liability insurance coverage shall be in amounts not less than \$100,000 per person and \$200,000 per incident or occurrence for personal injury, death, and property damage on the leased premises. Such policies of insurance shall name LESSOR, the State of Florida and LESSEE as co-insureds. LESSEE shall submit written evidence of having procured all insurance policies required herein prior to the effective date of this lease and shall submit annually thereafter, written evidence of maintaining such insurance to the Bureau of Public Land Administration, Division of State Lands, Department of Environmental Protection, Mail Station 130, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000. LESSEE shall purchase all policies of insurance from a financially-responsible insurer duly authorized to do business in the State of Florida. Any certificate of self-insurance shall be issued or approved by the Insurance Commissioner, State of Florida. The certificate of self-insurance shall provide for casualty and liability coverage. LESSEE shall immediately notify LESSOR and

the insurer of any erection or removal of any building or other improvement on the leased premises and any changes affecting the value of any improvements and shall request the insurer to make adequate changes in the coverage to reflect the changes in value. LESSEE shall be financially responsible for any loss due to failure to obtain adequate insurance coverage, and the failure to maintain such policies or certificate in the amounts set forth shall constitute a breach of this lease.

14. LIABILITY: Each party is responsible for all personal injury and property damage attributable to the negligent acts or omissions of that party and the officers, employees and agents thereof. Nothing herein shall be construed as an indemnity or a waiver of sovereign immunity enjoyed by any party hereto, as provided in Section 768.28, Florida Statutes, as amended from time to time, or any other law providing limitations on claims.

15. PAYMENT OF TAXES AND ASSESSMENTS: LESSEE shall assume full responsibility for and shall pay all taxes, assessments, liens or other similar liabilities that accrue to the leased premises or to the improvements thereon arising after this lease commences including any and all ad valorem taxes and drainage and special assessments or personal property taxes of every kind and all construction or materialman's liens which may be hereafter lawfully assessed and levied against the leased premises subsequent to the effective date of this lease. In no event shall the LESSEE be held liable for such liabilities which arose prior to the effective date of this lease.

16. NO WAIVER OF BREACH: The failure of LESSOR to insist in any one or more instances upon strict performance of any one or more of the covenants, terms and conditions of this lease shall not be construed as a waiver of such covenants, terms or conditions, but the same shall continue in full force and effect, and no waiver of LESSOR of any of the provisions hereof shall in any event be

deemed to have been made unless the waiver is set forth in writing, signed by LESSOR.

17. TIME: Time is expressly declared to be of the essence of this lease.

18. NON-DISCRIMINATION: LESSEE shall not discriminate against any individual because of that individual's race, color, religion, sex, national origin, age, handicap, or marital status with respect to any activity occurring within the leased premises or upon lands adjacent to and used as an adjunct of the leased premises.

19. UTILITY FEES: LESSEE shall be responsible for the payment of all charges for the furnishing of gas, electricity, water and other public utilities to the leased premises and for having the utilities turned off when the leased premises are surrendered.

20. MINERAL RIGHTS: This lease does not cover petroleum or petroleum products or minerals and does not give the right to LESSEE to drill for or develop the same.

21. RIGHT OF AUDIT: LESSEE shall make available to LESSOR all financial and other records relating to this lease, and LESSOR shall have the right to audit such records at any reasonable time during the term of this lease. This right shall be continuous until this lease expires or is terminated. This lease may be terminated by LESSOR should LESSEE fail to allow public access to all documents, papers, letters or other materials made or received in conjunction with this lease, pursuant to the provisions of Chapter 119, Florida Statutes.

22. CONDITION OF PREMISES: LESSOR assumes no liability or obligation to LESSEE with reference to the conditions of the leased premises. The leased premises herein are leased by LESSOR to LESSEE in an "as is" condition, with LESSOR assuming no responsibility for the care, repair, maintenance or improvement of the leased premises for the benefit of LESSEE.

23. COMPLIANCE WITH LAWS: LESSEE agrees that this lease is contingent upon and subject to LESSEE obtaining all applicable permits and complying with all applicable permits, regulations, ordinances, rules, and laws of the State of Florida or the United States or of any political subdivision or agency of either.

24. NOTICE: All notices given under this lease shall be in writing and shall be served by certified mail including, but not limited to, notice of any violation served pursuant to Section 253.04, Florida Statutes, to the last address of the party to whom notice is to be given, as designated by such party in writing. LESSOR and LESSEE hereby designate their address as follows:

LESSOR: Department of Environmental Protection
Division of State Lands
Bureau of Public Land Administration, M. S. 130
3900 Commonwealth Boulevard,
Tallahassee, Florida 32399-3000

LESSEE: County of Volusia
County Manager
123 W. Indiana Avenue
DeLand, Florida 32720

25. BREACH OF COVENANTS, TERMS, OR CONDITIONS: Should LESSEE breach any of the covenants, terms, or conditions of this lease, LESSOR shall give written notice to LESSEE to remedy such breach within sixty days of such notice. In the event LESSEE fails to remedy the breach to the satisfaction of LESSOR within sixty days of receipt of written notice, LESSOR may either terminate this lease and recover from LESSEE all damages LESSOR may incur by reason of the breach including, but not limited to, the cost of recovering the leased premises and attorneys' fees or maintain this lease in full force and effect and exercise all rights and remedies herein conferred upon LESSOR.

26. DAMAGE TO THE PREMISES: (a) LESSEE shall not do, or suffer to be done, in, on or upon the leased premises or as affecting said leased premises or adjacent properties, any act which may

result in damage or depreciation of value to the leased premises or adjacent properties, or any part thereof. (b) LESSEE shall not generate, store, produce, place, treat, release or discharge any contaminants, pollutants, or pollution, including, but not limited to, hazardous or toxic substances, chemicals or other agents on, into, or from the leased premises or any adjacent lands or waters in any manner not permitted by law. For the purposes of this lease, "hazardous substances" shall mean and include those elements or compounds defined in 42 USC Section 9601 or which are contained in the list of hazardous substances adopted by the United States Environmental Protection Agency (EPA) and the list of toxic pollutants designated by the United States Congress or the EPA or defined by any other federal, state or local statute, law, ordinance, code, rule, regulation, order or decree regulating, relating to, or imposing liability or standards of conduct concerning any hazardous, toxic or dangerous waste, substance, material, pollutant or contaminant.

"Pollutants" and "pollution" shall mean those products or substances defined in Chapters 376 and 403, Florida Statutes, and the rules promulgated thereunder, all as amended or updated from time to time. In the event of LESSEE's failure to comply with this paragraph, LESSEE shall, at its sole cost and expense, promptly commence and diligently pursue any legally required closure, investigation, assessment, cleanup, decontamination, remediation, restoration and monitoring of (1) the leased premises, and (2) all off-site ground and surface waters and lands affected by LESSEE's such failure to comply, as may be necessary to bring the leased premises and affected off-site waters and lands into full compliance with all applicable federal, state or local statutes, laws, ordinances, codes, rules, regulations, orders and decrees, and to restore the damaged property to the condition existing immediately prior to the occurrence which caused the damage. LESSEE'S obligations set

forth in this paragraph shall survive the termination or expiration of this lease. This paragraph shall not be construed as a limitation upon LESSEE'S obligations as set forth in paragraph 14 of this lease, nor upon any other obligations or responsibilities of LESSEE as set forth herein. Nothing herein shall relieve LESSEE of any responsibility or liability prescribed by law for fines, penalties and damages levied by governmental agencies, and the cost of cleaning up any contamination caused directly or indirectly by LESSEE'S activities or facilities. Upon discovery of a release of a hazardous substance or pollutant, or any other violation of local, state or federal law, ordinance, code, rule, regulation, order or decree relating to the generation, storage, production, placement, treatment, release or discharge of any contaminant, LESSEE shall report such violation to all applicable governmental agencies having jurisdiction, and to LESSOR, all within the reporting periods of the applicable governmental agencies. This paragraph shall not be deemed to apply to any conditions existing prior to the effective date of this lease.

27. ENVIRONMENTAL AUDIT: At LESSOR'S discretion, LESSEE shall provide LESSOR with a current Phase I environmental site assessment conducted in accordance with the Department of Environmental Protection, Division of State Land's standards prior to termination of this lease, and if necessary a Phase II environmental site assessment.

28. SURRENDER OF PREMISES: Upon termination or expiration of this lease, LESSEE shall surrender the leased premises to LESSOR. In the event no further use of the leased premises or any part thereof is needed, LESSEE shall give written notification to the Bureau of Public Land Administration, Division of State Lands, Department of Environmental Protection, Mail Station 130, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000, at least six months prior to the release of any or all of the leased

premises. Notification shall include a legal description, this lease number, and an explanation of the release. The release shall only be valid if approved by LESSOR through the execution of a release of lease instrument with the same formality as this lease. Upon release of all or any part of the leased premises or upon termination or expiration of this lease, all permanent/capital improvements, including both physical structures and modifications to the leased premises, shall become the property of LESSOR, unless LESSOR gives written notice to LESSEE to remove any or all such improvements at the expense of LESSEE. The decision to retain any improvements upon termination of this lease shall be at LESSOR'S sole discretion. Prior to surrender of all or any part of the leased premises a representative of the Division of State Lands, Department of Environmental Protection, shall perform an on-site inspection and the keys to any building on the leased premises shall be turned over to the Division.

29. BEST MANAGEMENT PRACTICES: LESSEE shall implement applicable Best Management Practices for all activities conducted under this lease in compliance with paragraph 18-2.018(2)(h), Florida Administrative Code, which have been selected, developed, or approved by LESSOR, LESSEE or other land managing agencies for the protection and enhancement of the leased premises.

30. PUBLIC LANDS ARTHROPOD CONTROL PLAN: LESSEE shall identify and subsequently designate to the respective arthropod control district or districts within one year of the effective date of this lease all of the environmentally sensitive and biologically highly productive lands contained within the leased premises, in accordance with Section 388.4111, Florida Statutes and Chapter 5E-13, Florida Administrative Code, for the purpose of obtaining a public lands arthropod control plan for such lands.

31. PROHIBITIONS AGAINST LIENS OR OTHER ENCUMBRANCES: Fee title to the leased premises is held by LESSOR. LESSEE shall not do or

permit anything to be done which purports to create a lien or encumbrance of any nature against the real property contained in the leased premises including, but not limited to, mortgages or construction liens against the leased premises or against any interest of LESSOR therein.

32. PARTIAL INVALIDITY: If any term, covenant, condition or provision of this lease shall be ruled by a court of competent jurisdiction to be invalid, void, or unenforceable, the remainder of the provisions shall remain in full force and effect and shall in no way be affected, impaired or invalidated.

33. ARCHAEOLOGICAL AND HISTORIC SITES: Execution of this lease in no way affects any of the parties' obligations pursuant to Chapter 267, Florida Statutes. The collection of artifacts or the disturbance of archaeological and historic sites on state-owned lands is prohibited unless prior authorization has been obtained from the Department of State, Division of Historical Resources. The Management Plan prepared pursuant to Chapters 18-2 and 18-4, Florida Administrative Code, shall be reviewed by the Division of Historical Resources to insure that adequate measures have been planned to locate, identify, protect and preserve the archaeological and historic sites and properties on the leased premises.

34. SOVEREIGNTY SUBMERGED LANDS: This lease does not authorize the use of any lands located waterward of the mean or ordinary high water line of any lake, river, stream, creek, bay, estuary, or other water body or the waters or the air space thereabove.

35. ENTIRE UNDERSTANDING: This lease sets forth the entire understanding between the parties and shall only be amended with the prior written approval of LESSOR.

36. MAINTENANCE OF IMPROVEMENTS: LESSEE shall maintain the real property contained within the leased premises and the improvements located thereon, in a state of good condition, working order and repair including, but not limited to, keeping

the leased premises free of trash or litter, meeting all building and safety codes for the location situated, maintaining the planned improvements as set forth in the approved Management Plan and maintaining any and all existing roads, canals, ditches, culverts, risers and the like in as good condition as the same may be on the effective date of this lease, reasonable wear and tear excepted; provided, however, that any removal, closure, etc, of the above improvements shall be acceptable when the proposed activity is consistent with the goals of conservation, protection, enhancement, or safety of the natural and historical resources within the leased premises and with the approved Management Plan.

37 GOVERNING LAW: This lease shall be governed by and interpreted according to the laws of the State of Florida.

38. SIGNS: LESSEE shall ensure that the area is identified as being publicly owned and operated as a public facility in all signs, literature and advertising. If federal grants or funds are used by LESSEE for any project on the leased premises LESSEE shall erect signs identifying the leased premises as a federally assisted project.

39. SECTION CAPTIONS: Articles, subsections and other captions contained in this lease are for reference purposes only and are in no way intended to describe, interpret, define or limit the scope, extent or intent of this lease or any provisions thereof.

40. ADMINISTRATIVE FEE: LESSEE shall pay LESSOR an annual administrative fee of \$300. The initial annual administrative fee shall be payable within thirty days from the date of execution of this lease agreement and shall be prorated based on the number of months or fraction thereof remaining in the fiscal year of execution. For purposes of this lease agreement, the fiscal year shall be the period extending from July 1 to June 30. Each annual payment thereafter shall be due and payable on July 1 of each subsequent year.

IN WITNESS WHEREOF, the parties have caused this lease to be executed on the day and year first above written.

BOARD OF TRUSTEES OF THE INTERNAL
IMPROVEMENT TRUST FUND OF THE
STATE OF FLORIDA

Debra Vickers
Witness
Debra Vickers
Print/Type Witness Name

Judy Woodard
Witness
Judy Woodard
Print/Type Witness Name

By: *Gloria C. Nelson* (SEAL)
GLORIA C. NELSON, OPERATIONS
AND MANAGEMENT CONSULTANT
MANAGER, BUREAU OF PUBLIC LAND
ADMINISTRATION, DIVISION OF
STATE LANDS, DEPARTMENT OF
ENVIRONMENTAL PROTECTION

"LESSOR"

STATE OF FLORIDA
COUNTY OF LEON

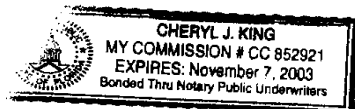
The foregoing instrument was acknowledged before me this
12th day of January 2001, by Gloria C. Nelson, as
Operations and Management Consultant Manager, Bureau of Public
Land Administration, Division of State Lands, Department of
Environmental Protection, as agent for and on behalf of the Board
of Trustees of the Internal Improvement Trust Fund of the State
of Florida, who is personally known to me.

Cheryl J. King
Notary Public, State of Florida

Print/Type Notary Name

Commission Number:

Commission Expires:



Approved as to
Form and Legality

By: *Samuel H. King*
DEP Attorney

COUNTY OF VOLUSIA, FLORIDA
BY ITS COUNTY COUNCIL

Diane Tyler
Witness
Diane Tyler
Print/Type Name
Jessica Cortes
Witness
Jessica Cortes
Print/Type Name

By: James E. Ward
James E. Ward
Print/Type Name
Title: Chair

OFFICIAL SEAL

ATTEST: [Signature]
County Manager/Clerk
County Council of Volusia
County

"LESSEE"

STATE OF FLORIDA
COUNTY OF VOLUSIA

The foregoing instrument was acknowledged before me this
14th day of December 2000, by JAMES E. WARD, and
RAY W. PENNEBAKER as Chair
and Chief Operating Officer, respectively, on behalf of the
County Council of Volusia County. They are personally known to
me.

(SEAL)



[Signature]
Notary Public, State of Florida

SUSAN M. WHITTAKER
Print/Type Notary Name

Commission Number: CC754321

Commission Expires: 8/8/02

Warranty Deed

EXHIBIT "A"
LEGAL DESCRIPTION

20-5 1237

BOOK PAGE
VOLUSIA COUNTY
FLORIDA

This Indenture, Made this 25th day of April 1986, Between
COUNTY OF VOLUSIA, a Political Subdivision of the State of Florida

of the County of Volusia, State of Florida, grantor, and

STATE OF FLORIDA BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND

whose post office address is

of the County of Volusia, State of Florida, grantee.

Witnesseth, That said grantor, for and in consideration of the sum of

— TEN AND NO/100THS —

Dollars,

and other good and valuable considerations to said grantor in hand paid by said grantee, the receipt whereof is hereby acknowledged, has granted, bargained and sold to the said grantee, and grantee's heirs and assigns forever, the following described land, situate, lying and being in Volusia County, Florida, to-wit:

(SEE ATTACHED LEGAL DESCRIPTION WHICH IS MARKED
EXHIBIT "A" AND MADE A PART HEREOF.)

FILED FOR RECORD
RECORD VERIFIED
MAY 2 12 39 PM '86
048925

and said grantor does hereby fully warrant the title to said land, and will defend the same against the lawful claims of all persons whomsoever.

"Grantor" and "grantee" are used for singular or plural, as context requires.

In Witness Whereof,

Grantor has hereunto set grantor's hand and seal the day and year first above written.

Signed, sealed and delivered in our presence:

COUNTY OF VOLUSIA, a Political Subdivision of
the State of Florida

BY: Jerome N. Dollner (Seal)

JEROME N. DOLLNER, Chairman of Volusia County Council

Attest: Thomas C. Kelly, County Manager/Clerk

Ex Officio (Seal)

(Seal)

STATE OF FLORIDA
COUNTY OF VOLUSIA

I HEREBY CERTIFY that on this day before me, an officer duly qualified to take acknowledgments, personally appeared JEROME N. DOLLNER, Chairman of Volusia County Council and THOMAS C. KELLY, County Manager/Clerk of Volusia County, a Political Subdivision of the State of Florida, to me known to be the person(s) described in and who executed the foregoing instrument and acknowledged before me that they executed the same.

WITNESS my hand and official seal in the County and State last aforesaid this 25th day of April 1986

My commission expires:

Notary Public, State of Florida at Large
My Commission Expires September 26, 1988

Notary Public

Page 15 of 24
Lease No. 4195

Revised 09/12/00

The South $\frac{1}{4}$ of the Southeast $\frac{1}{4}$, together with the Southerly 99.90 feet of the Northwest $\frac{1}{4}$ of the Southeast $\frac{1}{4}$, all in Section 33, Township 16 South, Range 33 East, Volusia County, Florida.

Also a portion of Sections 3 and 4, Township 17 South, Range 33 East, Volusia County, Florida, described as follows:

From the Northeast corner of said Section 4, run South 89 Degrees 08 Minutes 30 Seconds West along the North line of said Section 4 a distance of 506.98 feet to the Point of Beginning of the centerline of a 60 foot access and utility easement, being 30.00 feet on each side of the following described centerline; thence South 01 Degrees 07 Minutes 00 Seconds West, parallel with the East line of said Section 4 a distance of 1839.26 feet to the P.C. of a curve, concave Northeast, having a radius of 675.00 feet and a central angle of 54 Degrees 31 Minutes 26 Seconds; thence run Southerly along the arc of said curve a distance of 642.34 feet; thence South 53 Degrees 24 Minutes 26 Seconds East a distance of 350.00 feet to the centerline of Turnbull Bay Road and the termination of said centerline.

SUBJECT to Right of Way Easement in Deed Book 290, Page 545, Public Records of Volusia County, Florida.

SUBJECT to Florida Power & Light Easement recorded in Deed Book 199, Page 186, Public Records of Volusia County, Florida.

SUBJECT to certain boundary line agreement between Darrell S. Olier and Catherine C. Goodrich, recorded in Official Records Book 1892, Page 1727, Public Records of Volusia County, Florida.

SUBJECT to Right of Way in favor of Florida Gas Company, as recorded in Official Records Book 579, Page 685, Public Records of Volusia County, Florida.

SUBJECT to Right of Way of Martin Dairy Road.

SUBJECT to matters contained in that Special Warranty Deed from Berrien Becks, Sr. and Berrien Becks, Jr. to E. H. Oates, Jr., as recorded in Official Records Book 2782, Page 462, Public Records of Volusia County, Florida.

Please Return to:
 Brian Wood
 East Florida Title Services, Inc.
 138 W. New York Ave.
 Deland, FL 32720

COUNTY DEED

THIS DEED, MADE THIS 19TH DAY OF FEBRUARY, 1998, by the COUNTY OF VOLUSIA, a political subdivision of the State of Florida, GRANTOR, to the BOARD OF TRUSTEES OF THE INTERNAL IMPROVEMENT TRUST FUND OF THE STATE OF FLORIDA, whose mailing address is c/o Florida Department of Environmental Protection, 3900 Commonwealth Boulevard, Mail Station 115, Tallahassee, FL 32399-3000, GRANTEE;

WITNESSETH:

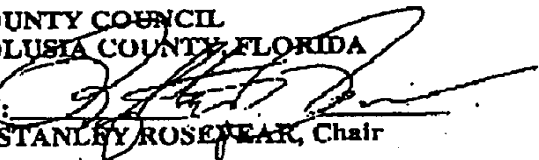
That said Grantor for and in consideration of the sum of Ten Dollars (\$10.00) and other good and valuable considerations to said Grantor in hand paid by said Grantee, the receipt whereof is hereby acknowledged, has granted, bargained and sold to said Grantee, its successors and assigns forever, all of its interest in the following described land, situate, lying and being in Volusia County, Florida, to-wit:

(See SCHEDULE "A" attached hereto for Legal Description)
 Property Appraiser's Parcel Identification No. 6323-00-00-0010

IN WITNESS WHEREOF, the GRANTOR has caused these presents to be executed in its name by its County Council acting by the Chairman of said Council, and its seal affixed on the day and year first above written.

(OFFICIAL SEAL)

COUNTY COUNCIL
 VOLUSIA COUNTY, FLORIDA

BY: 
 R. STANLEY ROSEPEAR, Chair

ATTEST: 
 Lawrence W. Arrington, County Manager.

This Instrument Prepared by:

COUNTY OF VOLUSIA
 122 W. Indiana Avenue
 Deland, Florida 32721-4613
 ATTN: Daniel D. Eckert
 1.476761616.doc

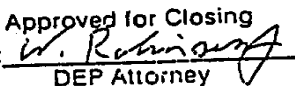
Approved for Closing
 By: 
 DEP Attorney
 Date: 2-19-98

EXHIBIT "A"

PARCEL NUMBER 1

THAT PART OF U.S. LOTS 1 AND 3, SECTION 23, TOWNSHIP 16 SOUTH, RANGE 33 EAST, LYING WEST OF U.S. HIGHWAY NO. 1, U.S. LOT 2, SECTION 23, TOWNSHIP 16 SOUTH, RANGE 33 EAST, U.S. LOTS 1, 4 AND 5, SECTION 22, TOWNSHIP 16 SOUTH, RANGE 33 EAST. THAT PART OF U.S. LOTS 2 AND 3, SECTION 22, TOWNSHIP 16 SOUTH, RANGE 33 EAST LYING EAST OF FLORIDA EAST COAST RAILWAY. THAT PART OF THE NORTHWEST 1/4 OF SECTION 22, TOWNSHIP 16 SOUTH, RANGE 33 EAST, LYING EAST OF THE FLORIDA EAST COAST RAILWAY. EXCEPTING THEREFROM THE FOLLOWING DESCRIBED PROPERTY IN LOT 1, SECTION 23, TOWNSHIP 16 SOUTH, RANGE 33 EAST: BEGIN AT A POINT ON THE WEST BOUNDARY OF U.S. NO. 1 HIGHWAY, WHERE THE SAME IS INTERSECTED BY THE SOUTHERLY SHORE OF ROSE BAY AT HIGHWATER MARK, THENCE SOUTHERLY ALONG THE WEST BOUNDARY OF SAID HIGHWAY 295.11 FEET, THENCE WESTERLY AND AT RIGHT ANGLES TO SAID HIGHWAY 295.11 FEET TO A CONCRETE MONUMENT, THENCE NORTHWESTERLY AND PARALLEL TO SAID HIGHWAY 295.11 FEET TO A POINT IN ROSE BAY, THENCE 295.11 FEET TO THE POINT OF BEGINNING, EXCEPT THAT PART NOW IN HIGHWAY NO. 1.

PARCEL NUMBER 9

PARCEL "A" - OFFICIAL RECORDS BOOK 2433, PAGE 333, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; SECTION 28, TOWNSHIP 16 SOUTH, RANGE 33 EAST; SOUTHWEST 1/4 OF NORTHWEST 1/4 LYING SOUTH AND WEST OF CREEK, SECTION 29, TOWNSHIP 16 SOUTH, RANGE 33 EAST; NORTHEAST 1/4 SOUTH OF SPRUCE CREEK, ALL LOCATED IN VOLUSIA COUNTY, FLORIDA, EXCEPTING THEREFROM PARCEL "B" OF OFFICIAL RECORDS BOOK 1274, PAGE 552, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA: THAT PART OF: SOUTHWEST 1/4 OF NORTHEAST 1/4, SOUTH OF SPRUCE CREEK, OF SECTION 29, TOWNSHIP 16 SOUTH, RANGE 33 EAST, LYING WESTERLY OF A LINE DESCRIBED AS FOLLOWS: COMMENCE ON THE SOUTH BOUNDARY OF SECTION 29, TOWNSHIP 16 SOUTH, RANGE 33 EAST AT A POINT 1492.50 FEET WEST FROM THE SOUTHEAST CORNER THEREOF, RUN THENCE NORTH 23 DEGREES 23 MINUTES 50 SECONDS WEST, 2244.80 FEET; THENCE NORTH 66 DEGREES 36 MINUTES 10 SECONDS EAST, 250 FEET TO THE POINT OF BEGINNING; RUN THENCE NORTH 13 DEGREES 36 MINUTES 19 SECONDS EAST, 1770 FEET, MORE OR LESS, TO THE MIDDLE OF SPRUCE CREEK, AND THE END OF THE LINE AS HEREIN DESCRIBED.

PARCEL NUMBER 4

THE PALMAS GRANT ALSO KNOWN AS SECTION 38, TOWNSHIP 16 SOUTH, RANGE 33 EAST, EXCEPTING THEREFROM THE FOLLOWING PARTS: LOT 8 IN BLOCK 11; THAT PART OF LOTS 1 AND 2 IN BLOCK 13, LYING EAST OF WHAT IS COMMONLY KNOWN AS THE SAW GRASS MARSH; LOTS 1 AND 2 AND 3, IN BLOCK 14; AND THE WEST 1/2 OF LOT 1 IN BLOCK 13; AND THAT PARCEL OF LAND HERETOFORE CONVEYED TO THE FLORIDA EAST COAST AND GULF RAILROAD CO., (NOW OWNED BY THE FLORIDA EAST COAST RAILROAD) ON OCTOBER 5, 1892, SAID EXCEPTED TRACTS AND THE BLOCKS AND LOTS ABOVE NAMED ARE KNOWN AS LOTS AND BLOCKS IN A PLAT OF THE PALMAS GRANT RECORDED IN MAP BOOK 1, PAGE 23, OF THE PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA, AND ALSO EXCEPTING THEREFROM A PORTION OF THE PALMAS GRANT, KNOWN AS THAT PORTION OF LOT OR BLOCK 24, CONNERAT'S SUBDIVISION OF SAID PALMAS GRANT, BEING MORE PARTICULARLY DESCRIBED AS BEGINNING AT A POINT IN THE WEST LINE OF U.S. HIGHWAY NO. 1, ALSO KNOWN AS DIXIE HIGHWAY AND BEING 200 FEET WIDE AS NOW LAID OUT AND OCCUPIED; SAID POINT BEING A DISTANCE OF 1960 FEET SOUTHERLY

SPRUCE CREEK/VOLUSIA COUNTY
PAGE 1 OF 4

EXHIBIT "A" (CONTINUED)

OF, AS MEASURED AT RIGHT ANGLES, TO THE NORTH LINE OF SAID PALMAS GRANT; THENCE SOUTH 14 DEGREES 40 MINUTES 30 SECONDS EAST ALONG SAID WEST LINE OF U.S. HIGHWAY NO. 1 (DIXIE HIGHWAY) A DISTANCE OF 250 FEET TO THE POINT THEREIN; THENCE SOUTH 60 DEGREES 00 MINUTES 00 SECONDS WEST, A DISTANCE OF 161 FEET MORE OR LESS TO A HIGH WATER MARK OF SPRUCE CREEK; THENCE NORTHERLY ALONG SAID HIGH WATER MARK A DISTANCE OF 275 FEET MORE OR LESS, TO A POINT IN A LINE PARALLEL TO AND 1960 FEET SOUTHERLY AS MEASURED AT RIGHT ANGLES, FROM SAID NORTH LINE OF PALMAS GRANT; THENCE NORTH 60 DEGREES EAST, ALONG SAID PARALLEL LINE A DISTANCE OF 100 MORE OR LESS TO A POINT OF BEGINNING AND ALSO EXCEPTING THEREFROM THAT CERTAIN 10 ACRES OF THE PLOT KNOWN AS "BLACK HAMMOCK", WHICH 10 ACRES ARE BOUNDED ON THE EAST BY THE HIGHWAY OR ROAD WHICH RUNS FROM NEW SMYRNA TO DAYTONA, ON THE NORTH BY SAME HIGHWAY AND BY SPRUCE CREEK, ON THE WEST BY SPRUCE CREEK AND TURNBULL BAY, AND ON THE SOUTH BY OTHER LAND OF PALMAS GRANT. ALSO EXCEPTING THEREFROM THE RIGHT OF WAY OF U.S. HIGHWAY NO. 1 AS NOW LAID OUT AND ESTABLISHED. ALSO EXCEPTING ALL LAND EAST OF U.S. HIGHWAY NO. 1; ALSO EXCEPTING ALL LAND WEST OF THE FLORIDA EAST COAST RAILROAD NORTH OF SPRUCE CREEK AND ALSO EXCEPTING ALL LAND SOUTH OF SPRUCE CREEK EAST OF TURNBULL BAY ALL OF SAID LAND WITHIN THE PALMAS GRANT.

AND ALSO EXCEPTING:

A PORTION OF BLOCKS 24 AND 25, LYING WESTERLY OF U.S. HIGHWAY NO. 1, A 160 FOOT RIGHT OF WAY, PALMAS GRANT SUBDIVISION AS RECORDED IN MAP BOOK 1, PAGE 23, OF THE PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; AND A PORTION OF GOVERNMENT LOT 3, SECTION 23, TOWNSHIP 16 SOUTH, RANGE 33 EAST AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCE AT THE NORTHEAST CORNER OF THE SAID PALMAS GRANT PER DEPARTMENT OF TRANSPORTATION RIGHT OF WAY MAPS. THENCE S 59°12'38" W, ALONG THE NORTH LINE OF SAID PALMAS GRANT, 710.79 FEET TO THE NORTHWESTERLY RIGHT OF WAY LINE OF U.S. HIGHWAY NO. 1 SAID POINT BEING N 59°12'38" E, .7 FEET FROM A FOUND CONCRETE MONUMENT ON THE SAID PALMAS GRANT LINE. THENCE S 01°05'04" W, ALONG THE WESTERLY RIGHT OF WAY LINE OF SAID U.S. HIGHWAY NO. 1, 449.03 FEET TO THE POINT OF BEGINNING; THENCE CONTINUE S 01°05'04" W, 754.86 FEET; THENCE ALONG A WETLANDS LINE AS LOCATED BY THE VOLUSIA COUNTY ENVIRONMENTAL DEPARTMENT THE FOLLOWING COURSES AND DISTANCES: N 51°14'31" W, 59.41 FEET; THENCE N 09°48'24" E, 22.34 FEET; THENCE N 08°24'49" W, 17.09 FEET; THENCE N 37°27'10" W, 39.89 FEET; THENCE N 17°34'37" E, 54.43 FEET; THENCE N 77°59'03" E, 18.65 FEET; THENCE N 12°41'49" E, 46.89 FEET; THENCE N 20°33'31" W, 36.92 FEET; THENCE N 03°11'47" E, 69.28 FEET; THENCE N 11°00'57" W, 30.82 FEET; THENCE N 28°37'59" W, 53.34 FEET; THENCE N 46°02'53" E, 36.86 FEET; THENCE N 85°35'44" W 34.46 FEET; THENCE S 32°06'38" W, 45.03 FEET; THENCE N 41°22'23" W, 55.36 FEET; THENCE S 03°44'33" W, 72.99 FEET; THENCE S 68°27'07" W, 77.06 FEET; THENCE S 05°23'34" E, 41.28 FEET; THENCE S 45°01'49" E, 47.46 FEET; THENCE S 14°22'22" W, 54.49 FEET; THENCE S 01°53'25" E, 54.31 FEET; THENCE S 21°01'39" E, 44.62 FEET; THENCE S 00°26'23" E, 70.32 FEET; THENCE S 54°00'46" W, 43.72 FEET; THENCE S 34°19'15" W, 83.75 FEET; THENCE S 14°14'25" E, 34.71 FEET; THENCE S 18°33'42" W, 38.56 FEET; THENCE S 09°34'15" E, 72.08 FEET; THENCE S 40°23'55" E, 25.89 FEET; THENCE S 52°41'29" W, 57.61 FEET; THENCE S 72°58'04" W, 41.55 FEET; THENCE S 09°45'32" E 30.10 FEET; THENCE S 33°03'22" E, 35.36 FEET; THENCE S 25°03'54" W, 26.72 FEET; THENCE S 73°21'26" W, 47.51 FEET; THENCE N 79°12'06" W 53.11 FEET; THENCE S 32°05'01" W, 27.61 FEET; THENCE S 72°11'00" E, 39.93 FEET; THENCE S 23°39'57" E, 45.33 FEET; THENCE S 18°24'28" W, 34.01 FEET; THENCE S 81°35'48" W, 64.17 FEET; THENCE N 77°54'30" W, 33.29 FEET; THENCE S 67°23'25" W, 34.67 FEET; THENCE N 65°47'33" W, 62.75 FEET; THENCE N 74°10'59" W, 38.19 FEET;

SPRUCE CREEK/VOLUSIA COUNTY
PAGE 2 OF 4

EXHIBIT "A" (CONTINUED)

THENCE N 09°29'55" W, 48.18 FEET; THENCE N 40°34'52" W, 32.80 FEET; THENCE N 40°55'44" W, 66.27 FEET; THENCE N 53°56'08" W, 63.80 FEET; THENCE N 26°30'18" W, 39.47 FEET; THENCE N 32°50'55" W, 48.11 FEET; THENCE N 34°55'30" W, 169.43 FEET; THENCE N 33°41'58" W, 92.53 FEET; THENCE N 40°04'03" W, 45.87 FEET; THENCE N 52°05'17" W, 51.41 FEET; THENCE N 18°02'44" W, 35.37 FEET; THENCE N 09°15'08" E, 69.20 FEET; THENCE N 08°50'07" E, 53.18 FEET; THENCE N 03°00'10" E, 43.53 FEET; THENCE N 38°48'46" E, 36.62 FEET; THENCE N 06°45'33" E, 70.01 FEET; THENCE N 25°11'18" W, 77.84 FEET; THENCE N 00°34'51" W, 79.72 FEET; THENCE N 01°17'24" W, 62.60 FEET; TO THE SAID NORTH LINE OF THE PALMAS GRANT; THENCE N 01°17'24" W, 13.25 FEET; THENCE N 24°09'52" W, 60.85 FEET; THENCE N 02°18'43" E, 62.79 FEET; THENCE N 07°11'38" W, 33.53 FEET; THENCE N 18°56'19" E, 32.93 FEET; THENCE N 12°03'34" W, 37.91 FEET; THENCE N 16°45'13" E, 56.50 FEET; THENCE N 10°07'15" E, 53.71 FEET; THENCE N 46°29'36" E, 26.76 FEET; THENCE S 65°53'18" E, 62.66 FEET; THENCE N 53°32'20" E, 45.25 FEET; THENCE N 39°56'09" E, 48.85 FEET; THENCE N 62°37'18" E, 44.19 FEET; THENCE N 80°12'52" E, 33.29 FEET; THENCE S 78°10'31" E, 36.77 FEET; THENCE S 34°19'53" E, 30.02 FEET; THENCE S 58°09'16" E, 61.04 FEET; THENCE S 40°21'37" W, 53.72 FEET; THENCE S 69°47'21" W, 40.74 FEET; THENCE S 07°54'59" W, 31.08 FEET; THENCE S 21°50'13" E, 51.40 FEET; THENCE S 79°38'15" E, 48.81 FEET; THENCE S 24°54'01" E, 25.92 FEET; TO THE SAID NORTH LINE OF THE PALMAS GRANT; THENCE S 24°54'01" E, 20.73 FEET; THENCE S 43°30'03" W, 28.00 FEET; THENCE N 80°23'56" E, 47.00 FEET; THENCE S 65°15'45" E, 38.00 FEET; THENCE S 75°33'57" E, 45.98 FEET; THENCE N 77°57'27" E, 33.70 FEET; THENCE S 86°51'24" E, 62.12 FEET; THENCE N 71°07'43" E, 37.53 FEET; THENCE N 61°38'46" E, 122.13 FEET; THENCE S 79°56'05" E, 35.51 FEET; THENCE S 57°34'43" E, 49.71 FEET; THENCE S 45°09'18" E, 85.20 FEET; THENCE N 80°37'21" E, 45.34 FEET; THENCE S 47°04'29" E, 42.68 FEET; THENCE S 02°52'05" E, 31.14 FEET; THENCE S 11°31'02" W, 48.19 FEET; THENCE S 88°53'30" E, 54.10 FEET; THENCE N 44°43'50" E, 42.64 FEET; THENCE N 06°03'48" E, 47.80 FEET; THENCE N 23°34'06" E, 63.12 FEET TO THE POINT OF BEGINNING.

AND ALSO EXCEPTING

A PORTION OF SAID PALMAS GRANT BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCE AT THE SOUTHWEST CORNER OF THE PALMAS GRANT, RUN ALONG THE SOUTHERLY LINE OF SAID PALMAS GRANT, N 60°34'28" E, 631.90 FEET TO THE POINT OF BEGINNING; THENCE N 14°03'22" W, 1354.64 FEET; THENCE N 30°01'19" W, 673.31 FEET; THENCE S 60°34'28" W, 40.01 FEET; TO THE SOUTHEAST CORNER OF LOT 2, BLOCK 13, SAID PALMAS GRANT; THENCE ALONG THE EASTERLY LINE OF LOTS 1 AND 2, SAID BLOCK 13, N 30°45'33" W, 330.00 FEET; THENCE N 60°34'28" E, 100.03 FEET; THENCE S 30°45'33" E, 328.99 FEET; THENCE S 30°01'19" E, 627.45 FEET, TO THE WESTERLY RIGHT OF WAY LINE OF THE FLORIDA EAST COAST RAILWAY; THENCE ALONG SAID RIGHT OF WAY, S 21°32'42" E, 115.35 FEET; THENCE S 14°03'22" E, 1284.75 FEET, TO THE SAID SOUTHERLY LINE OF THE PALMAS GRANT; THENCE ALONG SAID SOUTHERLY LINE S 60°34'28" W, 62.23 FEET, TO THE POINT OF BEGINNING.

AND ALSO EXCEPTING:

A PORTION OF SAID PALMAS GRANT BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCE AT THE SOUTHWEST CORNER OF THE PALMAS GRANT, RUN N 07°39'56" W, 2841.78 FEET, TO A POINT ON THE NORTHERLY LINE OF LOT 8, BLOCK 8 OF SAID PALMAS GRANT, BEING THE POINT OF BEGINNING; THENCE ALONG SAID NORTHERLY LINE OF LOT 8, S 60°34'28" W, 70.00 FEET TO THE SOUTHEAST CORNER OF LOT 3, BLOCK 14, OF SAID PALMAS GRANT; THENCE ALONG THE EASTERLY LINE OF SAID LOT 3, N 29°18'53" W,

SPRUCK CREEK/VOLUSIA COUNTY
PAGE 3 OF 4

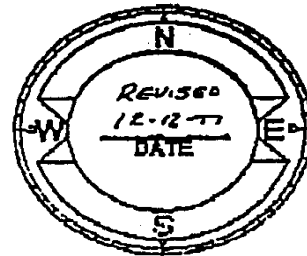
EXHIBIT "A" (CONTINUED)

711.25 FEET TO THE MEAN HIGH WATER LINE OF SPRUCE CREEK; THENCE ALONG SAID MEAN HIGH WATER LINE THE FOLLOWING TWO COURSES AND DISTANCES (1) S 58°22'46" E, 86.97 FEET, (2) N 78°31'25" E, 29.15 FEET; THENCE S 29°18'53" E, 626.30 FEET; TO THE POINT OF BEGINNING.

PARCEL 3:

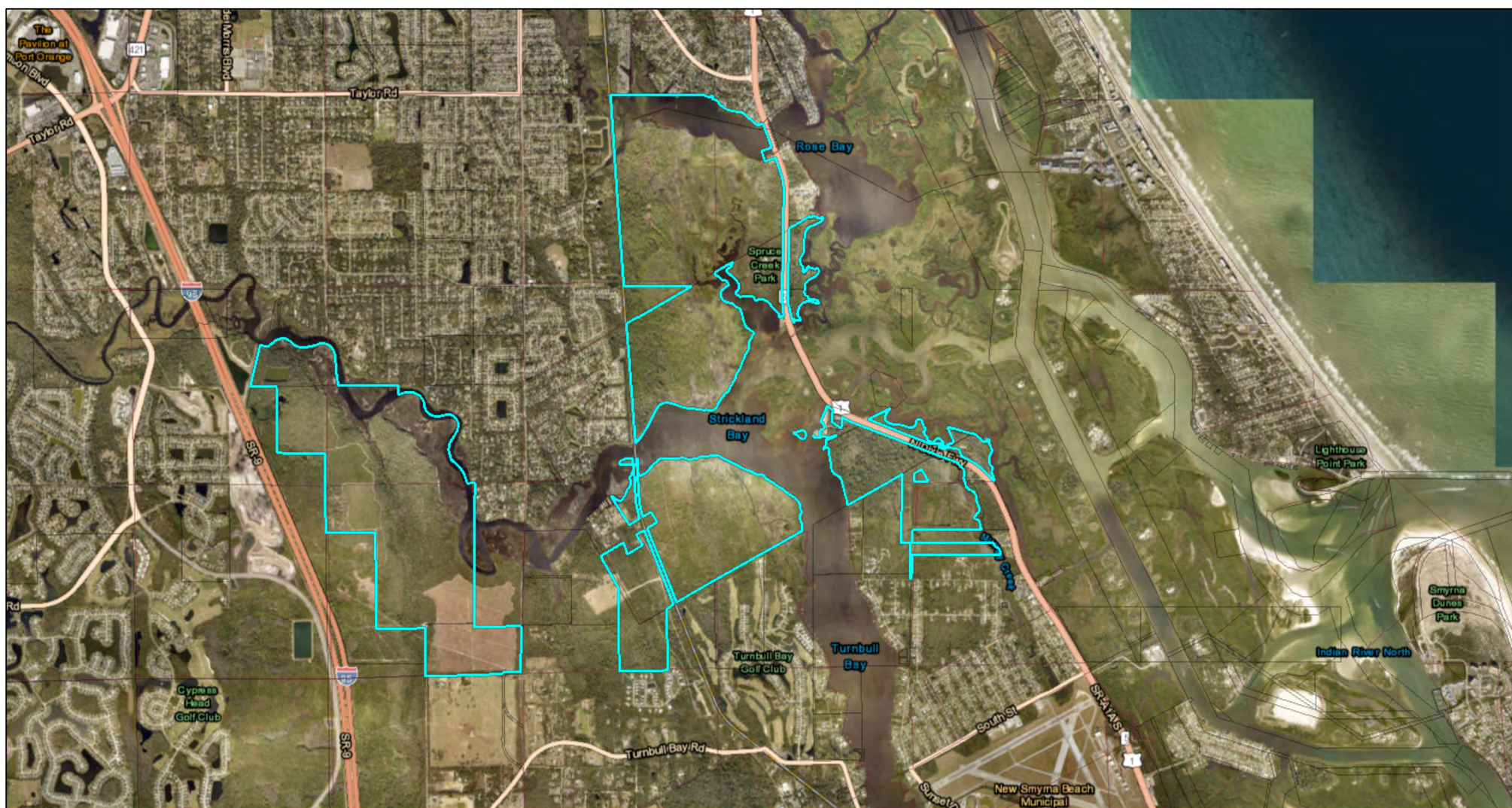
A PORTION OF BLOCKS 24 AND 25 AND A PORTION OF A VACATED 30 FOOT RIGHT OF WAY UNOPENED AND UNUSED LYING BETWEEN BLOCKS 24 AND 25, PALMAS ORANT SUBDIVISION OF SECTION 38, TOWNSHIP 16 SOUTH, RANGE 33 EAST, AS SHOWN IN MAP BOOK 1, PAGE 23 OF THE PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA, LYING EAST OF U.S. HIGHWAY #1, (160 FOOT RIGHT OF WAY AS NOW OCCUPIED) BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS: AS A POINT OF REFERENCE COMMENCE AT THE INTERSECTION OF THE NORTH LINE OF PALMAS GRANT, SECTION 38, TOWNSHIP 16 SOUTH, RANGE 33 EAST, WITH THE EASTERLY LINE OF U.S. HIGHWAY #1, (160 FOOT RIGHT OF WAY); THENCE SOUTH 01 DEGREES 05 MINUTES 04 SECONDS WEST ALONG THE EASTERLY LINE OF U.S. HIGHWAY #1 A DISTANCE OF 1583.55 FEET TO A POINT OF CURVATURE; THENCE ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 3045.36 FEET AND THROUGH A CENTRAL ANGLE OF 01 DEGREES 30 MINUTES 18 SECONDS A DISTANCE OF 80.00 FEET TO THE POINT OF BEGINNING; THENCE CONTINUE ALONG SAID CURVE TO THE LEFT HAVING A RADIUS OF 3045.36 FEET AND THROUGH A CENTRAL ANGLE OF 07 DEGREES 25 MINUTES 10 SECONDS A DISTANCE OF 394.35 FEET TO A POINT; THENCE NORTH 82 DEGREES 09 MINUTES 39 SECONDS EAST A DISTANCE OF 20.00 FEET TO A POINT ON A CURVE; THENCE FROM A TANGENT BEARING OF SOUTH 07 DEGREES 49 MINUTES 42 SECONDS EAST ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 3025.36 FEET AND THROUGH A CENTRAL ANGLE OF 06 DEGREES 47 MINUTES 36 SECONDS A DISTANCE OF 358.71 FEET TO A POINT ON THE MEAN HIGH WATERLINE OF ROSE BAY; THENCE IN A NORTHEASTERLY DIRECTION ALONG A MEAN HIGH WATER LINE A DISTANCE OF 745.00 FEET TO A POINT; THENCE NORTH 88 DEGREES 54 MINUTES 56 SECONDS WEST, A DISTANCE OF 285.00 FEET TO THE POINT OF BEGINNING.

LOTS 3 AND 4, BLOCK 12, LYING WEST OF THE RIGHT OF WAY OF THE FLORIDA EAST COAST RAILWAY, DOUGLAS MAP AND SUBDIVISION OF PALMAS GRANT, LOCATED IN SECTION 38, TOWNSHIP 16, SOUTH, RANGE 33 EAST, AS PER FLAT THEREOF RECORDED IN MAP BOOK 1, PAGE 23, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA.



SPRUCE CREEK/VOLUSIA COUNTY
PAGE 4 OF 4

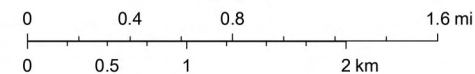
Lease 4195- Boundary map



January 18, 2022

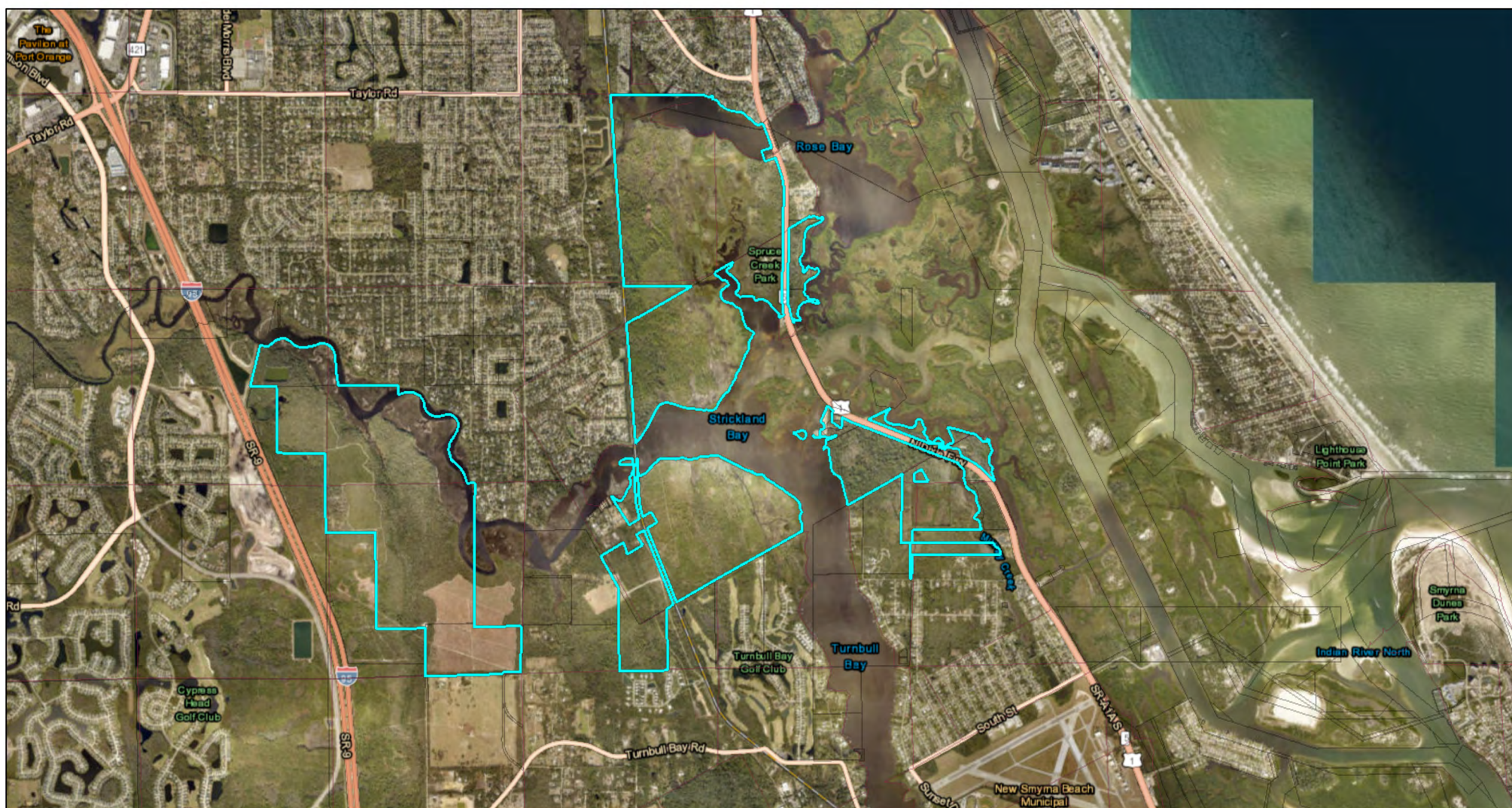
- State Land Records (BTLDSR)
- Public Land Survey System 2006

1:36,112



State of Florida, Maxar, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Esri, HERE, FDEP

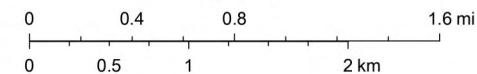
Lease 4195- Boundary map



January 18, 2022

- State Land Records (BTLDSR)
- Public Land Survey System 2006

1:36,112



State of Florida, Maxar, Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community, Esri, HERE, FDEP

Appendix B:

Legal Description

Legal Description:

All Blks 1 to 4 including exc 10 acres in blk 3 per mb 6 pg 106 & exc 4.6 A in st rd & blks B & C & inc vac streets adj per res 96-82 or bk 4102 pg 4393 & rip rts Palmas Grant Inc per or 4167 pg 3018-3019.

Exhibit "A"

PARCEL "A": Beginning at the intersection of R.J. Christy's south line per Map Book 7, page 33 of the Public Records of Volusia County, Florida and the westerly right of way line of U.S. Highway #1; thence S63 degrees 41'40"W, 972.5 feet along said Christy's line to the East bank of Turnbull Creek; thence N00 degrees 30'30"E, 100 feet; thence N07 degrees 29'30"W, 216.92 feet; thence N41 degrees 48'10"W, 261.71 feet; thence N12 degrees 01'30"E, 138.17 feet; thence N24 degrees 13'40"E, 362.7 feet to a point on the curve of the westerly right of way line of U.S. Highway No. 1; thence southerly along the said curve of said right of way line 868.58 feet (arc distance) to said curve's PC; thence S63 degrees 49'30"E, 190.61 feet along said Highway right of way line to the Point of Beginning. All being in the Palmas Grant, Section 38, Township 16 South, Range 33 East. EXCEPTING THEREFROM THE FOLLOWING: Commence at the intersection of the westerly right of way line of U.S. Highway No. 1 and the southerly line of R.J. Christy's property as shown on map in Map Book 7, page 33, of the Public Records of Volusia County, Florida; thence northerly along the said right of way line 550.09 feet for the Point of Beginning; thence S05 degrees 01'40"W, 331.67 feet; thence N54 degrees 17'46"W, 300 feet; thence N03 degrees 01'40"E, 331.67 feet to the westerly right of way line of said U.S. Highway No. 1; thence southerly 300.23 feet along the said westerly right of way line to the Point of Beginning. All lying and being in the Palmas Grant, Section 38, Township 16 South, Range 33 East.

AND:

PARCEL "B": Commence at the intersection of R. J. Christy's south line per Map Book 7, page 33 of the Public Records of Volusia County, Florida and the westerly right of way line of U.S. Highway No. 1; thence S63 degrees 41'40"W, 972.5 feet along said Christy's line to the East bank of Turnbull Creek; thence N00 degrees 30'30"E, 100 feet for the Point of Beginning; thence N59 degrees 29'30"W, 355.74 feet; thence N59 degrees 29'30"W, 80.52 feet; thence N00 degrees 30'30"E, 84.48 feet; thence N45 degrees 30'30"E, 127.38 feet; thence S89 degrees 29'30"E, 305.21 feet; thence S07 degrees 29'30"E, 216.92 feet to the Point of Beginning. All being in the Palmas Grant, Section 38, Township 16 South, Range 33 East. EXCEPTING THEREFROM THE FOLLOWING: Lot 7, Divito's Unrecorded Subdivision, being a portion of the Palmas Grant, Section 38, Township 16 South, Range 33 East; and being more particularly described as follows: Commence at the intersection of the R.J. Christy's south line per Map Book 7, page 33 of the Public Records of Volusia County, Florida and the westerly right of way line of U.S. Highway #1; thence S63 degrees 41'40"W, 972.50 feet along the said Christy's line to the east bank of Turnbull Creek; thence N00 degrees 30'30"E, 100.00 feet; thence N89 degrees 29'30"W, a distance of 231.37 feet for the POINT OF BEGINNING; thence continue N89 degrees 29'30"W, a distance of 124.38 feet; thence N59 degrees 29'30"W, a distance of 80.52 feet; thence N00 degrees 30'00"E, a distance of 84.48 feet; thence N45 degrees 30'30"E, a distance of 127.38 feet; thence S89 degrees 29'00"E, a distance of 104.04 feet; thence S00 degrees 30'30"W, a distance of 214.81 feet to the Point of Beginning.

AND:

PARCEL "C": Filled land being a portion of the Palmas Grant, Section 38, Township 16 South, Range 33 East and being described as follows: Commence at the intersection of R. J. Christy's south line per Map Book 7, page 33 of the Public Records of Volusia County, Florida and the westerly right of way line of U.S. Highway No. 1; thence S63 degrees 41'40"W, 972.5 feet along said Christy's line to the East bank of Turnbull Creek; thence N00 degrees 30'30"E, 100 feet; thence N07 degrees 29'30"W, a distance of 216.92 feet for the Point of Beginning; thence N89 degrees 29'30"W, a distance of 139.85 feet to the northerly edge of an existing bulkhead; thence northeasterly along said bulkhead N66 degrees 20'37"E, a distance of 55.70 feet; thence N30 degrees 05'28"E along said bulkhead, a distance of 53.12 feet; thence S41 degrees 48'10"E, a distance of 93.30 feet to the Point of Beginning.

OWNERSHIP:

VOLUSIA COUNTY HOLDS OWNERSHIP TO THE ENTIRE PARCEL
CONSISTING OF 21.38 ACRES.

DEVELOPER:

VOLUSIA COUNTY PARKS & RECREATION
123 WEST INDIANA AVENUE
DELAND, FLORIDA 32720

ENGINEER:

WILLIAM G. GRAY P.E.
COUNTY ENGINEER
123 WEST INDIANA AVENUE
DELAND, FLORIDA 32720

LEGAL DESCRIPTION:

A PORTION OF BLOCKS 24 & 25, LYING WESTERLY OF U.S. HIGHWAY NO.
1, A 160 FOOT RIGHT-OF-WAY, PALMAS GRANT SUBDIVISION AS RECORDED
IN MAP BOOK 1, PAGE 23 OF THE PUBLIC RECORDS OF VOLUSIA COUNTY
FLORIDA; AND A PORTION OF GOVERNMENT LOT 3, SECTION 23, TOWNSHIP
16 SOUTH, RANGE 33 EAST. SAID PARCEL CONTAINING 21.38 ACRES.

CONCURRENT ZONING:

A-2

VEHICULAR CIRCULATION:

DRIVEWAYS AND PARKING PATTERNS AS SHOWN.

CONNECTION TO PUBLIC RIGHT OF WAY:

THE DRIVEWAY WILL CONNECT TO U.S.1 AS SHOWN.

SEWER AND WATER CAPACITY:

SEWER: BY ON SITE SEPTIC TANK(1050 GAL),
w/500 sq.ft. ELEVATED DRAIN FIELD.(2 REQ.D.)
WATER: CENTRAL SYSTEM ON SITE.

PHASE 1

PAVILION & RESTROOMS
PLAYGROUND
CARETAKERS TRAILER
PICNIC AREA 1
PICNIC AREA 2
WATER TREATMENT PLANT
12' MOSQUITO CONTROL MAINTENANCE
ROAD & HORSE PATH
40 PARKING SPACES
PUBLIC FISHING PIER
TENT CAMPING AREA (17 SPACES)

EXHIBIT "A"

2:47:328

The Northwest 1/4 of the Southwest 1/4 and the West 431' ^{BOOK 290, PAGE 345} of the Southwest 1/4 and the East 890 feet of the Southwest 1/4 of the Southwest 1/4 and the East 1/2 of the Southwest 1/4, except the East 668.9 feet of the East 1/2 of the Northeast 1/4 of the Southwest 1/4 lying North of Spruce Creek and West 1/2 of the Southeast 1/4 lying Southwest of the main run of Spruce Creek, all in Section 28, Township 16 South, Range 33 East, Public Records of Volusia County, Florida.

TOGETHER WITH

The Northwest 1/4 of the Northwest 1/4 and the East 1/2 of the Northwest 1/4 and the Northwest 1/4 of the Northeast 1/4 and the Southwest 1/4 of the Northeast 1/4, and the Northeast 1/4 of the Southwest 1/4 and Northwest 1/4 of Southeast 1/4 and South 1/2 of the Southeast 1/4, all in Section 33, Township 16 South, Range 33 East, Public Records of Volusia County, Florida.

TOGETHER WITH

All of the Northeast 1/4, of the Southeast 1/4, also the North 511 feet of the Southeast 1/4, of the Southeast 1/4, of Section 29, Township 16 South, Range 33 East, Volusia County, Florida.

MORE PARTICULARLY DESCRIBED AS FOLLOWS:

A portion of Sections 28, 29 and 33, Township 16 South, Range 33 East, Volusia County, Florida, described as follows: From the Southwest corner of said Section 28, as the Point of Beginning, run North 01 Degrees 05 Minutes 03 Seconds East along the West line of said Section 28 a distance of 813.05 feet; thence departing said line, run North 88 Degrees 27 Minutes 19 Seconds West along the South line of the North 511 feet of the Southeast 1/4 of the Southeast 1/4 of said Section 29 a distance of 1332.58 feet; thence North 01 Degrees 06 Minutes 17 Seconds East along the West line of the East 1/4 of said Section 29 a distance of 1833.85 feet; thence South 88 Degrees 30 Minutes 34 Seconds East along the North line of the South 1/2 of said Section 29 a distance of 1331.91 feet to the West line of said Section 28; thence South 89 Degrees 02 Minutes 38 Seconds East along the North line of the South 1/2 of said Section 28 a distance of 2004.05 feet; thence South 01 Degrees 23 Minutes 30 Seconds West along the East line of the West 3/4 of the South 1/2 of said Section 28 a distance of 194.88 feet, more or less to the center of Spruce Creek; thence run Southeasterly along the center of said Spruce Creek to the South line of said Section 28; thence South 89 Degrees 43 Minutes 01 Seconds East along the South line of said Section 28 a distance of 160 feet, more or less, to the East line of the West 1/2 of the Northeast 1/4 of said Section 33; thence South 01 Degrees 27 Minutes 37 Seconds West along said line a distance of 2602.74 feet; thence continue South 01 Degrees 27 Minutes 37 Seconds West along the East line of the Northwest 1/4 of the Southeast 1/4 of said Section 33 a distance of 1308.24 feet; thence South 88 Degrees 58 Minutes 42 Seconds East along the North line of the Southeast 1/4 of the Southeast 1/4 of said Section 33 a distance of 1326.60 feet to the East line of said Section 33; thence South 01 Degrees 47 Minutes 14 Seconds West along said East line a distance of 1309.53 feet; thence North 88 Degree 55 Minutes 33 Seconds West along the South line of said Section 33 a distance of 2638.24 feet; thence departing said line, run North 01 Degrees 07 Minutes 58 Seconds East along the West line of the Southwest 1/4 of the Southeast 1/4 of said Section 33 a distance of 1306.99 feet; thence North 88 Degrees 58 Minutes 42 Seconds West along the South line of the Northeast 1/4 of the Southwest 1/4 of said Section 33 a distance of 1320.96 feet; thence North 01 Degrees 03 Minutes 07 Seconds East along the West line of the Northeast 1/4 of the Southwest 1/4 and the West line of the Southeast 1/4 of the Northwest 1/4 of said Section 33 a distance of 2604.69 feet; thence North 88 Degrees 47 Minutes 09 Seconds West along the South line of the Northwest 1/4 of the Northwest 1/4 of said Section 33 a distance of 1324.65 feet to the West line of said Section 33; thence North 01 Degrees 58 Minutes 15 Seconds East along said West line a distance of 1304.57 feet to the Point of Beginning.

Containing 611.48 acres, more or less.

Subject to Right of Way Easement recorded in Deed Book 290, Page 345, Public Records of Volusia County, Florida. B - 5

Also see Right Easement recorded in Official Records Book 199, Page

27471329

BOOK PAGE
VOLUME COUNTY
FILE#

EXHIBIT "A" CONTINUED

A portion of Sections 3 and 4, Township 17 South, Range 33 East, Volusia County, Florida, described as follows:

From the Northeast corner of said Section 4, run South 89 Degrees 08 Minutes 30 Seconds West along the North line of said Section 4 a distance of 506.98 feet to the Point of Beginning of the centerline of a 60 foot access and utility easement, being 30.00 feet on each side of the following described centerline; thence South 01 Degrees 07 Minutes 00 Seconds West, parallel with the East line of said Section 4 a distance of 1839.26 feet to the P.C. of a curve, concave Northeast, having a radius of 675.00 feet and a central angle of 54 Degrees 31 Minutes 26 Seconds; thence run Southerly along the arc of said curve a distance of 642.34 feet; thence South 53 Degrees 24 Minutes 26 Seconds East a distance of 350.00 feet to the centerline of Turnbull Bay Road and the termination of said centerline.

EXHIBIT "A" (CONTINUED)

The South $\frac{1}{2}$ of the Southeast $\frac{1}{4}$, together with the Southerly 99.90 feet of the Northwest $\frac{1}{4}$ of the Southeast $\frac{1}{4}$, all in Section 33, Township 16 South, Range 33 East, Volusia County, Florida.

Also a portion of Sections 3 and 4, Township 17 South, Range 33 East, Volusia County, Florida, described as follows:

From the Northeast corner of said Section 4, run South 89 Degrees 08 Minutes 30 Seconds West along the North line of said Section 4 a distance of 506.98 feet to the Point of Beginning of the centerline of a 60 foot access and utility easement, being 30.00 feet on each side of the following described centerline; thence South 01 Degrees 07 Minutes 00 Seconds West, parallel with the East line of said Section 4 a distance of 1839.26 feet to the P.C. of a curve, concave Northeast, having a radius of 675.00 feet and a central angle of 54 Degrees 31 Minutes 26 Seconds; thence run Southerly along the arc of said curve a distance of 642.34 feet; thence South 53 Degrees 24 Minutes 26 Seconds East a distance of 350.00 feet to the centerline of Turnbull Bay Road and the termination of said centerline.

SUBJECT to Right of Way Easement in Deed Book 290, Page 345, Public Records of Volusia County, Florida.

SUBJECT to Florida Power & Light Easement recorded in Deed Book 199, Page 186, Public Records of Volusia County, Florida.

SUBJECT to certain boundary line agreement between Darrell S. Ozier and Catherine C. Goodrich, recorded in Official Records Book 1892, Page 1727, Public Records of Volusia County, Florida.

SUBJECT to Right of Way in favor of Florida Gas Company, as recorded in Official Records Book 579, Page 685, Public Records of Volusia County, Florida.

SUBJECT to Right of Way of Martin Dairy Road.

SUBJECT to matters contained in that Special Warranty Deed from Berrien Becks, Sr. and Berrien Becks, Jr. to B. H. Oates, Jr., as recorded in Official Records Book 2781, Page 462, Public Records of Volusia County, Florida.

EXHIBIT "A"

PARCEL NUMBER 1

THAT PART OF U.S. LOTS 1 AND 3, SECTION 23, TOWNSHIP 16 SOUTH, RANGE 33 EAST, LYING WEST OF U.S. HIGHWAY NO. 1, U.S. LOT 2, SECTION 23, TOWNSHIP 16 SOUTH, RANGE 33 EAST, U.S. LOTS 1, 4 AND 5, SECTION 22, TOWNSHIP 16 SOUTH, RANGE 33 EAST. THAT PART OF U.S. LOTS 2 AND 3, SECTION 22, TOWNSHIP 16 SOUTH, RANGE 33 EAST LYING EAST OF FLORIDA EAST COAST RAILWAY. THAT PART OF THE NORTHWEST 1/4 OF SECTION 22, TOWNSHIP 16 SOUTH, RANGE 33 EAST, LYING EAST OF THE FLORIDA EAST COAST RAILWAY. EXCEPTING THEREFROM THE FOLLOWING DESCRIBED PROPERTY IN LOT 1, SECTION 23, TOWNSHIP 16 SOUTH, RANGE 33 EAST: BEGIN AT A POINT ON THE WEST BOUNDARY OF U.S. NO. 1 HIGHWAY, WHERE THE SAME IS INTERSECTED BY THE SOUTHERLY SHORE OF ROSE BAY AT HIGHWATER MARK, THENCE SOUTHERLY ALONG THE WEST BOUNDARY OF SAID HIGHWAY 295.11 FEET, THENCE WESTERLY AND AT RIGHT ANGLES TO SAID HIGHWAY 295.11 FEET TO A CONCRETE MONUMENT, THENCE NORTHWESTERLY AND PARALLEL TO SAID HIGHWAY 295.11 FEET TO A POINT IN ROSE BAY, THENCE 295.11 FEET TO THE POINT OF BEGINNING, EXCEPT THAT PART NOW IN HIGHWAY NO. 1.

PARCEL NUMBER 9

PARCEL "A" - OFFICIAL RECORDS BOOK 7433, PAGE 333, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; SECTION 28, TOWNSHIP 16 SOUTH, RANGE 33 EAST; SOUTHWEST 1/4 OF NORTHWEST 1/4 LYING SOUTH AND WEST OF CREEK, SECTION 29, TOWNSHIP 16 SOUTH, RANGE 33 EAST; NORTHEAST 1/4 SOUTH OF SPRUCE CREEK, ALL LOCATED IN VOLUSIA COUNTY, FLORIDA, EXCEPTING THEREFROM PARCEL "B" OF OFFICIAL RECORDS BOOK 1274, PAGE 552, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA: THAT PART OF: SOUTHWEST 1/4 OF NORTHEAST 1/4, SOUTH OF SPRUCE CREEK, OF SECTION 29, TOWNSHIP 16 SOUTH, RANGE 33 EAST, LYING WESTERLY OF A LINE DESCRIBED AS FOLLOWS: COMMENCE ON THE SOUTH BOUNDARY OF SECTION 29, TOWNSHIP 16 SOUTH, RANGE 33 EAST AT A POINT 1492.50 FEET WEST FROM THE SOUTHEAST CORNER THEREOF, RUN THENCE NORTH 23 DEGREES 23 MINUTES 50 SECONDS WEST, 2244.30 FEET; THENCE NORTH 66 DEGREES 36 MINUTES 10 SECONDS EAST, 250 FEET TO THE POINT OF BEGINNING; RUN THENCE NORTH 13 DEGREES 36 MINUTES 19 SECONDS EAST, 1770 FEET, MORE OR LESS, TO THE MIDDLE OF SPRUCE CREEK, AND THE END OF THE LINE AS HEREIN DESCRIBED.

PARCEL NUMBER 4

THE PALMAS GRANT ALSO KNOWN AS SECTION 33, TOWNSHIP 16 SOUTH, RANGE 33 EAST, EXCEPTING THEREFROM THE FOLLOWING PARTS: LOT 6 IN BLOCK 11; THAT PART OF LOTS 1 AND 2 IN BLOCK 13, LYING EAST OF WHAT IS COMMONLY KNOWN AS THE SAW GRASS MARSH; LOTS 1 AND 2 AND 3, IN BLOCK 14; AND THE WEST 1/2 OF LOT 1 IN BLOCK 13; AND THAT PARCEL OF LAND HERETOFORE CONVEYED TO THE FLORIDA EAST COAST AND GULF RAILROAD CO., (NOW OWNED BY THE FLORIDA EAST COAST RAILROAD) ON OCTOBER 5, 1892, SAID EXCEPTED TRACTS AND THE BLOCKS AND LOTS ABOVE NAMED ARE KNOWN AS LOTS AND BLOCKS IN A PLAT OF THE PALMAS GRANT RECORDED IN MAP BOOK 1, PAGE 23, OF THE PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA, AND ALSO EXCEPTING THEREFROM A PORTION OF THE PALMAS GRANT, KNOWN AS THAT PORTION OF LOT OR BLOCK 24, CONNERAT'S SUBDIVISION OF SAID PALMAS GRANT, BEING MORE PARTICULARLY DESCRIBED AS BEGINNING AT A POINT IN THE WEST LINE OF U.S. HIGHWAY NO. 1, ALSO KNOWN AS DIXIE HIGHWAY AND BEING 200 FEET WIDE AS NOW LAID OUT AND OCCUPIED; SAID POINT BEING A DISTANCE OF 1960 FEET SOUTHERLY

EXHIBIT "A" (CONTINUED)

OF, AS MEASURED AT RIGHT ANGLES, TO THE NORTH LINE OF SAID PALMAS GRANT; THENCE SOUTH 14 DEGREES 40 MINUTES 30 SECONDS EAST ALONG SAID WEST LINE OF U.S. HIGHWAY NO. 1 (DIXIE HIGHWAY) A DISTANCE OF 250 FEET TO A POINT THEREIN; THENCE SOUTH 60 DEGREES 00 MINUTES 00 SECONDS WEST, A DISTANCE OF 161 FEET MORE OR LESS TO A HIGH WATER MARK OF SPRUCE CREEK; THENCE NORTHERLY ALONG SAID HIGH WATER MARK A DISTANCE OF 275 FEET MORE OR LESS, TO A POINT IN A LINE PARALLEL TO AND 1960 FEET SOUTHERLY AS MEASURED AT RIGHT ANGLES, FROM SAID NORTH LINE OF PALMAS GRANT; THENCE NORTH 60 DEGREES EAST, ALONG SAID PARALLEL LINE A DISTANCE OF 100 MORE OR LESS TO A POINT OF BEGINNING AND ALSO EXCEPTING THEREFROM THAT CERTAIN 10 ACRES OF THE PLOT KNOWN AS "BLACK HAMMOCK", WHICH 10 ACRES ARE BOUNDED ON THE EAST BY THE HIGHWAY OR ROAD WHICH RUNS FROM NEW SMYRNA TO DAYTONA, ON THE NORTH BY SAME HIGHWAY AND BY SPRUCE CREEK, ON THE WEST BY SPRUCE CREEK AND TURNBULL BAY, AND ON THE SOUTH BY OTHER LAND OF PALMAS GRANT. ALSO EXCEPTING THEREFROM THE RIGHT OF WAY OF U.S. HIGHWAY NO. 1 AS NOW LAID OUT AND ESTABLISHED. ALSO EXCEPTING ALL LAND EAST OF U.S. HIGHWAY NO. 1; ALSO EXCEPTING ALL LAND WEST OF THE FLORIDA EAST COAST RAILROAD NORTH OF SPRUCE CREEK AND ALSO EXCEPTING ALL LAND SOUTH OF SPRUCE CREEK EAST OF TURNBULL BAY ALL OF SAID LAND WITHIN THE PALMAS GRANT.

AND ALSO EXCEPTING:

A PORTION OF BLOCKS 24 AND 25, LYING WESTERLY OF U.S. HIGHWAY NO. 1, A 160 FOOT RIGHT OF WAY, PALMAS GRANT SUBDIVISION AS RECORDED IN MAP BOOK 1, PAGE 21, OF THE PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA; AND A PORTION OF GOVERNMENT LOT 3, SECTION 23, TOWNSHIP 16 SOUTH, RANGE 33 EAST AND BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCE AT THE NORTHEAST CORNER OF THE SAID PALMAS GRANT PER DEPARTMENT OF TRANSPORTATION RIGHT OF WAY MAPS. THENCE S 59°12'35" W, ALONG THE NORTH LINE OF SAID PALMAS GRANT, 710.79 FEET TO THE NORTHWESTERLY RIGHT OF WAY LINE OF U.S. HIGHWAY NO. 1 SAID POINT BEING N 59°12'35" E, .7 FEET FROM A FOUND CONCRETE MONUMENT ON THE SAID PALMAS GRANT LINE. THENCE S 01°05'04" W, ALONG THE WESTERLY RIGHT OF WAY LINE OF SAID U.S. HIGHWAY NO. 1, 449.03 FEET TO THE POINT OF BEGINNING; THENCE CONTINUE S 01°05'04" W, 754.86 FEET; THENCE ALONG A WETLANDS LINE AS LOCATED BY THE VOLUSIA COUNTY ENVIRONMENTAL DEPARTMENT THE FOLLOWING COURSES AND DISTANCES: N 51°14'31" W, 59.41 FEET; THENCE N 09°48'24" E, 22.34 FEET; THENCE N 08°24'49" W, 17.09 FEET; THENCE N 37°27'10" W, 39.89 FEET; THENCE N 17°34'37" E, 54.43 FEET; THENCE N 77°59'03" E, 18.65 FEET; THENCE N 12°41'49" E, 46.89 FEET; THENCE N 20°33'31" W, 36.92 FEET; THENCE N 03°11'47" E, 69.28 FEET; THENCE N 11°00'57" W, 58.82 FEET; THENCE N 28°37'59" W, 53.34 FEET; THENCE N 46°02'53" E, 36.86 FEET; THENCE N 85°35'44" W 34.46 FEET; THENCE S 52°06'38" W, 45.03 FEET; THENCE N 41°22'25" W, 55.36 FEET; THENCE S 03°44'33" W, 72.99 FEET; THENCE S 68°27'07" W, 77.06 FEET; THENCE S 05°21'34" E, 41.28 FEET; THENCE S 45°01'49" E, 47.46 FEET; THENCE S 14°22'22" W, 54.49 FEET; THENCE S 01°53'25" E, 54.31 FEET; THENCE S 21°01'39" E, 44.62 FEET; THENCE S 00°26'23" E, 70.32 FEET; THENCE S 54°00'46" W, 43.72 FEET; THENCE S 34°19'15" W, 83.75 FEET; THENCE S 14°14'25" E, 34.71 FEET; THENCE S 18°33'42" W, 38.56 FEET; THENCE S 09°34'15" E, 72.08 FEET; THENCE S 40°23'55" E, 25.89 FEET; THENCE S 52°41'29" W, 57.61 FEET; THENCE S 72°58'04" W, 41.55 FEET; THENCE S 09°45'32" E 50.10 FEET; THENCE S 33°03'22" E, 35.36 FEET; THENCE S 25°03'54" W, 26.72 FEET; THENCE S 73°21'26" W, 47.51 FEET; THENCE N 79°12'06" W 53.11 FEET; THENCE S 32°05'01" W, 27.61 FEET; THENCE S 72°11'00" E, 39.93 FEET; THENCE S 23°39'57" E, 45.33 FEET; THENCE S 18°24'28" W, 34.01 FEET; THENCE S 81°35'48" W, 64.17 FEET; THENCE N 77°54'30" W, 33.29 FEET; THENCE S 67°23'23" W, 34.67 FEET; THENCE N 65°47'33" W, 62.75 FEET; THENCE N 74°10'59" W, 33.19 FEET;

EXHIBIT "A" (CONTINUED)

THENCE N 09°29'55" W, 48.18 FEET; THENCE N 40°34'32" W, 52.80 FEET; THENCE N 40°55'44" W, 66.27 FEET; THENCE N 53°56'08" W, 63.80 FEET; THENCE N 26°30'18" W, 39.47 FEET; THENCE N 32°50'35" W, 43.11 FEET; THENCE N 34°55'30" W, 169.43 FEET; THENCE N 33°41'58" W, 92.55 FEET; THENCE N 40°04'03" W, 45.87 FEET; THENCE N 52°05'17" W, 51.41 FEET; THENCE N 18°02'44" W, 35.37 FEET; THENCE N 09°15'08" E, 69.20 FEET; THENCE N 08°50'07" E, 53.18 FEET; THENCE N 03°00'10" E, 43.53 FEET; THENCE N 38°48'46" E, 36.62 FEET; THENCE N 06°45'33" E, 70.01 FEET; THENCE N 25°11'18" W, 77.84 FEET; THENCE N 00°34'51" W, 79.72 FEET; THENCE N 01°17'24" W, 62.60 FEET; TO THE SAID NORTH LINE OF THE PALMAS GRANT; THENCE N 01°17'24" W, 13.25 FEET; THENCE N 24°09'52" W, 60.85 FEET; THENCE N 02°18'43" E, 62.79 FEET; THENCE N 07°11'38" W, 33.53 FEET; THENCE N 18°56'19" E, 32.93 FEET; THENCE N 12°05'34" W, 37.91 FEET; THENCE N 16°45'13" E, 56.50 FEET; THENCE N 10°07'15" E, 53.71 FEET; THENCE N 46°29'56" E, 26.76 FEET; THENCE S 65°53'18" E, 62.66 FEET; THENCE N 53°32'20" E, 45.25 FEET; THENCE N 39°56'09" E, 48.85 FEET; THENCE N 62°37'18" E, 44.19 FEET; THENCE N 80°12'52" E, 33.29 FEET; THENCE S 78°10'31" E, 36.77 FEET; THENCE S 34°19'33" E, 30.02 FEET; THENCE S 58°09'16" E, 61.04 FEET; THENCE S 40°21'37" W, 53.72 FEET; THENCE S 69°47'21" W, 40.74 FEET; THENCE S 07°54'59" W, 31.08 FEET; THENCE S 21°50'13" E, 51.40 FEET; THENCE S 79°38'15" E, 48.81 FEET; THENCE S 24°54'01" E, 25.92 FEET; TO THE SAID NORTH LINE OF THE PALMAS GRANT; THENCE S 24°54'01" E, 20.73 FEET; THENCE S 43°30'03" W, 28.00 FEET; THENCE N 80°23'56" E, 47.00 FEET; THENCE S 65°15'45" E, 38.00 FEET; THENCE S 75°33'57" E, 45.98 FEET; THENCE N 77°57'27" E, 33.70 FEET; THENCE S 86°51'24" E, 62.12 FEET; THENCE N 71°07'43" E, 37.53 FEET; THENCE N 61°38'46" E, 122.13 FEET; THENCE S 79°36'05" E, 35.51 FEET; THENCE S 57°34'43" E, 49.71 FEET; THENCE S 45°09'18" E, 85.20 FEET; THENCE N 80°37'21" E, 45.54 FEET; THENCE S 47°04'29" E, 42.68 FEET; THENCE S 02°52'05" E, 31.14 FEET; THENCE S 11°31'02" W, 48.19 FEET; THENCE S 88°53'30" E, 54.10 FEET; THENCE N 44°43'30" E, 42.64 FEET; THENCE N 06°03'48" E, 47.80 FEET; THENCE N 23°34'06" E, 63.12 FEET TO THE POINT OF BEGINNING.

AND ALSO EXCEPTING

A PORTION OF SAID PALMAS GRANT BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCE AT THE SOUTHWEST CORNER OF THE PALMAS GRANT, RUN ALONG THE SOUTHERLY LINE OF SAID PALMAS GRANT, N 60°34'28" E, 631.90 FEET TO THE POINT OF BEGINNING; THENCE N 14°03'22" W, 1334.04 FEET; THENCE N 30°01'19" W, 673.31 FEET; THENCE S 60°34'28" W, 40.01 FEET; TO THE SOUTHEAST CORNER OF LOT 2, BLOCK 13, SAID PALMAS GRANT; THENCE ALONG THE EASTERLY LINE OF LOTS 1 AND 2, SAID BLOCK 13, N 30°45'33" W, 330.00 FEET; THENCE N 60°34'28" E, 100.03 FEET; THENCE S 30°45'33" E, 328.99 FEET; THENCE S 30°01'19" E, 627.45 FEET, TO THE WESTERLY RIGHT OF WAY LINE OF THE FLORIDA EAST COAST RAILWAY; THENCE ALONG SAID RIGHT OF WAY, S 21°32'42" E, 115.35 FEET; THENCE S 14°03'22" E, 1284.73 FEET, TO THE SAID SOUTHERLY LINE OF THE PALMAS GRANT; THENCE ALONG SAID SOUTHERLY LINE S 60°34'28" W, 62.23 FEET, TO THE POINT OF BEGINNING.

AND ALSO EXCEPTING:

A PORTION OF SAID PALMAS GRANT BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCE AT THE SOUTHWEST CORNER OF THE PALMAS GRANT, RUN N 07°39'56" W, 2341.78 FEET, TO A POINT ON THE NORTHERLY LINE OF LOT 8, BLOCK 8 OF SAID PALMAS GRANT, BEING THE POINT OF BEGINNING; THENCE ALONG SAID NORTHERLY LINE OF LOT 8, S 60°34'28" W, 70.00 FEET TO THE SOUTHEAST CORNER OF LOT 3, BLOCK 14, OF SAID PALMAS GRANT; THENCE ALONG THE EASTERLY LINE OF SAID LOT 3, N 29°18'53" W,

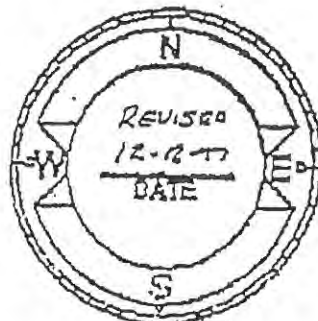
EXHIBIT "A" (CONTINUED)

711.25 FEET TO THE MEAN HIGH WATER LINE OF SPRUCE CREEK; THENCE ALONG SAID MEAN HIGH WATER LINE THE FOLLOWING TWO COURSES AND DISTANCES (1) S 58°22'46" E, 86.97 FEET, (2) N 78°31'25" E, 29.15 FEET; THENCE S 29°13'53" E, 626.30 FEET; TO THE POINT OF BEGINNING.

PARCEL 3:

A PORTION OF BLOCKS 24 AND 25 AND A PORTION OF A VACATED 30 FOOT RIGHT OF WAY UNOPENED AND UNUSED LYING BETWEEN BLOCKS 24 AND 25, PALMAS GRANT SUBDIVISION OF SECTION 38, TOWNSHIP 16 SOUTH, RANGE 33 EAST, AS SHOWN IN MAP BOOK 1, PAGE 23 OF THE PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA, LYING EAST OF U.S. HIGHWAY #1, (160 FOOT RIGHT OF WAY AS NOW OCCUPIED) BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS: AS A POINT OF REFERENCE COMMENCE AT THE INTERSECTION OF THE NORTH LINE OF PALMAS GRANT, SECTION 38, TOWNSHIP 16 SOUTH, RANGE 33 EAST, WITH THE EASTERLY LINE OF U.S. HIGHWAY #1, (160 FOOT RIGHT OF WAY); THENCE SOUTH 01 DEGREES 05 MINUTES 04 SECONDS WEST ALONG THE EASTERLY LINE OF U.S. HIGHWAY #1 A DISTANCE OF 1583.55 FEET TO A POINT OF CURVATURE; THENCE ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 3045.36 FEET AND THROUGH A CENTRAL ANGLE OF 01 DEGREES 30 MINUTES 18 SECONDS A DISTANCE OF 80.00 FEET TO THE POINT OF BEGINNING; THENCE CONTINUE ALONG SAID CURVE TO THE LEFT HAVING A RADIUS OF 3045.36 FEET AND THROUGH A CENTRAL ANGLE OF 07 DEGREES 25 MINUTES 10 SECONDS A DISTANCE OF 394.35 FEET TO A POINT; THENCE NORTH 82 DEGREES 09 MINUTES 39 SECONDS EAST A DISTANCE OF 20.00 FEET TO A POINT ON A CURVE; THENCE FROM A TANGENT BEARING OF SOUTH 07 DEGREES 49 MINUTES 42 SECONDS EAST ALONG A CURVE TO THE LEFT HAVING A RADIUS OF 3025.36 FEET AND THROUGH A CENTRAL ANGLE OF 06 DEGREES 47 MINUTES 36 SECONDS A DISTANCE OF 358.71 FEET TO A POINT ON THE MEAN HIGH WATERLINE OF ROSE BAY; THENCE IN A NORTHEASTERLY DIRECTION ALONG A MEAN HIGH WATER LINE A DISTANCE OF 745.00 FEET TO A POINT; THENCE NORTH 83 DEGREES 54 MINUTES 56 SECONDS WEST, A DISTANCE OF 285.00 FEET TO THE POINT OF BEGINNING.

LOTS 3 AND 4, BLOCK 12, LYING WEST OF THE RIGHT OF WAY OF THE FLORIDA EAST COAST RAILWAY, DOUGLAS MAP AND SUBDIVISION OF PALMAS GRANT, LOCATED IS SECTION 38, TOWNSHIP 16, SOUTH, RANGE 33 EAST, AS PER PLAT THEREOF RECORDED IN MAP BOOK 1, PAGE 23, PUBLIC RECORDS OF VOLUSIA COUNTY, FLORIDA.



Appendix C:

FDEP Management Prospectus

2021 Florida Forever Five-Year Plan

Spruce Creek

Summary of Recommendations and Status
as of
December 2020



Division of State Lands
Florida Department of Environmental Protection



Spruce Creek

Substantially Complete Project

Volusia

Project-at-a-Glance

Year Added to Priority List	1990
Project Acres	2,841
Acquired Acres	2,475
Cost of Acquired Acres	\$19,118,050
Remaining Project Acres	366
2019 Assessed Value of Remaining Acres	\$6,313,774

Purpose for State Acquisition

Natural areas along the coast of Volusia County are becoming scarce as residential developments expand from Daytona Beach and New Smyrna Beach. The Spruce Creek project protects one of the largest tracts of undeveloped land left in this region along the estuary of Spruce Creek and helps to maintain the water quality of the creeks and bays here, thus protecting a fishery. Additionally, this project will conserve what may be the site of Andrew Turnbull's 18th-century plantation and provide a recreation area where people can do anything from hiking and fishing to simply learning about the plants and animals of this scenic landscape.

Manager(s)

Volusia County is the recommended manager.

General Description

The original Spruce Creek project area, north and west of Strickland Bay, contains good estuarine tidal swamps, hammocks, scrub, and flatwoods. It protects habitat for such endangered or threatened species as bald eagles, wood storks and manatees. The addition, between U.S. 1 and Turnbull Bay, contains good Maritime or Xeric Hammock, with live oaks, cabbage palms, and several tropical shrubs near their northern limits. Flatwoods also cover a



large part of the addition, and tidal marsh with remnants of black mangrove fringes it. Disturbed areas include an historic house at the north end and the remains of a fish camp and marina east of U.S. 1. No FNAI-listed plants are known from the addition; of FNAI-listed animals, gopher tortoises have been found. The area is adjacent to several Outstanding Florida Waters, and the aquatic resources Florida Waters, and the aquatic resources are important to both recreation and commercial fisheries. There are two archaeological sites recorded within the project area: Spruce Creek Mound site, a prehistoric and historic burial mound; and J. D. site, a prehistoric and historic shell midden and burial site. The project may also contain historic archaeological sites related to the British Colonial Period occupation in this area of NE Florida (ca. 1763–1783 AD). The area is experiencing significant growth, so developable acreage is likely to be lost relatively soon.

FNAI Element Occurrence Summary

<u>FNAI Elements</u>	<u>Score</u>
Florida scrub-jay	G2?/S2
Gopher tortoise	G3/S3
Florida black bear	G5T4/S4
Florida beargrass	G3/S3
Bald eagle	G5/S3

5 rare species are associated with the project

Public Use

This project is designated as a recreation area with uses such as cultural and environmental education, hiking, fishing, camping and picnicking.

Acquisition Planning

1989

On December 1, 1989, the Land Acquisition Advisory Council (LAAC) added the original Spruce Creek project to the CARL Priority list. This fee-simple acquisition, sponsored by Volusia County, consisted of approximately 1,718 acres, nine owners, and a 1989 taxable value of \$2,675,000.

1990

On December 7, 1990, an owner-sponsored 54-acre parcel was added to the boundary.

1992

The project was removed on December 10, 1992 due to unwilling sellers. At that time, it was less than 90 percent complete.



1994

On December 6, 1994, LAAC added the current Spruce Creek project to the 1995 CARL Priority list. This fee-simple proposal was sponsored by Volusia County, as the previous one had been, and had the same name, but consisted of 524 acres -a 208-acre portion of the original project and a 316-acre addition and had a 1993 taxable value of \$2,124,141. The project boundary, as approved by LAAC, however, included the portions of the 1989 project that had already been acquired. The resulting project acreage equaled 1,593 acres with a taxable value of \$3,406,991.

2002

On October 24, 2002, the Acquisition and Restoration Council (ARC) approved a fee-simple 648-acre addition to the project boundary. It was sponsored by Volusia County and consisted of five owners.

2009

On October 9, 2009, ARC voted to remove 6 sites with 54 individual parcels (97 acres) containing residential and commercial buildings or infrastructure. The total acreage removed had a just value of \$9,166,381.

2011

On December 9, 2011, ARC placed this project in the Substantially Complete category of Florida Forever projects.

Coordination

Volusia County is a partner in the acquisition of this project as well as being identified as the manager. SJRWMD and City of Port Orange are acquisition partners also.

Management Policy Statement

The primary goals of management of the Spruce Creek project are to conserve, protect, manage, or restore important ecosystems, landscapes, and forests, in order to enhance or protect significant surface water, coastal, recreation, timber, fish or wildlife resources which local or state regulatory programs cannot adequately protect; to provide areas, including recreation trails, for natural-resource based recreation; and to preserve significant archaeological or historical sites.



Management Prospectus

Qualifications for state designation

The Spruce Creek Recreation Area has the size, natural, cultural, and recreation resources, and surrounding population density to qualify as a State Recreation Area.

Manager

Volusia County in cooperation with the State of Florida.

Conditions affecting intensity of management

The project includes moderate-need tracts requiring more than basic resource management and protection. These lands will contain more highly developed resource-related recreation facilities. Large portions of the property, however, would be considered low-need tracts requiring only basic resource management and protection. Recreation use will be incorporated but in a more dispersed and less intensive manner.

Timetable for implementing management and provisions for security and protection of infrastructure

Within the first year after acquisition, management activities will concentrate on site security and resource inventory. Volusia County will provide appropriate access to the site to maintain existing and historic uses while protecting sensitive resources on the site. The site's natural resources and listed plants and animals will be inventoried, recreation opportunities and uses identified, and a management plan formulated. Long-range plans for Spruce Creek will be specified in the management plan and will generally be directed as follows: Development of recreation facilities, a comprehensive trail management program, a comprehensive educational and interpretive program, and a comprehensive historic resource management program; restoration of disturbed areas; maintenance of natural communities through a program of selected harvest and fire management; and habitat enhancement for listed species.

Revenue-generating potential

This will be determined by the concepts in the Management Plan. Some revenues will probably be generated by user and concession fees at recreation sites. Some revenues may be generated through sale of forest products, but any such revenues will be minimal. Use of small portions of the area as mitigation for development elsewhere would not only restore damaged areas on-site but would yield revenue as well. It will be several years before potential revenue sources could be fully developed.

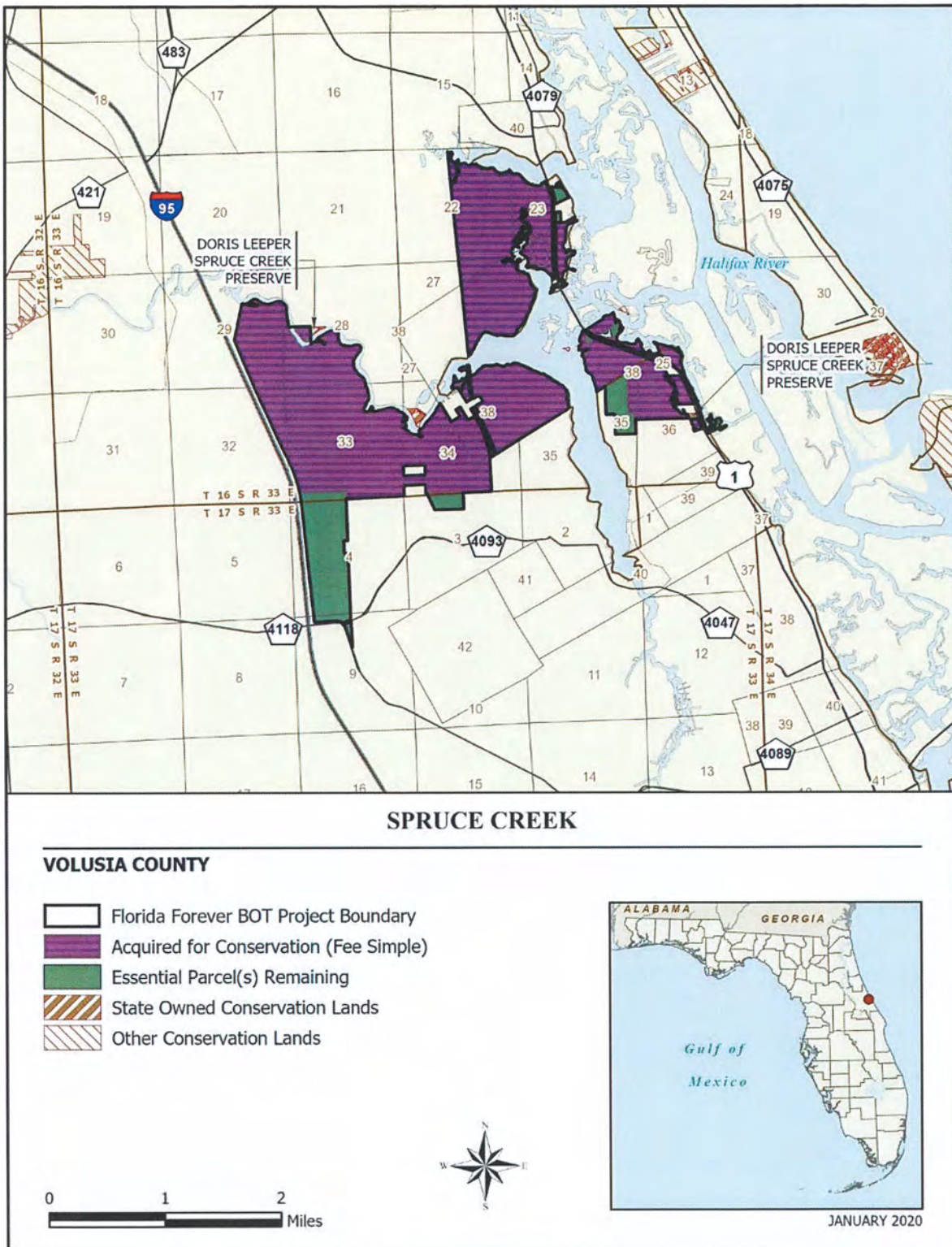
*Cooperators in management activities*

Port Orange and New Smyrna Beach both will be involved in the planning of the project. The Museum of Arts and Sciences and the Atlantic Center for the Arts may prove to be valuable partners in optimizing the educational and interpretive opportunities on this site. The Nature Conservancy still owns the 150 acres that is managed by the Museum of Arts and Sciences. The Environmental Council and Sierra Club have played important roles in the early protection of the creek including sponsoring OFW status in 1986. The Southeast Volusia Historical Society and Volusia Anthropological Society have had long-standing interest in protection and interpretation of the cultural, historical and archaeological resources located on the project site. Volunteers will be invaluable in developing, managing, and interpreting the site.

Management Cost Summary

<u>Volusia County</u>	<u>1996/97</u>	<u>1997/98</u>
Source of Funds	Volusia County	Volusia County
OPS	\$0	\$0
Expense	\$0	\$0
OCO	\$0	\$0
FCO	\$0	\$0
TOTAL	\$6,240	\$6,240

Source: Management Prospectus as originally submitted



Map 1: FNAI, January 2021

Appendix D:

**Public Involvement
Management Plan Advisory Group**



MINUTES

Doris Leeper Spruce Creek Preserve Management Plan Advisory Group Public Meeting



January 31, 2022

MEMBERS

Lauren Akins, Florida Fish & Wildlife Conservation Commission
Dr. Wendy Anderson, Chair, Volusia County Soil & Water Conservation District
Tim Baylie, Parks, Recreation & Culture Director
Hon. Jeff Brower, Volusia County Council Chair
Dr. Brad Burbaugh, Resource Stewardship Director
Sonya Guidry, Florida Native Plant Society – Paw Paw Chapter
Brent Saulsbury, Florida Forest Service
Wanda VanDam, Landowner & Volusia Forever Advisory Committee Member

MODERATOR

Bill Korn, Young Bear Environmental Consulting

CALL TO ORDER/WELCOME

Bill Korn called the meeting to order at 5:00 p.m., and welcomed Advisory Group Members to the Public Meeting.

ADVISORY GROUP ORIENTATION/OVERVIEW OF HEARING PROCEDURES

Mr. Korn explained that Section 259.032 F.S. requires that an individual management plan be developed for state owned lands over 160 acres. He stated this statute also requires a minimum of one public hearing and input from an advisory group. Mr. Korn stated the statute also required the management plan to be reviewed every 10 years.

Mr. Korn related the expectation of the Florida Sunshine Law which, in brief, instructs members of a governmental body or group in a decision-making capacity not to discuss agenda items outside the publicly noticed meeting.

Mr. Korn explained the meeting processes for the Public Meeting and for the Public Hearing beginning at 5:30pm. He stated the role of the MPAG at these meetings would be to listen to public comments. He said the Lead Managing Agency, Resource Stewardship Division, along with supporting county staff would handle the responses to public questions.

Mr. Korn said the Public Meeting scheduled for 9:00a.m., Wednesday, February 2, 2022 would be the Advisory Group's opportunity to review all public comments, discuss and make recommendations to the Lead Managing Agency to assist with the preparation of the updated management plan for the Doris Leeper Spruce Creek Preserve. This management plan would then be presented to the County Council for approval, and subsequently submitted to the Division of State Lands for approval by the Acquisition and Restoration Council.

CHAIR ELECTION

Mr. Korn called for the election of a Chair for the Doris Leeper Spruce Creek Preserve Management Plan Advisory Group.

Jeff Brower made a MOTION *"To nominate Tim Baylie"*. Wanda VanDam seconded the motion. The motion carried unanimously.

ADJOURNMENT

The meeting was adjourned at 5:15 p.m.

MINUTES
Doris Leeper Spruce Creek Preserve
Management Plan Advisory Group
Public Hearing
❖❖❖
January 31, 2022

MEMBERS

Lauren Akins, Florida Fish & Wildlife Conservation Commission
Dr. Wendy Anderson, Chair, Volusia County Soil & Water Conservation District
Tim Baylie, Parks, Recreation & Culture Director
Hon. Jeff Brower, Volusia County Council Chair
Dr. Brad Burbaugh, Resource Stewardship Director
Sonya Guidry, Florida Native Plant Society – Paw Paw Chapter
Brent Saulsbury, Florida Forest Service
Wanda VanDam, Landowner & Volusia Forever Advisory Committee Member

MODERATOR

Bill Korn, Young Bear Environmental Consulting

PRESENTER

Danny Young, Young Bear Environmental Consulting

CALL TO ORDER/WELCOME

Chair Tim Baylie called the meeting to order at 5:30 p.m., and welcomed Advisory Group Members and attendees to the Public Hearing. Chair Baylie welcomed those attending virtually and explained the process for submitting questions online.

OVERVIEW OF PUBLIC HEARING PROCEDURES/PROCESS

Bill Korn, Young Bear Environmental Consulting, introduced himself and gave a brief overview of the public hearing procedures and process as outlined by the Florida Statutes.

Mr. Korn gave a brief history of the current management plan and explained that state statutes required a review/update every 10 years.

He then introduced Danny Young, Young Bear Environmental Consulting.

PRESENTATION

Mr. Young provided a PowerPoint presentation and explanation of how the current management plan was developed.

Mr. Young presented a map showing the various owners of the ~2,500 acres of the Doris Leeper Spruce Creek Preserve. He reviewed the management history of the Preserve.

Mr. Young provided an overview of the goals, objectives and accomplishments of the management plan, which were broken into eight (8) categories:

- 1) Habitat
 - a. Goals
 - i. Restore habitats
 - ii. Maintain habitats
 - b. Objectives
 - i. Manage for maintenance condition
 - ii. Achieve desired future conditions
 - c. Accomplishments
 - i. Restoration Plan implemented
 - ii. Scrub and scrubby flatwoods restoration
- 2) Forest Management
 - a. Goals & Objectives
 - i. Manage/monitor timber stands
 - ii. Sustainable forest management
 - iii. No forestation or harvest planned
 - iv. Access Issues
 1. Rose Bay
 2. Turnbull Bay
- 3) Invasive Species
 - a. Goals & Objectives
 - i. Remove/Control exotic invasive
 - ii. Conduct ongoing maintenance
- 4) Imperiled Species (Wildlife and Plants)
 - a. Goals
 - i. Restore, maintain, monitor species
 - ii. Populations and habitats
 - iii. Restore, maintain imperiled habitats
 - b. Objectives
 - i. Continue tracking/inventory
 - ii. Continue partnerships for monitoring
 - iii. Continue habitat restoration and management
 - iv. Educate visitors and public about imperiled species
 - c. Accomplishments
 - i. Gopher Tortoise Burrow survey
 - ii. Scrub Jay survey updates
 - iii. Wildlife App
 1. Citizen Science
 2. Public can report species sighted
 - iv. Completed Habitat Restoration Plan
- 5) Hydrological – Water Quality
 - a. Goals & Objectives

- i. Protect water quality and quantity
 - ii. Inventory and monitor trails and infrastructure
 - iii. Restore and maintain erosion issues
 - b. Accomplishments
 - i. Erosion control implemented
 - 1. Spruce Creek Mound
 - 2. Spruce Creek Bluffs
- 6) Cultural and Historical
 - a. Goals
 - i. Identify, protect, preserve and maintain the cultural and historical resources.
 - ii. Historical vs. Cultural
 - b. Objectives
 - i. Continue resource protection
 - ii. Submit new finds to SHPO – Florida Master Site File
 - iii. Maintain Archeological Resource Management Certification
 - c. Accomplishments
 - i. Resource monitoring, protection
 - 1. Regulatory signage
 - 2. Physical (trail alignments, fencing)
 - ii. Debris/Trash removed from Historical Site
 - iii. Documented 16 sites on State land
 - 1. Spruce Creek Mound
 - 2. Martins Dairy
 - iv. Spruce Creek Mound Interpretation
- 7) Public Access
 - a. Goals
 - i. Public access
 - ii. Outdoor recreation
 - iii. Environmental education
 - iv. Compatible Uses/Level of Service
 - b. Objectives
 - i. Education/Stakeholder Co-ops
 - 1. Program IBIS
 - ii. Environmental Education
 - 1. Signage, apps, website
 - 2. Interpretive/education programs
 - iii. Monitor & maintain multi-use trails
 - iv. Additional facilities as funding allows
 - v. Exclude off-road vehicle use
 - vi. Monitor Uses & Level of Service
 - c. Accomplishments
 - i. Kayak landing installed at Kaye
 - ii. Low water crossing installed (Turnbull)

8) Facilities

a. Goals

- i. Provide Infrastructure & Facilities
- ii. Necessary to meet all other goals and objectives of this Plan
 1. Natural Resources (Fire, Invasives, Imperiled spp., Public Ownership)
 2. Cultural & Historical (Interpretive, Inventories)
 3. Use Management (Trails, Gates, Kiosks)

b. Accomplishments

- i. Interpretive Kiosk
 1. Trailheads
 2. Spruce Creek Mound (increased security)
- ii. Disc Golf
- iii. Updated/new trails & trail markers
- iv. Recreation Plan – 80% complete
- v. Increased mountain bike trails
- vi. Fencing/barriers (erosion control)
- vii. Trail Cams

At the conclusion of the presentation, Mr. Young asked for questions.

Mr. Korn asked staff to introduce themselves and assemble at the front of the room so they could answer questions from the public.

In the interim, Mr. Korn complemented staff on the most recent Land Management Review.

Question 1: Doug McGinnis, Atlantic Center for the Arts Board of Directors, asked why the fire/mitigation was minimized or put on low priority in a lot of areas in the updated management plan.

Nick Dunnam, Land Management, stated the fire dependent communities within the preserve had different fire return intervals, explaining that some were as high as 5 to 10 years.

Mr. Young, DBE, said part of the reason is that it was super high priority in the old plan to get the process started, but now it's moved into a different category. It's not imperative to get it started anymore; it's moved to a lower priority because it is now maintenance.

Question 2: Lori Sandman asked how the management of the preserve is affected by the upstream landowners and if the plan was harmonized with other plans in the community to manage the areas that flow into the preserve.

Richard Harris, Land Management, explained that the management of the preserve was only within the preserve's boundaries. He stated the county works with adjoining agencies in the surrounding areas to manage the habitats

holistically when possible. He said the county works in combination with other agencies, giving examples of oyster bed restoration and plant re-introduction.

Ms. Sandman asked if staff had any advice for landowners who wanted to help.

Danielle Dangleman, Land Management, suggested she contact the county Environmental Management Division saying they had information that could be given to her neighbors.

Mr. Korn said the Florida DEP might be able to help her too.

Question 3: Jacob Hunt referred to the sections within the preserve that had fallen out of management which requires remediation to restore the original habitat and asked how that happened.

Mr. Dunnam stated it happened due to a lack of management over time. He gave an example of a fire dependent community that has had no fire in it for a number of years.

Mr. Hunt asked if it was due to being privately owned property.

Mr. Dunnam explained that past land uses play a big role.

Mr. Young stated while the preserve doesn't have a lot to say regarding what happens up river, the existence of the preserve helps generate money for grant projects or publicly funded projects for retrofit stormwater or something similar. He said the existence of the preserve also helps with the regulation of upstream waters.

Mr. Young said the Florida Statute says the managers should be cognizant of adjacent land uses. He said the north-western parcel was purchased because the county was reviewing adjacent land uses.

PUBLIC COMMENTS

Bob Young thanked the MPAG allowing the public to speak to them and stated he was impressed with the presentation. He told the Group how he got involved with Disc Golf and described how it had improved his life. Mr. Young asked the Group to consider expanding the Disc Golf course located on the preserve.

Jacob Hunt expressed his experience with Disc Golf and how it affected his life. He described the courses in the area, stating that the sport was growing in popularity. He asked that the Group consider expanding the preserve's Disc Golf course.

Dan Mescret said he had been playing Disc Golf for two and a half years describing how it changed his lifestyle. He stated the current course needed to be expanded due to the growing usage and asked that expansion be considered.

Gene Varano, CEO Disc Golf Association, complemented the presentation and described his experiences with Disc Golf. He explained that the mission, vision and values of the association was to promote the sport of disc golf through public/private partnerships.

Mr. Varano said the association provided professional design and installation of courses as well as assistance for programming and educational curriculum opportunities.

Mr. Varano described the growth and benefits of the sport. He stated the equipment costs were low and it required virtually no maintenance to play.

He suggested an expansion of the current course and another course somewhere in the preserve.

Suzanne Schreiber, virtual attendant, asked staff if gopher tortoises were relocated to the preserve from development.

Mr. Dunnam explained the Doris Leeper Spruce Creek Preserve was not a donor site for gopher tortoise relocation.

Chair Jeff Brower asked Mr. McGinnis if he had any concerns about the preserve and how it affected his home/business.

Mr. McGinnis expressed his concern, being the private homes on Turnbull Bay that were not hooked up to sewer systems. He stated the hope that the City of New Smyrna Beach would become more active with sewer systems.

Chair Brower asked how close the Scrub Jays were to the preserve.

Rich Harris said the Scrub Jays were no longer at the Spruce Creek High School, which had been the closest habitat.

Mr. Young stated the nearest population on the coast was Meritt Island National Wildlife Refuge.

He explained that the largest group was on the west side of Volusia at the Lyonia Environmental Center, land restored and managed by the county. He stated the Lyonia Environmental Center was one of the state's largest producing population.

Chair Brower asked if there was a correlation between the recreational activities going on at the preserve and the lack of Scrub Jays.

Mr. Young said there was not.

Chair Brower said he visited the preserve and saw a lot of disc golf players and wondered if there were any plans for expansion.

Mr. Varano said they had a couple of ideas that could be discussed at a staff level. He assured the Group that the Association did not play in a Scrub Jay habitat.

Mr. Korn reminded everyone that the next meeting would be Wednesday, February 2nd at 9:00 a.m.

Chair Baylie asked staff to review the correspondence submitted and highlight the requests for the Wednesday meeting and to provide ideas on how to address those requests.

Chair Brower said he was interested in seeing the major uses of the preserve.

Chair Baylie asked staff to provide a map showing the location of the activities on the preserve.

Dr. Burbaugh said the state had some capacity guidance based on recreational use and asked staff to provide the information for Wednesday's meeting.

ADJOURNMENT

The meeting was adjourned at 7:00 p.m.



MINUTES
Doris Leeper Spruce Creek Preserve
Management Plan Advisory Group
Public Meeting
❖❖❖
February 2, 2022

MEMBERS

Lauren Akins, Florida Fish & Wildlife Conservation Commission
Dr. Wendy Anderson, Chair, Volusia County Soil & Water Conservation District
Tim Baylie, Parks, Recreation & Culture Director
Hon. Jeff Brower, Volusia County Council Chair
Dr. Brad Burbaugh, Resource Stewardship Director
Sonya Guidry, Florida Native Plant Society – Paw Paw Chapter
Brent Saulsbury, Florida Forest Service
Wanda VanDam, Landowner & Volusia Forever Advisory Committee Member

MODERATOR

Bill Korn, Young Bear Environmental Consulting

CALL TO ORDER/WELCOME

Chair Tim Baylie called the meeting to order at 9:00 a.m. Roll was called. All members were present. There was a quorum.

INTRODUCTION/INSTRUCTIONS

Bill Korn, Young Bear Environmental Consulting, stated the public meeting on January 31st had gone well and explained that the current meeting was the time for the Advisory Group to discuss and provide feedback to county staff on the Management Plan.

He explained that after the meeting staff would make necessary changes and present the plan to the County Council, if approved, it would be submitted to Tallahassee for final review.

Mr. Korn reminded the group of the Sunshine Law and stated they would remain under the law until the Volusia County Council approved the final draft.

PUBLIC PARTICIPATION

There was no public participation.

APPROVAL OF MINUTES FROM JANUARY 31, 2022

Dr. Wendy Anderson made a **MOTION** *"To approve the minutes of January 31, 2022"*. Jeff Brower seconded the motion. The motion carried unanimously.

REVIEW OF PUBLIC COMMENTS

Nick Dunnam, Land Management, reviewed the public comments and provided a memo to the committee in response to some comments (see attached).

Mr. Dunnam stated there was a concern regarding the different acreage numbers in the source information. He stated staff reviewed the information and there are 2,513 acres of public ownership in the Preserve. He stated the number includes 38 acres of property deeded to the county by FDOT.

He went on to explain that the optimal boundary for the Preserve area, which includes public/private partnerships is 2,841 acres.

Mr. Dunnam said 320 acres remain in the optimal boundary area and in October 2021 the Volusia Forever staff reached out to those land owners and encouraged them to submit applications to Volusia Forever.

Mr. Baylie asked if the numbers in the plan needed to be changed or left as they were.

Mr. Dunnam stated the numbers in the plan were correct.

Dr. Burbaugh stated the numbers were updated from the 2012 plan to add in the 38 additional acres from FDOT.

Mr. Dunnam affirmed.

Dr. Burbaugh asked for the habitat status of the 38 acres deeded to the county.

Mr. Dunnam stated it was considered a disturbed site, mostly an oak hammock.

Cindy Venuti, Land Manager, addressed the next comment which was the suggestion that the management plan include some acknowledgement of Doris Leeper and her contribution to the Preserve.

Ms. Venuti stated staff agreed and would include historic information regarding her contributions.

Dr. Burbaugh mentioned the kiosk in place honoring Ms. Leeper and suggested using the wording and possibly a picture of the kiosk in the plan.

Mr. Dunnam said the next public suggestion was to add more detail explaining why there were so many owners within the preserve.

Mr. Dunnam said that information was already included in the appendices of the management plan.

Ms. Venuti explained the next public comment stated the boundary listed in the draft plan does not match the current Florida Forever project map.

Ms. Venuti explained the map would be updated in the new Management Plan.

Mr. Dunnam said the next concern expressed was the comment in the draft plan saying the scrub areas being within desired future conditions. The citizen stated he had been to the Preserve two years ago and did not, at that time, find the scrub area in a desired state.

Mr. Dunnam said during the last two years the Land Management team had conducted 211 acres of mechanical treatments and 98 acres of prescribed fires in the scrub jay habitat. He explained that those activities had resulted in the majority of the scrub area being within desired future conditions.

Mr. Bailey stated the program had recently gone through a review and asked that Mr. Dunnam elaborate on the findings.

Mr. Dunnam explained that the State does a field review of land management activities every five years. They conduct a tour of the property and go through all the requirements for the location being evaluated. This review resulted in an average score of 4.7 out of 5.

Wanda Van Dam verified that the information from the review was in section L of the appendix.

Sonja Guidry stated she attended the land management review and the State was really impressed with the transformation of the scrub area.

She stated she believed there was still more improvement needed.

Mr. Dunnam stated the Management Plan would be updated to reflect the current status of restoration.

Ms. Venuti reviewed some of the inconsistent language and wording in the draft plan and explained how they would be changed to add more consistency and clarity.

Ms. Venuti explained that some scrub areas previously targeted for restoration had developed into a new community type due to the 50 year absence of fire. She said that the maps have been updated in the draft to reflect those changes.

Dr. Burbaugh explained that after discussion with staff it was determined that some of the targeted areas had changed to create new habitats and clear cutting for restoration wasn't feasible or palatable. He used the example of an area that used to be scrub, but now had live oaks, hickory trees and palms and would be managed as xeric hammock due to those community changes.

Mr. Korn stated xeric hammocks were often overlooked and said that community type was rare.

He said reassessing and remapping was a good approach in the circumstances.

Mr. Dunnam explained that boundaries will transform and transition naturally over time when there is no management of the property.

Mr. Korn reminded the board that the management of the property did not affect the issue of public use, stating that was a separate decision.

Mr. Baylie said at the beginning of the process in 2012 there was public outcry about the prescribed burns. He informed the board that experts were brought in to educate the public regarding need to continue the burns.

Brent Salisbury noted the recreational trails in zone B and asked if the county would no longer be performing prescribed burns in the scrub habitat.

Mr. Dunnam responded there would not be fire targeted in that area.

Mr. Salisbury asked if there was a fire break around zones C & B.

Mr. Dunnam confirmed there was a fire break in that area.

Mr. Dunnam presented the next public comment saying there was a need to spell out the fire return intervals in the management plan so it would be clearly understood by various user groups.

Mr. Dunnam explained the intervals were determined individually based on the specific management goals for the area and stated they were listed in several places throughout the Management Plan.

He said staff would add additional language that would be provided in a chart format.

Ms. Venuti said there was a public comment asking that staff consult with the Fish & Wildlife Commission to determine if the area would be suitable for scrub jay relocation in the future. She said staff agreed and the language would be added to the plan.

Ms. Van Dam asked staff if scrub jay relocation was considered population restoration or if specific language need to be added to the management plan.

Dr. Burbaugh said additional language should be added to specifically include scrub jay relocation.

Mr. Dunnam agreed.

Mr. Dunnam addressed the next comment asserting that Wood Storks should be included on the species list. Mr. Dunnam agreed and stated the table was corrected to include the Wood Stork.

Ms. Venuti said the next comment addressed the threat proposed by the planned I-95 interchange and suggested staff work with FDOT on mitigation needs.

Ms. Venuti affirmed that the Volusia Forever staff had already reached out to the St. Johns River Management District (SJRWMD) regarding mitigation funds.

Mr. Baylie asked if language had been added to state the intention to work with the SJRWMD.

Ms. Venuti replied it had not been added, but staff would be willing to entertain the idea.

Dr. Burbaugh explained Volusia Forever staff had already met with the SJRWMD regarding the mitigation funding and had also engaged with property owners in the project area regarding acquisition. He stated he did not think it needed to be added to the Management Plan, but did want the public to know staff was engaged in the process.

Mr. Dunnam stated the next comment suggested more extensive archaeological surveys should be conducted on the site.

He agreed with the suggestion and said staff recommended adding language to the Management Plan articulating staff will seek partnerships and funding for research projects in the Preserve and surrounding area.

Ms. Venuti said the next comment stated the known sites within the preserve should be interpreted and protected. Staff explained all historic sites on the preserve are monitored on an annual basis and action taken if necessary. She said staff would work in conjunction with the Division of Historical Resources and the Bureau of Natural and Cultural Resources for earthen mounds and additional interpretation utilizing informational kiosks.

Dr. Burbaugh said he thought some archaeological work had already taken place on the site.

Richard Harris confirmed a lot of work had already taken place.

Mr. Baylie suggested there were educational opportunities on the Preserve.

Mr. Harris agreed.

Mr. Dunnam said staff recommended adding language to the plan addressing historical and archaeological activities.

Ms. Guidry said they needed to be cautious until there was the ability to protect the area.

Mr. Korn suggested creating a display with information and pictures of the mounds off the trail and away from the site.

Mr. Dunnam said there was public interest in an Environmental Learning Center or outdoor classroom being created within the Preserve.

He said based on feedback from the public staff had included an outdoor learning center/classroom as part of the plan update for consideration by the group.

Mr. Korn asked if there was anything in the existing plan about a learning center.

Mr. Dunnam said there was not.

Mr. Baylie explained there was support from the County Council to create an environmental learning center after the plan had been adopted. He said due to the economic downturn the project did not move forward.

Mr. Baylie stated they were adding this into the current plan and pledging to follow through with what was supported by County Council previously. He said staff would review the area to find a good location for it.

Mr. Korn suggested identifying the location zone and adding it into plan would reduce the pushback when the plan is ready to be presented for approval.

Ms. VanDam thanked staff for their explanation and said she supported the idea. She said she understood the facility and parking involved would have an impact on the area, however, sometimes you have to give up a little to benefit the community.

Dr. Burbaugh suggested adding the information to the appendix of the Management Plan, so the County Council and State will understand the direction the county is taking.

He said rather than a facility/structure that would require operational funds each year, he envisioned something more unique.

Mr. Korn said it sounded like they were thinking of something more resource based.

Mr. Dunnam said the next issue presented was disc golf, explaining staff had received more than 30 emails in support of expanding the disc golf area at the Preserve.

Mr. Korn directed the group to the emails included in their package. He mentioned there were also a few emails not in support of expansion.

Mr. Dunnam explained that the current 18 hole disc golf course was not on the state owned portion of the preserve.

He said based on feedback from the public, staff recommendation was to add disc golf as a conditional use on state owned property for consideration of the advisory group.

Dr. Burbaugh asked staff to use the map to show the group the activities currently taking place within the Preserve.

Mr. Dunnam explained there were multiple uses including wildlife observation, trails, campsites and equestrian trails. He reviewed the trail capacity, explaining the preserve is currently under the use threshold guidelines established by the FDEP.

Mr. Baylie stated there was a perception that there were too many trails in the area and he wanted to make sure they were within capacity. He also assured the group that trails were relocated as needed to ensure the habitat is not disrupted.

Dr. Burbaugh asked for the history of public access management within the preserve. He asked if staff thought there was a balance in usage.

Mr. Dunnam explained that there was a lot of public pressure when it came to recreational use, but that staff felt they had reached a good balance.

Ms. Guidry stated the more development that occurred in the area, the more pressure for public access would become an issue.

She stated their mission was conservation, preservation and restoration. She stated usage of the property should remain passive.

Mr. Korn reminded the committee that the current issue was regarding disc golf and if the group agreed with the staff's recommendation to add it to the plan as a conditional use on state lands.

Chair Jeff Brower stated he did not have a problem with the proposed language being put in the Management Plan. He stated there was an obvious tension concerning the disc golf expansion.

He asked if there was a problem with the existing disc golf area.

Mr. Dunnam said there was no problem with the current location of the 18 hole golf course.

Chair Brower asked if the disc golf club had requested expansion to a specific area of the preserve.

Dr. Burbaugh explained they were currently on a county owned portion of the preserve. He said if the group recommends adding a conditional use to the plan, the state would still make the final determination for access on their lands.

Dr. Burbaugh showed a mapped location, an open field, the disc golf club tentatively wanted to use for the expansion. He said the club was flexible.

Mr. Korn asked if Dr. Burbaugh knew the habitat type for the area. Dr. Burbaugh stated it was pasture land.

Ms. Van Dam said the FDEP guidelines stated the optimum use thresholds for preserves were to be reduced.

Ms. VanDam stated she was struggling with whether it was an active or passive use. She asked if they would wait for the state to define if it was passive or active.

Mr. Korn explained if it was included in the plan it would more than likely go through because there was no site specific plan at this time. He said if the county moved that way at a later date they would probably need a letter of approval from the DEP.

Mr. Baylie addressed the active vs passive issue stating that disc golf was a grey area and there would need to be some deliberation at the state level to make that final decision.

Ms. Guidry said she visited the site with two active disc golf players and both of them did not want the course expanded. She informed the advisory group there were additional courses within the County.

Ms. VanDam reviewed the map to confirm that additional parking would not be required if the course was expanded. She asked if there was any plan to restore the pasture area.

Mr. Dunnam stated that restoring a portion of the pasture to an upland community was in the management plan.

Mr. Korn reminded the Advisory Group that they were discussing conceptual use, not a specific site. He said the language recommended would allow staff to review this as a conditional use on state owned lands.

Dr. Burbaugh stated the Disc Golf Association was a good partner.

He said he was concerned about adding more recreation to the Martens Dairy area and asked Mr. Dunnam if there were other county owned conservation lands that could be identified for an additional disc golf course.

Mr. Dunnam said it was something they could look into with the Association.

Chair Brower said he understood one of the main goals they were dealing with was to preserve the lands, but they also needed to keep in mind that the taxpayers are invested.

He said one of the best ways to preserve lands was to get people out to see it, to use it and to experience it.

He said he watched the disc golf players and he didn't see any difference between that and walking the trails, that it was the most low impact sport he had ever seen.

Chair Brower said he doesn't want to do anything that would adversely affect the Land Management Plan, but he was struggling with how what they were doing was hurting the environment.

He said he was comfortable with the proposed language.

Dr. Burbaugh said he agreed they should include the conditional use and see what the state says, it will be their decision.

He suggested if the state approves the language, the staff should work with the Association to look at different possible locations.

Mr. Baylie stated there were already disc golf courses on county owned lands, the use needed to be put in the plan, if not the county would have activities taking place that were not in the management plan.

Mr. Korn affirmed that the consensus was to include the conditional use language in the new plan.

Mr. Korn referred the Advisory Group to the public comments from the previous meeting and reviewed each comment.

ADVISORY GROUP COMMENTS

Mr. Salisbury suggested changes to pages 5 and 50 to update the “Department of Forestry” to the new designation of “Florida Forestry Service”.

He said that on page 60 language should be added to specify a recipient site for the scrub jay translocation.

He suggested adding language to Page 76 to offer cost share programs to Florida Forest Service and National Resources Conservation Service to help adjacent land owners.

Dr. Anderson complemented the staff on the update.

Ms. VanDam asked why references to the Brown Pelican and Black Bear on pages 36 and 37 had been removed.

Mr. Dunnam explained that the protected status of both species had changed, so they were removed from the plan.

Ms. VanDam stated that the table on page 78 mentions the restoration of Longleaf Pine, but did not see much about the topic in the body of the plan. She asked if it was only in the table.

Mr. Dunnam explained that Longleaf Pine crossed many different habitats rather than just one area, so it was not listed in the body and would be handled on an operational basis.

Ms. VanDam restated that Longleaf Pine restoration would take place throughout the Preserve.

Ms. VanDam referenced pages 67 – 68, stating that the body of the document and the tables do not match and suggested staff review those areas.

Mr. Dunnam agreed.

Dr. Anderson said she was initially happy they were continuing to prioritize hydrologic restoration, but then noticed it was marked out in the table. She asked why they were no longer prioritizing hydrologic restoration.

Mr. Dunnam said they marked the updated status of some of the goals/objectives.

Dr. Burbaugh thanked staff for their work. He stated he was good with the plan and thanked everyone for their input.

He said there were a lot of opportunities for grants and partnerships for the property, he encouraged staff to add the language that they will seek grants and partnerships.

Council Chair Brower commended the staff for the work they did on the plan. He said he feared a day when every square inch of longleaf pine has been developed.

He stated he wanted to get people out there to use the land, in the most passive way. He said it's important to keep it as it is for the health of the community in which we live.

Mr. Brower referred to page 47 assessment of the impact of planned use and suggested that staff add a line to say one of the primary goals is to increase public appreciation for the natural environment.

He stated he would like to see additional focus on giving people the chance to see and appreciate the preserve beyond just recreational use.

Dr. Burbaugh said funds have been set aside to increase the user experience and appreciation of the area.

Mr. Baylie thanked the committee members for volunteering their time.

He agreed with Chair Brower that the goal was to get people to enjoy nature and to make sure the area wasn't destroyed.

Mr. Baylie said from an environmental standpoint they needed to develop responsible and compatible recreation for the preserve.

He mentioned several competitions that have taken place on the preserve, citing horse races and disc golf competitions. He asked if the plan needed to mention competitions.

Mr. Dunnam said as long as the events align with the activities allowed by the Management Plan they would come under a conditional use.

Ms. Guidry asked what Project IBIS was.

Mr. Dunnam explained it was an outdoor education program previously called The Legacy Program.

Ms. Guidry commended staff for their work on the Management Plan. She stated the outdoor programs managed by Tim Baylie were exactly what was needed for the preserve.

Ms. Akins said she was happy with the plan and that staff had done a good job balancing the recreation and land management.

Mr. Korn explained the process for approving the minutes. He stated once completed they would be forwarded to the committee for review and comments/changes.

He explained that once approved, the minutes would be attached to the Management Plan.

Mr. Baylie thanked Mr. Korn for the help navigating them through the process.

ADJOURNMENT

The meeting was adjourned at 11:11 a.m.



Resource Stewardship Division

MEMORANDUM

TO: Management Plan Advisory Group Members
Doris Leeper Spruce Creek Preserve

FROM: Nick Dunnam, Activity Project Manager
Land Management Activity

DATE: February 1, 2022

RE: Staff Responses to Public Comments & Advisory Committee
Requests

- 1) First, I would request that staff double check the acreage numbers. The Plan notes the preserve contains 2,513 acres. Florida Natural Areas Inventory data shows the preserve at 2,841 acres. The Florida Forever project report shows 2,475 acres have been acquired.**

Staff Response: The acres of publicly owned properties is 2,513 acres which includes an addition of 38 acres that was deeded to the County in 2014 by the FL Department of Transportation (i.e., previous I-95 rest area) for conservation use. The Optimal Boundary (OB), which include current public holdings and areas identified for future, targeted land acquisitions totals 2,841 acres. As such, 328 acres remain to be acquired to complete the DLSCP. Volusia Forever staff reached out to the owners of these remaining properties in October 2021 and encouraged them to submit their land for acquisition consideration during the Volusia Forever application period.

- 2) Next, the plan should contain some acknowledgement for the name of the preserve.**

Staff Response: Based on feedback from the public, staff recommends adding a section to the management plan providing information on Doris Leeper for whom the preserve is named.

- 3) Purchase. This section should contain additional detail to explain why there are so many different ownerships within the preserve.**

Staff Response: The explanation of historical purchases of state properties are in the DEP approved Management Prospectus found in Appendix C, pp. 2-4. The following sentence has been added to the first paragraph of Section 2. Purchase, to make this clearer: The Management Prospectus from DEP provides a more in-depth understanding of the purchase history (see Appendix C, pp. 2-4).

- 4) Optimal Boundary. The optimal boundary described in the draft management plan is different from the current Florida Forever project map approved by the Acquisition and Restoration Council. The Florida Forever project map includes a significant parcel along Martin Dairy Road owned by Pioneer Investments. It also includes lands owned by Florida Audubon Society and Atlantic Center for the Arts.**

Staff Response: Staff is updating the map is to show the OB in its entirety. The total acreages (2,841 acres) of the OB will be shown be shown in Section I. General Information C. Optimal Boundary.

- 5) Scrub Management. The draft plan states that the scrub is currently within desired future conditions. Though I have not seen this area for over two years, I would not have agreed with that statement on my last visit to the preserve.**

Staff Response: During the past two years staff has completed 211 acres of mechanical treatments and 98 acres of prescribed fire in the scrub community. The majority of the scrub community is within the desired future conditions outlined in the scrub restoration plan. During the most recent land management review by the state, the county received a score of 4.71/Excellent out of 5 on Scrub management.

- 6) There does appear to be some inconsistent language concerning prescribed burns. The language on page 52 deletes our previously approved language on burns and includes new language which is troubling:**

- 7) It is not clear exactly where this area is, and why the environmental management needs of the property are now subservient to recreation.**

Staff Response: Some scrub areas that were previously targeted for restoration have developed into a new community type because of the 50-year absence of fire. These areas also have established trail systems for public use. In 2012, there was a buffer plan created for the scrub restoration area that can be found in the restoration plan Appendix P on pp. 43-44. This plan, with input from the public and staff, provided for the restoration of scrub with minimal impact to public use by relocating trails and remapping the scrub boundaries to be more accurate with current habitat characteristics. Staff determined that part of the area had transitioned into a xeric hammock. This habitat change has been updated in the draft management plan habitat descriptions and habitat community maps.

- 8) It is also not clear what the fire return goals are for this property. The plan should clearly spell out fire return interval such as 3-5 years so that this is clearly understood by various user groups.**

Staff Response: The fire return intervals are determined on each burn unit individually and may vary depending upon the specific management goal of the unit. Fire return intervals are listed in several places in the plan. Staff recommends adding additional language to clarify the fire return interval in the plan. This will be provided in chart format in the natural communities section.

- 9) Once the scrub has achieved it desired condition, the county should consult with the USFWS/FFWCC on whether it would be suitable for scrub jay relocation.**

Staff Response: Staff is in agreement with this statement and will coordinate with the appropriate agencies for determining the suitability of the site to be used for Scrub Jay relocation.

- 10) Table 3. Wildlife Species. Please review Table 3 on page 28 of the Draft Plan. For instance, the table shows the Wood Stork is not a listed species, but the Osprey is. Indeed, the opposite is true.**

Staff Response: This was an alignment issue. The table has been corrected and updated in the draft management plan.

- 11) Development impact. The draft plan fails to mention the imminent threat posed by the planned Pioneer Trail I-95 interchange. There may be an opportunity to work with FDOT on its mitigation needs by acquiring additional parcels for the preserve.**

Staff Response: Mitigation funds for this project will be paid to the St. Johns River Water Management District (SJRWMD) by FDOT. As such, Volusia Forever staff has contacted and recently met with SJRWMD staff and offered to partner in order to leverage these mitigation funds with Volusia Forever to acquire more conservation lands in the area. Staff will continue to engage the SJRWMD on this issue moving forward.

- 12) Historical Surveys. A more extensive archaeological survey should be conducted on the site with ongoing steps taken to both interpret the site and protect it from encroachment.**

Staff Response: Staff recommends adding language in the plan to seek partnerships and funding for research projects to document the prehistory and history of the Doris Leeper Spruce Creek Preserve and the surrounding area. Staff will develop new educational kiosks to improve public awareness and encourage protection and stewardship of the cultural resources at DLSCP. In addition, the land management activity has budgeted \$25,000 in FY21-22 for the development and installation of additional interpretive signage, kiosks, trail markers, and other amenities to improve education and user experience on the preserve.

13) Additional survey and research is also warranted for Turnbull Era sites within the Preserve.

Staff Response: Staff recommends adding language to the plan to continue research on the known indigo operation located on the Volusia County owned Blanchette property and its connection to the state owned portion of DLSCP as funding allows. Staff will continue efforts to locate Kings Road and interpret through signage.

14) The county should encourage, and fund continued archaeological studies of the site.

Staff Response: Staff recommends adding language to the plan that encourages coordinating with other agencies and educational institutions to facilitate “field schools” or research projects to study and interpret the past history of DLSCP.

15) The known sites within the preserve should be interpreted and protected.

Staff Response: All known sites located on DLSCP are monitored on an annual basis and action taken, if necessary. Staff will develop appropriate remedial stabilization plans in conjunction with Division of Historical Resources (DHR) and the Bureau of Natural and Cultural Resources (BNCR) for earthen mounds, mainly Spruce Creek Mound (8V099), and interpret utilizing informational kiosks.

16) The management plan should provide for the possibility of some kind of environmental learning center or outdoor classroom within the preserve.

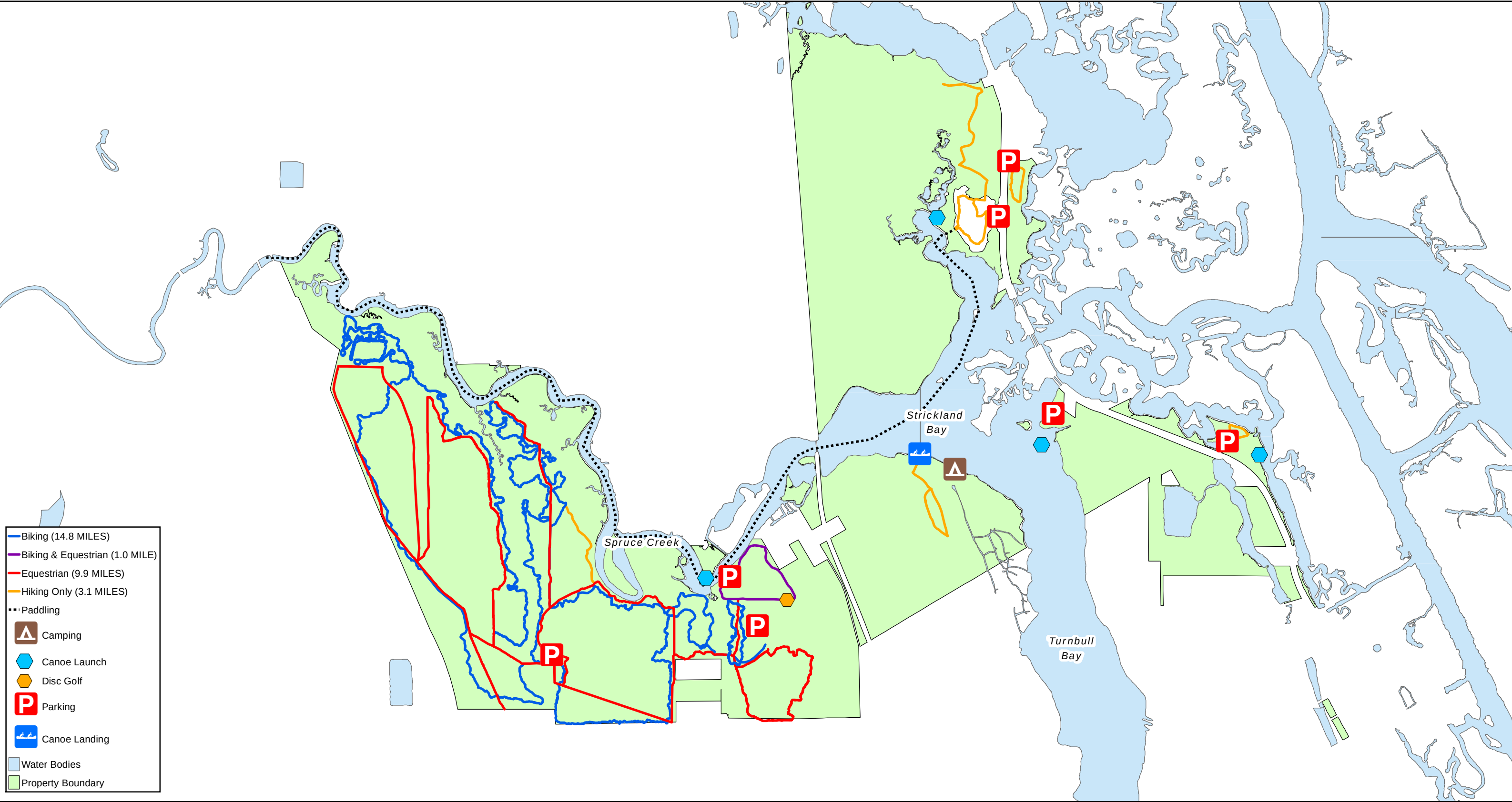
Staff Response: Based on feedback from the public, staff has included an outdoor learning center/classroom as part of the update for consideration of the MPAG (see p. 49, Table 8).

17) There is public interest for the expansion of the 18 hole disc golf course on Doris Leeper Spruce Creek Preserve.

Staff Response: Currently, the disc golf course is not on the state-owned portion of the preserve. Based on feedback from the public, staff has included disc golf as part of the update for consideration of the MPAG (see p. 49, Table 8)

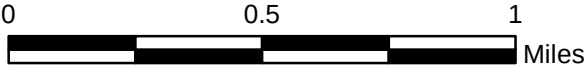
18) Recreation Plan & Use Map (see page 5)

19) Recreational Carrying Capacity Guidelines (see pages 6-11)



- Biking (14.8 MILES)
- Biking & Equestrian (1.0 MILE)
- Equestrian (9.9 MILES)
- Hiking Only (3.1 MILES)
- Paddling
- Camping
- Canoe Launch
- Disc Golf
- Parking
- Canoe Landing
- Water Bodies
- Property Boundary

NOTICE:
THIS MAP IS CONCEPTUAL AND INTENDED FOR GENERAL PLANNING PURPOSES ONLY. PROPOSED ACTIVITIES, LOCALES, AND ACREAGES MAY CHANGE DEPENDING UPON CONSIDERATIONS SUCH AS, BUT NOT LIMITED TO, SITE SPECIFIC CONDITIONS, WEATHER, MARKETS, PROJECT PRIORITIES, AND AVAILABILITY OF STAFF. ALL ACREAGES ARE APPROXIMATE.



1 inch = 2,000 feet
Created by: Resource Stewardship
January 2022



Resource Stewardship Division
123 W. Indiana Ave
Room 200
Deland, FL 32720

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF RECREATION AND PARKS
RECREATIONAL CARRYING CAPACITY GUIDELINES

THE SELECTION AND CAPACITY DETERMINATION OF USE SITES

Introduction

The Division of Recreation and Parks has the responsibility of planning the use of and managing a sizable portion of Florida's public lands and water areas. With tremendous population increases and the constant and extensive development of private lands, the state recreation and parks system has a more significant role than ever before in (a) providing opportunities for quality outdoor recreation experiences, and (b) preserving representative and unique natural areas of the state. Both the quality of the recreation experience and the protection of the natural areas are directly affected by the implementation of the site plans, or land use plans, which are prepared for the various areas of the system and which designate sites to be established for public use and lands to be set aside for preservation purposes. Important factors given thorough study during the site planning process are the types of recreation activities to be provided, where these activities are to take place, and the amount of public use to be allowed.

Site Selection and Site Deterioration

Proper site selection is a critical part of the site planning process. Deterioration of recreation sites through normal use can be minimized when a designer remains sensitive to the plant communities he is working with. Some communities are significantly more tolerant of man's presence than others.

To assure the consideration of these factors, it is helpful to map plant communities existing at each site. This, coupled with analysis of plant communities' characteristics as summarized in Attachment A, should insure selection of the best available site which in turn will minimize the degree of deterioration from normal use.

Other factors, such as wildlife, soils, topography, and hydrology, should also be considered during the site planning process. Plant communities, once identified, suggest the soil makeup and animals which will be found at the site, but geology and hydrology should be considered separately.

Plant Community Limitations

Attachment A, "Characteristics of Florida's Major Plant Communities," was prepared to assist in the study of areas' plant community limitations. Included is a relative ranking of each community's ability to tolerate use other than that normally associated with wilderness. Practically all of the plant communities of Florida are represented on lands of the state recreation and parks system. They vary from unstable types which cannot withstand trampling, such as sand dunes, to stable types, such as pine flatwoods.

Several plant communities are rare or endangered because of extensive development which has taken place over the past 30 years. For example, the coastal hammocks which were once found in a continuous band along the barrier islands of the Atlantic Coast, have been reduced to remnants, due to extensive coastal development. To encourage active use of unstable and fragile plant communities is contrary to sound environmental management. Wherever possible, use sites will be located in communities and on terrain resistant to trampling. Similarly, communities which are considered to be rare or endangered, will be avoided. These areas best serve the public in scenic, interpretive, and biological research categories.

In some instances, planners are faced with the dilemma of not having a stable community in which to place a use site. Many east coast barrier islands consist of three basic communities--dune, coastal hammock, and mangroves. The coastal hammock is stable but endangered, and the dunes and mangroves are unstable as well as endangered. The most suitable location, therefore, is the outer portion of the coastal hammock. In areas which do not possess suitable plant communities, and yet some degree of use is determined desirable, the degree of development and corresponding intensity of use will be low.

Additional biological factors must be considered during the initial planning. Sand dunes are unable to withstand trampling, but high intensity use of adjacent beaches can be allowed by the installation of boardwalks over the dunes. Also, the location of a use site adjacent to an important wildlife nesting or feeding area may be detrimental even though the community is well suited for active use. Early field investigations for the purpose of inventorying plant communities, will provide such information.

Overcrowding and Site Deterioration

Areas in the state recreation and parks system have always been popular with large segments of the public and have accordingly received considerable use. But previously, they were seldom overcrowded to the extent that a lessening of the quality of the users' outdoor recreation experiences resulted. Now, in several areas, the number of persons seeking outdoor recreation exceeds the space allotments of the public use sites. Carrying capacities--limitations on the number of persons to use each site at a given time--can protect users' experiences by preventing overcrowding which (a) causes deterioration of the natural attribute of each use site and (b) impedes each user's ability to move freely and to fully enjoy the natural setting without undue distraction.

Optimum Carrying Capacities for Users

In order to determine appropriate carrying capacities for each park situation, two guides are provided here: Attachment A, "Characteristics of Florida's Major Plant Communities," already discussed, and Attachment B, "Optimum Carrying Capacities for Outdoor Recreation Activities." Attachment B gives the recommended limits on the number of users for most outdoor recreation activities in an attempt to prevent overcrowding, and a recommended land base to assure that sufficient support area and buffer area are provided. A range is given for almost every activity, to allow for differences in each site. The site's classification is a main factor in density variation. For state parks, special feature sites and preserves, the carrying capacities should be reduced to insure compatibility with the management objectives of each category.

The carrying capacities determined by these guidelines are to be followed in the preparation of site plans for new use sites and for authorized alterations of existing use sites. The applicable carrying capacity for a given use site also governs the number of parking spaces, the size of restrooms, and all quantities of support facilities to be provided.

Control of Established Carrying Capacities

Carrying capacity computations derived with the help of the guidelines contained here are vital to planning of new use sites, renovation of older developed sites and continuous management of all areas of the system, to prevent overcrowding and resource deterioration. The estimated optimum carrying capacity is included in each approved park unit management plan, in a tabular format. This estimate is evaluated and revised, as needed, as part of the periodic unit management plan update procedure

ATTACHMENT A

CHARACTERISTICS OF FLORIDA'S MAJOR PLANT COMMUNITIES

	Moisture Level Moist- ▲ Dry- ◇ Moderate- ●	Shade Potential Dense- ▲ None- ◇ Moderate- ●	Understory Buffer Dense- ▲ None- ◇ Moderate- ●
<u>Group 1</u>			
Pine Flatwoods	●	●	●
Mixed Hardwood/Pine	●	▲	▲
<u>Group 2</u>			
Xeric Hammock	◇	▲	●
Coastal Hammock*	◇	▲	◇
Mesic Hammock	●	▲	◇
Tropical Hammock*	●	▲	●
<u>Group 3</u>			
Sand Pine Scrub*	◇	●	▲
Sandhill*	◇	●	◇
<u>Group 4</u>			
Low Flatwoods	▲	◇	●
Hydric Hammock	▲	▲	◇
<u>Group 5</u>			
Dunes*	◇	◇	◇
Wetlands*	▲	varies	▲

*Indicates rare and endangered communities.

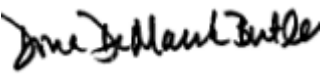
The group number indicates the relative degree to which each community is affected by development. Group 1 is least affected, Group 5 is most affected.

ATTACHMENT B
OPTIMUM CARRYING CAPACITY FOR OUTDOOR RECREATION ACTIVITIES
LAND-BASED ACTIVITIES

<u>Recreation Activity</u>	<u>Required Land Base</u>	<u>Area Requirements</u>	<u>People/Unit of Facility</u>	<u>Turnover Rate</u>
Camping				
Hike-in	10-50 acres/site	Sites clustered to a maximum of 4 sites/acre	4/site	1/day
Short-walk, Tent	2-10 acres/site	3-8 sites/acre	4/site	1/day
Limited Facility	1-5 acres/site	3-8 sites/acre	4/site	1/day
Standard Facility	1-3 acres/site	3-10 sites/acre	8/site	1/day
Groups	20-50 acres/area	5-20 acres/area	10-30/site	1/day
Cabins	1-3 acres/cabin	2-6/acre	4-12/cabin	1/day
Amphitheater/Campfire	1-2 acres/facility	1/4-1/2 acre/facility	1/2 camping capacity	1/day
Museum/Visitor Center	1-5 acres/structure	1/4-1/2 acre/structure	1/20 sq. ft.	4/day
Picnicking	1/4-4 acres/site of exhibit area	8-15 tables/acre	4/table	2/day
Trails				
General Hiking (Nature Trails)	min. of 25 acres/mile of trail, max. length 1 mile	5-20 groups/mile	2/group	4/day
Primitive Hiking	min. of 100 acres/mile of trail, min. length 1 mile	1-5 groups/mile	2/group	2/day
Bicycle	min. of 25 acres/mile of trail	10-20 bikes/lane/mile	1/bike	4/day
Equestrian	min. 75 acres/mile of trail min. length 5 miles	2-8 groups/mile	4/group	1 to 2/day

ATTACHMENT B
OPTIMUM CARRYING CAPACITY FOR OUTDOOR RECREATION ACTIVITIES
WATER-BASED ACTIVITIES

<u>Recreation Activity</u>	<u>Required Water/Land Base</u>	<u>Area Requirements</u>	<u>People/Unit of Facility</u>	<u>Turnover Rate</u>
Swimming	min. 1/8 acre of land/ swimmer	50-200 sq. ft. of water and 200-500 sq. ft. of beach/ swimmer		2/day
Surfing	min. 1/2 mile of beach for a surfing area, and 1/8 acre of land/surfer	40-100 linear ft. of beach/surfer		2/day
Fishing				
Shoreline	min. 1/4 mile of shoreline for a fishing area, and 1/8 acre of land/fisherman	1 fisherman/20-100 linear feet		2/day
Jetty Pier	min. 1/8 acre of land/ fisherman	1 fisherman/10-40 linear feet		2/day
Boating				
Limited Power (10 HP or less)	min. 200 acres of water, and 1/4 acre of land/boat	1 boat/5-10 acres of water	2/boat	2/day
Unlimited Power	min. 600 acres of water and 1/4 acre of land/boat	1 boat/10-20 acres of water	4/boat	1/day
Water-skiing	min. 600 acres of water and 1/4 acre of land/boat	1 boat/20-50 acres of water	4/boat	1/day
Sailing	min. 200 acres of water and 1/4 acre of land/boat	1 boat/5-10 acres of water	2/boat	2/day
No Power, Still Water	min. 50 acres of water and 1/4 acre of land/boat	1 boat/5-10 acres of water	2/boat	2/day
No Power, Moving Water	min. 1 mile of stream	2-10 boats/mile	2/boat	2/day

Date: 12/14/2021		AGENDA ITEM				Item: 05	
☐ Ordinance		☐ Resolution		☐ Budget Resolution		☒ Other	
County Goals							
☐	Thriving Communities	☐	Economic & Financial Vitality	☒	Excellence In Government	☐	NA
Department: Community Services Division: Resource Stewardship							
Subject: Public announcement of the Doris Leeper Spruce Creek Preserve Management Plan Advisory Group public meetings and hearing							
Dona DeMarsh Butler  Department Approval				Legal Heather Wallace Assistant County Attorney  Approved as to Form and Legality		County Manager's Office Aaron Van Kleeck Proxy for Ryan Ossowski Chief Financial Officer 	
Brad Burbaugh Director Resource Stewardship  Division Approval							
Council Action:							
Modification:							
Account Number(s): NA Total Item Budget: NA							
Staff Contact(s): Dona D. Butler Brad Burbaugh				Phone: 386 943 7029 386 943 7081		Ext. 12893 13455	
Summary/Highlights: In accordance with Section 259.032 F.S., the herein described public announcement must be made at a regularly scheduled meeting of the County Council serving as the local governing body before the Doris Leeper Spruce Creek Preserve Management Plan Advisory Group public hearing. The statute also requires the development of an updated management plan for state owned lands within the Doris Leeper Spruce Creek Preserve. On Monday, January 31, 2022, an informational public meeting will be held by the Doris Leeper Spruce Creek Preserve Management Plan Advisory Group at 5:00 pm with a Public Hearing to follow at 5:30 pm. On Wednesday, February 2, 2022, a second public meeting of the Doris Leeper Spruce Creek Preserve Management Plan Advisory Group will be held at 9:00 am to consider comments from the public and the advisory group, and provide recommendations to the Resource Stewardship Division, the County Council and, subsequently, to the Florida Department of Environmental Protection.							

These meetings will be held at the Thomas C. Kelley Administration Building, County Council Chambers, 123 W Indiana Ave, DeLand, FL 32720.

Recommended Motion: Staff is requesting county council approval of the attached public announcement.

PUBLIC NOTICE

The Volusia County Council, Volusia County Resource Stewardship Division, and the Doris Leeper Spruce Creek Preserve Management Plan Advisory Group announce two public meetings and a public hearing to which all persons are invited.

- DATE & TIME:** **Public Meeting**
Doris Leeper Spruce Creek Preserve Management Plan Advisory Group
Monday, January 31, 2022 from 5:00 pm – 5:30 pm
- PLACE:** Thomas C. Kelley Administration Building, County Council Chambers (2nd Floor)
123 W Indiana Ave, DeLand, FL 32720
- PURPOSE:** To allow the Doris Leeper Spruce Creek Preserve Management Plan Advisory Group to prepare for a public hearing later in the evening where they will hear recommendations to help in their preparation of a revised management plan for the Doris Leeper Spruce Creek Preserve.
- DATE & TIME:** **Public Hearing**
Doris Leeper Spruce Creek Preserve Management Plan Advisory Group
Monday, January 31, 2022 from 5:30 pm – 7:30 pm
- PLACE:** Thomas C. Kelley Administration Building, County Council Chambers (2nd Floor)
123 W Indiana Ave, DeLand, FL 32720
- AGENDA:** *-Call to Order*
 -Introductions and Remarks
 -Summary of Draft Plan
 -Public Comments
 -Summation and Adjournment
- PURPOSE:** To solicit comments on management of the Doris Leeper Spruce Creek Preserve. Comments may be presented orally or in writing at the hearing. Written comments may also be submitted to the Resource Stewardship Division at 123 W. Indiana Ave, Suite 200, DeLand, FL 32720 to the attention of Jill Marcum (jmarcum@volusia.org) and should be mailed or sent electronically so as to arrive at by the date of the public hearing.
- DATE & TIME:** **Public Meeting**
Doris Leeper Spruce Creek Preserve Management Plan Advisory Group
Wednesday, February 2, 2022 from 9:00 am – 12:00 pm
- PLACE:** Thomas C. Kelley Administration Building, County Council Chambers (2nd Floor)
123 W Indiana Ave, DeLand, FL 32720
- PURPOSE:** To allow the Doris Leeper Spruce Creek Preserve Management Plan Advisory Group to review comments from the prior public hearing and provide recommendations to the Resource Stewardship Division to help in preparation of a revised management plan for the Doris Leeper Spruce Creek Preserve.

Copies of the current management plan are available at <https://tinyurl.com/DorisLeeper> or can be obtained by contacting Jill Marcum (386) 943-7089 ext. 13458 or jmarcum@volusia.org at the Resource Stewardship Division at 123 W. Indiana Ave, Suite 200, DeLand, FL 32720.

NOTICE UNDER THE AMERICANS WITH DISABILITIES ACT (TITLE II). In accordance with the requirements of Title II of the Americans with Disabilities Act of 1990 ("ADA"), the County of Volusia ("County") will not discriminate against qualified individuals with disabilities on the basis of disability in its services, programs, or activities. Anyone who requires an auxiliary aid or service for effective communication, or a modification of policies or procedures to participate in a program, service, or activity of County, should contact the office of the County's ADA Title II Coordinator, Mr. James Corbett at (386) 248-1760 as soon as possible, but no later than 2 business days before the scheduled event or meeting. This paragraph shall likewise apply to written requests by a physically handicapped person needing a special accommodation to attend a public meeting in accordance with section 286.26, Florida Statutes. A copy of the County's Notice under the Americans with Disabilities Act (Title II) can be obtained at <http://www.volusia.org/ada> or requested from the County's ADA Title II Coordinator at the telephone number listed above.



NEWS FOR IMMEDIATE RELEASE

Jan. 17, 2022

Media contact: Pat Kuehn, CPRC
Community Information Specialist
386-822-5062, ext. 12934

County to review Spruce Creek Preserve Management Plan

Volusia County's Resource Stewardship Division will update the management plan for the 2,500-acre Doris Leeper Spruce Creek Preserve, which includes natural lands and historic sites along U.S. 1 north of New Smyrna Beach.

The preserve's Management Plan Advisory Group will meet from 5 to 5:30 p.m. Monday, Jan. 31, in the county council chambers at the Thomas C. Kelly Administration Center, 123 W. Indiana Ave., DeLand. Afterward, members will hold a public hearing from 5:30 to 7:30 p.m. to solicit comments on the preserve's management plan update.

The group will meet again from 9 a.m. to noon Wednesday, Feb. 2, in the county council chambers. Interested individuals can access the agendas, draft management plan and register to attend virtually at www.volusia.org/land-management.

Members of the public may submit comments orally or in writing at the hearing. Written comments also may be submitted to Jill Marcum at jmarcum@volusia.org or by mail to the Resource Stewardship Division, 123 W. Indiana Ave., Suite 200, DeLand, FL 32720.

Two or more County Council members may attend the meetings and hearing.

For more information, contact Brad Burbaugh at bburbaugh@volusia.org or 386-943-7081, ext. 13455.

- 30 -

www.volusia.org

VOLUSIA COUNTY COUNCIL

JEFF BROWER
COUNTY CHAIR

BEN JOHNSON
AT-LARGE

BARB GIRTMAN
VICE CHAIR, DISTRICT 1

BILLIE WHEELER
DISTRICT 2

DANNY ROBINS
DISTRICT 3

HEATHER POST
DISTRICT 4

DR. FRED LOWRY
DISTRICT 5



NEWS FOR IMMEDIATE RELEASE

Jan. 24, 2022

Media contact: Pat Kuehn, CPRC
Community Information Specialist
386-822-5062, ext. 12934

Spruce Creek Preserve advisory group plans public meetings, hearing

Volusia County's Resource Stewardship Division will update the management plan for the 2,500-acre Doris Leeper Spruce Creek Preserve, which includes natural lands and historic sites along U.S. 1 north of New Smyrna Beach.

The preserve's Management Plan Advisory Group will meet from 5 to 5:30 p.m. Monday, Jan. 31, in the county council chambers at the Thomas C. Kelly Administration Center, 123 W. Indiana Ave., DeLand. Afterward, members will hold a public hearing from 5:30 to 7:30 p.m. to solicit comments on the preserve's management plan update.

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Two or more County Council members may attend the meetings and hearing.

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- 30 -

Notice under the Americans with Disabilities Act (Title II)

Pursuant to Title II of the ADA, Volusia County does not discriminate against qualified individuals with disabilities in providing or conducting its services, programs or activities. Anyone requiring an auxiliary aid or service for effective communication, or a modification of county policies to participate in a meeting or other event, should contact the county's ADA Title II coordinator, Jim Corbett, at [386-248-1760](tel:386-248-1760) no later than two business days before the event or meeting.

www.volusia.org

VOLUSIA COUNTY COUNCIL

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BILLIE WHEELER
DISTRICT 2

DANNY ROBINS
DISTRICT 3

HEATHER POST
DISTRICT 4

DR. FRED LOWRY
DISTRICT 5

Appendix E:

FNAI Report



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

May 5, 2021

Danielle Dangleman
Volusia County
1110 N. Ridgewood Ave
DeLand, FL 32720

Dear Ms. Dangleman,

Thank you for requesting information from the Florida Natural Areas Inventory (FNAI). At your request we have produced the following report for your project area.

The purpose of this Standard Data Report is to provide objective scientific information on natural resources located in the vicinity of a site of interest, in order to inform those involved in project planning and evaluation. This Report makes no determination of the suitability of a proposed project for this location, or the potential impacts of the project on natural resources in the area.

Project: Doris Leeper Spruce Creek Preserve 10-year plan
Date Received: 4/28/2021
Location: Volusia 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.

Element Occurrences

A search of our maps and database indicates that we currently have many 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.



Florida Resources
and Environmental
Analysis Center

Institute of Science
and Public Affairs

The Florida State University

Tracking Florida's Biodiversity

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.

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.

CLIP

The enclosed map shows natural resource conservation priorities based on the Critical Lands and Waters Identification Project. CLIP is based on many of the same natural resource data developed for the Florida Forever Conservation Needs Assessment, but provides an overall picture of conservation priorities across different resource categories, including biodiversity, landscapes, surface waters, and aggregated CLIP priorities (that combine the individual resource categories). CLIP is also based primarily on remote sensed data and is not intended to be the definitive authority on natural resources on a site.

For more information on CLIP, visit <http://www.fnai.org/clip.cfm>.

Managed Areas

Portions of the site appear to be located within the Doris Leeper Spruce Creek Preserve, managed by the Volusia 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 Spruce Creek Florida Forever BOT Project, which is part of the State of Florida's Conservation and Recreation Lands land acquisition program. 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. **The maps contain sensitive environmental information, please do not distribute or publish without prior consent from FNAI.** FNAI data may not be resold for profit.

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

Sincerely,

Kerri Brinegar

Kerri Brinegar
GIS / Data Services

Encl

Doris Leeper Spruce Creek Preserve 10-year plan

Site boundaries are approximate.

Volusia County



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

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

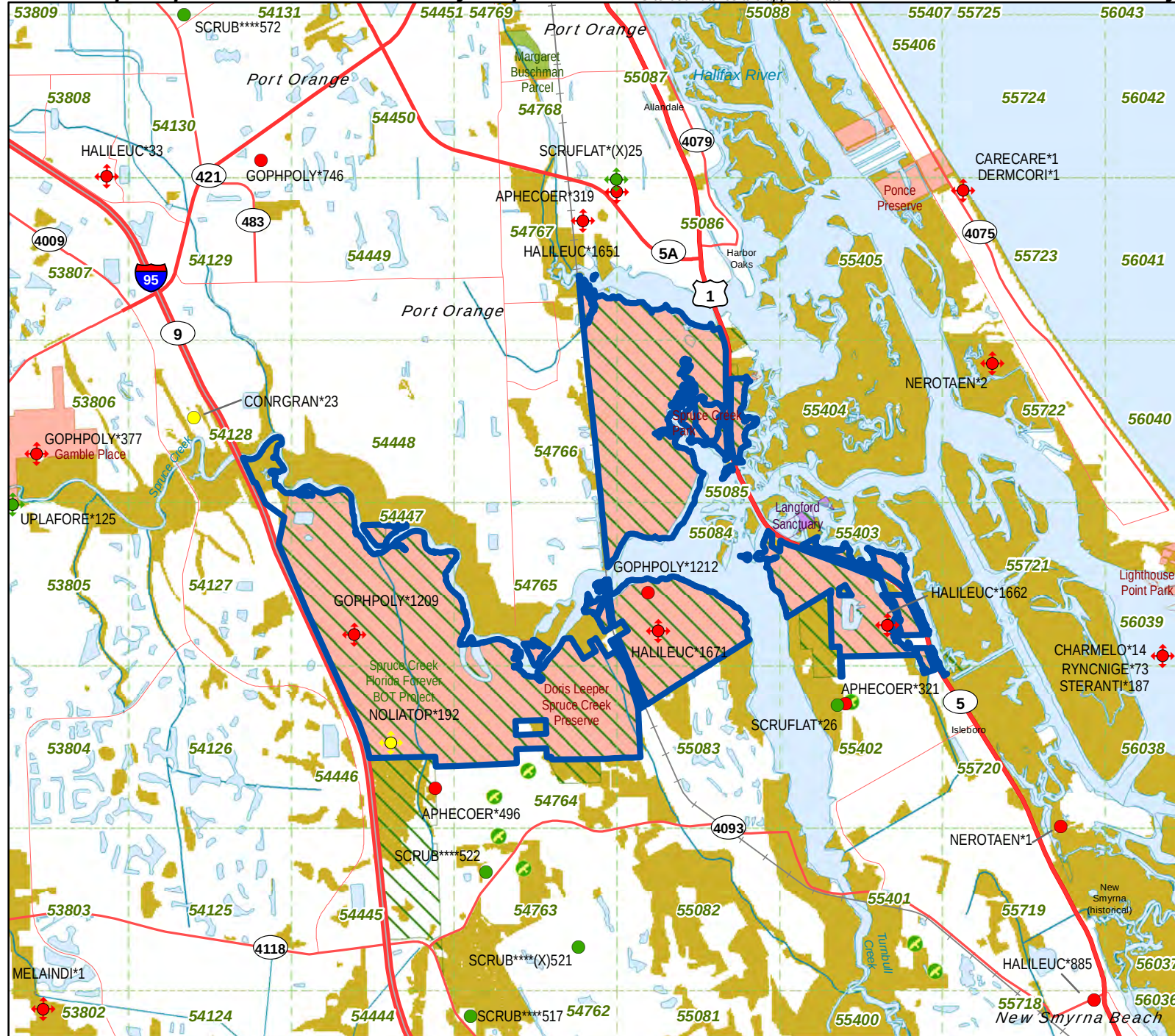
- Florida Forever
- Board of Trustees Projects

- FNAI Rare Species Habitat
- FNAI Biodiversity Matrix Square Mile Units

- County Boundary
- Roads
- Water

NOTE

This map contains environmentally sensitive information. Please do not distribute or publish without prior consent from FNAI. Map should not be interpreted without accompanying documents.



Map produced by KAB
5/4/2021



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

FLORIDA
Natural Areas
INVENTORY

CLIP v4.0 Resource Priorities

Biodiversity Resource Category

- Priority 1 - highest
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Landscape Resource Category

- Priority 1 - highest
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Surface Water Resource Category

- Priority 1 - highest
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Aggregated CLIP Priorities

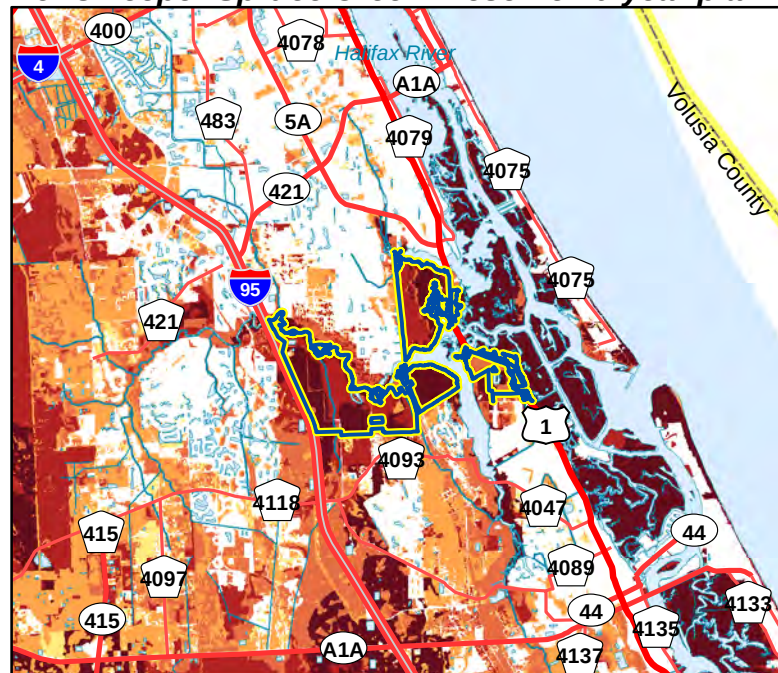
- Priority 1 - highest
- Priority 2
- Priority 3
- Priority 4
- Priority 5

Site Boundary

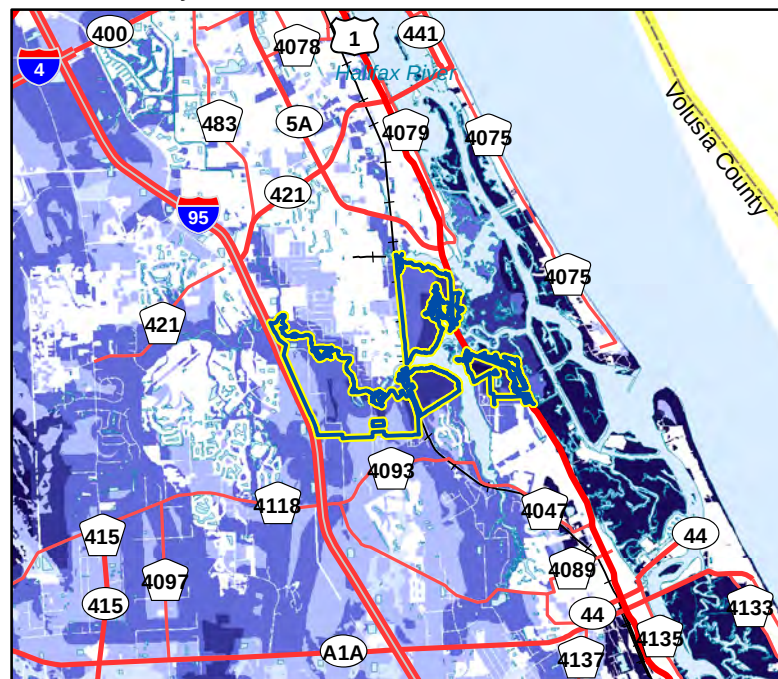
Map should not be interpreted without
accompanying documents.

Critical Lands and Waters Identification Project
(CLIP) is a cooperative effort between the FSU
Florida Natural Areas Inventory, UF Center for
Landscape Conservation Planning, and FL Fish &
Wildlife Conservation Commission, with additional
funding from FL Dept of Environmental Protection and
US Fish & Wildlife Service.

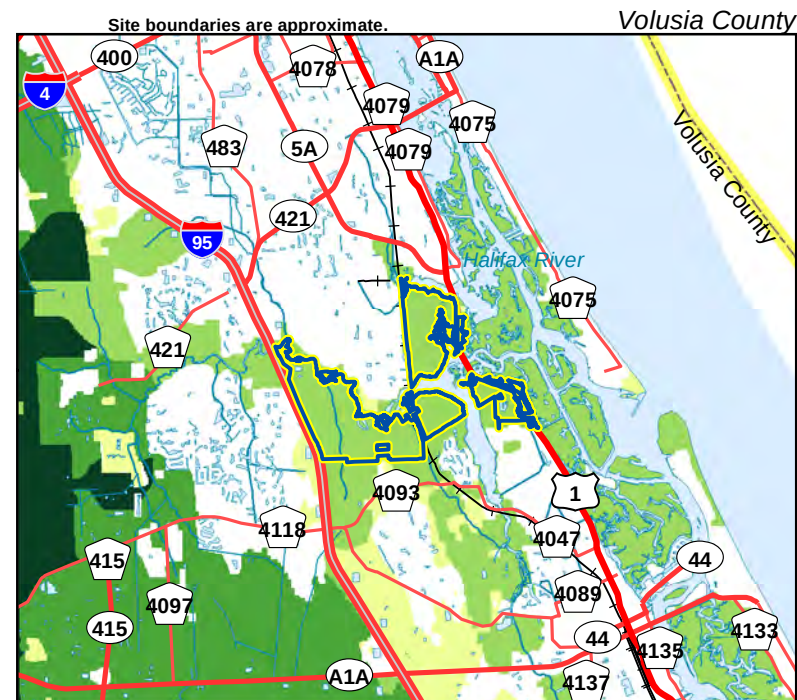
Doris Leeper Spruce Creek Preserve 10-year plan



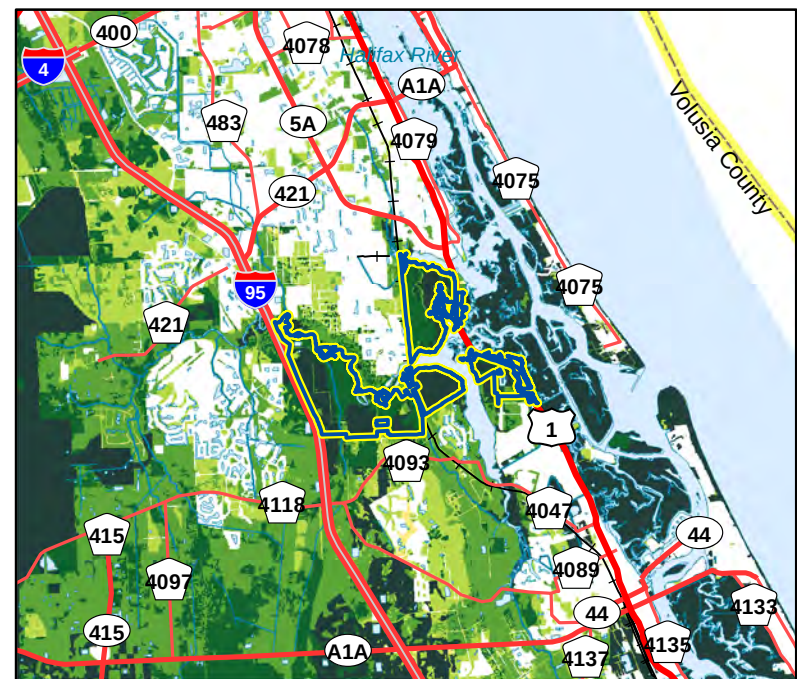
CLIP Biodiversity Resource Priorities



CLIP Surface Water Resource Priorities



CLIP Landscape Resource Priorities



CLIP Aggregated Resource Priorities

Map produced by KAB
5/4/2021



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FLORIDA
Natural Areas
INVENTORY

Florida Natural Areas Inventory

Managed Area Element Summary Doris Leeper Spruce Creek Preserve



SCIENTIFIC NAME	COMMON NAME	Global rank	State rank	Federal status	State status
PLANTS					
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
REPTILES					
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
BIRDS					
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N
MAMMALS					
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

Note: Summary includes all documented and likely species occurrence records currently in the FNAI database.



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FNAI ELEMENT OCCURRENCE REPORT on or near

Doris Leeper Spruce Creek Preserve 10-year plan



Map Label	Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing	Observation Date	Description	EO Comments
APHECOER*319	<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT	1981-05-17	"OPEN SLASH PINE SCRUB, SOME HAS BEEN DEVELOPED" SCRUBBY FLATWOODS	1981-05-17 2 SCRUB JAYS.
APHECOER*321	<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT	1981-05-17	"DISTURBED SLASH PINE SCRUB, DEVELOPMENT TO SOUTH". SCRUBBY FLATWOODS	1981-05-17 2 SCRUB JAYS.
APHECOER*496	<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT	2005-02-10	2005-02-10: Rural residential with immature sand pine scrub to west and farm to east on road (PNDLYO02FLUS).	2005-02-10: Five, maybe 6, birds observed; none banded. Birds using both sides of road (PNDLYO02FLUS). 2003: found the area where jays were found in 1993 to be unsuitable, dense, 20-30' planted sand pines (PNDNES03FLUS). 1993-05-17: Six jays in 3 groups were documented within 0.6 mi. to east during the statewide mapping effort (U94FIT02FLUS, U97PRA01FLUS).
CHARMELO*14	<i>Charadrius melodus</i>	Piping Plover	G3	S2	T	FT	1987-02-24	MARINE UNCONSOLIDATED SUBSTRATE (SAND SHOAL).	WINTERING AREA: 1986 - 10 OBSERVED AT INLET IN JAN. (U86JOH01FL), 1987 - 2 OBSERVED IN FEB. FORAGING WITH MULTI-SPECIES FLOCK ON SAND SHOAL IN BASS FLATS (U87NIC04FL).
CONRGRAN*23	<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T	1987-10-26	SAND PINE SCRUB ON TRUCK PARKING SIDE OF REST AREA	10-40 PLANTS IN FULL FLOWER ON DISTURBED BANK (ALSO CONTINUING INTO THE UNDISTURBED SCRUB).
GOPHPOLY*1209	<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST	2007	2003-2004: burrows noted in powerline right-of-way in overgrown sand pine/oak scrub; xeric hammock and overgrown scrub, historically scrub, and various clearings (U04SCH04FLUS).	2007: Kindell noted burrows, including some recently harvested, in western part of preserve ca. 300 m east of I-10 (site 4: PNDKIN02FLUS). 2004-07-06: 3 active burrows (at least 1 is adult) at 2 locations along a 0.1 mile stretch of sand road in overgrown scrub (site 3) (U04SCH04FLUS). 2003-08-28: 5 burrows (2 large, 3 juvenile) and 1 juvenile (5 inches) along power line (site 1); 2 burrows, 1 adult in xeric hammock (historic scrub; site 2) (U04SCH04FLUS). 1989: MacLaren recorded 3 burrows in area of site 4 noted above in 2007 (U90MAC05FLUS).



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GOPHPOLY*1212	<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST	2004-05-19	2004-05-19: scrubby flatwoods on area managed for natural resources (U04SCH04FLUS)	2007: suitable habitat to support a population, but survey data needed (PNDKIN02FLUS). 2004-05-19: Schultz and NeSmith observed one active burrow (U04SCH04FLUS).
GOPHPOLY*377	<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST	1983-02-18	Sandhills and scrubby flatwoods variants; very old growth longleaf pine forest (understory mowed but not burned); sand pine-turkey oak and saw palmetto understories; <i>Aristida stricta</i> present.	Leonard observed gopher tortoise burrows here, presumably on both sides of Taylor Road (Rt. 415).
HALILEUC*1651	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	2003	2005-07-12: Source does not provide a description.	Nest status: Active, 2003, 2002, 2001, 2000, 1999;(U03FWC01FLUS)
HALILEUC*1662	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	2003	2005-07-12: Source does not provide a description.	Nest status: Active, 2003, 2002, 2001; Unknown status or not assessed, 2000, 1999;(U03FWC01FLUS)
HALILEUC*1671	<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N	2006	2005-07-12: Source does not provide a description.	2006: continuously active 2003 - 2006 (W06FWC01FLUS). 2003: Nest status: Active, 2003, 2002; Unknown status or not assessed, 2001, 2000, 1999;(U03FWC01FLUS)
NEROTAEN*1	<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT	1987-05-20	No general description given	ONE DOR JUVENILE ON ROAD; ONE ADULT FEMALE COLLECTED IN MARSH. THE FEMALE GAVE BIRTH TO 3 YOUNG ON 15 OCT. 1987.
NEROTAEN*2	<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT	1979-10-04	No general description given	SNAKE(S) OBSERVED BY MOLER AND KOCHMAN.
NOLIATOP*192	<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T	2004-07-06	2004-07-06: scrubby flatwoods, moderately fire-excluded, with some ORV trails (U04SCH04FLUS)	2004-07-06: 100-1000 plants scattered in a wide area, most in flower, few in fruit. Plants in clusters, to 3' tall (U04SCH04FLUS).
RYNCNIGE*73	<i>Rynchops niger</i>	Black Skimmer	G5	S3	N	ST	1990-05-24	Beach dune	1990/05/24: J.A. Hovis, GFC, observed 9 adults. No evidence of breeding activity.



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Map Label	Scientific Name	Common Name	Global State Federal State Observation				Date	Description	EO Comments
			Rank	Rank	Status	Listing			
SCRUB**** (X)521	Scrub		G2	S2	N	N	1984-01-28	SCRUB SITE IS RELATIVELY LEVEL. LARGE AND NUMEROUS SERENOA REPENS. DOMINANT SHRUBS ARE CHAPMAN, MYRTLE AND LIVE OAK (U88CHR01). F84STO09 REPORTS ARISTIDA STRICTA IN OCCASIONAL OPENINGS, BUT GENERALLY, THERE IS LITTLE GROUND VEGETATION.	SOME TREES ARE 40 CM D6H.
SCRUB****522	Scrub		G2	S2	N	N	2004	SAND PINE SCRUB LOCATED ON OLD DUNE LINE. SHRUB LAYER DENSITY AND HEIGHT VARIES FROM E TO W ACROSS DUNE. UNDERSTORY DOMINATED BY OAKS, LYONIA FERRUGINEA, XIMENIA AND SERENOA REPENS.	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1984-01-28) (U05FNA02FLUS). AN OLD STAND OF SAND PINE ON SITE. NUMEROUS SAND PINE SEEDLINGS PRESENT.
SCRUFLAT* (X)25	Scrubby flatwoods		G2	S2?	N	N	1981-05-17	"OPEN SLASH PINE SCRUB, SOME HAS BEEN DEVELOPED" SCRUBBY FLATWOODS	No EO data given
SCRUFLAT*26	Scrubby flatwoods		G2	S2?	N	N	2004	"DISTURBED SLASH PINE SCRUB, DEVELOPMENT TO SOUTH" SCRUBBY FLATWOODS	2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1981-05-17) (U05FNA02FLUS).
STERANTI*187	<i>Sternula antillarum</i>	Least Tern	G4	S3	N	ST	1988	No general description given	1991/07/05: J.A. Hovis, GFC, no terns or nests observed (U97GFC02FLUS). 1990/05/24: J.A. Hovis, GFC, no nesting activity observed (U97GFC02FLUS). 1988: nesting began on 24 May and ended on 26 July; 40 nests observed (U97GFC02FLUS). 1987/05/08: T.E. O'Meara, GFC, reports 120 adults, 3 nests; counts were conducted early in the nesting season; potential colony size may be greater; CBR form available (U97GFC02FLUS).



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UPLAFORE*125	Upland hardwood forest		G5	S3	N	N	2004	TRANSITION FROM SCRUB UPLANDS TO CYPRESS/RED MAPLE FLOODPLAIN. WATER SEEPS FROM BASE OF SLOPE AT SEVERAL POINTS	2010: Prior to the 2010 natural community reclassification effort this EO had been known as Slope forest EO number 1 (see U10FNA01FLUS for updated community descriptions). 2004: Update to last obs date was based on interpretation of aerial photography (previous value was 1975-05-26) (U05FNA02FLUS). MAGNOLIA, SPRUCE PINE, "HICKORY", "OAKS".

Florida Natural Areas Inventory

Biodiversity Matrix Report



Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Matrix Unit ID: 54127					
Likely					
<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
Mesic flatwoods		G4	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
Scrub		G2	S2	N	N
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT
Potential					
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i>	sand-dune spurge	G2	S2	N	E
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Deeringothamnus rugelii</i>	Rugel's pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Lithobates capito</i>	Gopher Frog	G2G3	S3	N	N
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N
Matrix Unit ID: 54128					
Documented-Historic					
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
Likely					
<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
Mesic flatwoods		G4	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
Scrub		G2	S2	N	N
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT
Potential					
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i>	sand-dune spurge	G2	S2	N	E
<i>Deeringothamnus rugelii</i>	Rugel's pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST

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Florida Natural Areas Inventory

Biodiversity Matrix Report



Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Pteroglossaspis ecristata</i>	giant orchid	G2G3	S2	N	T
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

Matrix Unit ID: 54446

Documented

<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T

Likely

Mesic flatwoods		G4	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
Scrub		G2	S2	N	N
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT

Potential

<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i>	sand-dune spurge	G2	S2	N	E
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Deeringothamnus rugelii</i>	Rugel's pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Peucaea aestivalis</i>	Bachman's Sparrow	G3	S3	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

Matrix Unit ID: 54447

Documented

<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
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Likely

<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
Mesic flatwoods		G4	S4	N	N

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Biodiversity Matrix Report



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<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
Scrub		G2	S2	N	N
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT
Potential					
<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon	G3T3	S1	E	FE
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i>	sand-dune spurge	G2	S2	N	E
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Deeringothamnus rugelii</i>	Rugel's pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

Matrix Unit ID: 54448

Likely

Mesic flatwoods		G4	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
Scrub		G2	S2	N	N
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT

Potential

<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i>	sand-dune spurge	G2	S2	N	E
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

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Florida Natural Areas Inventory

Biodiversity Matrix Report



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Matrix Unit ID: 54764					
Documented					
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
Likely					
<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
Mesic flatwoods		G4	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
Scrub		G2	S2	N	N
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT
Potential					
<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon	G3T3	S1	E	FE
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i>	sand-dune spurge	G2	S2	N	E
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	G3G4	S1	N	N
<i>Deeringothamnus rugelii</i>	Rugel's pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Lithobates capito</i>	Gopher Frog	G2G3	S3	N	N
<i>Lupinus aridorum</i>	scrub lupine	G3T1	S1	E	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulae</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Peucaea aestivalis</i>	Bachman's Sparrow	G3	S3	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N
Matrix Unit ID: 54765					
Likely					
<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
Mesic flatwoods		G4	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT
Scrub		G2	S2	N	N
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT
Potential					
<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon	G3T3	S1	E	FE
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T

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FLORIDA
Natural Areas
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Florida Natural Areas Inventory

Biodiversity Matrix Report



Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i>	sand-dune spurge	G2	S2	N	E
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Deeringothamnus rugelii</i>	Rugel's pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Eretmochelys imbricata</i>	Hawksbill Sea Turtle	G3	S1	E	FE
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Lithobates capito</i>	Gopher Frog	G2G3	S3	N	N
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Setophaga discolor paludicola</i>	Florida Prairie Warbler	G5T3	S3	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

Matrix Unit ID: 54766

Likely

Mesic flatwoods		G4	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT

Potential

<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i>	sand-dune spurge	G2	S2	N	E
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Deeringothamnus rugelii</i>	Rugel's pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Eretmochelys imbricata</i>	Hawksbill Sea Turtle	G3	S1	E	FE
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Setophaga discolor paludicola</i>	Florida Prairie Warbler	G5T3	S3	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

Matrix Unit ID: 54767

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Florida Natural Areas Inventory

Biodiversity Matrix Report



Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Documented					
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N
Likely					
Mesic flatwoods		G4	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT
Potential					
<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon	G3T3	S1	E	FE
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i>	sand-dune spurge	G2	S2	N	E
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Deeringothamnus rugelii</i>	Rugel's pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Eretmochelys imbricata</i>	Hawksbill Sea Turtle	G3	S1	E	FE
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
Scrubby flatwoods		G2	S2?	N	N
<i>Setophaga discolor paludicola</i>	Florida Prairie Warbler	G5T3	S3	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

Matrix Unit ID: 55083

Likely

<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
Mesic flatwoods		G4	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT
Scrub		G2	S2	N	N
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT

Potential

<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon	G3T3	S1	E	FE
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i>	sand-dune spurge	G2	S2	N	E

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Florida Natural Areas Inventory

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<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Corynorhinus rafinesquii</i>	Rafinesque's Big-eared Bat	G3G4	S1	N	N
<i>Deeringothamnus rugelii</i>	Rugel's pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Eretmochelys imbricata</i>	Hawksbill Sea Turtle	G3	S1	E	FE
<i>Glandularia maritima</i>	coastal vervain	G3	S3	N	E
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Lithobates capito</i>	Gopher Frog	G2G3	S3	N	N
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulae</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Peucaea aestivalis</i>	Bachman's Sparrow	G3	S3	N	N
<i>Setophaga discolor paludicola</i>	Florida Prairie Warbler	G5T3	S3	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

Matrix Unit ID: 55084

Documented

<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N

Likely

<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
Mesic flatwoods		G4	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT
Scrub		G2	S2	N	N
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT

Potential

<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon	G3T3	S1	E	FE
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i>	sand-dune spurge	G2	S2	N	E
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Deeringothamnus rugelii</i>	Rugel's pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Eretmochelys imbricata</i>	Hawksbill Sea Turtle	G3	S1	E	FE
<i>Glandularia maritima</i>	coastal vervain	G3	S3	N	E
<i>Harrisia simpsonii</i>	Simpson's prickly apple	G2	S2	N	N
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Lithobates capito</i>	Gopher Frog	G2G3	S3	N	N

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Florida Natural Areas Inventory

Biodiversity Matrix Report



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<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Setophaga discolor paludicola</i>	Florida Prairie Warbler	G5T3	S3	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

Matrix Unit ID: 55085

Likely

Mesic flatwoods		G4	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT

Potential

<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon	G3T3	S1	E	FE
<i>Apelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i>	sand-dune spurge	G2	S2	N	E
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Deeringothamnus rugelii</i>	Rugel's pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Eretmochelys imbricata</i>	Hawksbill Sea Turtle	G3	S1	E	FE
<i>Glandularia maritima</i>	coastal vervain	G3	S3	N	E
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Harrisia simpsonii</i>	Simpson's prickly apple	G2	S2	N	N
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Lupinus aridorum</i>	scrub lupine	G3T1	S1	E	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Setophaga discolor paludicola</i>	Florida Prairie Warbler	G5T3	S3	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

Matrix Unit ID: 55086

Likely

Mesic flatwoods		G4	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT

Potential

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<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon	G3T3	S1	E	FE
<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Deeringothamnus rugelii</i>	Rugel's pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Eretmochelys imbricata</i>	Hawksbill Sea Turtle	G3	S1	E	FE
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Lupinus aridorum</i>	scrub lupine	G3T1	S1	E	E
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
Scrubby flatwoods		G2	S2?	N	N
<i>Setophaga discolor paludicola</i>	Florida Prairie Warbler	G5T3	S3	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

Matrix Unit ID: 55402

Documented

Scrubby flatwoods	G2	S2?	N	N
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Documented-Historic

<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
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Likely

Mesic flatwoods		G4	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT
Scrub		G2	S2	N	N
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT

Potential

<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon	G3T3	S1	E	FE
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i>	sand-dune spurge	G2	S2	N	E
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Deeringothamnus rugelii</i>	Rugel's pawpaw	G1	S1	E	E
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Eretmochelys imbricata</i>	Hawksbill Sea Turtle	G3	S1	E	FE
<i>Glandularia maritima</i>	coastal vervain	G3	S3	N	E
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T

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<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Lithobates capito</i>	Gopher Frog	G2G3	S3	N	N
<i>Matelea floridana</i>	Florida spiny-pod	G2	S2	N	E
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Nolina atopocarpa</i>	Florida beargrass	G3	S3	N	T
<i>Pteroglossaspis ecrinata</i>	giant orchid	G2G3	S2	N	T
<i>Setophaga discolor paludicola</i>	Florida Prairie Warbler	G5T3	S3	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

Matrix Unit ID: 55403

Documented

<i>Haliaeetus leucocephalus</i>	Bald Eagle	G5	S3	N	N
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Likely

<i>Aphelocoma coerulescens</i>	Florida Scrub-Jay	G2?	S2	T	FT
Mesic flatwoods		G4	S4	N	N
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT
Scrub		G2	S2	N	N
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT

Potential

<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon	G3T3	S1	E	FE
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Chamaesyce cumulicola</i>	sand-dune spurge	G2	S2	N	E
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Deeringothamnus rugelii</i>	Rugel's pawpaw	G1	S1	E	E
<i>Dermochelys coriacea</i>	Leatherback Sea Turtle	G2	S2	E	FE
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Eretmochelys imbricata</i>	Hawksbill Sea Turtle	G3	S1	E	FE
<i>Glandularia maritima</i>	coastal vervain	G3	S3	N	E
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Harrisia simpsonii</i>	Simpson's prickly apple	G2	S2	N	N
<i>Heterodon simus</i>	Southern Hognose Snake	G2	S2S3	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Lechea divaricata</i>	pine pinweed	G2	S2	N	E
<i>Lithobates capito</i>	Gopher Frog	G2G3	S3	N	N
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Pteroglossaspis ecrinata</i>	giant orchid	G2G3	S2	N	T
<i>Setophaga discolor paludicola</i>	Florida Prairie Warbler	G5T3	S3	N	N
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

Matrix Unit ID: 55720

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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Florida Natural Areas Inventory

Biodiversity Matrix Report



Scientific Name	Common Name	Global Rank	State Rank	Federal Status	State Listing
Likely					
<i>Mycteria americana</i>	Wood Stork	G4	S2	T	FT
<i>Nerodia clarkii taeniata</i>	Atlantic Salt Marsh Snake	G4T1Q	S1	T	FT
Scrub		G2	S2	N	N
<i>Trichechus manatus</i>	West Indian Manatee	G2G3	S2	T	FT
Potential					
<i>Acipenser oxyrinchus oxyrinchus</i>	Atlantic Sturgeon	G3T3	S1	E	FE
<i>Antigone canadensis pratensis</i>	Florida Sandhill Crane	G5T2	S2	N	ST
<i>Calopogon multiflorus</i>	many-flowered grass-pink	G2G3	S2S3	N	T
<i>Centrosema arenicola</i>	sand butterfly pea	G2Q	S2	N	E
<i>Charadrius melodus</i>	Piping Plover	G3	S2	T	FT
<i>Conradina grandiflora</i>	large-flowered rosemary	G3	S3	N	T
<i>Dermochelys coriacea</i>	Leatherback Sea Turtle	G2	S2	E	FE
<i>Drymarchon couperi</i>	Eastern Indigo Snake	G3	S2?	T	FT
<i>Eretmochelys imbricata</i>	Hawksbill Sea Turtle	G3	S1	E	FE
<i>Glandularia maritima</i>	coastal vervain	G3	S3	N	E
<i>Gopherus polyphemus</i>	Gopher Tortoise	G3	S3	C	ST
<i>Harrisia simpsonii</i>	Simpson's prickly apple	G2	S2	N	N
<i>Lechea cernua</i>	nodding pinweed	G3	S3	N	T
<i>Mustela frenata peninsulæ</i>	Florida Long-tailed Weasel	G5T3?	S3?	N	N
<i>Nemastylis floridana</i>	celestial lily	G2	S2	N	E
<i>Neofiber alleni</i>	Round-tailed Muskrat	G2	S2	N	N
<i>Pteroglossaspis ecristata</i>	giant orchid	G2G3	S2	N	T
<i>Setophaga discolor paludicola</i>	Florida Prairie Warbler	G5T3	S3	N	N
<i>Sternula antillarum</i>	Least Tern	G4	S3	N	ST
<i>Ursus americanus floridanus</i>	Florida Black Bear	G5T4	S4	N	N

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.

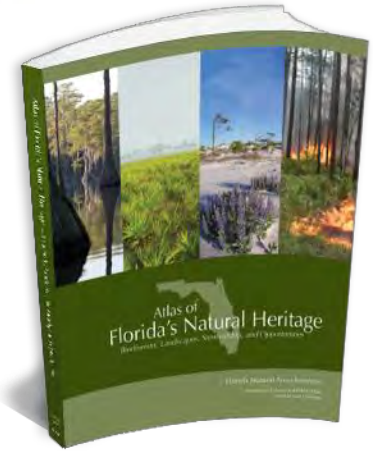
The rank of X is assigned to EOs for which there is documented destruction of habitat or environment, or persuasive evidence of eradication based on adequate survey (i.e., thorough or repeated survey efforts by one or more experienced observers at times and under conditions appropriate for the Element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



Atlas of Florida's Natural Heritage

Biodiversity, Landscapes, Stewardship, and Opportunities

The Florida Natural Areas Inventory is pleased to announce the publication of the ***Atlas of Florida's Natural Heritage: Biodiversity, Landscapes, Stewardship, and Opportunities***. This high-quality, full-color *Atlas* is sure to become a standard reference for anyone involved in the conservation, management, study, or enjoyment of Florida's rich natural resources. We hope the *Atlas* will inspire, educate, and raise awareness of and interest in biodiversity and conservation issues.



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and



Appendix F

List of Species Observed by Staff, User Groups and Project Ibis

VERTEBRATES			
Scientific Name	Common Name		
<i>Anolis sagrei</i>	Brown Anole		
<i>Procyon lotor</i>	Common Raccoon		
<i>Osteopilus septentrionalis</i>	Cuban Tree Frog		
<i>Sistrurus miliarius barbouri</i>	Dusky Pygmy Rattlesnake		
<i>Micrurus fulvius</i>	Eastern Coralsnake		
<i>Sciurus carolinensis</i>	Eastern Gray Squirrel		
<i>Gambusia holbrooki</i>	Eastern Mosquitofish		
<i>Anolis carolinensis</i>	Green Anole		
<i>Dasypus novemcinctus</i>	Nine-banded Armadillo		
<i>Plestiodon inexpectatus</i>	Southeastern Five-lined Skink		
<i>Coluber constrictor priapus</i>	Southern Black Racer		
INVERTEBRATES			
Scientific Name	Common Name	Scientific Name	Common Name
<i>Stomolophus meleagris</i>	Cannonball Jelly	<i>Apis mellifera</i>	Western Honey Bee
<i>Littoraria irrorata</i>	Marsh Periwinkle	<i>Xylocopa virginica</i>	Eastern Carpenter Bee
<i>Melongena corona</i>	American Crown Conch	<i>Apis mellifera</i>	Western Honey Bee
<i>Cerithium atratum</i>	Dark Cerith	<i>Philanthus ventralis</i>	Flat-collared Beewolf
<i>Hepatus epheliticus</i>	Dolly Varden Crab	<i>Bombus impatiens</i>	Common Eastern Bumble Bee
<i>Leptuca pugilator</i>	Atlantic Sand Fiddler Crab	<i>Battus philenor</i>	Pipevine Swallowtail
<i>Minuca pugnax</i>	Mud Fiddler Crab	<i>Seirarctia echo</i>	Echo Moth
<i>Leptuca pugilator</i>	Atlantic Sand Fiddler Crab	<i>Urbanus proteus</i>	Long-tailed Skipper
<i>Armases cinereum</i>	Squareback Marsh Crab	<i>Danaus plexippus</i>	Monarch
<i>Aratus pisonii</i>	Mangrove Tree Crab	<i>Dione vanillae</i>	Gulf Fritillary
<i>Trichonephila clavipes</i>	Golden Silk Spider	<i>Strymon melinus</i>	Gray Hairstreak
<i>Argiope aurantia</i>	Yellow Garden Spider	<i>Heliconius charithonia</i>	Zebra Longwing
<i>Uloborus campestratus</i>		<i>Phobetron pithecium</i>	Hag Moth
<i>Naphrys xerophila</i>		<i>Erynnis horatius</i>	Horace's Duskywing
<i>Hemisphaerota cyanea</i>	Palmetto Tortoise Beetle	<i>Eacles imperialis</i>	Imperial Moth
<i>Alaus oculatus</i>	Eastern Eyed Click Beetle	<i>Inga sparsiciliella</i>	Black-marked Inga Moth
<i>Odontotaenius disjunctus</i>	Horned Passalus Beetle	<i>Eurytides marcellus</i>	Zebra Swallowtail
<i>Phanaeus igneus</i>		<i>Erythrodiplax berenice</i>	Seaside Dragonlet

<i>Brachys fasciferus</i>		<i>Celithemis eponina</i>	Halloween Pennant
<i>Xylomya americana</i>		<i>Pachydiplax longipennis</i>	Blue Dasher
<i>Bertamyia notata</i>		<i>Erythemis simplicicollis</i>	Eastern Pondhawk
<i>Neotibicen davisii davisii</i>		<i>Erythrodiplax berenice</i>	Seaside Dragonlet
<i>Sephina gundlachii</i>	Giant Milkweed Bug	<i>Chortophaga australior</i>	Southern Greenstriped Grasshopper
<i>Flatoidinus punctatus</i>		<i>Romalea microptera</i>	Eastern Lubber Grasshopper
FUNGI			
Scientific Name	Common Name		
<i>Herpothallon rubrocinctum</i>	Christmas lichen		
<i>Clathrus columnatus</i>	column stinkhorn		
<i>Stereum complicatum</i>	crowded parchment		
<i>Omphalotus illudens</i>	Eastern American jack-o'-lantern		
<i>Stereum ostrea</i>	false turkey-tail		
<i>Lentinus crinitus</i>	fringed sawgill		
<i>Irpiciporus pachyodon</i>	marshmallow polypore		
<i>Omphalotus subilludens</i>	southern jack-o'-lantern		
<i>Ramaria stricta</i>	Upright Coral Fungus		
<i>Clavulina coralloides</i>	White Coral Fungus		
<i>Ganoderma sessile</i>	<i>Laetiporus gilbertsonii pallidus</i>		
<i>Ganoderma lobatum</i>	<i>Favolus brasiliensis</i>		
PLANTS			
Scientific Name	Common Name	Scientific Name	Common Name
<i>Thalia geniculata</i>	alligator flag	<i>Erigeron canadensis</i>	horseweed
<i>Callicarpa americana</i>	American beautyberry	<i>Conradina grandiflora</i>	Largeflower False Rosemary
<i>Solanum americanum</i>	American black nightshade	<i>Sabatia grandiflora</i>	Largeflower Rose Gentian
<i>Ilex opaca</i>	American holly	<i>Saururus cernuus</i>	lizard's tail
<i>Phytolacca americana</i>	American pokeweed	<i>Salvia lyrata</i>	lyreleaf sage
<i>Campsis radicans</i>	American trumpet vine	<i>Tillandsia simulata</i>	Manatee River airplant
<i>Tillandsia bartramii</i>	Bartram's airplant	<i>Penstemon multiflorus</i>	Manyflower Beardtongue
<i>Canavalia rosea</i>	Beach Bean	<i>Pluchea odorata</i>	marsh fleabane
<i>Smallanthus uvedalia</i>	bear's foot	<i>Pityopsis graminifolia</i>	Narrowleaf Silkgrass
<i>Vaccinium fuscum</i>	Black Highbush Blueberry	<i>Erigeron quercifolius</i>	oakleaf fleabane
<i>Avicennia germinans</i>	black mangrove	<i>Euphorbia cyathophora</i>	painted leaf
<i>Medicago lupulina</i>	Black Medick	<i>Desmodium paniculatum</i>	panicked ticktrefoil

<i>Piptochaetium avenaceum</i>	Blackseed Needlegrass	<i>Clitoria mariana</i>	Pigeonwings
<i>Trichostema dichotomum</i>	Blue Curls	<i>Polygala incarnata</i>	Pink Milkwort
<i>Nuttallanthus canadensis</i>	blue toadflax	<i>Passiflora incarnata</i>	purple passionflower
<i>Tradescantia ohiensis</i>	bluejacket	<i>Galactia purshii</i>	Pursh's Milkpea
<i>Schinus terebinthifolia</i>	Brazilian pepper	<i>Rhizophora mangle</i>	red mangrove
<i>Rhynchosia cinerea</i>	Brownhair Snoutbean	<i>Pleopeltis michauxiana</i>	resurrection fern
<i>Centrosema virginianum</i>	butterfly pea	<i>Bidens alba</i>	Romerillo
<i>Polygala nana</i>	candyroot	<i>Abrus precatorius</i>	rosary pea
<i>Indigofera caroliniana</i>	Carolina Indigo	<i>Houstonia procumbens</i>	roundleaf bluet
<i>Dichondra carolinensis</i>	Carolina ponysfoot	<i>Lyonia ferruginea</i>	rusty staggerbush
<i>Ruellia caroliniensis</i>	Carolina ruellia	<i>Smilax pumila</i>	sarsaparilla vine
<i>Eustoma exaltatum</i>	catchfly prairie gentian	<i>Serenoa repens</i>	saw palmetto
<i>Zeuxine strateumatica</i>	centipede grass orchid	<i>Carya floridana</i>	Scrub Hickory
<i>Lycium carolinianum</i>	Christmas berry	<i>Borrichia frutescens</i>	sea ox-eye
<i>Ampelaster carolinianus</i>	Climbing Aster	<i>Sesuvium portulacastrum</i>	sea purslane
<i>Commelina diffusa</i>	climbing dayflower	<i>Portulaca pilosa</i>	shaggy portulaca
<i>Liatris laevigata</i>	clusterleaf blazing star	<i>Rhus copallinum</i>	shining sumac
<i>Sabatia calycina</i>	Coastal Rose Gentian	<i>Vaccinium myrsinites</i>	Shiny blueberry
<i>Cenchrus spinifex</i>	coastal sandbur	<i>Psychotria nervosa</i>	Shiny-leaved Wild Coffee
<i>Lantana camara</i>	common lantana	<i>Vittaria lineata</i>	Shoestring Fern
<i>Zamia integrifolia</i>	Coontie	<i>Asemeia grandiflora</i>	Showy milkwort
<i>Erythrina herbacea</i>	Coral Bean	<i>Blutaparon vermiculare</i>	Silverhead
<i>Melothria pendula</i>	creeping cucumber	<i>Oenothera simulans</i>	Southern Beeblossom
<i>Vaccinium stamineum</i>	deerberry	<i>Rubus trivialis</i>	southern dewberry
<i>Amorpha fruticosa</i>	desert false indigo	<i>Magnolia grandiflora</i>	southern magnolia
<i>Rhynchosia difformis</i>	Doubleform Snoutbean	<i>Tillandsia usneoides</i>	Spanish moss
<i>Smilax auriculata</i>	Earleaf Greenbrier	<i>Monarda punctata</i>	spotted horse mint
<i>Tripsacum dactyloides</i>	Eastern Gamagrass	<i>Cnidioscolus stimulosus</i>	spurge nettle
<i>Vaccinium arboreum</i>	farkleberry	<i>Hypericum hypericoides</i>	St. Andrew's cross
<i>Dalea feayi</i>	Feay's Prairie Clover	<i>Vernonia gigantea</i>	Tall Ironweed
<i>Lyonia lucida</i>	fetterbush lyonia	<i>Hyptis mutabilis</i>	Tropical Bushmint
<i>Hamelia patens</i>	Firebush	<i>Carphephorus odoratissimus</i>	Vanillaleaf
<i>Erechtites hieracifolius</i>	fireweed	<i>Desmodium viridiflorum</i>	Velvetleaf Ticktrefoil
<i>Asimina obovata</i>	Flag-pawpaw	<i>Salicornia ambigua</i>	Virginia Glasswort
<i>Hypericum tetrapetalum</i>	fourpetal St. Johnswort	<i>Laguncularia racemosa</i>	White Mangrove
<i>Thunbergia fragrans</i>	Fragrant Thunbergia	<i>Melilotus albus</i>	White Sweetclover

<i>Verbesina virginica</i>	frostweed	<i>Vigna luteola</i>	Wild Cowpea
<i>Ilex glabra</i>	gallberry	<i>Ipomoea pandurata</i>	wild potato vine
<i>Acrostichum danaeifolium</i>	Giant leather fern	<i>Sapindus saponaria</i>	Wingleaf Soapberry
<i>Phlebodium aureum</i>	golden polypody	<i>Oxalis</i>	woodsorrels
<i>Geobalanus oblongifolius</i>	Gopher apple	<i>Ilex vomitoria</i>	Yaupon Holly
<i>Bacopa monnieri</i>	Herb-of-Grace	<i>Gelsemium sempervirens</i>	yellow jessamine
<i>Ptilimnium capillaceum</i>	herbwilliam		
Birds			
Common Name	Common Name	Common Name	Common Name
American Coot	American Redstart	Acadian Flycatcher	Sandhill Crane
American Oystercatcher	American White Pelican	American Goldfinch	Scarlet Tanager
American Robin	Anhinga	American Kestrel	Sedge Wren
American Wigeon	Bay-breasted Warbler	Americn Crow	Snow Goose
Barn Swallow	Black Skimmer	Baltimore Oriole	Sora
Black Scoter	Black-and-white Warbler	Barred Owl	Surf Scoter
Blak-bellied Plover	Blackburnian Warbler	Belted Kingfisher	Swainson's Thrush
Blue-gray Gnatcatcher	Blackpoll Warbler	Black Vulture	Tree Swallow
Blue-winged Teal	Black-throated Blue Warbler	Black-crowned Night-Heron	Tufted Titmouse
Brown Thrasher	Black-throated Gree Warbler	Blad Eagle	Veery
Brown-headed Nuthatch	Bonaparte's Gull	Blue Jay	Virginia Rail
Canada Goose	Brown Pelican	Boat-tailed Grackle	White-winged Scoter
Canvasback	Cape May Warbler	Cedar Waxwing	Wild Turkey
Carolina Chickadee	Caspian Tern	Common Grackle	Wood Duck
Carolina Wren	Cattle Egret	Cooper's Hawk	Yellow-billed Cuckoo
Chimney Swift	Chestnut-sided Warbler	Downy Woodpecker	Snowy Egret
Chuck-will's-widow	Common Loon	Easern Towhee	Spotted Sandpiper
Clapper Rail	Common Yellowthroat	Easter Phoebe	Summer Tanager
Common Gallinule	Double-crested Cormorant	Easter Wood-Pewee	Swainson's Warbler
Common Ground Dove	Dunlin Least Sandpiper	Eastern Screech-Owl	Tennessee Warbler
Common Nighthawk	Forster's Tern	Fish Crow	Tricolored Heron
duck sp.	Great Black-backed Gull	Glossy Ibis	warbler sp.
Eastern Bluebird	Great Egret	Golden-winged Warbler	Western Sandpiper
Eurasian Collared-Dove	Great Glue Heron	Gray Kinbird	Willet
European Starling	Greater Yellowlegs	Great Crested Flycatcher	Wilson's Snipe
Golden-crowned Kinglet	Greater Yellowlegs	Great Horned Owl	Wood Stork

Gray Catbird	gull sp.	Green Heron	Yellow Warbler
Green-winged Teal	Herring Gill	Hairy Woodpecker	Yellow-rumped Warbler
Hermit Thrush	Hooded Warbler	House Finch	Yellow-throated Warbler
Hooded Merganser	Killdeer	House Sparrow	Sharp-tailed Sparrow
Horned Grebe	Laughing Gull	Indigo Bunting	Shipping Sparrow
House Wren	Least Bittern	Loggerhead Shrike	Short-tailed Hawk
Indian Peafowl	Least Tern	Louisiana Waterthrush	Song Sparrow
King Rail	Lesser Black-backed Gull	Merlin	Swallow-tailed Kite
Lesser Scaup	Lesser Yellowlegs	Norther Flicker	Swamp Sparrow
Mallard	Little Blue Heron	Norther Harrier	Turkey Vulture
Mallard/Mottled Duck	Long-billed Dowitcher	Northern Cardinal	Vesper Sparrow
Marsh Wren	Magnolia Warbler	Northern Waterthrush	White-eyed Vireo
Mottled Duck	Norther Parula	Osprey	White Ibis
Mourning Dove	Northern Gannet	Ovenbird	woodpecker sp.
Muscoby Duck	Orange-crowned Warbler	Painted Bunting	Worm-eating Warbler
Norther Mockingbird	Palm Warbler	Peregrine Falcon	Yellow-bellied Sapsucker
Norther Rough-winged Swallow	peep sp.	Pileated Woodpecker	Yellow-crowned Night-Heron
Pied-billed Grebe	Pine Warbler	Red-bellied Woodpecker	
Purple Martin	Prairie Warbler	Red-eyed Vireo	
Readhead	Red Knot	Red-headed Woodpecker	
Red-breasted Merganser	Reddish Egret	Red-shouldered Hawk	
Red-breasted Nuthatch	Ring-billed Gull	Red-tailed Hawk	
Ring-necked Duck	Ruddy Turnstone	Red-winged Blackbird	
Rock Pigeon	Sanderling	Roseate Spoonbill	
Ruby-crowned Kinglet	Sandwich Tern	Saltmarsh Sparrow	
Ruby-throated Hummingbird	Semipalmated Plover	Savannah Sparrow	
Ruddy Duck	Short-billed Dowitcher	Sharp-shinned Hawk	

Appendix G

Scrub-Jay Survey Report



FLORIDA SCRUB-JAY SURVEY REPORT

**DORIS LEEPER SPRUCE CREEK PRESERVE
VOLUSIA COUNTY, FLORIDA**

PREPARED FOR:

County of Volusia
Resource Stewardship Division
Attention: Danielle Dangleman
123 West Indiana Ave., Room 201
DeLand, FL 32720

PREPARED BY:

Young Bear Environmental Consulting, Inc.
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SUBMITTED TO:

US Fish and Wildlife Service
Florida Ecological Services Field Office
Attention: Erin M. Gawera,
7915 Baymeadows Way, Suite 200
Jacksonville, FL 32256-7517

July 16, 2021

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1.0 INTRODUCTION

Doris Leeper Spruce Creek Preserve (hereafter referred to as the Preserve) is comprised of parcels owned by various public entities and managed in whole by Volusia County (Figure 1). The Preserve is located in eastern Volusia County, east of I-95 along Spruce Creek, Strickland Bay and Turnbull Bay. The Preserve occurs within portions of unincorporated Volusia County and within incorporated areas of New Smyrna Beach and Ponce Inlet in Volusia County, Florida, within Sections 20, 22, 23, 25, 26, 28, 29, 32, 33, 34, 35, 36, 38, Township 16S, Range 33E. The Preserve consists of approximately 2,500 acres of a variety of natural communities, including scrub habitat.

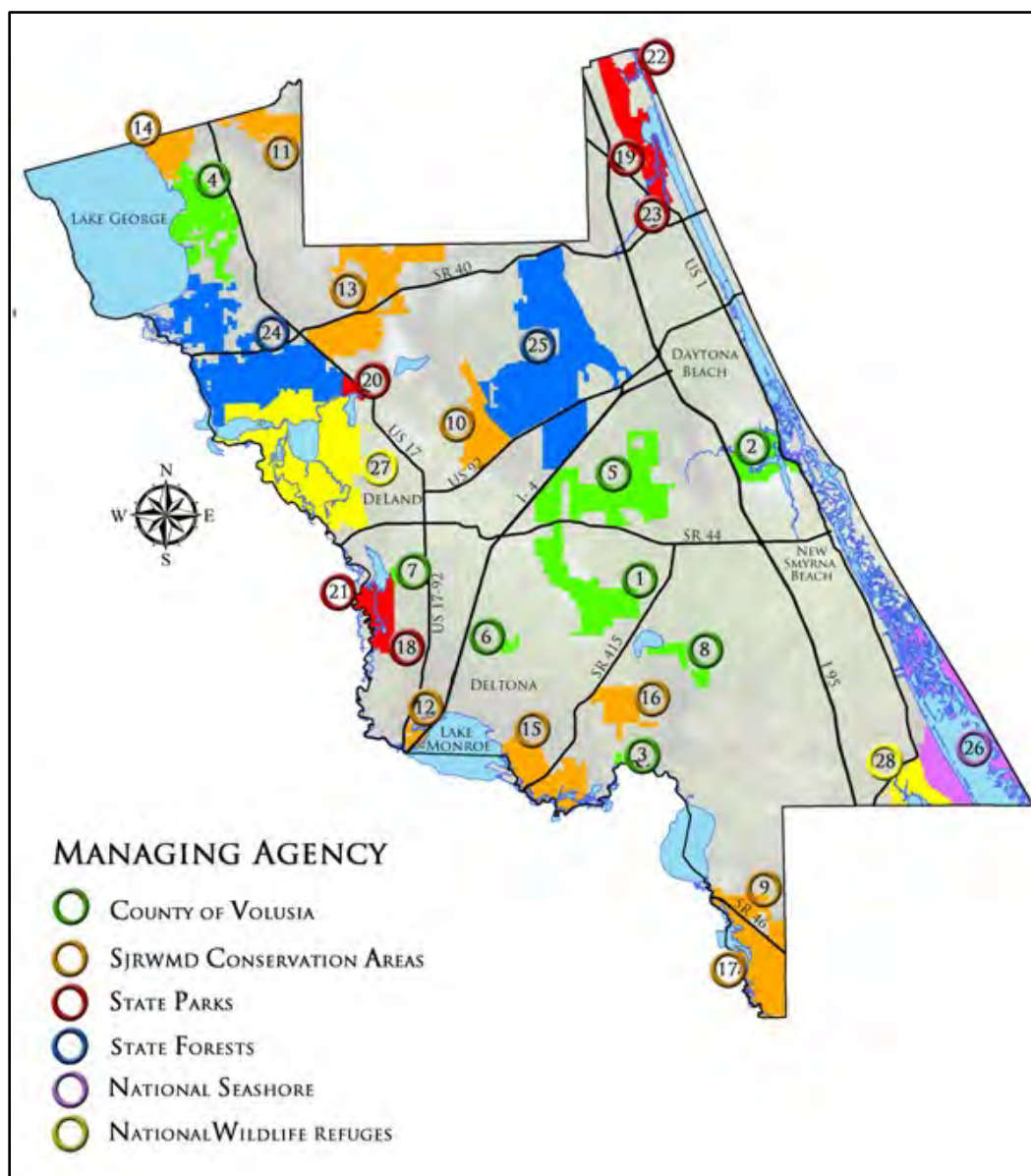


Figure 1. Conservation lands and managing entities within Volusia County. Area 2 is Doris Leeper Spruce Creek Preserve

Volusia County manages the Preserve for the preservation and protection of natural, historical, and archaeological resources and public access and outdoor recreation. Under their stewardship, the County monitors and manages for imperiled species. In recent years, this has included restoration of scrub habitat

(refer to the *Doris Leeper Spruce Creek Management Plan* for more details). As part of the scrub restoration and assessment, YBE Consulting, Inc. (YBE) was contracted by the County to conduct a species-specific survey for the presence of Florida scrub-jays (*Aphelocoma coerulescens*) within the Preserve. The purpose of the survey was to identify the presence/absence of the Florida scrub-jay within the Preserve, and, if present, the approximate family sizes and ranges.

2.0 BACKGROUND INFORMATION

The Florida scrub-jay is listed as Threatened by the U.S. Fish and Wildlife Service (USFWS) and the Florida Fish and Wildlife Conservation Commission (FWC), pursuant to the Federal Endangered Species Act (50 C.F.R. 17.11) and the Florida Administrative Code (Chapter 68A-27.003, F.A.C.), respectively. The most significant difference between these regulations is that the ESA specifically protects the loss of habitat and not just the loss of the species. The ESA protects scrub-jays from being “killed, harassed, taken”, etc. either directly or indirectly. A direct taking would include destroying a nest with young in the nest or the killing of an adult. An indirect or incidental taking would involve the development of occupied habitat leading to habitat destruction, even if the birds were not directly harmed. Habitat loss prevents the birds from using the site for portions of their life cycle and eventually leads to their demise. Generally, the Florida Administrative Code only protects the species from a direct taking.

Scrub-jays inhabit oak scrub communities with nearby open sandy areas. Scrub-jays typically nest in dense scrub oak pockets. Dense scrub oak sub-canopies provide protection from predatory raptors and domestic cats. This protection is critical to the survival of scrub-jays, which are brightly colored birds with poor evasive flying abilities. Typically, scrub-jays stay relatively close to or on the ground and generally hop between dense shrubby vegetation while foraging. The primary vegetative source of food for the Florida scrub-jay is acorns, however scrub-jays are also known to eat certain insect larvae. The proximity of open sandy areas for acorn caching is critical to the species, as the individuals are vulnerable to predation for shorter periods of time when the caching areas are closer to dense protective vegetation. Areas of dense oak and pine canopy cover and areas of extensive saw palmetto are of limited suitability to scrub-jays.

Scrub-jays exemplify cooperative breeding, which means offspring from previous nesting cycles remain to help the parental adults raise future offspring. Scrub-jay families typically consist of an adult pair, plus 1-10 adult and juvenile helpers. The presence of one or two helpers per adult pair is typical, thus typical family size is three to four individuals.

3.0 METHODOLOGY

3.1 Florida Scrub-jay Observation Data

A background literature search was conducted to determine if scrub-jays have been documented on the Preserve or in the vicinity. Distribution and observation data were reviewed from the following sources: the Florida Natural Areas Inventory’s *Standard Data Report* (FNAI, 2021), the Florida Committee on Rare and Endangered Plants and Animals (FCREPA) publications, the FWCC, the USFWS, *Status and Distribution of the Florida Scrub-Jay* (Cox, 1987), *Florida Scrub-jay Report* (Sisk, 2010) and eBird data.

3.2 Habitat Evaluation

An inventory of the wildlife habitat found within the Preserve was produced using the Florida Natural Areas Inventory Guide to the Natural Communities of Florida: 2010 Edition. For each habitat type, qualitative data were recorded including general structure and dominant species for each vegetative stratum. Additionally, each natural community was evaluated for the type of scrub-jay habitat present (Fitzpatrick

et. al., 1991). Three types are described, Type I, II, and III, which represent habitats of varying degrees of suitability for scrub-jay occupation. The definition of each habitat type is provided below.

- Type I – any upland plant community in which percent cover of the substrate by scrub oak species is 15 percent or more.
- Type II – any plant community, not meeting the definition of type I habitat, in which one or more scrub oak species is represented.
- Type III – any upland or seasonally dry wetland within 400 m (0.25 mi) of any area designated as Type I or II habitats.

Only natural communities that were assigned one of the three scrub-jay habitat types are presented in this report.

3.3 *Scrub-jay Field Survey*

YBE, along with Volusia County Land Management staff, surveyed the Preserve in accordance with the techniques outlined in Fitzpatrick *et. al.*, (1991). The survey protocol followed guidelines provided by the USFWS North Florida Field Office, in their document, Scrub-Jay Survey Guidelines, which was adapted from Fitzpatrick *et. al.*, (1991; updated on 08/24/2007). The survey consisted of playback of recorded scrub-jay vocalizations at (11) stations that were located to provide broadcast coverage of the recording within suitable scrub-jay habitat (see Figure 2. Scrub-Jay Survey Stations Map). Habitats with mature, closed canopies were excluded as such habitat structure precludes successful occupation by Florida scrub-jays. Each playback station was located using the *GPS Tracks* smartphone application (Version 3.6.8). Playback stations were spaced to allow adequate overlap of detectable sound between stations such that the entire habitat was covered.

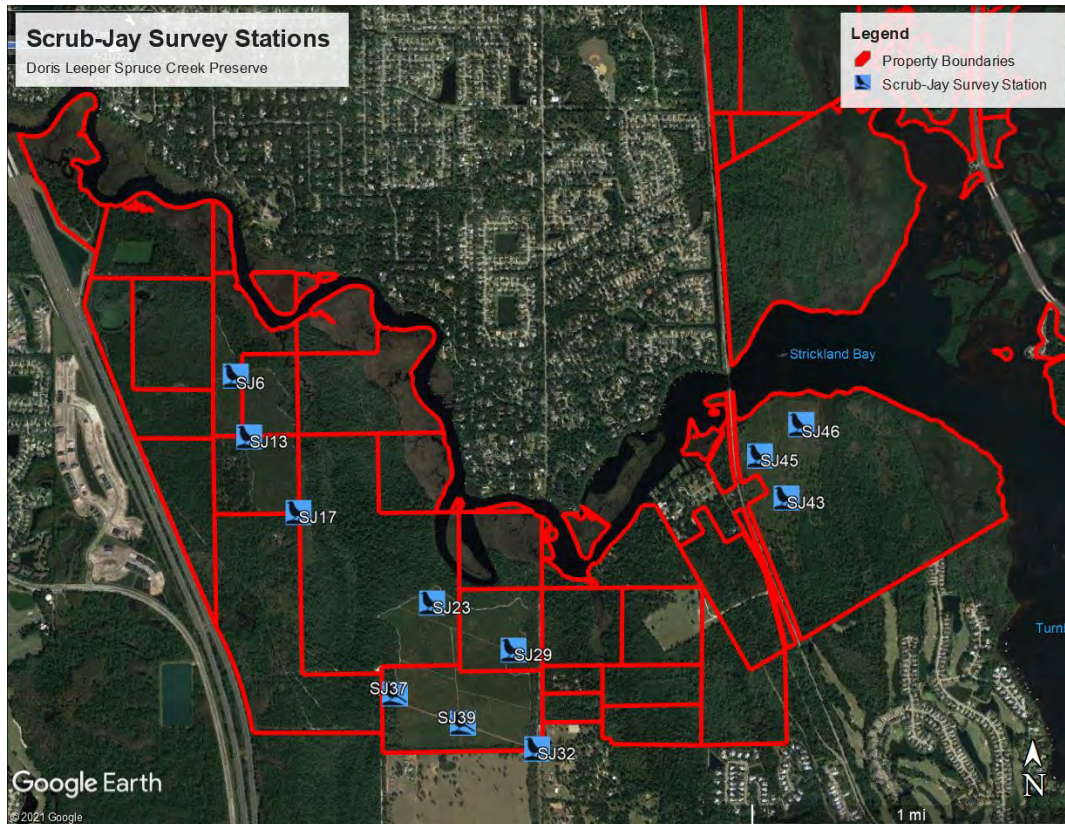


Figure 2. Florida scrub-jay playback stations

Bluetooth compatible speakers were used to broadcast recordings of scrub-jay scolding, territory advertisement, and female "hiccup" calls. The audio track was excerpted from Keller (1997). Typically, when these calls are played in an occupied scrub-jay territory, the resident jays will respond to the playback with calls of their own and visual displays in an attempt to locate and challenge the perceived intruder. The surveys were conducted in the morning hours and documented in daily field notes. The recording was not played during any precipitation or in the presence of observed predators. The vocalizations played were unobstructed by other loud noises as the major roadways in the area are buffered by trees found within the Preserve.

4.0 RESULTS

4.1 Florida Scrub-jay Observation Data

Background research revealed eight (8) documented Florida scrub-jay populations/families, within a three-mile radius. This included four (4) families within one mile south of the western parcels, three (3) families directly south of the eastern most parcels, and one (1) family directly north of the eastern most parcels (see Figure 3. Florida Scrub-Jay Family Map). The data used for this map includes data from the 1987 surveys conducted by Jeffrey A. Cox and the original statewide surveys conducted in 1992 and 1993 (Fitzpatrick *et al.*). Many of the scrub-jay families documented in these surveys potentially no longer occur in the area due to development and predation.

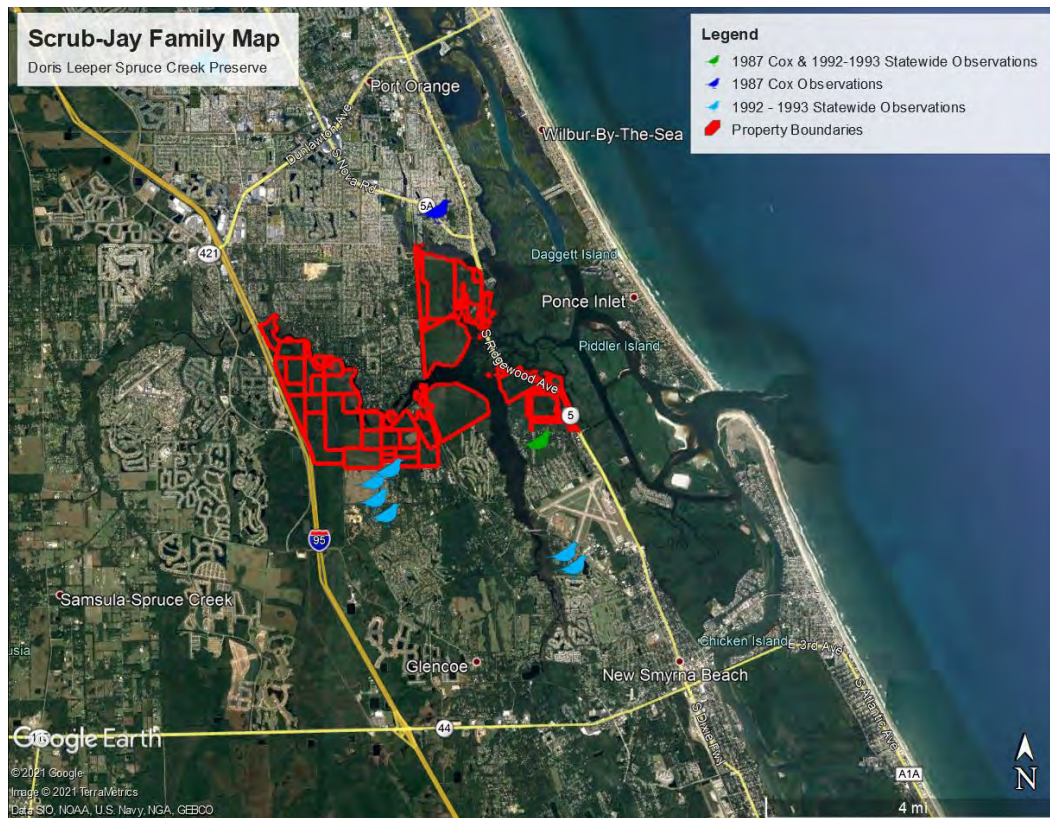


Figure 3. Historically documented Florida scrub-jay families within a 3-mile radius of the Preserve

One individual Florida scrub-jay was documented on 28 July 2010 during the 2010 DLSCP survey (Sisk, 2010). The scrub-jay flew from south of the property to the southern boundary to respond to the playback recording and then flew back offsite and did not return. The scrub-jay was not seen at any other locations or on other days during the 2010 surveys.

There were twenty-one (21) *eBird* observations of Florida scrub-jays within a 10-mile radius of the Preserve (see Figure 4. *eBird* Scrub-Jay Observations Map). One of the observations was from 2016, at the Atlantic Center for the Arts (ACA) which is embedded within the Preserve. No sightings from within the Preserve boundary were recorded and only one sighting was near the documented families discussed above. The most recent observation within the searched area was from 2019, in Ponce Inlet.

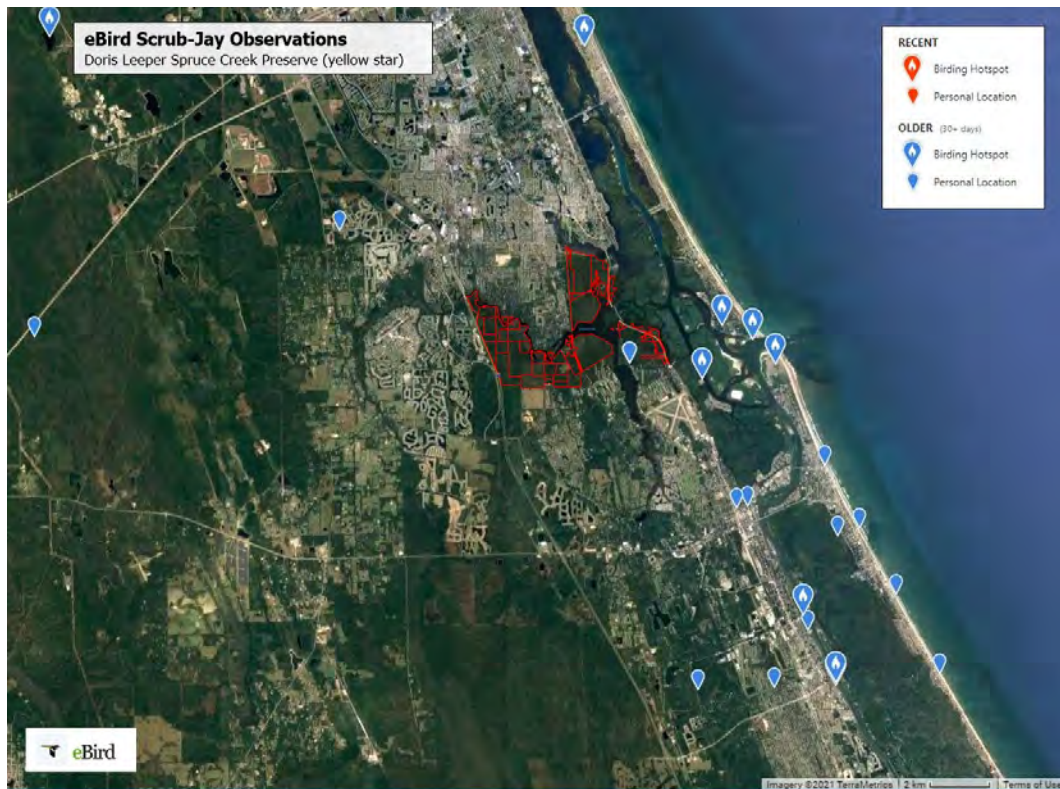


Figure 4. eBird observation data for Florida scrub-jays; accessed July 6, 2021

4.2 Habitat Descriptions

Habitat boundaries within the Preserve were updated at the time of this survey in preparation for the *Doris Leeper Spruce Creek Preserve Management Plan* (2022). Habitat types and descriptions are based on natural communities developed by Florida Natural Areas Inventory (2010). The habitats that meet the definition of Type I, II or III are discussed below including general habitat descriptions, management considerations and their relevance to utilization by Florida scrub-jays.

Natural Communities:

High Pine and Scrub

Scrub (Type I Habitat) – Scrub is a community composed of evergreen shrubs, with or without a canopy of pines, and is found on dry, infertile, sandy ridges. Scrub is dominated by myrtle oak (*Quercus myrtifolia*), sand live oak (*Quercus geminate*), Chapman’s oak (*Quercus chapmanii*), sand pine (*Pinus clausa*), Florida rosemary (*Ceratiola ericoides*), rusty lyonia (*Lyonia ferruginea*), and saw palmetto. The oaks form a dense cover interspersed with patchy openings that consist of bare sand with a sparse cover of herbs, particularly threeawns (*Aristida* spp.), hairsedges (*Bulbostylis* spp.), sandyfield beaksedge (*Rhynchospora megalocarpa*), pinweeds (*Lechea* spp.), jointweeds (*Polygonella* spp.), and ground lichens (*Ladonia leporine*, *Cladonia prostrate*, *Cladina subtenuis*, and *Cladina evansii*).

Florida scrub is home to a multitude of rare animals. This includes the Florida scrub-jay, scrub lizard (*Sceloporus woodi*), gopher tortoise (*Gopherus polyphemus*), Florida mouse (*Peromyscus floridanus*), short-tailed snake (*Stilosoma extenuatum*), gopher frog (*Rana capito*), and many other species.

While scrub is a fire-maintained community, it is not easily ignited. Scrub is thought to have burned less frequently than communities with a more easily ignited grassy groundcover, such as sandhill or mesic flatwoods. Scrub oak dominated scrub, as found within the Preserve, likely burned naturally at intervals between 5 and 20 years based on the habitat requirements of the Florida scrub-jay. Oak height is a critical limiting factor for Florida scrub-jays which have been documented to abandon territories where the oaks reached >3 meters. A minimum of five years is based on the time required for re-sprouting oak stems to reach acorn-bearing height.

Growth rates of scrub oaks are related to burn history and environmental conditions onsite. Long unburned oak scrub, which comprises the Preserve, may attain heights unsuitable for scrub-jays up to 50 percent faster after fire than regularly burned oak scrub and thus may at first require shorter burn intervals to maintain optimum heights following restoration of burning. In addition, small openings, needed by Florida scrub-jays for caching acorns, may need to be artificially restored in long unburned scrub by piling up fuel to create hotspots that kill the roots of the oaks.

The County has implemented mechanical restoration on approximately 240 acres of scrub habitat. Prescribed fire has been applied to approximately 145 acres of scrub, following the mechanical treatment. There is an additional 30 acres of scrub in the northwestern section that are slated for restoration. Refer to the Management Plan for additional details.

Pine Flatwoods and Dry Prairie

Scrubby Flatwoods (Type II Habitat) – Scrubby flatwoods have an open canopy of widely spaced pine trees and a low, shrubby understory dominated by scrub oaks and saw palmetto. Scrubby flatwoods differ from the aforementioned scrub in the presence of wiregrass, a greater abundance of saw palmetto, and/or the presence of typical flatwoods shrubs such as gallberry and fetterbushes. Structurally it differs from scrub in its lack of a continuous cover of scrubby oaks.

The scrubby flatwoods at the Preserve have a canopy of longleaf pine, slash pine, and sand pine. The understory consists of a closed cover of sand live oak, myrtle oak, Chapman's oak, saw palmetto, gallberry, and fetterbush. Some instances of grasses were found which include wiregrass, broomsedge bluestem (*Andropogon virginicus*), and shiny blueberry (*Vaccinium myrsinites*). The majority of the scrubby flatwoods found within the Preserve has a closed canopy of scrub oaks in the 3 to 4 meter range in height due to the lack of fire.

Scrubby flatwoods are often associated with scrub and/or mesic flatwoods. Therefore, many of the rare species associated with the aforementioned scrub habitat are also likely to inhabit scrubby flatwoods.

Scrubby flatwoods have a more continuous ground cover than scrub, therefore historically have burned more readily than scrub. Due to less ground cover grasses, scrubby flatwoods tend to burn less readily than mesic flatwoods. Therefore, scrubby flatwoods historically have burned at a frequency intermediate of the two, most likely in the 5 to 15 year range. Light ground fires in the surrounding mesic flatwoods tend to enter scrubby flatwoods and extinguish, leading to a patchwork of recently burned and unburned portions, a situation which has been found to be favorable for scrub-jays. Therefore, variability in season and frequency of prescribed fires to produce a mosaic of burned and unburned patches would be the most desirable for maintaining high biotic diversity within this community.

The County has conducted mechanical treatment on approximately 50 acres of scrubby flatwoods and has applied prescribed fire to approximately 15 acres of the 50 acres mechanically treated.

Hardwood Forested Uplands

Xeric Hammock (Type II Habitat) – Xeric hammock is a well-developed evergreen hardwood and/or palm forest on soils that are rarely inundated. The canopy is typically closed and dominated by live oak (*Quercus virginiana*), with cabbage palm (*Sabal palmetto*) generally common in the canopy and subcanopy. Southern magnolia (*Magnolia grandiflora*) and pignut hickory (*Carya glabra*) may be occasional in the subcanopy.

Xeric hammock is located in fire shadow areas, culturally sensitive area, and in compromise areas to provide for outdoor recreation. Hammocks represent the late successional stage and shall be managed as is. It should not be considered a fire dependent community and is not targeted for restoration. As such, the closed canopy precludes occupation by Florida scrub-jays, despite its designation as a Type II habitat.

Freshwater Non-Forested Wetlands

Wet Prairie (Type III Habitat) – Wet prairie is an herbaceous community found on continuously wet, but not inundated, soils on somewhat flat or gentle slopes between lower lying depression marshes, shrub bogs, or dome swamps and slightly higher than wet or mesic flatwoods, or dry prairie. The wet prairies found within the Preserve are small depressions adjacent to wet flatwoods and mesic flatwoods. The groundcover consists primarily of yellow eyed grass (*Xyris* spp.), St. John's wort (*Hypericum fasciculatum*), maidencane, beaksedges, and Carolina redroot.

Natural fires likely entered wet prairies from surrounding pine flatwoods and burned through them when they were dry enough to carry fire. It is estimated that wet prairies found adjacent to pine flatwoods historically had a fire interval of 2 to 4 years. In the absence of fire, shrubs and trees invade wet prairies and shade out the light-loving herbaceous species. Further evidence of fire interval is the necessity of many of the dominant grasses that require fire to stimulate flowering. Wet prairies should be burned by land managers when nearby Type I and Type II habitats are burned. Wet prairies are sensitive to relatively slight physical alterations to the soil surface which can permanently alter the hydrology. Such disturbances include soil rutting by human disturbance or hog rooting. These disturbances can cause major changes in species composition that require expensive restoration to repair.

Wet prairies were only surveyed where they were adjacent to scrub and / or scrubby flatwoods and would be accessible to Florida scrub-jays.

4.3 Field Survey

The scrub-jay survey was conducted over 5 days starting on 21 April 2021 and ending on 11 June 2021. Survey times generally began in the early morning hours around 7:00 a.m. and generally ended around 10:00 a.m. Weather conditions were generally optimal with good visibility, no precipitation, calm winds, and temperatures within the acceptable range. Multiple teams of 2 biologists were used to cover the survey stations within the appropriate times. No scrub-jays were documented throughout the suitable scrub-jay habitat within Doris Leeper Spruce Creek.

5.0 DISCUSSION

The Florida scrub-jay inhabits fire dominated, low-growing, oak scrub habitat found on well-drained sandy soils. They may persist in areas with sparser oaks or scrub areas that are overgrown, but at much lower densities and with reduced survivorship. Oak height is a critical limiting factor for Florida scrub-jays which have been documented to abandon territories where the oaks reached >3 meters. The mesic flatwoods, scrubby flatwoods, and scrub found within the Preserve provide the potential for valuable acreage which

could be utilized by local scrub-jay families and offspring. Prescribed fire within the above habitats is essential to re-establish these areas as optimum Florida scrub-jay habitats.

As stated previously, the continued existence of the Florida scrub-jay species will depend on preservation and long-term management of suitable habitat throughout the State. Within the Doris Leeper Spruce Creek Preserve, scrub, scrubby flatwoods, and adjacent wet prairies provide potentially suitable habitat which could be utilized by Florida scrub-jays. The County has implemented a restoration plan of these habitats that would return the habitats to a suitable condition for occupation by Florida scrub-jays. However, the apparent loss of nearby families greatly reduces the likelihood of natural re-occupation of the Preserve by Florida scrub-jays. The County has included the evaluation of Florida scrub-jay translocation to the Preserve as a long-range objective within the 2022 Management Plan. As restoration of the scrub habitat continues, it could foster relocation of scrub-jays from other populations in the future. However, the successful relocation of scrub-jays is not feasible at this time.

6.0 CONCLUSION

YBE Consulting, Inc. has conducted a Florida scrub-jay (*Aphelocoma coerulescens*) survey for the Doris Leeper Spruce Creek Preserve. Research data shows that numerous populations have been documented within and nearby the Preserve. However, few if any of those populations appear to be functional, valid family groups at this time. No Florida scrub-jays were documented during the 2021 surveys, demonstrating the need for continued land management to restore suitable scrub-jay habitat within the Preserve.

YBE Consulting, Inc. received concurrence from USFWS that the Florida scrub-jay does not occupy the Doris Leeper Spruce Creek Preserve in its present state due to the overgrown condition of the potential scrub-jay habitats onsite (see Appendix C).

TECHNICAL LITERATURE REFERENCES

Ashton, Jr., Ray E. 1996. *Rare and Endangered Biota of Florida, Volume V. Birds*. Florida Committee on Rare and Endangered Plants and Animals. University Press of Florida. Gainesville, Florida 267 pp.

County of Volusia, Community Services Department, Parks, Recreation and Culture Division, Growth and Resource Management Department, Environmental Management Division. *Management Plan - Doris Leeper Spruce Creek Preserve*. Draft in progress – 2022.

Cox, J. A. 1987. *Status and Distribution of the Florida Scrub-Jay*. Florida Ornithological Society. Special Publication No. 3. Gainesville, Florida 110 pp.

eBird. 2021. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: <http://www.ebird.org>. (Accessed: July 6, 2022).

Fitzpatrick, J. W., G. E. Woolfenden, and M. T. Kopeny. 1991. *Ecology and Development-Related Habitat Requirements of the Florida Scrub-Jay (Aphelocoma coerulescens coerulescens)*. Florida Game and Freshwater Fish Commission, Nongame Wildlife Program. Technical Report No. 8. Tallahassee, Florida. 49 pp.

Florida Natural Areas Inventory (FNAI). 2010. *Guide to the natural communities of Florida: 2010 edition*. Florida Natural Areas Inventory, Tallahassee, FL.

Florida Natural Areas Inventory (FNAI). 2021. *Standard Data Report for Doris Leeper Spruce Creek Preserve 10-year Plan*. Florida Natural Areas Inventory, Tallahassee, FL.

Hipes, D. D.R. Jackson, K. NeSmith, D. Printiss, K. Brandt. 2001. *Field Guide to the Rare Animals of Florida*. Florida Natural Areas Inventory, Tallahassee, Florida.

Mitch Waite Group. 2021. *iBird Pro Guide to Birds*. Version 12.6.2, Build 369. [Mobile app]. <https://ibird.com>

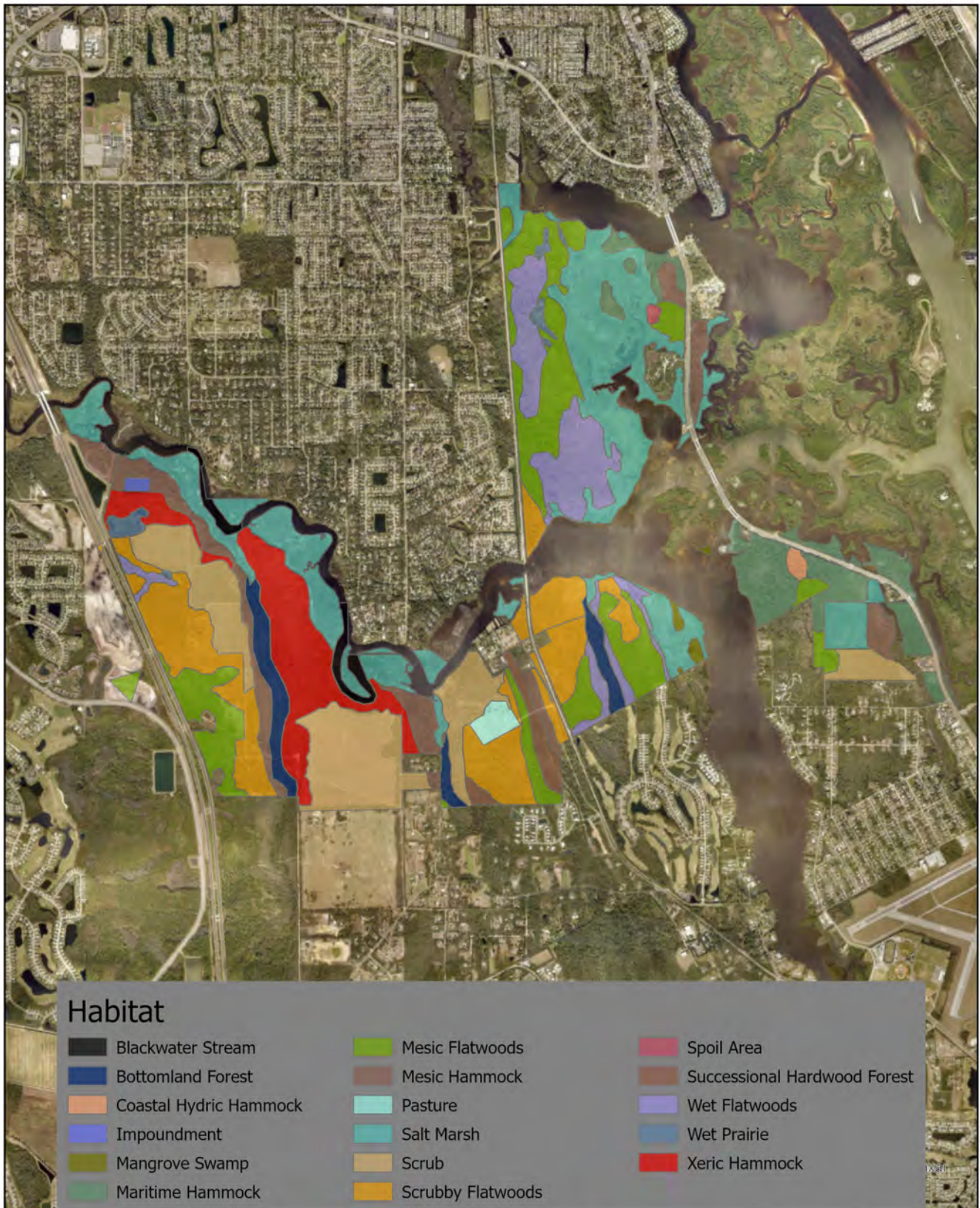
Keller, Geoffery. 1997. *Bird Songs of Florida*. Compact Disc. Library of Natural Sounds. Cornell Laboratory of Ornithology.

NatureServe. 2021. NatureServe Explorer [web application]. NatureServe, Arlington, Virginia. Available <https://explorer.natureserve.org/>. (Accessed: July 7, 2021).

Scrub-Jay Survey Guidelines. North Florida Field Office. U. S. Fish and Wildlife Service webpage. <http://northflorida.fws.gov/Scrub-Jays/survey-guide.htm>. 4 pp.

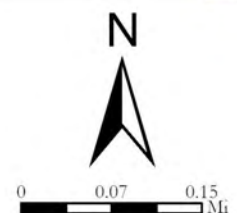
Sisk, Jody. 2010. *Florida Scrub-Jay Report; Doris Leeper Spruce Creek Preserve, Volusia County, Florida*. Zev Cohen & Associates, Inc. 28 pp.

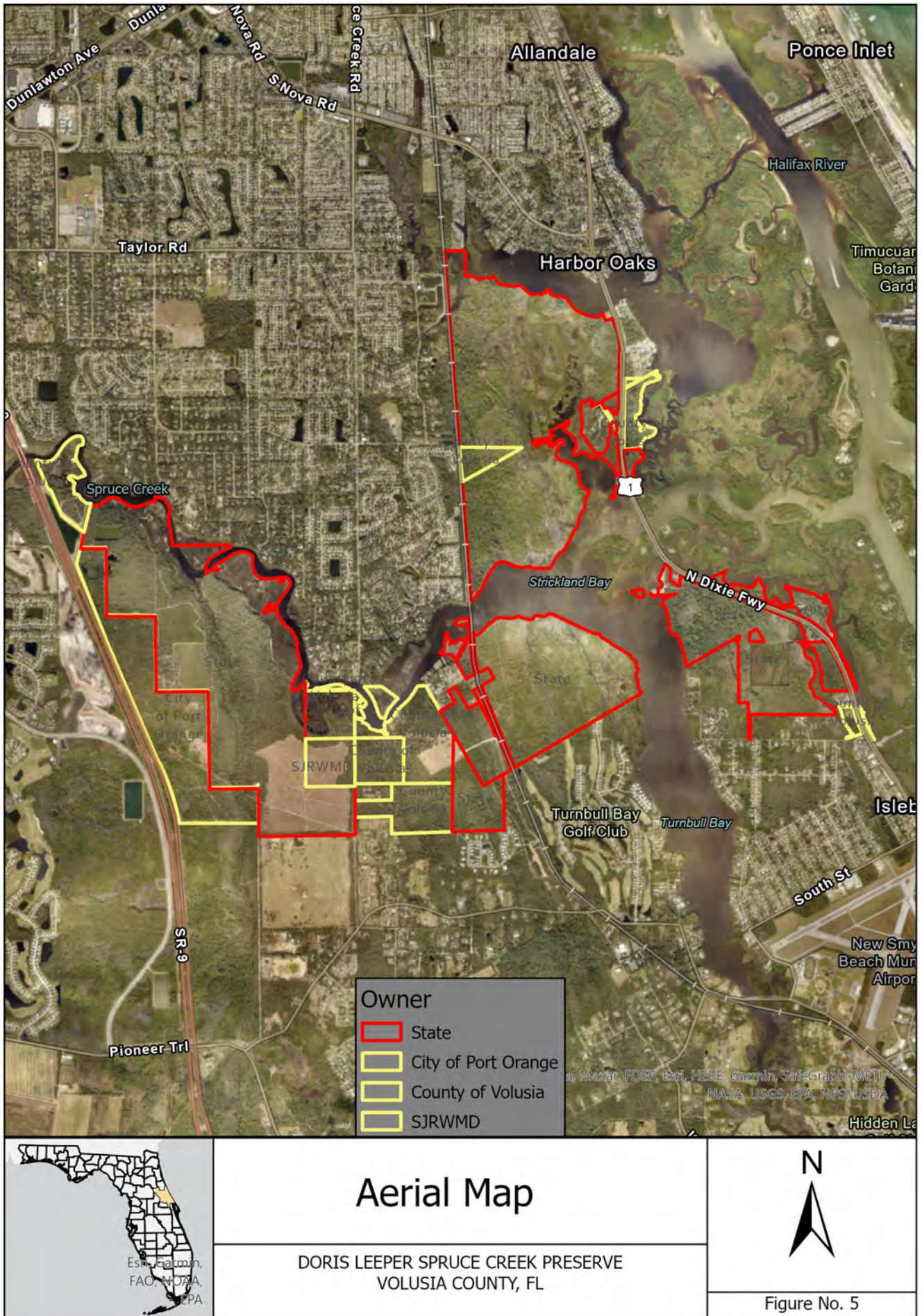
APPENDIX A - MAPS

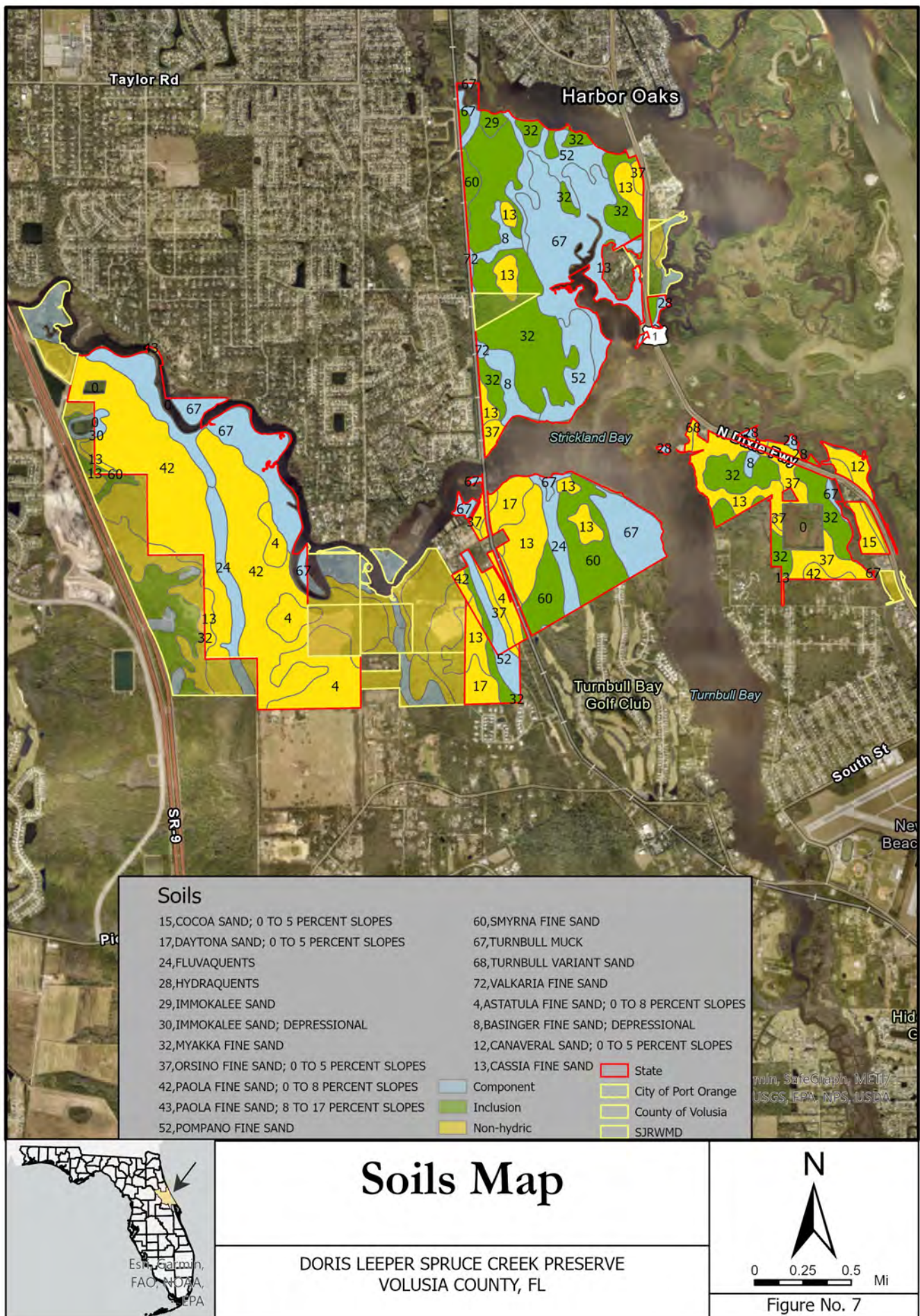


Habitat Map

Doris Leeper Spruce Creek Preserve
Volusia County, Florida







APPENDIX B – DATA SHEETS

Scrub Jay Survey Data
Doris Leeper Spruce Creek Preserve
2021

Staff	Station	Time	Date	Weather	Jays Obs. (Y/N)	Notes
AS/DY	46	7:36	4.21.21	OC,F/72/<5/NW	N	
DY/CV	37	8:23	4.21.21	OC,F/72/<5/NW	N	
DY/CV	23	8:35	4.21.21	OC,F/72/<5/NW	N	
DY/CV	29	8:50	4.21.21	OC,F/72/<5/NW	N	Paused for Cooper's hawk at 8:53
DY/CV	32	9:16	4.21.21	OC,F/72/<5/NW	N	
DY/CV	39	9:30	4.21.21	OC,F/72/<5/NW	N	Wind increasing; fog burning off
DY/CV	45	9:49	4.21.21	OC,F/72/<5/NW	N	Wind calm again
DY/CV	43	10:55	4.21.21	S/75/7/NW	N	
AS/J	17	8:37	4.21.21	OC,F/72/<5/NW	N	
AS/J	13	8:53	4.21.21	OC,F/72/<5/NW	N	
AS/J	6	9:12	4.21.21	OC,F/72/<5/NW	N	

Weather Code / Notes:	
Cloud Cover	Temp F Wind mph Wind Direction
OC	Overcast
F	Fog
PC	Partly Cloudy
S	Sunny

Scrub Jay Survey Data
Doris Leeper Spruce Creek Preserve
2021

Staff	Station	Time	Date	Weather	Jays Obs. (Y/N)	Notes
AS	37	8:48	5/7/2021	S/72/5/NNW	N	
AS	23	9:11	5/7/2021	S/72/5/NNW	N	Delayed start 9:07- Red Shouldered Hawk perched in tree line
AS	29	9:33	5/7/2021	S/72/5/NNW	N	
AS	32	9:47	5/7/2021	S/72/5/NNW	N	Paused recording 9:52 due to vehicle driving by - resumed 9:53
AS	39	10:05	5/7/2021	S/74/8/NNW	N	Delayed start 10:02 due to Red Shouldered Hawk perched nearby; paused recording 10:09 due to Red Shouldered Hawk perched nearby - resumed 10:19
DY	46	7:17	5/7/2021	S/68/6/NNW	N	
DY	45	7:37	5/7/2021	S/68/6/NNW	N	
DY	43	7:49	5/7/2021	S/68/6/NNW	N	
DY/RH	17	8:56	5/7/2021	S/72/5/NNW	N	
DY/RH	13	9:06	5/7/2021	S/72/5/NNW	N	
DY/RH	6	9:17	5/7/2021	S/72/5/NNW	N	

Weather Code / Notes:	
Cloud Cover	Temp F Wind mph Wind Direction
OC	Overcast
F	Fog
PC	Partly Cloudy
S	Sunny

Scrub Jay Survey Data
Doris Leeper Spruce Creek Preserve
2021

Staff	Station	Time	Date	Weather	Jays Obs. (Y/N)	Notes
AS/SM	39	8:41	5/12/2021	S/77/3/SW	N	
AS/SM	32	8:56	5/12/2021	S/77/3/SW	N	
AS/SM	29	9:15	5/12/2021	S/77/3/SW	N	9:17 -9:19 Paused due to raptor flying overhead
AS/SM	23	9:31	5/12/2021	S/77/3/SW	N	
AS/SM	37	9:43	5/12/2021	S/77/3/SW	N	
DY	43	7:16	5/12/2021	S/72/0/-	N	
DY	45	7:29	5/12/2021	S/72/0/-	N	
DY	46	7:39	5/12/2021	S/72/0/-	N	
DY/RH	17	8:35	5/12/2021	S/78/7/SSW	N	
DY/RH	13	8:47	5/12/2021	S/78/7/SSW	N	
DY/RH	6	9:09	5/12/2021	S/78/7/SSW	N	

Weather Code / Notes:	
Cloud Cover	Temp F Wind mph Wind Direction
OC	Overcast
F	Fog
PC	Partly Cloudy
S	Sunny

Scrub Jay Survey Data
Doris Leeper Spruce Creek Preserve
2021

Staff	Station	Time	Date	Weather	Jays Obs. (Y/N)	Notes
AS/RH	23	8:48	5/26/2021	S/76/3/SE	N	
AS/RH	29	9:05	5/26/2021	S/76/3/SE	N	
AS/RH	32	9:19	5/26/2021	S/76/3/SE	N	
AS/RH	39	9:32	5/26/2021	S/76/3/SE	N	
AS/RH	37	9:43	5/26/2021	S/76/3/SE	N	
DY	46	7:30	5/26/2021	S/72/3/SE	N	
DY	45	7:50	5/26/2021	S/72/3/SE	N	
DY/J	6	9:03	5/26/2021	S/78/5/SE	N	
DY/J	13	9:15	5/26/2021	S/78/5/SE	N	
DY/J	17	9:28	5/26/2021	S/78/5/SE	N	

Weather Code / Notes:	
Cloud Cover	Temp F Wind mph Wind Direction
OC	Overcast
F	Fog
PC	Partly Cloudy
S	Sunny

Scrub Jay Survey Data
Doris Leeper Spruce Creek Preserve
2021

Staff	Station	Time	Date	Weather	Jays Obs. (Y/N)	Notes
AS/RH	39	8:20	6/11/2021	S/80/4/SW	N	Paused recording 8:21-8:22 for raptor flying overhead
AS/RH	32	8:39	6/11/2021	S/80/4/SW	N	
AS/RH	29	8:53	6/11/2021	S/80/4/SW	N	
AS/RH	23	9:07	6/11/2021	S/80/4/SW	N	
AS/RH	37	9:20	6/11/2021	S/80/4/SW	N	
DY	6	7:18	6/11/2021	S/80/4/SW	N	
DY	13	7:28	6/11/2021	S/80/4/SW	N	
DY	17	7:38	6/11/2021	S/80/4/SW	N	
DY	45	8:24	6/11/2021	S/80/4/SW	N	
DY	46	8:35	6/11/2021	S/80/4/SW	N	

Weather Code / Notes:	
Cloud Cover	Temp F Wind mph Wind Direction
OC	Overcast
F	Fog
PC	Partly Cloudy
S	Sunny

Re: [EXTERNAL] 2021 Scrub-Jay Survey Report - Doris Leeper SpruceCreek Preserve

From: Gawera, Erin <erin_gawera@fws.gov>
Sent: Mon, Apr 4, 2022 at 3:02 pm
To: astevenson@ybeconsulting.com
Cc: Richard Harris

[sig.jpg](#) (10.7 KB)

 Images not displayed. **SHOW IMAGES** | **ALWAYS SHOW IMAGES FROM THIS SENDER**

Hi Amber,

The Service agrees that based on the results of your survey, the Doris Leeper Spruce Creek Preserve is currently not occupied by scrub-jays. Thank you for submitting your report. Future submittals should include the following project number for reference:

Project Number: 2022-0027772 Doris Leeper Spruce Creek Preserve

Thank you and have a great week!

Erin

Erin M. Gawera, Fish and Wildlife Biologist
US Fish and Wildlife Service
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Florida Ecological Services Field Office
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Jacksonville, FL 32256-7517
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Fax: 904/731-3045 or 3048

From: astevenson@ybeconsulting.com <astevenson@ybeconsulting.com>
Sent: Thursday, March 17, 2022 11:54 AM
To: Gawera, Erin <erin_gawera@fws.gov>
Cc: Richard Harris <rwharris@volusia.org>
Subject: [EXTERNAL] 2021 Scrub-Jay Survey Report - Doris Leeper Spruce Creek Preserve

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

Good Afternoon Ms. Gawera,

Please see the attached Scrub-Jay Survey Report for Doris Leeper Spruce Creek Preserve. We are seeking concurrence with the findings from our recent surveys in 2021.

Best Regards,
- Amber

Amber Stevenson
Young Bear Environmental Consulting
<http://www.ybeconsulting.com/>
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Appendix H:

**Best Management Practices for
Archaeological Sites**

BEST MANAGEMENT PRACTICES

AN OWNER'S GUIDE TO PROTECTING ARCHAEOLOGICAL SITES



PRESERVING AND
PROTECTING



FLORIDA'S ARCHAEOLOGICAL
SITES FOR FUTURE GENERATIONS



ACKNOWLEDGMENTS

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This publication has been a collaborative effort. Several authors have contributed sections to this manuscript including Mary Glowacki, Stacey Hopper, Jim Miller, Heather Pence and Louis Tesar.

This publication would not have been possible without the help of many individuals and organizations. We would like to offer our sincere appreciation to those people and agencies that offered to share their knowledge and resources.

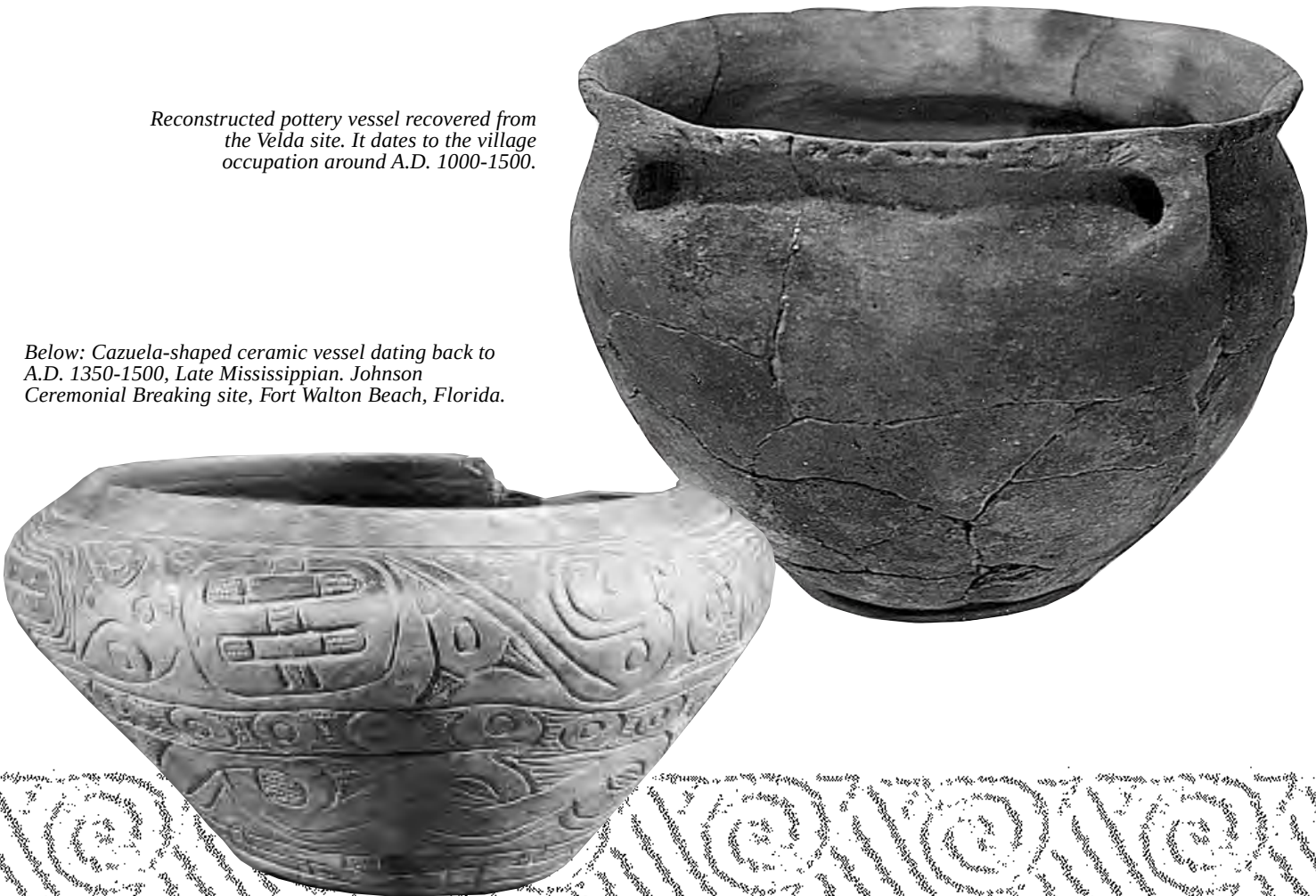
From the Florida Division of Historical Resources, we would like to thank the former Directors, George W. Percy and Dr. Janet Snyder Matthews.

In the Bureau of Archaeological Research, many thanks and appreciation to Jim Miller, former Chief of the Bureau of Archaeological Research, for his support and guidance throughout this project. Additionally, we extend our thanks to Henry Baker, Jim Christie, Deric Johnson, Melissa Memory, Alan Nelson, Chris Newman, Brenda Swann, Louis Tesar, Mike Wisenbaker and Ryan Wheeler. Special thanks to Mable Revell and DeAnna McDonald who provided administrative assistance and support.

We would also like to thank the State of Florida, Department of Environmental Protection (DEP), Bureau of Beaches and Coastal Systems for valuable information on erosion issues. Certain Federal agencies provided assistance for this publication. We thank George Smith of the National Park Service Southeast Archaeological Center for his editorial assistance and Robert Thorne, National Clearinghouse for Archaeological Site Stabilization, who provided excellent sources for information and editorial suggestions.

Reconstructed pottery vessel recovered from the Velda site. It dates to the village occupation around A.D. 1000-1500.

Below: Cazuela-shaped ceramic vessel dating back to A.D. 1350-1500, Late Mississippian. Johnson Ceremonial Breaking site, Fort Walton Beach, Florida.





BEST MANAGEMENT PRACTICES:

An Owner's Guide to Protecting Archaeological Sites

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WHAT IS THE PURPOSE OF THIS GUIDE?

This guide is for owners and managers of archaeological sites. It is written to explain to non-specialists what archaeological sites are like, how they are threatened, and how they can be protected against such threats. It is also written with a few assumptions in mind—

- ♦ Few sites are managed by archaeologists.
- ♦ A large number of archaeological sites are on private lands.
- ♦ The people whose decisions affect archaeological sites over the long term have little experience in site management.
- ♦ Anyone can learn how to care for sites.

We hope this guide will help landowners understand and appreciate the valuable historical resources in their stewardship, provide basic information on caring for archaeological sites, and help owners obtain professional help when needed.

WHAT ARE BEST MANAGEMENT PRACTICES?

Best Management Practices (BMPs) are actions that are considered effective and appropriate. They represent the general knowledge and practice of informed professionals. Best Management Practices are commonly used in agriculture, forestry and other resource management fields, but they have not been widely adopted for archaeology. Here is a short list of some common Best Management Practices for archaeological sites. The rest of this guide explains in detail these and other topics in archaeological site management and provides possible solutions to many common site destabilization problems.

Do:

- ♦ document the archaeological site located on your property.
- ♦ try to protect the archaeological site by stopping destabilizing actions such as erosion.
- ♦ check the condition of the site on a regular basis.
- ♦ contact professionals for help in dealing with your archaeological site.

Avoid:

- ♦ ground disturbing activities in the area of an archaeological site.
- ♦ frequent traffic, either by pedestrians or vehicles, on archaeological sites.
- ♦ using untested methods to stabilize your archaeological site – they may do more harm than good. This guide presents several methods that have been tested for site stabilization.

Lake Jackson Indian temple mound, Tallahassee, ca., AD 1000-1500.



INTRODUCTION

A few decades ago, American archaeologists began to realize that the *archaeological record*, the total accumulation of archaeological sites of all types and all periods, was rapidly disappearing. Sites were being lost to development, erosion, looting, and other natural and cultural factors, but there was little understanding of the scope of the problem or of possible solutions. The value of archaeological sites and other *historic properties*, as they are called in Florida law, was first established as a national policy in the Antiquities Act of 1906. Since then, a comprehensive system of laws and regulations has been developed at the federal, state and local levels to make sure archaeological resources are considered during planning and permitting of major projects. Additionally, government at all levels has expressed the will of the people to protect these pieces of the past by acquiring sites, managing them for public benefit, and interpreting them for public appreciation and enjoyment. These mandates, and the practices of *cultural resource managers* who implement them, have made a dramatic difference in the rate of loss of archaeological sites, especially on public lands and in large scale projects that require public review and permitting. On private lands, few of these regulations apply to most land uses, so conservation of archaeological sites that are not in public ownership depends on informed and caring landowners.

The tradition of stewardship for private property is well developed in our society, especially among owners of large tracts. The difference between site conservation and site loss usually depends on knowledge and education. Landowners have little difficulty extending their customary care of natural resources to cultural resources, once they understand where the resources are and how they can be protected.

What is Archaeology?

Archaeology is the scientific study of material remains of past human life and activities. *Archaeological sites* are places where people left some sign of their presence. This typically means that *artifacts*, things people made or modified, are present. However, sites can also include changes in the land—a ditch, a levee, a mound. Sites usually contain materials in addition to artifacts, like plant and animal remains, soil, and charcoal.

Portion of an incised pottery bowl, associated with the Ft. Walton culture of northwest Florida, A.D. 1000-1500.



Together, these form an *archaeological deposit*. When people stay in one place for a long time, deposits accumulate, one on top of the other, over decades or centuries. Because people and environments change over time, deposits differ from each other. Moreover, any single deposit may contain evidence of many different activities. Archaeological sites and the artifacts associated with them are messengers from our past. Without archaeological research and excavation, these unique pieces of our history would be lost.

The Value of Archaeological Sites

Archaeological sites are surprisingly common on the landscape and come in all sizes and a variety of types. Archaeological sites in Florida range from large, prominent prehistoric mounds, historic forts and plantations, to smaller sites, such as a historic dump or small scatters of artifacts that represent temporary encampments of Native American people. Regardless of size or complexity, all archaeological sites have the potential to tell us something about people and environments of the past. More than 27,000 different archaeological sites of all periods are already known in



Artist's impression of a Timucuan village located along the St. Johns River, ca., 1450. This scene was modeled after research findings from the Thursby Mound and Hontoon Island, two neighboring archaeological sites.

Florida, and many new sites are recorded in the Florida Master Site File each year. Some archaeological sites are completely buried and remain unknown until accidentally uncovered by digging, or until they are found during an archaeological survey.

Clues to past events and previous ways of life remain in backyards, pastures, forests, hammocks, and streambeds all across the Florida landscape. Pre-European archaeological sites (before A.D. 1500) offer clues to Native American hunting and cooking methods, social organization and family life, artistic and religious expression, and past environments. Archaeological evidence of later cultures, more like our own, also exists. Early European exploration and settlement, and Florida's territorial and statehood growth, left their unique

signatures on and under the ground, creating a Florida landscape that is a mosaic of different natural and historical events.

While the value of archaeological sites is partly scientific, revealing new information about the past, it is also social, providing opportunities for recreation, reflection, and education. Some privately owned sites are unsuitable for visitors; however, there are many alternative ways of interpreting sites for the public. The best-managed sites are not only protected from deterioration, but they are also made available to the public on some basis.

Artifacts in Original Context

The single most important characteristic of archaeological sites is *association*, that is, the relationship between all of its components. Artifacts and other cultural remains that are associated together represent single activities or events that can be revealed through careful excavation and analysis. When artifacts and remains that are from separate time periods or separate events are mixed together, it is difficult or impossible to recreate what happened at the site. This simple fact leads to the most basic principle of archaeological site management. Things should remain



Archaeological feature being excavated with pit contents (potsherds, mica, turtle and deer bone, etc.) left in place to document their context.

in their original location or *context*. When the artifacts and surrounding material are disturbed, archaeological information is destroyed. An artifact might be aesthetic in its own right, but its greatest value—the information about its user that was learned from its context—will be lost if it is removed from its original context. The large part of site management is simple to express, but difficult to achieve—*prevent change*.

Preventing change to preserve original context can require little effort, other than an occasional visit to see that the site is stable and to determine that there is no

threat of disturbance. When disturbance occurs, it is often progressive. Minor erosion on a mound is easy to correct in its early stages; but by the time it is a gully much has been lost, and it is more difficult to prevent further damage. A few small holes from unauthorized digging are a sign that further digging is likely, and steps should be taken early to prevent it. In the following sections we will address some of the more common threats to archaeological deposits and show the best management practices for these particular situations.

The Well-Managed Site

The specific characteristics of a well-managed site will vary according to whether the site is owned by a private landowner or managed by a public land manager, since the available resources will be different for each group. The greatest difference will be the level of public accessibility. For this reason, we have separated the discussion of accessibility into two sections, one for public land managers, the other for private landowners.

Documentation

What are the characteristics of a well-managed site? First, a well-managed site is one that has been documented. Site documentation involves a description of a site's horizontal and vertical dimensions, the characteristics by which it is identified (e.g., the remains of brick foundation walls, a shell deposit, etc.), its cultural association, and so forth. This information can help a private landowner protect the site, or it could help a public land manager in developing a site management plan. A record of a site should be filed at the Florida Master Site File in Tallahassee, a central repository for information on historical resources in this state. This database of archaeological and historical sites is used by planners, consultants, government staff, archaeologists, managers, and owners to determine if sites are within the area of proposed projects that might have an adverse effect. If a site is unrecorded, and many are, the site area may not be recognized in the review and permitting process as something worthy of protection. However, if the site is recorded, it is more likely to be investigated further to determine how it might be protected.

Stabilization

Second, a well-managed site is stable. Every part of the ground surface (especially the upper six inches) is always changing due to disturbances caused by vegetative growth and decay, animal activity, and environmental forces, such as wind and rain. Dynamic topsoil is a natural condition, and is the reason the top several inches of an archaeological site lack good association. The underlying zones, however, are much less active, biologically, chemically, and physically,



An archaeologist identifies, for a young onlooker, animal bones recovered from an archaeological site.

since they are protected by the topsoil and humus layers. Many sites are naturally vegetated with trees, shrubs, and ground cover. While tree roots extend through archaeological deposits, their disturbance can usually be sorted out during excavations. The most important part of the vegetative association is ground cover. Where ground cover is missing or not healthy there is a greater risk of erosion, especially on slopes. Ground cover should be repaired or reestablished if exposed soil is unstable.

Public Access and Interpretation and Private Landowners

Private land that contains an archaeological site can be made available for education and recreation. As an owner of an archaeological site, you are not obligated to open your site to the public, but you may choose to do so for a variety of reasons. Visiting archaeological sites can be educational. It gives people first-hand experience with understanding and interpreting the past. This experience can be fun and informative. For example, an archaeological site might be accessed by a bike or walking trail. There are many walking tours that showcase archaeological sites of local interest. By participating in these programs, property owners can contribute to the understanding and appreciation of Florida's cultural heritage. Should a property owner express interest in providing public access to an archaeological site, there are many ways in which information regarding the site can be disseminated. For example, the creation of brochures, pamphlets, web pages, lecture series, and other products can increase public knowledge about archaeological sites in private

ownership. These are highly valued by local school systems. While precautions are necessary to insure public safety and to prevent site destruction or damage, the advantages to providing public access to privately owned archaeological sites far outweigh the disadvantages.

Accessibility and the Public Land Manager

A well-managed public archaeological site is accessible to the public, except in certain circumstances. This means that a path or walkway has been established, either planned or unplanned. In the case of the large mounds that visitors wish to climb, this can be a recipe for erosion if protective measures, such as a stairway, are not implemented. Public access also implies some form of interpretation—a message about the site and the people who once lived there. The message can also address proper

treatment of the site and set forth rules to prevent disturbance. In some cases, along with public access comes a complex of facilities, such as parking, paths, signage, and perhaps rest rooms and a picnic area. Care should be taken to ensure that construction of these does not damage site deposits, and much thought should be given in advance to direct the flow of people and vehicles to prevent damage over the long term. Consideration should also be given to locating these improvements to avoid or minimize their visual intrusion on any scenic vistas associated with a site.

Preservation

Finally, a well-managed archaeological site is cared for. Signs of vandalism, litter, neglect of facilities, and unkempt grounds all send a subliminal message that this is a place others do not respect, and that the usual rules of responsible behavior do not apply to the visitor. Although it would not be apparent from looking at the site, a well-managed site has a management plan in place that can respond to threats or damage. A site owner or manager should have established contact with local law enforcement, with a local archaeologist, or perhaps a local archaeological society, so that all parties will already be familiar with the site if some action is required. It is helpful to keep a site notebook with information about the site as well as names and telephone numbers of various people to contact when help is needed.

MANAGEMENT STRATEGIES

Threats and Responses

Because many archaeological sites and historic properties on public land receive some level of management, most site destruction occurs on private property. Unintentional site damage is caused through ignorance and without malice. Some examples of unintentional site damage are erosion caused by boat wakes, off road vehicle activity, animal burrowing, and tree falls. Intentional site damage such as looting and vandalism also account for a great loss of archaeological and historic sites. *Looting* is the deliberate destruction of an archaeological site or structure for personal gain. *Vandalism* is deliberate damage to an archaeological site or structure for the sake of causing the property owner distress, or because of misguided political, social, or religious beliefs. The following section addresses the issues of unintentional and intentional site damage. Options for site protection are also provided, but you should also ask an archaeologist for help in determining what threats your archaeological site is exposed to and which protection methods may be appropriate to address the threats.

Best Management Practices in Responding to Threats to Archaeological Sites

1. Identify the cause or the source of the threat
2. Determine potential solutions to the problem
3. Determine whether permits are required
4. Determine with experts whether the proposed solution is likely to be effective over the long term
5. Make sure the solution does not cause more damage than it fixes
6. Determine whether the proposed solution is cost effective
7. Monitor the site to determine whether the solution continues to be effective over the long term
8. As appropriate, document site damage using a Florida Master Site File "Changing of Status" form

Erosion

Many archaeological sites are near water, because people have always chosen such desirable locations for activities and settlements. Erosion is one of the most serious threats to archaeological sites. Because of the great negative effects of erosion, we need to recognize the basic processes, understand which can be modified, and assess whether erosion control efforts will be appropriate in each unique situation.

We think of erosion as something unusual, some kind of natural calamity that befalls us, and something that we should be able to control or prevent. In fact, erosion is constant on the earth's surface. It is the geologic force that levels mountains over millions of years and that cuts canyons and valleys on a continental scale. On a smaller scale, at a local level and over years instead of millennia, we can have some effect on erosion. Perhaps we can prevent it from occurring at some particular location, or perhaps we can slow its rate.

Costs and Benefits

Steps to control erosion may range from inexpensive to very costly. They may have unintended consequences that also need to be considered as costs. In some of the erosion control strategies listed below, like re-vegetation and armoring with sandbags or old tires, construction costs can be minimal. However, placement of imported stone or construction of concrete structures can be very expensive, especially in remote or inaccessible areas. In areas where it is not possible to navigate a barge or other vessel laden with project construction material, clearing a road to transport equipment and supplies may cause greater damage than would be addressed by the proposed control plan. Some site loss must be accepted, and the most cost-effective response may be archaeological excavation before more erosion occurs.

Stream Erosion

Stream erosion includes many kinds of events, from sheet flow across normally dry lands, to lakeside erosion due to changes in water level, to bank erosion in the largest rivers. Stream erosion occurs most frequently when there is some change in the normal equilibrium of a flow of water in its normal course. Erosion might be due to altered vegetation within, along, or near a stream,



Example of river erosion causing tree fall, exacerbating erosion until the obstruction is removed.

a change in the volume of water flow, velocity, and sediment load, or a change in the upstream channel. Streams will respond to any change by trying to establish a new equilibrium or balance. This may mean deposition of sediment in some locations and removal of sediment elsewhere. Over time, streams meander. They change their course within a valley due to the dynamics of flowing water. In the course of thousands of years, streams and rivers move from one side of their valley to another creating oxbows, dead lakes, bank deposits, channel deposits, and bluffs. Whether sites in the valley or on its edges are threatened by stream erosion often depends on long term and large-scale processes of stream flow.

A stream is considered stable when there is no visible evidence of erosion along its banks. Typically, a stable stream is relatively straight or has gentle curves, and is neither silted in nor down cut. In many cases of stream erosion, a recently fallen tree or new upstream construction can often be identified as the cause of redirected stream flow. If the stream bed is changing as a result of a new and permanent obstacle, like a boat ramp, or increased runoff due to a new housing development and related impervious surfaces, then a long term solution should be sought. If the erosion-causing agent is a tree fall or other temporary factor, cooperation with an upstream landowner to remove the obstruction may be all that is necessary. In every case, a cost-benefit analysis should be done to determine if the long or short term benefit merits the money spent to fix the problem, and especially whether the solution will last for a long time or also be lost to continuing erosion.

There are many indicators of erosion evident in and adjacent to streambeds. Some of these are rills, sheet erosion, cracks, bank failure, scour, down cutting, and silting in. Each of these symptoms indicates erosion that can be destructive to archaeological sites. Rills, small gullies running perpendicular to the stream flow, are the result of drainage running into the stream over the top of the bank. They are formed when vegetation has been cut away from the edge of the stream bank, resulting in the ground being unable to absorb the runoff, and, in turn, causing the water to create a new channel to the stream bank. Sheet erosion, small particles of dirt being carried to a stream by rainwater flowing over the ground, is probably the most difficult to detect. Cracks are found parallel to the stream and are caused as large blocks of soil, separating from the surrounding bank, begin to slide into the stream. Bank failure occurs when the bank slides into the stream. Bank failure at a bend in the stream is called a scour. If a stream is attempting to make itself deeper, it is down cutting. On the other hand, when a stream slows and can no longer hold its sediment load, it is silting in.

To apply the best protection measure for stream erosion, an analysis of upstream causes of erosion must be undertaken. This is where the volume and velocity of

water are established before it reaches your land. The best solution will focus on the source of the problem rather than its local expression on your land.

There are almost as many ways to prevent and combat stream erosion as there are causes of it. This section discusses the most common erosion defense strategies including vegetation, sandbags and hay bales. The key is to discover what will work best for your situation. Many of these solutions can be employed with little expense, but some require heavy equipment and should not be undertaken without professional guidance. Help can be found through the U.S. Department of Agriculture, Natural Resources Conservation Service, through the state's water management districts, in local government environmental and permitting agencies, and at some university departments. A list of agencies and contacts can be found at the end of this guide.

Control of large-scale erosion is beyond the scope of most private landowners. Placement of fill in wetlands, dredging, and placement of obstructions in navigable waterways are undertakings that require environmental permits. Before considering projects of this type, be sure to consult with local, state and federal environmental agencies that may have jurisdiction over such activities. See the list of agencies and contacts at the end of the guide.

Best Management Options for Preventing Stream Erosion

Vegetation
Sandbags
Hay Bales

Vegetation

Vegetation is fundamental in erosion control. Often when vegetation is well established and undisturbed, the ground surface is stable and erosion is absent. If the ground cover has been removed and soil is exposed, erosion is more likely, especially on slopes. Flowing water will concentrate in areas of least resistance, on bare soil rather than through leaves, stems, roots, and humus. As the loose soil is washed away, the flow is further concentrated.



Planting sod on the surface of a restored mound.

The key to stabilization is to reestablish the ground cover that acts to hold the soil in place and dissipate the force of flowing water. Different plants can be used for different results. Grasses and fast growing plants with short root systems are best for archaeological sites since their root systems are less likely to displace buried features or artifacts. Native species are preferred since they are adapted to local conditions. In fact, for many sites, the best vegetative cover is that which previously existed on the site. Many factors determine which species will thrive at a particular location, and over the long term, these will already have been naturally selected.

The use of non-native species carries some risks. First, it is best to avoid vegetation that requires special attention like watering, fertilization or mowing. Second, some introduced species will thrive at the expense of diverse native plant communities. Brazilian pepper, cogon grass, kudzu, wisteria, Australian pine, and Chinese tallow are well known examples of exotics that have displaced natural plant and animal communities. These plants now require very costly removal programs to control their continued spread. Contact a local nursery or the Florida Department of Agriculture and Consumer Services, Division of Plant Industry (address at end of the guide) with specific questions about what species are suitable for your particular needs.

Sandbags

Sandbags are effective for controlling many forms of erosion. They are relatively inexpensive and do not require special equipment to create or install. Sandbags are most effective where the forces of erosion are moderate and where conditions are too unstable to promote growth of vegetation. They can be employed relatively quickly and may afford a temporary or a long-term solution. Properly filled and placed with a protective backing, sandbags can prevent erosion in situations of low energy. Higher volume or velocity, as in storm events, can displace them or cause them to split and spill their contents.

If sandbags are filled with a concrete mixture, they can form a more stable and permanent erosion barrier. When water breaks against a barrier, the brunt of the erosion is borne at the foot or toe of the structure—this is called toe scour. Proper placement of sandbags is essential to prevent toe scour, because water can seep between the bags and erode away the soil behind them, causing destabilization of the entire structure.

Hay Bales

Hay bales can be used in a manner similar to revetments as a short-term solution, and have similar placement considerations. Hay bales can be staked along a low

wave-energy shoreline as a temporary erosion protection measure. They should be placed to leave gaps to permit water outflow from overtopping and tidal action. If properly placed, the hay bales will trap sand and provide shoreline vegetation an opportunity to re-establish itself before the hay turns to compost.

Large Scale Erosion Control Options

Other methods such as revetments, gabions and jacks can also be employed for preventing stream erosion. These methods do represent viable responses to erosion, but they can only be implemented in large-scale projects at great expense.

A revetment is a layer of concrete or rock lining a slope to protect it from wave action. Revetments can be constructed from poured cement, rocks, or concrete construction debris. Construction debris or concrete rubble is also a good erosion control device when certain limitations are considered. There are also aesthetic and other safety problems with revetments. They are visually intrusive and pose safety problems for those trying to walk on them. It may be possible to cover revetments with soil, providing a safer setting in which vegetation may be established, thus fortifying erosion protection.

Gabions are metal wire cages filled with rocks and anchored to the shore. They can be an alternative to rock revetments due to the scarcity of stone in many parts of Florida. There are certain disadvantages to their use. Rusty gabions can be dangerous and unattractive. Sometimes the stone in the wire cages rubs off the protective coating causing the underlying metal to corrode. As an alternative to stone, a framework can be built around the base of the wire cage and a layer of concrete poured into it to provide the needed structural weight.

Jacks are another method that can be used to control erosion. Jacks are large-scale steel structures that have a shape similar to children's jacks. They are lowered into the stream channel to reduce the stream's velocity. As the water slows, it has less energy and can carry less sediment. An area of erosion becomes an area of deposition. This can be a very effective method of erosion control that can build up areas previously eroded. However, there can be problems. First, jacks can be an obstruction to navigation. Second, upstream deposition may increase downstream erosion.

Coastal Erosion

In contrast to stream erosion, coastal erosion results from the energy of vast bodies of water acting upon the shoreline at the edge of the continents. This unique energy is expressed in tides, waves, and currents, sometimes mildly in the steady rhythm of the shore, but often wildly in a storm event, such as a hurricane.



Damage to a mound caused by coastal erosion.

Beyond a certain point, coastal erosion is not subject to effective control. The rise in the level of the sea, the movement of the barrier islands, the transgression of the sea in certain sections of the coast, the loss of beachfront property—these are inexorable, despite the expensive efforts of governments and private landowners. A realistic analysis of coastal erosion is essential in determining how to respond to threats to historical resources (both archaeological sites and historic structures) on the coast.

Erosion control on the open Atlantic or Gulf shoreline involves great public effort and expenditure and is far beyond the scope of the average private landowner. Such projects typically cost millions of dollars and involve all levels of government in planning, permitting, and construction efforts that may extend over many years. However, certain coastal shorelines, those within estuaries, lagoons, and bays are sometimes suitable for smaller scale stabilization techniques that are within the scope of a private landowner or a community association. These projects still require considerable expertise as well as permits from various agencies, and are not to be undertaken lightly. Just like stream erosion, wave and tidal action can be detrimental to historic properties. Wave action associated with storms causes some of the most severe damage in the coastal strand. But, like sheet erosion, everyday wave and tidal action is difficult to observe as a cause of erosion. The Atlantic and Gulf coasts are part of a dynamic zone that extends from the toe of the stable dune to a distance of several miles offshore. Within this zone sediments are moving seaward from barrier islands and dunes to beaches to offshore bars.

The only thing permanent about a natural beach zone is change. Over the long-term barrier islands migrate. They move in the direction of the dominant long-shore currents and waves. They also migrate landward as a consequence of on-shore breezes and sea level rise, eroding on the ocean side and accreting on the bay side. Inlets also move along the coast, as they open and close over periods of centuries, or more rapidly as result of storm events.

Most archaeological sites along the coast reflect the human preference for a pleasant place to live. Except in

modern times when our substantial dwellings can overcome the harsh conditions of sun, wind, and salt spray, people chose to live away from the beach. Typically, archaeological sites are found on the bay or lagoon shore on the back of barrier islands. Here the vegetation is well established, the microclimate is moderate and stable, and the resources of the estuarine system are nearby. Among the most common sites are middens, the accumulations of living remains like

shells, animal bones, and pottery sherds in a dark soil matrix. These are often recognizable along the shore in areas of hammock vegetation as a layer of black soil and shell contrasting with the usual light-colored sandy soils. Middens often extend as small headlands into the bay or lagoon. Midden soils, because they are more compact, organically rich, and favor vegetative growth, are often more resistant to erosion than sandy soils.

Many methods of erosion control can be applied in coastal environments, including vegetation, hay bales, breakwaters, groins, bulkheads and sea walls, and re-nourishment. All require permitting, but on lagoon and bay shores this need not be so complicated as along the beach itself. Just as with planning erosion protection strategies for streams, it is necessary to involve experienced professionals in design and planning. Erosion control failures are very common, and it is often better to be slow and cautious in one's decisions than to do something wrong. An ill-conceived erosion control structure can cause more damage than it prevents. Some contacts for expert assistance are listed at the end of the guide.

Best Management Options for Preventing Low Energy Coastal Erosion

Vegetation
Hay Bales
Breakwaters
Re-nourishment



An example of a healthy, well-vegetated sand dune.

Vegetation

The best defense against windblown erosion is vegetation. Usually, when vegetation is well established and undisturbed, especially in low wave energy coastal settings, the ground surface is stable and erosion is absent. Sand dunes, the sign of healthy beach upland, are at the greatest risk for erosion when their vegetation is destroyed. The harsh conditions of a sand dune (constant wind, salt spray, excessive soil drainage, and often, a lack of rain) limit the range and variety of species capable of growing on it. Special care must be taken when re-vegetating to ensure that existing plants are not damaged while encouraging new ones to take root. Many native Florida plant species will provide lasting protection without demanding constant care or becoming a nuisance in the future. Salt tolerant species like sea oats, palm, gopher apple, sea grapes, and cord grass vine are all examples of plants suited to the coast. Different regions encourage various species, and a local nursery should be able to help you choose the plants best suited to your needs and location. Florida law prohibits digging up sea oats or sea grapes on public land.

Hay Bales

Hay bales can also be used in the low wave-energy shoreline of a bay or estuary. As a temporary erosion protection measure, hay bales can be staked to the shore. Placed end to end with occasional gaps, or alternatively, individually placed in a spaced line with the bales oriented diagonally to the direction of the prevailing wave surge, they will allow water to outflow from overtopping and tidal action. The hay bales trap sand and provide shoreline vegetation an opportunity to reestablish, before the hay turns to compost.

Breakwaters

Breakwaters are appropriately named, as they break the wave before it reaches the shore, reducing its energy and erosive force. Permanent breakwaters are expensive and difficult to maintain over the long run, and they may cause erosion on adjacent segments of the coast. Temporary breakwaters like hay bales or contained brush are most effective in protecting an area that is newly planted to reestablish vegetation at the adjacent shoreline.

Renourishment

Sediment eroded from a shoreline can be artificially replaced. This process, known as beach renourishment, is a popular response to erosion but is almost always a temporary solution. The same coastal dynamics that removed the sediment in the first place are still at work, with renourishment typically necessary within five years, sooner following storm events. In more protected

situations like bays and lagoons, renourishment may have a longer effective life. It is important to plan renourishment carefully, since the characteristics of the new sediment will determine how long it will stay and whether it can reestablish the natural habitat and function of the beach system it replaces.

Large Scale Erosion Control Options

As is true for large-scale stream erosion, there are certain techniques that can only be employed in large-scale coastal erosion prevention projects. All of these techniques involve great expense, professional planning and environmental permitting. A revetment is like coastal armor. This armor is made by placing heavy and large objects like rocks and sandbags along the shoreline to protect less stable soils from the energy of water and wind. Revetments used for coastal erosion protection are of similar design and construction as those mentioned above for stream erosion protection. For stability, revetments need filter cloth underlying the rocks to protect the soil from movement and to stabilize the base or toe to prevent undercutting. In considering installation of a revetment, be sure to involve an experienced professional, and coordinate with permitting agencies.

Groins are a series of parallel revetments that generally run perpendicular to the beach. They work like fingers of a hand extending outward from the shore to catch passing sand. Groins interrupt the normal transport of sand along the beach and cause it to accumulate on the upstream side of the structure. However, the downstream shore becomes starved for sediment and subject to severe erosion as the system attempts to reach equilibrium again. If sediments are brought in to fill the groins at the time of construction, sediment transport is better maintained and down-beach erosion can be reduced.

Bulkheads and sea walls are vertical barriers to the transport of sediment from the shore to the water. They are constructed of interlocking metal sheets, wood planks attached to pilings, or concrete slabs, and are commonly installed to protect buildings and other infrastructure at the shore. Bulkheads and sea walls can be difficult to maintain due to toe scour, which can undermine the wall. Also, sea walls interrupt the natural transition from the upland to the water, and beach transitional zones are often critical habitat areas for marine life.

Critical Beach Erosion Areas

Over the last century or so, a great amount of information has been accumulated about the changing configuration of the coastline. By comparing old surveys, maps, aerial photographs, and other coastal data, it is possible to track the movement of the shore over time.

The Florida Department of Environmental Protection (FDEP) recently surveyed coastal areas (not including bays or estuaries) to determine which were eroding the fastest. These stretches of beach have been called Critical Beach Erosion Areas. Archaeological and historic sites in these areas are in greater danger of being negatively affected by storms as well as ongoing erosive forces.

Incidental Damage

Off road vehicles (ORVs), horses, bikes, and frequent pedestrian traffic can damage archaeological sites. Many parts of archaeological sites are very fragile. In addition to crushing sites and artifacts, ORVs can damage vegetation, contributing to subsequent water and windblown sand erosion. To a lesser extent, horseback riding, bikes, and pedestrian traffic also create erosion



Off road vehicle activity can be very destructive to archaeological sites.

problems. To prevent this unintentional destruction, ORVs should be encouraged to travel around archaeological sites. This can be accomplished either by posting signs to redirect them or by clearing an alternative path, which they can follow. Paths that already cross sites should be closed off by replanting trees, moving a deadfall across the path, or fencing it off. The same should be done for trail bike and horse riding trails. These measures, when properly implemented, can prevent further destruction without advertising the exact location of an archaeological site.

Animal Activity

Animal burrowing and digging, while a natural part of the wild, should be discouraged at archaeological site areas. Burrowing animals displace artifacts by bringing deeply buried material to the surface and allowing surface material to fall into the burrow. In certain sensitive sites, animals like hogs, cattle, gopher tortoises, and armadillos should be excluded. The Florida Fish and Wildlife Conservation Commission may be able to help keep nuisance wildlife under control. Contact the nearest regional office or the Tallahassee office to request brochures or assistance.

Trees

Trees, while normally excellent erosion deterrents, can damage a site. When an old tree is blown over, a large root ball is sometimes pulled up, which displaces the dirt and any artifacts that might be in it. Trees located on an archaeological site should be examined routinely for signs of death and disease. Sick trees should be cut off close to the ground, leaving the roots to rot in place. This prevents tree falls and ensures that no further disturbance is done to the site. Consult with a local arborist to determine the best course of action.



An example of the kind of destruction to archaeological and historical remains caused by tree growth.

Looting and Vandalism

Deliberate destruction of archaeological sites by looting is on the rise. Deterring looters can be a difficult task, but one well worth the effort. Supporting you in this endeavor are federal and state laws and law enforcement officers. If you have difficulty controlling unauthorized access to your property, you can take some positive steps. Law officers are ready to assist you when a law has been broken, but they can also assist you in preventing crimes. Artifacts taken from your property without your permission are legally still yours. Looters who sell these items can be charged with selling stolen property. If looters are caught on your property, they can be charged with trespassing. Trespass laws are more effectively enforced when land is posted with “no trespassing” signs. Looters can also be charged with vandalism and property damage, if they have been digging on your property without your permission.

For further protection, your site may be designated a State Archaeological Landmark or Landmark Zone, which affords private lands the same protection as state lands under chapter 267, F.S. In certain cases, the Archaeological Resource Protection Act of 1979, as amended, (ARPA) can protect sites on private land. ARPA subsection 6(c) includes interstate transportation of stolen items. Thus, violations of a state or local law may give rise to an ARPA violation. In the event a site is looted on private land and the artifacts are taken across state lines, ARPA would apply. In Florida, looting a cemetery or unmarked burial site is a felony.

Contact your local sheriff and ask that a deputy visit your site with you before problems occur so officers will know where to go if their assistance is needed. Best of all, contact an archaeologist and arrange a time for all three of you to meet and tour the property. If a site is looted, the archaeologist can provide a cost estimate on the damaged resource in order to repair it and to help determine what action should be taken. Take pictures of the current condition of your property and start a log documenting (with photographs) damage each time you notice it. Take photographs or make a video tape of the site and any subsequent damage to it. If you are experiencing looting, request the sheriff, or other appropriate law enforcement official, to patrol the area and possibly even stake out the site. Once the looters are caught, the damage estimate provided by the archaeologist can be used in a civil case to determine an appropriate amount of restitution and can be helpful in a criminal case to determine a penalty.

The best way to prevent further looting is to repair the damage. Again, a trained archaeologist can help you. Consider filling in the looter holes with clean dirt that is free of artifacts. Line the insides of the holes with sheet plastic or filter cloth and refill them. Replant ground cover to camouflage the area against future looting.

The deliberate destruction of archaeological sites has become a serious problem in some areas. Unauthorized digging in sites, particularly those containing human burials, has caused the loss of much archaeological information and the desecration of many important sites. There are several things you can do to defend against this senseless disturbance of the past. First, sites are vandalized when it appears no one cares for them. Not only sites in remote areas, but more often sites that show signs of neglect are at high risk for vandalism. Sites that appear cared for, well maintained, clearly interpreted, and frequently visited, are seldom vandalized.

Should you notice signs of vandalism like unauthorized digging, graffiti, late night visitation, unusual vehicles, or other suspicious activities, act quickly to secure the site. Posted signs, lights, and perhaps a visit from local law enforcement can all serve to let others know the site is closely watched. If there is evidence of disturbance of the archaeological site, treat the area as a crime scene. Secure the area from public access, notify local law enforcement, and do not confuse the evidence by introducing new footprints or removing anything.

Protection Strategies

Many site protection strategies defend against deliberate looting and vandalism. Use of signs, fencing, camouflage, site burial, site monitoring, and law enforcement, alone or in combination, can all be effective approaches. Sites in frequently visited, easily

viewed, and publicly interpreted settings are among the least looted and vandalized.

Signage

Signs are typically one component of a broader site protection program that includes law enforcement and regular site monitoring. Two types of signs are helpful. The first type guides or interprets; the second advises or warns. Signs that guide or interpret are used to direct, such as trail markers, or to educate, such as historic plaques. The second type of sign makes the viewer aware of the law and the penalty for damaging or endangering a site. Experience has shown that the use of signs generally, but not always, reduces site looting and vandalism. Like a lock, signs keep honest people honest. Signs usually should not be posted at archaeological sites located in remote areas, as they might call attention to sites that cannot be properly protected. On the other hand, highly visible and accessible sites should have prominent signs that both interpret the site and discourage damaging activity. These signs should indicate to visitors how to report unauthorized activities. Signs can also be placed along trails and roads, near campsites, and as part of a wayside exhibit.



Signage warning looters against unauthorized digging and the penalties for disturbing unmarked burials.

Fencing

The use of fencing for archaeological site protection is, like signs, best in a monitored area. Fences in unusual places may call attention to a site that otherwise would be unknown, saying, "loot here." Fences can be used to guide as well as to restrict access and need not be impenetrable to be effective. A simple series of posts connected by a chain or rope can keep visitors in the right area. Fences should be used in highly visible areas to deter the curious from climbing mounds or where there is no stabilized trail.

Camouflage

Hiding a site can offer some protection. Camouflaging a site works best when it is done prior to any looting or vandalism. Planting poison ivy or oak, cactus, or Spanish bayonet and utilizing beehives will

dissuade many potential diggers. Posting signs noting the presence of such species may also be a sufficient deterrent.

Site Burial

Intentional site burial can be an effective deterrent to looters and vandals. In many cases a soil cap can adequately cover surface evidence of archaeological remains. For sites with considerable threat, construction wire, rebar, cement, or other material can be placed over them, followed by a cap of clean sand, and then replanting. Site disturbance will become almost impossible without heavy equipment. This method is not inexpensive, but it does work.

Site Monitoring

The most inexpensive method of site protection is site monitoring. Regular visits to your archaeological site will alert looters that you care about the site and will take steps to protect it. Site monitoring also gives you a chance to keep a log of activities that could be used in court. Authorized visitors, like members of local historical and archaeological groups or scouts, could assist you in monitoring the site. Increased site visitation results in decreased looting and vandalism events.

RESPONSIBLE DEVELOPMENT

The Context of Development

Florida is one of the most rapidly growing states in the nation. The most recent population census shows that Florida's population increases by more than 200,000 people each year, with this figure constantly rising. This has created a demand for new houses, shopping centers, roads, workplaces, and other facilities. As undeveloped lands are converted to more intensive land uses, the land is contoured, scraped, cleared, cut and filled, and otherwise modified. All of these activities have the potential to damage or destroy archaeological resources. Over the past twenty years or so, a legal and practical framework has been established to review certain development projects, determine whether significant archaeological resources may be threatened, and consider options to preserve or protect such properties—or the information they contain.

At the federal, state and local levels, archaeological and historic preservation laws, ordinances, and regulations support a system of cultural resource management that has already protected a great many sites. Typically, a development project with federal involvement, or that falls within the scope of certain state or local

government mandates, will be assessed by the Division of Historical Resources' review and compliance staff. Based on the distribution and type of archaeological sites known or predicted to exist on the development property, staff may recommend a range of archaeological activities from protection of known sites, to field survey, to archaeological monitoring to no action. If a survey is recommended, the archaeologist conducting the work will locate, inventory, and assess archaeological sites, then offer recommendations concerning their protection during development, if they are deemed significant.

Through early review, reliable information, and proper advance planning, it is often feasible to arrange for the long-term protection of historic sites. Where this is not possible, or where sites are less important, salvage excavations may be recommended to save information in the site. The best archaeological resource protection opportunities exist when survey is conducted and good information is available far in advance of development. Understanding the location and extent of sites to be preserved is critical before lots and roads are laid out, and especially before property is sold. The most serious archaeological crises occur when significant archaeological sites are discovered after construction begins. Such situations offer few options and little flexibility. If you are involved in developing land, you should acquire a thorough understanding of archaeological sites on your property as early as possible. Some lending institutions are beginning to require archaeological surveys as a condition of financing.

Archaeological resources need not be a liability; they can be an important asset. Knowing in advance not only the location but also the age, type, and function of archaeological sites offers opportunities for interpretation as well as preservation. Archaeological sites can become important greenspace components in a development, and can be developed for public access, education, and recreation. In Florida and elsewhere, such sites are an amenity offering added value to property, and have been featured in marketing and community relations efforts.

Questions You Should Ask Before Developing Land with Archaeological Resources

- ◆ *What type of site do I have?*
- ◆ *Where is my site located?*
- ◆ *How big is my site?*
- ◆ *How can I avoid the site during development?*
- ◆ *If I have to disturb an area that is archaeologically sensitive, how can I make sure valuable information is properly collected?*

Site Assessment

Before development is ready to proceed, it is first necessary to assess one's archaeological site to help determine the most viable protection measures for it. How big is it? How far does it extend below ground? How important is it? How much damage has occurred in the past? These questions and others can be answered by an archaeologist. If possible, landowners should seek the assistance of a professional who can help advise them in these matters. Sometimes the archaeologist will recommend a survey to map the site, serving both to document it for the archaeological record and to help plan the property development. The Florida Master Site File at the Division of Historical Resources keeps records on all known archaeological sites in Florida. Site File staff can provide information to landowners and planners, which may help significantly in preparing development plans.

Minimizing Site Impact

Having identified the extent and significance of the site and determined that protection is warranted, development should proceed in a fashion that has the least amount of adverse impact to the site. Ground disturbing activities such as the installation of an in-ground pool, septic tank and drainfield, electrical cable, water pipes, or a building foundation should be planned in areas without archaeological remains. There are many appropriate above ground uses of archaeological sites that also serve as a means of protecting them. Landscaping, which can minimize or avoid ground disturbance by using fill or other means is the most obvious. It can also serve to preserve the open space setting of the site. Sites may also be protected by carefully sealing them under properly designed driveways, parking lots, tennis courts, or the like.



Archaeologists at work in the backyard of a home. A screen is employed to help recover small excavated artifacts.

Occasionally, even those devoted to the protection of their archaeological site have to dig a hole. In this case, special care should be taken to record what is observed during such disturbance, such as soil color and consistency, the presence of bone or shells and the artifacts encountered and collected while digging. To recover artifacts sift the dirt through 1/4" or 1/8" mesh hardware cloth, which is like window screen only more durable, attached to the bottom of a rectangular wood frame. Take careful notes, record the depth at which you found each artifact, and draw a map (or use a detailed property map) locating on it each hole in relation to the house, property line, or trees. Place the artifacts from each excavation unit in separately labeled bags. If your digging is associated with a planned project, make your notes on the plans showing where you dug and what was found. If large projects need to be undertaken, like digging a well, swimming pool or sprinkler system, and it is impossible to avoid archaeologically sensitive areas, consider having an archaeologist excavate the area first or monitor any excavations you may undertake, particularly when using heavy equipment. Contact the Bureau of Archaeological Research for help with planning these activities.

In most large cities in Florida there is a local chapter of avocational archaeologists from the Florida Anthropological Society (FAS). The FAS is a non-profit organization whose members have a great interest in local and Florida-wide archaeology. FAS members can give you further information and assist you in identifying the artifacts that you have found. They can also be called to give informal talks about archaeology or sponsor workshops in flint tool and pottery making.

Land Use and Development Issues

Land uses or land modifications like farming, pond and canal dredging and vegetation removal can also be detrimental to archaeological resources. The following discussion outlines various issues in land use and development and offers recommendations for protecting archaeological sites during such activities.

Agriculture

Some of the most interesting and valuable archaeological sites can be found on land suitable for agricultural production. This is not surprising since many Florida Indian tribes, Spanish mission settlements, and later Florida settlers depended heavily on agriculture and chose locations with fertile soils for settlements. These sites are located on land still favored by today's farmers. Although different farming methods were employed in prehistoric and early historic times, many of the same crops continue to be grown. Like many modern farmers, aboriginal farmers lived close to their fields and close to water. These archaeological sites

provide the most information about such early farmers. However, due to the use of heavy machinery to drain and reshape the land as well as the modern use of fertilizers and pesticides, areas that were once marginal for farming, are now being cultivated. Traditional farming methods only disturbed the top 6 to 8 inches of soil, and such shallow plowing only minimally disturbs archaeological sites. With the advent of mechanized farming and deep plowing, now up to 3 feet of soil can be turned. This causes great damage to archaeological sites, as does re-contouring the land to level high spots and fill in low areas or digging ditches for drainage.

There are ways you can preserve the intact underground portion of an archaeological site on your farmland. The best method is to dedicate it to a passive use. The area could be converted to pasture or a woodlot. If the land must be farmed, shallow plowing could be used in this area. Alternatively, you can bury your archaeological site under a cap of clean soil, limiting plowing to the upper layer of soil.

Mounds and earthworks are the easiest to protect because they generally represent only a small portion of arable land. These sites should be removed from cultivation.

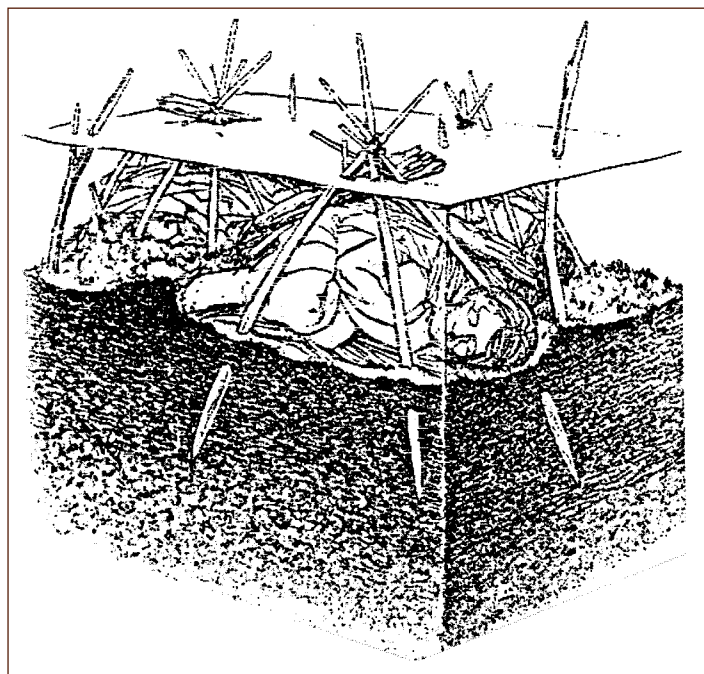
Pond and Canal Dredging

If you are thinking about developing an inundated area of your property, consider consulting with a professional archaeologist. Wetland areas can contain significant archaeological resources because their environment tends to preserve archaeological remains like wood and bone, which are rarely or only poorly preserved in other archaeological sites. One of the most famous sites of this type in Florida is Windover Pond. This small pond, situated between the Indian and St. Johns Rivers, contains one of the most important archaeological finds in the state. The site was discovered during dredging in advance of road construction.

Following the site's discovery, its importance was recognized and professional archaeological excavations were conducted. Deep within the peat deposits of the pond, some 10 feet below the modern pond surface, were found the remains of over 120 individuals buried nearly 8,000 years ago. They are older than the Ice Man found in the Italian Alps and the mummies of Egypt. Similar Archaic burial sites have also been discovered in Hardee and Sarasota counties. Such finds are unique to Florida and demonstrate the potential for underwater burials in unexpected places.

Vegetation Removal

The removal of trees and other vegetation from an archaeological site can cause considerable damage to archaeological resources. For example, tree removal from an archaeological site could damage the site by



An artists' version of a Windover Pond burial.

disturbing artifacts and features located near the root system. If possible, trees should be cut off close to the ground and the stumps left to decompose in place.

Landowners should also take special care when removing overgrown vegetation from historic cemeteries. Cemeteries are unique archaeological sites because objects located on the ground surface of cemeteries can be valuable sources of information. Items such as grave offerings or old headstones can provide a more accurate picture of a cemetery and the people it represents. For these reasons, clearing and/or restoring an overgrown cemetery should be done in conjunction with a professional archaeologist or cemetery preservationist. Please feel free to contact the Bureau of Archaeological Research for more information regarding cemetery preservation.

HUMAN BURIALS

In 1987, Florida's cemetery law was revised to protect unmarked human burials—those graves and burial sites and their contents that occur outside our traditional cemeteries. While unmarked burials usually represent Native Americans who lived in Florida before European contact, there are many examples of more recent rural and ethnic graves that were never clearly marked or whose modest wooden markers have disappeared. Whatever the origin of the human remains, they are all afforded equal protection under Florida law. Under Section 872.02, *Florida Statutes*, it is a felony to willfully and knowingly injure or remove a tomb or

monument or to willfully and knowingly disturb the contents of a tomb or grave. This law applies to Indian burial mounds as well as it applies to church and city cemeteries. Anyone having knowledge of the discovery of unmarked human remains must report the incident to local law enforcement. Whenever human remains are discovered, all activity that could disturb the remains must cease and cannot resume until authorized by the state archaeologist or the medical examiner.

If the remains are involved in a criminal investigation or have been buried less than 75 years, the medical examiner will have jurisdiction and responsibility to authorize activities to resume once the remains are removed or protected. If the remains have been in the ground more than 75 years, responsibility rests with the Division of Historical Resources. Different procedures are followed depending on whether the remains were encountered during an archaeological investigation or not, but the procedures are intended to provide an opportunity to arrange for protection of the remains. The law does not require or prohibit removal of the remains, but preservation in place is the preferred alternative.

If remains for which the Division of Historical Resources has responsibility are removed from the ground, certain steps are followed concerning identification, analysis, and notification of family or community representatives. In the event no living relatives or representatives can be found, a committee of four is appointed to provide advice on final disposition of the remains. If the remains are Native American, two members of the committee are members of tribes recommended by the Florida Governor's Council on Indian Affairs, Inc.

Over the last decade in Florida hundreds of cases of unmarked human remains have been handled under the procedures specified in Chapter 872. If you encounter or have knowledge of unmarked human remains you are required by law to notify a local law enforcement authority. Tell them you are reporting unmarked human remains in accordance with Section 872.05, *Florida Statutes*, and record the name of the person with whom you spoke. Leave your name and telephone number in case it is necessary to inquire further about the site. Do not disturb the remains or the soil containing them. If the remains were exposed by illegal digging, treat the area as a crime scene. Do not disturb any evidence or introduce new footprints or other material to the site. The law enforcement agency will coordinate with the medical examiner and the state archaeologist if appropriate. Discoveries of human remains are given high priority, and someone should be able to visit the site within a day or so to continue the steps outlined in the law.

THE PARTNERSHIP APPROACH

Protecting archaeological sites requires creativity, cooperation and planning. Landowners have an opportunity to work with all of the partners necessary to protect and compatibly develop their land. Some of these partners include public and private organizations and local, state and federal governments. Through these partnerships, the possibilities for protecting valuable archaeological resources on private lands are numerous. Some methods have been in use for years, others are new and emerging. As more landowners become interested in resource protection, techniques will continue to develop.

Programs for Archaeological Site Protection

There are a number of programs and organizations that private landowners can rely on for site preservation and management. Please feel free to contact the Department of State, Division of Historical Resources for help in deciding which of these programs or organizations may be appropriate for your archaeological site.

Land Acquisition Programs and Organizations

In some cases, private landowners may want to pursue the sale or donation of land that contains an archaeological site. There are organizations and government programs that are established to ensure the permanent protection of cultural resources. Most of the public programs listed below require that a landowner work with a local or state agency or a private nonprofit organization. Private landowners should consult a tax attorney or estate planner to review the tax benefits that may be available through land sale, donations or easements.

Conservation and Recreation Lands (CARL) Program, Florida Department of Environmental Protection

Address: Office of Environmental Services
3900 Commonwealth Blvd.
Mail Station #100
Tallahassee, FL 32399-3000
Phone: (850) 245-2784

Historic Preservation Grants Program, Florida Department of State

Address: Division of Historical Resources,
Bureau of Historic Preservation
R.A. Gray Building
500 South Bronough Street,
Tallahassee, FL 32399-0250
Phone: (850) 245-6333

Office of Greenways and Trails

Address: Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Mail Station 795
Tallahassee, FL 32399-3000
Phone: (850) 245-2052

The Archaeological Conservancy

Address: 5301 Central Avenue NE, Suite 1218
Albuquerque, NM 87108-1517
Phone: (505) 266-1540

The Archaeological and Historical Conservancy

Address: 4800 Sw 64th Ave., Suite 107
Davie, FL 33014
Phone: (954) 792-9776

Land Trusts

Land trusts are private, nonprofit organizations that protect valuable natural and cultural resources through land acquisition. While there is no one program carried out by all land trusts, the work they do involves private lands. Their principal objectives are achieving permanent preservation of lands having at least one of the following qualities: natural, historic, cultural, agricultural, recreational, or scenic significance. Here are a few land trusts you may wish to contact for further information.

National Trust for Historic Preservation

Address: 1785 Massachusetts Avenue, N.W.
Washington, D.C. 20036-2117
Phone: (202) 588-6000

Red Hills Conservation Program

Address: Tall Timbers Research Station
13093 Henry Beadel Drive
Tallahassee, FL 32312-0918
Phone: (850) 893-4153

Trust for Public Land

Address: Southeast Regional Office
306 N. Monroe Street
Tallahassee, FL 32301-7635
Phone: (850) 222-7911

Registry Programs

A registry program recognizes an owner's protection of historic or archaeological sites. Registration is usually voluntary and nonbinding. It is an agreement that can be canceled by either party at any time. Registration involves no payment or receipt of funds. Some registry programs also provide assistance in site management and education. Through a registry program, the owner will usually receive a certificate or plaque that recognizes the owner's site as archaeologically important. There are registry programs at national and state levels. The National Register of Historic Places is the most prominent organization. The State of Florida has several registry options including archaeological landmarks and the Florida Site Steward Agreement.

National Register of Historic Places

Address: National Register, History and Education
National Park Service
1201 Eye St., N.W., 8th Floor (MS 2280)
Washington, D.C. 20005
Phone: (202) 354-2213

State Archaeological Landmark Program

Address: Florida Division of Historical Resources,
Bureau of Archaeological Research
R.A. Gray Building
500 South Bronough Street,
Tallahassee, FL 32399-0250
Phone: (850) 245-6444

Florida Heritage Marker Program

Address: Florida Division of Historical Resources,
Bureau of Historic Preservation,
Survey and Registration Section
R.A. Gray Building
500 South Bronough Street
Tallahassee, FL 32399-0250
Phone: (850) 245-2333

Florida Site Steward Agreement

Address: Florida Division of Historical Resources,
Bureau of Archaeological Research
R.A. Gray Building
500 South Bronough Street,
Tallahassee, FL 32399-0250
Phone: (850) 245-6444

Volunteer Programs and Organizations for Public Support and Education

There is a broad array of archaeological expertise available through various private, state and federal archaeology programs and organizations. Public archaeology programs increase awareness of and respect for the past and explain the importance of archaeological research and the benefits of cultural resources to the public. These programs include formal and informal education approaches and the use of volunteers. Organizations such as the Society for American Archaeology and the Archaeological Institute of America promote archaeology through publications, meetings and various other programs.

Archaeological Resource Management Training Program (ARM)

Address: Florida Division of Historical Resources,
Bureau of Archaeological Research
R.A. Gray Building
500 South Bronough Street,
Tallahassee, FL 32399-0250
Phone: (850) 245-6444

Listing of Education in Archeology Projects (LEAP)

Address: U.S. Department of the Interior
National Park Service
Archeology & Ethnography Program
1849 C St., N.W., 7th Floor
Washington, D.C. 20240
Phone: (202) 354-2100

Society for American Archaeology (SAA)

Address: 900 Second Street, N.E., Number 12
Washington, D.C. 20002-3557
Phone: (202) 789-8200

Archaeological Institute of America (AIA)

Address: Boston University
656 Beacon Street
Boston, MA 02215-2006
Phone: (617) 353-9361

Florida Anthropological Society, Inc. (FAS)

Address: P.O. Box 608
St. Petersburg, FL 33731
Internet: <http://www.fasweb.org>

Register of Professional Archaeologists (RPA)

Address: 5024-R Campbell Boulevard
Baltimore, MD 21236
Phone: (410) 933-3486

Other Organizations:

The following organizations can be contacted to provide reference materials and professional assistance regarding management issues such as erosion control and vegetation removal.

Department of Agriculture, Division of Forestry, Bureau of Forest Management

Address: 3125 Conner Boulevard
Tallahassee, FL 32311
Phone: (850) 488-4274

Florida Department of Agriculture and Consumer Services, Division of Plant Industry

Address: P.O. Box 147100
Gainesville, FL 32614-7100
Phone: (352) 372-3505

Department of Community Affairs, Florida Coastal Management Program

Address: 2555 Shumard Oak Blvd.
Tallahassee, FL 32399-2100
Phone: (850) 488-8466

Florida Fish and Wildlife Conservation Commission

Address: 620 S. Meridian St.
Tallahassee, FL 32399-1600
Phone: 1-888-404-FWCC

Natural Resources Conservation Service, Plant Material Center for Florida

Address: 14119 Broad St.
Brooksville, FL 34601
Phone: (904) 796-9600

U.S. Army Corps of Engineers District Office in Florida

Address: 701 San Marco Blvd.
Jacksonville, FL 32207
Phone: (904) 232-2568

ADDITIONAL RESOURCES

Florida Archaeology

Brown, Robin

1994 *Florida's First People: 12,000 Years of Human History*. Pineapple Press, Sarasota.

Hann, John H. and Bonnie G. McEwan

1998 *The Apalachee Indians and Mission San Luis*. University Press of Florida, Gainesville.

McEwan, Bonnie G.

- 1992 *The Spanish Missions of La Florida*. University Press of Florida, Gainesville.

Milanich, Jerald T.

- 1994 *Archaeology of Precolumbian Florida*. University Press of Florida, Gainesville.

Perry, I. Mac

- 1989 *Indian Mounds You Can Visit: 165 Aboriginal Sites in Florida's West Coast*. Great Outdoors Publishing Company, St. Petersburg.

Purdy, Barbara A.

- 1991 *The Art and Archaeology of Florida's Wetlands*. CRC Press, Inc., Boca Raton.

Weisman, Brent R.

- 1999 *Unconquered People: Florida's Seminole and Miccosukee Indians*. University Press of Florida, Gainesville.

Site Stabilization

Broome, S. W., E. D. Seneca, and W. W. Woodhouse, Jr.

- 1982 *Building and Stabilizing Coastal Dunes with Vegetation*. UNC Sea Grant College Publication UNC-SG-82-05, NOAA, U.S. Department of Commerce.

Ehrenhard, J. E. (editor)

- 1988 *Coping with Site Looting, Southeastern Perspectives: Essays in Archeological Resource Protection*. National Park Service, Interagency Archaeological Services Division, Atlanta.

Federal Emergency Management Agency

- 1986 *Coastal Construction Manual*. FEMA-55/February 1986.

Carnett, C. L.

- 1995 *A Survey of State Statutes Protecting Archaeological Resources*. Archaeological Assistance Study Number 3, Preservation Law Reporter Special Report. U.S. Department of Interior, National Park Service, Archaeological Assistance Division and the National Trust for Historic Preservation, Washington, D.C.

Freed, R. A.

- 1990 Sign Placement as a Means of Protecting Archaeological Resources. In *The Archaeological Sites Protection and Preservation Notebook*, ASPPN X-1, pp. 1-11. Environmental Impact Research Program, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.

Gilbert, S.

- 1986 America Washing Away. *Science Digest* (94)8:29-79.

Heede, Burchard H.

- 1980 *Stream Dynamics: An Overview for Land Managers*. U.S.D.A. Forest Service, General Technical Report RM-72, Rocky Mountain Forest and Range Experiment Station, Ft. Collins, CO.
- 1990 A Form for Evaluating Site Condition. In *The Archaeological Sites Protection and Preservation Notebook*, ASPPN I-10, pp. 1-12. Environmental Impact Research Program, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.
- 1987 Control of Coastal Erosion to Protect Archaeological Resources. In *The Archaeological Sites Protection and Preservation Notebook*, ASPPN III-8, pp. 1-9. Environmental Impact Research Program, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.
- 1991 Control of Shoreline Erosion by Means of Revegetation. In *The Archaeological Sites Protection and Preservation Notebook*, ASPPN V-2, pp. 1-6. Environmental Impact Research Program, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.
- 1990 Vegetation Management on Archaeological Sites. In *The Archaeological Sites Protection and Preservation Notebook*, ASPPN IX-2, pp. 1-4. Environmental Impact Research Program, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.
- Keown, Malcolm P. and Elba A. Dardeau, Jr.**
- 1980 *Utilization of Filter Fabric for Streambank Protection Applications*. Technical Report HL-80-12. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.

MacDonald, A.

- 1992 *Surface Erosion and Disturbance at Archaeological Sites: Implications for Site Preservation*. Miscellaneous Paper EL-90-6, Environmental Impact Research Program, U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.

National Research Council

- 1990 *Managing Coastal Erosion*. National Academy Press, Washington, D.C.

Nickens, P. R.

- 1993 *Use of Signs as a Protective Measure for Cultural Resource Sites*. U.S. Army Corps of Engineers, Waterways Experiment Station, Vicksburg, MS.

- Pilkey, O. H. Jr., D. C. Sharma, H. R. Wanless, L. J. Doyle, O. H. Pilkey, Sr., W. J. Neal, and B. L. Gruver**
- 1984 *Living with the East Florida Shore*. Duke University Press, Durham N.C.

Thorne, Robert

- 1988a *Filter Fabric: A Technique for Short-term Site Stabilization*. Technical Brief No. 1, Archaeological Assistance Division, National Park Service, Washington, D.C.
- 1989b *Intentional Site Burial*. Technical Brief No. 5, Archaeological Assistance Division, National Park Service, Washington, D.C.
- 1990 *Revegetation: The Soft Approach to Archaeological Site Stabilization*. Technical Brief No. 8, Archaeological Assistance Division, National Park Service, Washington, D.C.

General Site Protection and Preservation

Florida Trust for Historic Preservation

- 1995 *Florida's Heritage Resource Directory*, 1996. Tallahassee.

Henry, S. L.

- 1993 *Protecting Archeological Sites on Private Lands*. U.S. Department of the Interior, National Park Service, Preservation Planning Branch, Interagency Resources Division, Washington, D.C.

Hutchinson, R. (editor)

- 1991 *Land Preservation for Floridians*. Florida Land Trust Association, Tallahassee.

Norton, P.

- 1981 A Modest Proposal for Mobilizing the Private Sector. In *Rescue Archaeology*, edited by R. L. Wilson and G. Loyola, pp. 85-88. National Trust for Historic Preservation Organization of American States. Preservation Press, Washington, D.C.

Ryan, J. S.

- 1993 *Preventing Cultural Resources Destruction: Taking Action Through Interpretation*. U.S. Department of the Interior, National Park Service.



U.S. Department of the Interior

- 1982 *New Tools for Land Protection: An Introductory Handbook*. U.S. Department of the Interior, Office of the Assistant Secretary for Fish and Wildlife and Parks.

Internet Resources

For information on historical and archaeological resources of the **Florida Department of State**, see, <http://www.flheritage.com>. This address will take you to various web pages of the Division of Historical Resources including the Bureau of Archaeological Research, the Bureau of Historic Preservation, and the Museum of Florida History.

For information on **Florida Greenways and Trails**, see, <http://www.dep.state.fl.us/gwt>.

The **National Park Service's Heritage Preservation Services** helps citizens and communities identify, evaluate, protect, and preserve historic properties. Their web page is at <http://www.2.cr.nps.gov/>.

Archaeological Institute of America (AIA)
<http://www.archaeological.org/>

Heritage Preservation
<http://www.heritagepreservation.org/>

SAA Society for American Archaeology
<http://www.saa.org>

There are also World Wide Web servers devoted to the field of archaeology. Try **ARCHNET**, a virtual library for archaeology. This server provides access to archaeological resources available on the Internet. <http://archnet.uconn.edu/>.



Do

- Document your archaeological site
- Stop erosion
- Check on your site on a regular basis
- Contact professionals for help

Avoid

- Ground disturbing activities at your site
- Frequent traffic by people, animals and vehicles
- Untested stabilization methods

Responding to Threats

- Identify the cause
- Consult with experts
- Determine potential solutions
- Determine whether permits are required
- Select a cost effective and long term solution
- Monitor the site



Responding to Looting and Vandalism

- Notify law enforcement
- Secure the area and do not disturb the evidence
- Notify an archaeologist to conduct a damage assessment
- Consider how the site can be protected better in the future

Questions to Ask Before Developing Land With Archaeological Resources

- What type of site do I have?
- Where is my site located?
- How big is my site?
- How can I avoid the site during development?
- If I have to disturb an area that is archaeologically sensitive, how can I make sure valuable information is properly collected?

What to do When Human Burials are Encountered

- Stop any activity that may disturb the burials
- Secure the area
- Notify local law enforcement and mention Chapter 872, Florida Statutes
- Cooperate with the medical examiner or the state archaeologist, whoever has jurisdiction
- Do not remove bones or artifacts
- Make bones and burial artifacts available for proper final disposition

Partners

- Record your site with the Florida Master Site File
- Get to know an archaeologist
- Work with land conservation experts and non-profit organizations
- Consider public access or acquisition for important sites

Thank you for your wise management of Florida's Archaeological Resources.

GUIDELINES FOR USERS: FLORIDA MASTER SITE FILE

Background State and federal law mandate that the state maintain an inventory of all known historic structures and archaeological sites. The Florida Master Site File, Bureau of Archaeological Research, Division of Historical Resources, is the office which maintains Florida's inventory. An eighth of a million cultural resources, including 22,000 archaeological sites and 101,000 historical structures, are recorded at this time on the Site File. Roughly 7,000 new records or updates are added annually. These large numbers, however, represent only a small part of the heritage of Floridians, considering that less than 10% of the area of most Florida counties has undergone field survey by qualified archaeologists or architectural historians. More information about the Site File and other activities of the Division of Historical Resources is available on the World Wide Web at <http://www.dos.state.fl.us/dhr/msf/>.

Function The Site File is an archive and information source only, analogous to a public library. Site File staff evaluate neither the historical significance of sites nor the potential impact of development projects, although official and unofficial evaluations by others are included in our records. Consult the Compliance Review Section of the Bureau of Historic Preservation (850-487-2333) if you have inquiries related to preservation aspects of development projects, inquiries related to local government comprehensive planning, or questions dealing with the historical aspects of state lands.

Requesting Information The Florida Master Site File maintains individual paper and computer files on archaeological sites and historic structures reported to this office. We plot the locations of archaeological sites, structures which are listed on or eligible for the National Register, and historical districts on USGS 7.5 minute topographic maps. Research involving more than about 15 minutes of staff time, including photocopying, is normally done by the user. Our office is open Monday through Friday from 8:00 to 5:00 and we have a copier available for public use. We are sometimes able to steer clients to local help if they need extensive photocopying but are not able to get to Tallahassee themselves. We charge \$0.15 per page for all photocopies when the total number of copies exceeds 100; there is no charge for smaller totals. Please consult with us well in advance of deadlines, by fax, letter, or e-mail, if possible, not by phone, and plan on a response time of two weeks for routine inquiries. Replies by fax or express mail services are not ordinarily possible. We cannot photocopy sheets larger than 11 x 14 7/8 inches.

We are developing electronic mapping with a Geographic Information System (GIS). Currently GIS data layers are complete for archaeological sites, historical structures, National Register properties, historical bridges, historical cemeteries, and field survey projects (see the Site File document *User's Guide to the GIS of the Florida Master Site File* or contact the Site File for more information).

Helping Us to Search Site or Survey Records Inquiries about sites should, when known, refer to the state file number assigned to each site, historic property, or survey project. For sites and historic properties, file numbers include a two letter county code, a serial number in assignment order within the county, and an optional terminal letter, when applicable, designating spatial or other subdivisions of the site. "LE220" or "LE00220," for example, refers to the 220th site recorded in Florida's Leon County. Searches for all historical structures and archaeological sites in a given area can efficiently be performed by legal survey location—township, range, and section, though many extraneous resources may be listed. Specific historical structures are best searched by full street address and all known historical names. Specific archaeological sites are best searched according to their map location on 1:24,000

GUIDELINES FOR USERS: FLORIDA MASTER SITE FILE

topographical maps of the United States Geological Survey. Survey projects and reports are filed in a single statewide sequence, and specific surveys can be searched based on the county, report author, publication date, and report title. Past surveys within a given area can be identified from map location, preferably on 1:24,000 or 1:100,000 USGS contour maps. **We limit, as far as possible, the distribution of location information on sites which are especially susceptible to damage through illegal activities.** If you have very large or complex tracts of land which need to be searched, the Site File's GIS might help; contact the Site File for current information.

Eligibility for Listing on the Florida Master Site File The criteria for listing a property on the Florida Master Site File are that it be adequately documented and normally that it be at least 50 years old. Therefore, entry of a property on the Site File does not necessarily imply that it is especially significant historically, although many listed properties have great significance.

Recording Sites Nonprofessionals as well as professionals have often furnished information useful in understanding and preserving historical sites. Standard Site File forms and manuals are available for recording archaeological sites, historical standing structures, historical bridges, and historical cemeteries. We are developing a form for use with historic districts. A preliminary form is available for recording historic shipwrecks. Supplementary documentation is normally required in addition to the completed form. For instance, for archaeological sites, we require (1) boundaries plotted on a 1:24,000 scale USGS topographic map for all sites, and (2) a detailed site plan at 1:600 scale or better. We encourage site recorders to use the Site File's *SmartForm* program to document cultural resources; state-sponsored surveys resulting in at least 45 forms are required to use *SmartForm*. Various paper forms, manuals, and the *SmartForm* program may be downloaded at <http://www.dos.state.fl.us/dhr/msf/>.

Distributing Computer Database Information The Site File can write the general computer information relating to cultural resources, one county at a time, in a convenient one record per site format. Such "Santa Claus" files can be sent via diskette, CD, or, if you have Web access, FTP download. There are explanatory handouts for each different resource for which we send Santa Claus data. It is easiest to send the data in Microsoft Access format, which can be read by most database systems. Otherwise, we can send the information in fixed column delimited formats—or as a paper listing, if fewer than 200 sites are involved.

GIS (Geographic Information System) Data If you need very large amounts of precise location data, or if the project area is very large or complex, our evolving GIS system may be able to help. Staff limitations prevent us from routine plotting of custom paper maps, but if you have a Geographic Information System, you may be able to download GIS data from our FTP site, depending upon file size and your system. Consult with the GIS Supervisor of the Site File.

Florida Master Site File
Division of Historical Resources
R. A. Gray Building, 500 South Bronough
Tallahassee, Florida 32399-0250
Phone: 850-245-6440; Suncom: 205-6440; Fax: 850-245-6439
E-mail: fmsfile@dos.state.fl.us
Site File web page: <http://www.dos.state.fl.us/dhr/msf/>

FORMS FOR MANAGING ARCHAEOLOGICAL RESOURCES

The forms on the following pages are for you to cut out or photocopy and use in managing sites on your property.

The **Archaeological Resources Checklist** is a good place to begin to assess your site. It requests information that any archaeologist or manager will want to know to recognize management needs. If you send the form to the Bureau of Archaeological Research, you can receive technical assistance in taking care of your site.

The **Florida Master Site File** is the single place in Florida where information is kept on all the known archaeological and historical sites in the state. The Guidelines for Users provides an introduction to the Site File, and helps explain the context for the Site File forms that follow

The **Florida Master Site File** form (2 sides) is the basic recording form for all archaeological sites in the state, and is the basis for organizing and maintaining information in the site file. It is technical in some places, and you can get help from any archaeologist or by calling the Bureau of Archaeological Research. The main Site File form is supplemented by other forms for other particular kinds of sites like cemeteries.

The **Florida Master Site File Cemetery Form** (2 sides) is designed for recording cemeteries. It requests information that will be helpful for archaeological and historical documentation as well as for responsible management.

The **Florida Master Site File Archaeological Short Form** (2 sides) was created to solicit the most basic information about a site. No special experience or knowledge is necessary to complete the form, and it often serves as the first source of information submitted to the Site File. Often, upon receipt of a Short Form, the Site File will contact the owner to discuss a possible visit by an archaeologist to collect more information.

Recording your site in the Florida Master Site File conveys no rights or interest in your property. Listing in the Florida Master Site File implies no legal status or government control over your property. It does create a public record that can be viewed by others, and will help ensure that knowledge of your site is available for research and management purposes.

Thank you for your stewardship.

ARCHAEOLOGICAL RESOURCES CHECKLIST

This form is used by the Bureau of Archaeological Research to assist landowners and land managers in archaeological site stewardship. It is designed to identify areas that can be improved in the management of cultural resources. To help the Bureau determine what types of information or technical assistance are appropriate, please photocopy, complete and send this form to:

Bureau of Archaeological Research
500 S. Bronough Street
Tallahassee, FL 32399-0250

A. Background Information

Name of Management Tract/Property _____ County _____

Name/Site Number of Archaeological Sites _____

Yes No

- ☐ ☐ Is the manager/landowner maintaining a cultural resources notebook containing copies of site forms, survey reports, site visit reports, monitoring reports, correspondence from the Division of Historical Resources, and other relevant information?
- ☐ ☐ Are there cultural resource maps showing the locations of all recorded archaeological sites and cultural resources investigation areas within the management tract/property boundary?
- ☐ ☐ Are all of the recorded sites represented by site forms and map locations?
- ☐ ☐ If artifacts have been collected during construction, monitoring activities or by other means, are they stored in plastic bags marked with collection date, site of origin, and other pertinent information?
- ☐ ☐ Have site visits been completed in a timely manner and current site condition and observations recorded in the notebook?
- ☐ ☐ Is a record of site vandalism, unauthorized artifact collection and site excavation maintained, including the names and other identification for individuals given warnings or arrested?
- ☐ ☐ Has a comprehensive cultural resources assessment survey been performed of the management tract/property?
- ☐ ☐ Do the property brochures, signage and other public information notify visitors that archaeological sites should not be disturbed and that artifacts should not be collected?
- ☐ ☐ Has the manager/landowner attended the Cooperative Approach to Archaeological Resource Management workshop sponsored by the Florida Division of Historical Resources (DHR) and the Florida Department of Environmental Protection, Division of Recreation and Parks?

B. Field Evaluation of Archaeological Sites

1. Do any of the sites show evidence of:

Yes No

If Yes, identify by site numbers/names

- ☐ ☐ Natural erosion _____
- ☐ ☐ Vehicular damage _____
- ☐ ☐ Horse or pedestrian damage _____
- ☐ ☐ Looting activities _____
- ☐ ☐ Construction activities _____
- ☐ ☐ Animal damage _____
- ☐ ☐ Other _____

2. Comment on any YES answers (for each site). Identify what measures have been taken to correct the problem:

3. If none yet taken, (for each site) what corrective measures are proposed, and what is the schedule to accomplish these measures?

4. List the sites accessible to the public:

5. What cultural resource interpretive measures are in place, such as park brochures, guidebooks, site brochures, trail side exhibits, visitors center exhibits? (Attach copy or describe)

6. What interpretive measures, if any, are proposed?

7. If there are known archaeological sites on the property, but no interpretive measures, why are there none?

C. Name of Property Manager/Landowner Providing Information in this Cultural Resource Management Assessment:

Name: _____

Unit/Property Name: _____

Phone: _____ Fax: _____ E-mail: _____

D. Name and Agency or Affiliation of Individual Preparing Assessment:

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Phone: _____ Fax: _____ E-mail: _____



ARCHAEOLOGICAL SITE FORM FLORIDA MASTER SITE FILE

Version 2.2 3/97

Consult *Guide to Archaeological Site Form* for detailed instructions.Recorder Site# _____
Field Date ____/____/____

- ☐ Original
☐ Update
(give site#)

Site Name(s) _____ **Multiple Listing [DHR only]**
Project Name _____ **FMSF Survey #** _____
Ownership: ☐ private-profit ☐ private-nonprofit ☐ private-individual ☐ private-unspecifd. ☐ city ☐ county ☐ state ☐ federal ☐ foreign ☐ Native American ☐ unknown
USGS 7.5 Map Name & Date _____ County _____
Township _____ Range _____ Section _____ ☐ Check if Irregular Section; Qtr. Section (check all that apply): ☐ NE ☐ NW ☐ SE ☐ SW
Landgrant _____ Tax Parcel # (s) _____
City / Town (if within 3 mi.) _____ In Current City Limits? ☐ yes ☐ no ☐ unknown
UTM: Zone ☐ 16 ☐ 17 Easting _____ 0 Northing _____ 0
Address / Vicinity of / Route to _____
Name of Public Tract (e.g., park) _____

TYPE OF SITE (Check all choices that apply; if needed write others in at bottom)

SETTING *

- ☐ Land - terrestrial
☐ Cave/Sink - subterranean
☐ terrestrial
☐ aquatic
☐ intermittently flooded
☐ Wetland - palustrine
☐ usually flooded
☐ sometimes flooded
☐ usually dry
- ☐ Lake/Pond - lacustrine
☐ River/Stream/Creek - riverine
☐ Tidal - estuarine
☐ Saltwater - marine
☐ marine unspecified
☐ high energy marine
☐ low energy marine
☐ Other _____

STRUCTURES - OR - FEATURES *

- ☐ aboriginal boat ☐ fort ☐ road segment
☐ agric/farm building ☐ midden ☐ shell midden
☐ burial mound ☐ mill unspecified ☐ shell mound
☐ building remains ☐ mission ☐ shipwreck
☐ cemetery/grave ☐ mound unspecified ☐ subsurface features
☐ dump/refuse ☐ plantation ☐ surface scatter
☐ earthworks ☐ platform mound ☐ well

FUNCTION *

- ☐ none specified
☐ campsite
☐ extractive site
☐ habitation (prehistoric)
☐ homestead (historic)
☐ farmstead
☐ village (prehistoric)
☐ town (historic)
☐ quarry

HISTORIC CONTEXTS (Check all that apply; use most specific subphases:

e.g., if *Glades Ia* only, don't also use *Glades I*)

Aboriginal *

- ☐ Alachua ☐ Englewood ☐ Glades unspcif. ☐ St. Augustine ☐ Seminole: 2d War To 3d
☐ Archaic, Early ☐ Fort Walton ☐ Hickory Pond ☐ St. Johns Ia ☐ Seminole: 3d War On
☐ Archaic, Middle ☐ Glades Ia ☐ Leon-Jefferson ☐ St. Johns Ib ☐ Seminole unspecified
☐ Archaic, Late ☐ Glades Ib ☐ Malabar I ☐ St. Johns I unspecified ☐ Swift Creek, Early
☐ Archaic unspecified ☐ Glades I unspcif. ☐ Malabar II ☐ St. Johns IIa ☐ Swift Creek, Late
☐ Belle Glade I ☐ Glades IIa ☐ Manasota ☐ St. Johns IIb ☐ Swift Creek, unspecified
☐ Belle Glade II ☐ Glades IIb ☐ Mount Taylor ☐ St. Johns IIc ☐ Transitional
☐ Belle Glade III ☐ Glades IIc ☐ Norwood ☐ St. Johns II unspecified ☐ Weeden Island I
☐ Belle Glade IV ☐ Glades II unspcif. ☐ Orange ☐ St. Johns unspecified ☐ Weeden Island II
☐ Belle Glade unspcif. ☐ Glades IIIa ☐ Paleoindian ☐ Santa Rosa ☐ Weeden Island unspcif.
☐ Cades Pond ☐ Glades IIIb ☐ Pensacola ☐ Santa Rosa-Swift Creek ☐ Prehistoric nonceramic
☐ Deptford ☐ Glades IIIc ☐ Perico Island ☐ Seminole: Colonization ☐ Prehistoric ceramic
☐ Glades III unspcif. ☐ Safety Harbor ☐ Seminole: 1st War To 2d ☐ Prehistoric unspecified

Nonaboriginal *

- ☐ First Spanish 1513-99
☐ First Spanish 1600-99
☐ First Spanish 1700-1763
☐ First Spanish unspecified
☐ British 1763-1783
☐ Second Spanish 1783-1821
☐ American Territorial 1821-45
☐ American Civil War 1861-65
☐ American 19th Century
☐ American 20th Century
☐ American unspecified
☐ African-American

☐ Other (Less common phases are not check-listed. For historic sites, also give specific dates if known.) _____* Consult *Guide to Archaeological Site Form* for preferred descriptions not listed above (data are "coded fields" at the Site File).

SURVEYOR'S EVALUATION OF SITE

Potentially eligible for a local register? ☐ yes: name register at right ☐ no ☐ insufficient info Name of local register if eligible: _____
Individually eligible for National Register? ☐ yes ☐ no ☐ insufficient info _____
Potential contributor to NR district? ☐ yes ☐ no ☐ insufficient info _____
Explanation of Evaluation (Required if evaluated; limit to 3 lines; attach full justification) _____

Recommendations for Owner or SHPO Action _____

DHR USE ONLY OFFICIAL EVALUATIONS DHR USE ONLY

NR DATE ____/____/____ KEEPER-NR ELIGIBILITY: ☐ yes ☐ no Date ____/____/____
____/____/____ SHPO-NR ELIGIBILITY: ☐ yes ☐ no ☐ potentially elig. ☐ insufficient info. Date ____/____/____
DELIST DATE ____/____/____ LOCAL DESIGNATION: _____ Date ____/____/____
____/____/____ Local office _____
National Register Criteria for Evaluation ☐ a ☐ b ☐ c ☐ d (See *National Register Bulletin 15*, p. 2)

Consult *Guide to Archaeological Site Form* for detailed instructions.**FIELD METHODS (Check one or more methods for detection and for boundaries)****SITE DETECTION***

- ☐ no field check ☐ exposed ground ☐ screened shovel
☐ literature search ☐ posthole digger
☐ informant report ☐ auger--size: _____
☐ remote sensing ☐ unscreened shovel

SITE BOUNDARIES*

- ☐ bounds unknown ☐ remote sensing ☐ unscreened shovel
☐ none by recorder ☐ insp exposed ground ☐ screened shovel
☐ literature search ☐ posthole tests ☐ block excavations
☐ informant report ☐ auger--size: _____ ☐ estimate or guess

Other methods; number, size, depth, pattern of units; screen size (attach site plan) _____

SITE DESCRIPTIONExtent Size (m²) _____ Depth/stratigraphy of cultural deposit _____Temporal Interpretation* - Components (check one): ☐ single ☐ prob single ☐ prob multiple ☐ multiple ☐ uncertain ☐ unknown

Describe each occupation in plan (refer to attached large scale map) and stratigraphically. Discuss temporal and functional interpretations: _____

Integrity Overall disturbance*: ☐ none seen ☐ minor ☐ substantial ☐ major ☐ redeposited ☐ destroyed-document! ☐ unknown

Disturbances/threats/protective measures _____

Surface: area collected _____ m² # collection units _____ ; Excavation: # noncontiguous blocks _____**ARTIFACTS**

Total Artifacts # _____ (C)ount or (E)stimate? Surface # _____ (C) or (E) Subsurface # _____ (C) or (E)

COLLECTION SELECTIVITY*

- ☐ unknown ☐ unselective (all artifacts)
☐ selective (some artifacts)
☐ mixed selectivity

SPATIAL CONTROL*

- ☐ uncollected ☐ general (not by subarea)
☐ unknown ☐ controlled (by subarea)
☐ variable spatial control
☐ Other _____

ARTIFACT CATEGORIES* and DISPOSITIONS* (example: A bone-human)

Pick exactly one code from Disposition List ⇒ ⇒ ⇒

- | | |
|-----------------------------|---------------------------|
| _____ bone-animal | _____ exotic-nonlocal |
| _____ bone-human | _____ glass |
| _____ bone-unspecified | _____ lithics-aboriginal |
| _____ bone-worked | _____ metal-nonprecious |
| _____ brick/building debris | _____ metal-precious/coin |
| _____ ceramic-aboriginal | _____ shell-unworked |
| _____ ceramic-nonaboriginal | _____ shell-worked |
| _____ daub | _____ Others: _____ |

Disposition List*

- A - category always collected
 S - some items in category collected
 O - observed first hand, but not collected
 R - collected and subsequently left at site
 I - informant reported category present
 U - unknown

Artifact Comments _____

DIAGNOSTICS (Type or mode, and frequency: e.g., *Suwanee ppk*, *heat-treated chert*, *Deptford Check-stamped*, *ironstone/whiteware*)

- | | | |
|-------------------|-------------------|--------------------|
| 1. _____ N= _____ | 5. _____ N= _____ | 9. _____ N= _____ |
| 2. _____ N= _____ | 6. _____ N= _____ | 10. _____ N= _____ |
| 3. _____ N= _____ | 7. _____ N= _____ | 11. _____ N= _____ |
| 4. _____ N= _____ | 8. _____ N= _____ | 12. _____ N= _____ |

ENVIRONMENT

Nearest fresh water type* & name (incl. relict source) _____ Distance (m)/bearing _____

Natural community (FNAI category* or leave blank) _____

Local vegetation _____

Topography* _____ Min Elevation _____ meters Max Elevation _____ meters

Present land use _____

SCS soil series _____ Soil association _____

FURTHER INFORMATION

Informant(s): Name/Address/Phone/Email _____

Describe field & analysis notes, artifacts, photos. For each, give type*(e.g., notes), curating organization*, accession #s, and short description.

Manuscripts or Publications on the site (Use continuation sheet, give FMSF# if relevant) _____

Recorder(s): Name/Addr./Phone/Email _____

Affiliation* or FAS Chapter _____

* Consult *Guide to Archaeological Site Form* for preferred descriptions not listed above (data are "coded fields" at the Site File).**SITE PLAN & USGS REQUIRED** At 1"=300' (1:3600) or larger scale, show: site boundaries, scale, north arrow, datum, test/collection units, landmarks, mappers, date.

- ☐ Original
☐ Update (give site # at right)



HISTORICAL CEMETERY FORM

Florida Master Site File

Version 3.0: 8/98

Site #8

Recorder #

Field Date _____

*Consult Guide to the Historical Cemetery Form for detailed instructions

Form Date _____

LOCATION & IDENTIFICATION

Cemetery Name(s) _____ **Multiple Listing [DHR only]**
 Project Name _____ **FMSF Survey #**
 Address/Vicinity of/Route to _____

Nearest City/Town (within three miles) _____ In Current City Limits? ☐ yes ☐ no ☐ unknown
 County _____ Tax Parcel #(s) (optional) _____
 Ownership Type (check exactly one) ☐ private-profit ☐ private-nonprofit ☐ private-unspecified ☐ city ☐ county
☐ state ☐ federal ☐ foreign ☐ Native American ☐ unknown
 Public Tract Enclosing Cem., if any (e.g. park) _____

MAPPING

USGS 7.5 Map Name and Date _____
 Township _____ Range _____ Section _____ 1/4 section ☐ NW ☐ SW ☐ SE ☐ NE ☐ Irregular sec.-name: _____
 Township _____ Range _____ Section _____ 1/4 section ☐ NW ☐ SW ☐ SE ☐ NE ☐ Irregular sec.-name: _____
 Landgrant: _____ Plat or Other Map _____

HISTORY

Year Cemetery Established: _____ Estimated Year _____ Ownership History (especially original owners) _____
 Year Burials Ceased, if applicable _____ Reason(s) Burials Ceased _____

Range of Death Dates Earliest _____ Most Recent _____ (O)bserved or (R)esearched? _____

Acreage Expansions/Dates: _____

List People Important in Local, State, or National History Buried in Cemetery _____

FDHR Form Number HRXXXXXXX-98 Computer Document File P:\FSF\DOCS\FORMS\CM_V30ms.doc

Previous Attempts at Repair, Cleaning, or Restoration? _____

GENERAL DESCRIPTION OF CEMETERY

Type (Check all that apply) ☐ community ☐ company town ☐ epidemic ☐ family ☐ fraternal order
☐ memorial park ☐ military(not national) ☐ municipal ☐ national ☐ potter s field ☐ prison
☐ religious ☐ Rural Movement ☐ other (explain): _____
 Ethnic Group(s) Interred (Check all that apply) ☐ White non-Hispanic ☐ Hispanic ☐ Asian ☐ Caribbean
☐ African American ☐ American Indian-tribe: _____ ☐ other (explain): _____
 Current Status: ☐ used for burials ☐ maintained but not used ☐ abandoned Size: _____ ft X _____ ft or _____ acres
 Total # Graves: _____ Does Total # Include Unmarked Graves?: ☐ yes ☐ no
 Evidence/# of Unmarked Graves? _____
 Condition: ☐ well maintained ☐ some areas maintained, others neglected ☐ poorly maintained
☐ not maintained, but can identify ☐ not maintained, hard to identify ☐ not identifiable but known to exist (explain): _____

Cemetery Boundary Type: ☐ fence ☐ wall ☐ hedge ☐ other (explain): _____

Describe Cem. Boundary (e.g. cast iron fence, stone or brick wall, etc.) _____

Historical Vegetation (trees, shrubs, flowers) _____

Grave Groupings (Check all that apply) ☐ family ☐ fraternal order ☐ military ☐ religious ☐ ethnic heritage ☐ other (explain): _____

Groupings Indicated By (Check all that apply) ☐ curbing ☐ fence ☐ hedge ☐ wall ☐ other (explain): _____

Public Access ☐ Unlimited ☐ Restricted: How? _____

Surroundings [use (N)one, (S)ome, (M)ost, (A)ll or nearly (A)ll] _____ Commercial _____ Residential _____ Institutional _____ Undeveloped

Threats (Check all that apply) ☐ abandonment ☐ agriculture ☐ desecration ☐ public development ☐ private development

☐ mining or timbering ☐ other (explain): _____

Associated Historical Properties/Archaeological (non-cemetery) Remains _____

☐ Check if Historical Structure Form completed

☐ Check if Archaeological Site Form completed

*Consult *Guide to the Historical Cemetery Form* for detailed instructions**GRAVES**

If question requests N/S/M/A, estimate proportions by using a letter as follows: (N)one/Very Few, (S)ome, (M)ost, (A)ll/Nearly (A)ll.

Orientation (N/S/M/A) (complete all that apply) _____ East/West _____ North/South _____ Other: (explain): _____

Marked Graves (N/S/M/A) (complete all that apply) _____ Headstones _____ Marked with objects or plants (no headstone on grave)

_____ Graves mounded _____ Graves depressed

If Other Method(s) of Marking Graves Used, List and Give N/S/M/A _____

Marker Materials (Check all that apply) ☐marble ☐concrete/cement ☐fieldstone ☐granite ☐wrought iron ☐cast iron ☐white bronze/zinc ☐sandstone ☐slate ☐wood ☐other (explain below): _____

Describe Grave Articles Found in Cemetery _____

Marker Conditions (N/S/M/A) _____ Sunken or tilted _____ Chipped, cracked, weathered, but standing

_____ Broken or in fragments _____ Deliberately vandalized

Other Notable Conditions Observed and Proportions (N/S/M/A) _____

Inscriptions (N/S/M/A) _____ Legible inscriptions _____ Illegible inscriptions _____ No inscriptions

Distinctive Gravemarkers, Monuments, and/or Architectural Features _____

Signatures of Stone Carvers (Specify name, town if available) _____

RECORDER'S EVALUATIONPotentially Eligible for Local Designation? ☐yes ☐no ☐insufficient information

Name of Local Register if Eligible _____

Individually Eligible for Nat. Register? ☐yes ☐no ☐insufficient informationPotential Contributor to NR District? ☐yes ☐no ☐insufficient informationAreas of Historical Significance (See *National Register Bulletin 15*, p. 8 for categories: e.g. "architecture", "ethnic heritage", etc.): _____

Explanation of Evaluation (required; limit to three lines; attach full statement on separate sheet): _____

DOCUMENTATIONResearch Methods (Consult **Guide to the Historical Cemetery Form** for detailed instructions) _____

Bibliographic References (Author, date, title, publication information. If unpublished, give FSF Manuscript Number, or location where available): _____

Local Contact: Name/Address/Phone # /Administrative Office _____

Recorder(Name/Address/Phone/Affiliation): _____

Photographs: Required. Request the use of B&W prints no smaller than 3x5. Photographs would be useful to document main gate or entrance, representative general views, representative or unusual monuments or markers, and damage or neglect.

Describe and Give Location/File Nos. of Notes, Records, or Photos: _____

DHR USE ONLY OFFICIAL EVALUATIONS DHR USE ONLY

NR DATE ____/____/____	KEEPER-NR ELIGIBILITY: ☐ yes ☐ no	Date ____/____/____
DELIST DATE ____/____/____	SHPO-NR ELIGIBILITY: ☐ yes ☐ no ☐ potentially elig. ☐ insufficient info.	Date ____/____/____
	LOCAL DESIGNATION: _____	Date ____/____/____
	Local office _____	
National Register Criteria for Evaluation ☐ a ☐ b ☐ c ☐ d (See <i>National Register Bulletin 15</i> , p. 2)		

REQUIRED: Photocopy or Orig. 7.5' Map with Boundaries in Red

ARCHAEOLOGICAL SHORT FORM FLORIDA MASTER SITE FILE

Version 3.0 12/95

- ☐ Original
☐ Update

Site File No. 8 _____
Date of Form _____
Field Dates _____

Site Name(s) _____
Survey Name _____ Site File # if known _____
USGS Map name _____
(A USGS topographic map in the 7.5 minute series, or a photocopy, must be attached to this form)

Ownership ☐ private-profit (corporation) ☐ private-nonprofit (church) ☐ private-individual ☐ private-unspecif
☐ city ☐ county ☐ state ☐ federal ☐ foreign ☐ native american ☐ unknown

Nearest Town _____ in current city limits? ☐ y ☐ n
County _____ Township _____ Range _____ Section _____
Address / Vicinity Of/Route To _____

Environment (nearest fresh water) _____ Distance (m/ft) _____
Local Vegetation _____
Current Land Use _____

Artifact Categories (If possible, attach photos, sketches, or photocopies of datable and representative artifacts)
☐ Stone tools, flakes, chips ☐ Glass ☐ Bone-animal
☐ Ceramics-prehistoric ☐ Precious metal/coin ☐ Bone-unidentified
☐ Ceramics-historic or Euro. ☐ Metal ☐ Shell
☐ Brick/building material ☐ Bone-human ☐ Other (describe below)

Other _____ DHR Form HR6E04906-92 Computer Document File F:\DOCS\FORMS\ARSHORT

Location (field notes, artifacts, photographs) _____

Contact Person (name) _____
Address/Phone _____

Is Contact Person the landowner? ☐ yes ☐ no Agreeable to further contact? ☐ yes ☐ no

NARRATIVE DESCRIPTION: Attach extra sheets with information on site discovery, artifacts observed or collected, history of land use, current condition, apparent threats to the site, current environment, and other pertinent observations.

RECORDER Name _____
Affiliation (FAS Chapter if member)/Address/Phone _____

To learn about a nonprofit organization of amateur and professional archaeologists concerned with preserving and learning about Florida's heritage, write: Membership Secretary, Florida Anthropological Society, P. O. Box 82255, Tampa, Florida 33682.

FURTHER READING

The Florida Master Site File has produced a one page *Bibliography for Archaeology in Florida*.
Write to the address on the bottom of this page.

*** * * REQUIRED: USGS MAP OR PHOTOCOPY WITH SITE MARKED * * ***
DON'T TRESPASS * DON'T DIG OR COLLECT WITHOUT TRAINING & RECORDS

SHORT FORM INSTRUCTIONS

WHICH FORM TO USE

If you have not had any archaeological training, use this Short Form. If you have had training, use the Site File's standard Archaeological Site Form, with instructions *Guide to the 1992 Archaeological Site Form of the Florida Master Site File*.

WHEN TO COMPLETE A FORM

If material from one category in the margin is found, note it and consider completing a form. If items from two or more categories are found together, always complete a form.

PREHISTORIC MATERIALS

- | | |
|----------|--|
| Bone | <ul style="list-style-type: none"> ■ It is a felony in Florida to knowingly disturb ANY human remains without authorization. If you find bone that could be human but that may not be old, call law enforcement. If the bone is human and known to be old, notify law enforcement and call the State Archaeologist at (904) 487-2299. ■ Bone buried deeper than 18" (40 cm). ■ Bone at any level with materials made by humans. |
| Charcoal | <ul style="list-style-type: none"> ■ Any concentration not clearly from a recent fire (aluminum cans indicate a recent event). |
| or Ash | <ul style="list-style-type: none"> ■ Even scattered pieces of ash, especially if there are any pieces of pottery, shell, or discolored stones or stone flakes that are not obviously part of a stream bed or from bedrock. |
| Stone | <ul style="list-style-type: none"> ■ Arrowhead or projectile point. ■ Two or more human-altered stone flakes within a 100' (30 meter) diameter area. |
| Ceramics | <ul style="list-style-type: none"> ■ Two or more pieces of Indian pottery. |
| Shell | <ul style="list-style-type: none"> ■ More than 4 pieces, clearly old (e.g. moss covered), within 100' diameter area. Note especially conch, oyster, apple snail, and periwinkle shell. |

HISTORIC MATERIALS

Fifty years old is a rule of thumb for "historic." Trash dumps can be especially important.

- | | |
|---------------|---|
| Wood | <ul style="list-style-type: none"> ■ Lumber: More than one piece hand cut or with square nails (for example, the remains of a wall). ■ Logs: Especially if notched or with bark removed. ■ Recognizable object. Example: canoe from lake. |
| Metal | <ul style="list-style-type: none"> ■ Recognizable hardware or three square cut nails. |
| Glass | <ul style="list-style-type: none"> ■ More than two pieces of any of these colors/kinds: purple, cobalt blue, white milk, dark amber, or green; glass with dates, writing, or decoration. |
| Ceramics | <ul style="list-style-type: none"> ■ At least one decorated sherd of European pottery. |
| Brick or clay | <ul style="list-style-type: none"> ■ Bricks in alignment (for a foundation?) or in a pile. ■ Older bricks, not machine made, are less regular in finish and size, and less likely to contain frogs (recesses and perforations designed into the brick). ■ Burned clay, especially with impressions from other materials. |
| Concrete | <ul style="list-style-type: none"> ■ Remnants of a foundation or structure, unless it is clearly less than fifty years old. |
| Other | <ul style="list-style-type: none"> ■ Any buttons, beads, toys, or jewelry. |

FIELD BY FIELD INSTRUCTIONS

Original/Update: Mark Original if you have verified with Site File that the site has never been recorded or if you do not know whether it has been recorded; mark Update otherwise and write previous number in the Site File No. 8 field.

Site File No. 8: Omit if not assigned by Florida Master Site File.

Date of Form: When the form was actually completed.

Field Dates: When the site was actually observed; put all dates if more than one day's work was involved.

SITE NAME(S): All commonly used names for the site. If formerly unknown, sites are usually named for natural features, landmarks, or landowners. E.g.: Bryan Homestead, Roy's Mound, Beaver Creek, Hutchins (the word "Site" may be omitted from this field--it is understood).

SURVEY NAME: If the site has been recorded as part of a survey project, give the project name here.

Site File # if known: The Site File assigns survey projects a file number and keeps standard information on them. You will not know this number unless you have had your project, and the written report on it, assigned such a number.

USGS MAP NAME: The name of the USGS 7.5 minute topographic map on which the site appears, including the date of the map's latest revision. Vital! Mark the site area to scale on the map, preferably in red. Ensure that map name and date are written on the copy. USGS topographic maps at the large 1:24,000 scale may be used at large libraries. Purchase from large bookstores, engineering supply stores, or directly from U. S. Geological Survey, Map Distribution, Federal Center, Box 25286, Denver, CO, 80225, phone (303) 236-7477.

OWNERSHIP: If uncertain, mark unknown. Commercial uses including pine plantation are private-profit. Besides trespass laws, note that archaeological sites are legally protected on all state and federal lands, as well as by some local governments.

NEAREST TOWN: Nearest town or none if none within 10 mi.

IN CURRENT CITY LIMITS?: It is important to accurately complete this item from updated local maps. Local governments compile lists of sites from the Site File.

COUNTY: Spell it out. If the site overlaps counties, use the county in which the greater part of the site lies.

TOWNSHIP: North-south surveyor coordinate, red lines on USGS maps. Also shown on Florida Dept. of Transportation, soils, and other maps. Example: 1 South or 1S.

RANGE: The east-west surveyor coordinate as shown on above maps. Examples: 23E, 3W, 16W, etc.

SECTION: A subdivision (usually a square mile) of a given township and range, as read from above maps. On USGS maps, sections are marked by fine red solid or dashed lines.

ADDRESS / VICINITY OF/ROUTE TO: Give address if the site is on a lot with an address. Box/route information is not useful. In any case, explain briefly how to get there. Example: From Main St and US 98 in Bradford, S on US 98, 5.8 mi N; right on dirt rd, 0.5 mi; site S behind house, 100 ft.

Nearest Fresh Water: If named, identify by name: Lake Jones. Otherwise, indicate, e.g., unnamed creek.

Distance: indicate meters or feet and compass direction from site. Example: 120 m NE.

Local Vegetation: Describe (1) dominant trees; (2) nature of ground cover; (3) percent of ground covered. Example: Scrub oak, assorted evergreens and weeds, 75% cover.

Current Land Use: Examples: Cultivated field, old field, planted pine, groves, woods, subdivision under construction, existing residential area, urban redevelopment, right of way (for road, pipeline, powerline, etc.).

ARTIFACT CATEGORIES: Show number of artifacts if known; otherwise, check all the categories that are present. If possible, photograph, sketch, or photocopy artifacts such as arrowheads and decorated pottery. Pottery rims and glazed pottery sherds with designs or stamped or painted patterns are best for dating. Other is for artifacts outside these categories.

LOCATION Field notes, artifacts, photographs: Where are these items kept? This can guide future researchers.

CONTACT PERSON: Who locally knows about the site?

RECORDER: Person completing the form.

FURTHER INFORMATION

PHOTOGRAPHS: Optional, but valuable to document site condition (especially if obviously looted), and to document diagnostic artifacts. B&W prints, at least 3x5, are preferred; label in pencil on the back, including site number and name.

DON'T TRESPASS ** DON'T DIG OR COLLECT WITHOUT RECORDS & TRAINING



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Division of Historical Resources, Bureau of Archaeological Research
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H-36

WEB: <http://www.flheritage.com/archaeology>



Designed by: Gelhardt Graphics, Tallahassee, FL



Appendix I:

Burn Plan

INTRODUCTION

Fires, naturally occurring or man-induced, are an integral part of the ecology of the southern pine (*Pinus* spp.) region (Miller 1963) and have maintained fire-dependent plant communities in the southeast for countless years. Exclusion of fire reduces nutrient cycling and changes the vegetative community from an open canopy system to a closed one. The growth of dense brush shades out fire-dependent plants, including listed species, and has an adverse effect on fire-dependent wildlife such as Florida scrub-jays and gopher tortoises. Exclusion of fires allows several stages to increase until a climax hardwood community exists. Areas covered by dense brush lose much of their value to wildlife. Additionally, heavy fuel accumulation results in increased wildfire hazard. Prescribed burning is used extensively in forestry and wildlife management for fuel reduction, brush control, disease and insect control, site preparation and wildlife habitat improvement. It is a recommended tool for management of such game animals as white-tailed deer (*Odocoileus virginianus*), bobwhite quail (*Colinus virginianus*), mourning dove (*Zenaida macroura*) and wild turkey (*Meleagris gallopavo*) (U. S. Forest Service 1969, Stoddard 1971). The value of prescribed fire to these and other animals, such as raptors and some songbirds, are well documented (Givens 1962, Miller 1963, Stoddard 1963). Prescribed fire benefits wildlife by reducing underbrush density, thus improving access, promoting the growth of succulent vegetation and lowering browse to feeding height of deer. Additionally, it benefits aesthetic values and enhances growth and fruiting of important wildlife food plants, such as dewberries (*Rubus* spp.) blueberries (*Vaccinium* spp.) (Halls 1977), and wiregrass (*Aristida stricta* var. *beyrichiana*).

BURN OBJECTIVES

Prescribed fire will be used on Doris Leeper Spruce Creek Preserve (DLSCP or Preserve) as a habitat management tool in conjunction with other management techniques to accomplish a variety of objectives. The primary objective for using prescribed fire on the DLSCP is to restore and /or maintain fire-dependent native habitat communities. This will result in preserving native plant communities while simultaneously improving wildlife habitat. The benefits that will be derived from prescribed burning on the DLSCP include the long term preservation of native plant communities, improved wildlife habitat, and numerous others as well.

Table 1. Objectives of the Doris Leeper Spruce Creek Preserve Prescribed Fire Plan, March, 2022

- 1 Restore and /or maintain fire-dependent native habitat communities
- 2 Reduce fuel loads, to prevent or mitigate effects of wildfires
- 3 (Re)introduce natural fire regime, growing season burns
- 4 Enhance aesthetics by controlling undesirable vegetation
- 5 Promote succession of longleaf pine in flatwoods communities
- 6 Reduce biomass in shrub and canopy layers
- 7 Increase herbaceous species cover
- 8 Identify habitats requiring mechanical or other fire surrogate treatments prior to application of prescribed fire
- 9 Identify by habitat and location, appropriate fire-surrogate and other required pre-burn activities

- 10 Identify by habitat and location, areas where pre-treatment activities are required prior to conducting a prescribed burn
- 11 Control competing vegetation, forest diseases and insects
- 12 Improve forage for wildlife
- 13 Remove dead materials and return nutrients to soils
- 14 Reduce oak xeric shrub biomass in the scrub community
- 15 Establish target fire return intervals for onsite communities
- 16 Create/ increase open patches, especially in the scrub habitat
- 17 Identify areas / habitats where shrub layer is overgrown or excessive fuel loads exist
- 18 Introduce fire in varying seasonality, intensity and return intervals to promote pyrodiversity
- 19 Evaluate utilization of wildfires as a natural, controlled burn, on a case by case basis

DESCRIPTION OF AREA

DLSCP lies within three (3) local jurisdictions that include the City of Port Orange, the City of New Smyrna Beach, and unincorporated Volusia County. It's generally bordered on the north by Spruce Creek and Rose Bay, on the west by public lands along Interstate 95, on the south by developed and undeveloped private residential lands, and on the east by US Hwy 1. Some parcels do occur east of US 1. Several city and county owned forested properties are contiguous to and abut the DLSCP on several of its boundaries. The Preserve consists of tracts separated by Spruce Creek, Strickland Bay, Turnbull Bay, Murray Creek and US 1. For communication purposes, these tracts are referred to by individual name as shown on the Parcel Identification Map. DLSCP is 1,932 acres in size and is comprised of the following habitats. Approximately 730 acres of the Preserve are proposed to be treated with prescribed fire. This number is less than the total acreage of habitat that is considered fire dependent. The reason is there are several areas that are located in an area that make fire logistically not feasible. This is discussed by habitat in this plan and shown on the Burn Unit Map.

Rx Fire	Comm. Acres
Scrub	231.6
Scrubby FW	185.7
Mesic FW	257.8
Wet FW	176.1
Wet Prairie	14.8
Total Acres	866.0
Burn Unit Acres:	730.35

Natural Community Descriptions:

Mesic Hammock – Mesic hammocks are well developed hardwood and/or palm forests on rarely inundated soils. The canopy is typically closed and dominated by live oak (*Quercus virginiana*), cabbage palm (*Sabal palmetto*), southern magnolia (*Magnolia grandiflora*), and pignut hickory (*Carya glabra*). The mesic hammocks found at the Preserve are dominated by the canopy trees mentioned above and the canopy is closed. The understory consists of saw palmetto (*Serenoa repens*), American beautyberry (*Callicarpa americana*), gallberry (*Ilex glabra*), sparkleberry (*Vaccinium arboreum*), yaupon holly (*Ilex vomitoria*) and wax myrtle (*Myrica cerifera*).

Mesic hammocks are not considered fire-adapted communities and their structure and composition generally exclude fire encroachment. Fire will be utilized in adjacent communities to remove high levels of fuels and prevent catastrophic fires from encroaching into the hammocks.

However, the mesic hammocks located on the Martin's Dairy tract that are located between bluffs bordering the bottomland forest creek system and Spruce Creek may have been former xeric hammocks or scrub. These areas are within natural fire shadows and have trended towards a mesic setting in their current condition. Based on the underlying soil map unit (42, Paola fine sand) these areas would typically be more xeric in appearance and vegetative composition. Soils within these specific hammocks indicate an intermediate condition of these two communities (xeric vs. mesic). Void of natural processes such as fire, xeric hammocks drift towards mesic hammocks. As the canopy closes, large canopy oaks become resistant to fire, hardwoods like southern magnolia encroach, and the growing layer of leaf litter increase organics and cover open sand patches associated with xeric hammocks. Evidence of some hammock in these areas is visible on the 1943 aerials.

Based on these conditions, portions of the mesic hammock on the Martin's Dairy tract may be targeted for timber harvest and scrub restoration. This would be targeted only to those areas above the bluffs along either creek system and would occur along borders adjacent to scrub restoration areas. At this time, no fire interval or prescribed burning is proposed within the hammocks. As scrub restoration approaches the edges of mesic hammocks described above, portions may be targeted for restoration. These areas would be monitored during successive years to determine if scrub conditions or a secondary successional forest begins to appear. These observations will guide whether additional active management occurs in these zones.

Scrub –Scrub is a community composed of evergreen shrubs, with or without a canopy of pines, and is found on dry, infertile, sandy ridges.

Scrub within the Preserve is dominated by myrtle oak (*Quercus myrtifolia*), sand live oak (*Quercus geminata*), Chapman's oak (*Quercus chapmanii*), and rusty lyonia (*Lyonia ferruginea*) within the shrub and subcanopy strata. There are a few remnant stands of sand pine (*Pinus clausa*) in the canopy, but these appear to be declining in abundance. The oaks form a dense cover interspersed with few patchy openings that consist of bare sand with a sparse cover of herbs, particularly threeawns (*Aristida* spp.), hairsedges (*Bulbostylis* spp.), sandyfield beaksedge (*Rhynchospora megalocarpa*), pinweeds (*Lechea* spp.), and ground lichens (*Cladonia* spp.). Saw palmetto (*Serenoa repens*) is common but not dominant within the scrub.

While scrub is a fire-maintained community, it is not easily ignited. Scrub is thought to have burned less frequently than communities with a more easily ignited grassy groundcover, such as sandhill or mesic flatwoods. Scrub oak dominated scrub, as found within the Preserve, likely burned naturally at intervals between 5 and 20 years (based on the habitat requirements of the Florida scrub-jay). Oak height is a critical limiting factor for Florida scrub-jays which have been documented to abandon territories where the oaks reached >3 meters. A minimum five year fire return interval appears to be the time required for re-sprouting oak stems to reach acorn-bearing height, an important food source for jays.

Growth rates of scrub oaks are related to burn history and environmental conditions onsite. Long unburned oak scrub, which is found on the Preserve, may attain heights unsuitable for scrub-jays up to 50 percent faster after fire than regularly burned oak scrub and thus may at first require shorter burn intervals to maintain optimum heights following restoration of burning. In addition, small openings, needed by Florida scrub-jays for caching acorns, may need to be artificially restored in long unburned scrub by piling up fuel to create hotspots that kill the roots of the oaks.

Prescribed fire will be implemented in small tracts, from 10 – 25 acres at a time. The initial fire return interval for the DLSCP scrub will be 5-7 years. Following several seasons of fire implementation, this fire interval should be re-evaluated, and likely increased. When fire is not logistically possible, fire surrogate activities will be implemented once a burn unit is more than one year beyond the desired fire return interval.

Wet Flatwoods – Wet flatwoods are pine forests with a sparse or absent mid-story and a dense groundcover of hydrophytic grasses, herbs, and low shrubs.

The canopy of the wet flatwoods within the Preserve consists of slash pine (*Pinus elliottii*) and pond pine (*P. serotina*). The subcanopy consists of loblolly bay (*Gordonia lasianthus*), swamp bay (*Persea palustris*), dahoon holly (*Ilex cassine*), and wax myrtle. The shrub layer is dominated by gallberry (*Ilex glabra*), shiny lyonia (*Lyonia lucida*), and saw palmetto (*Serenoa repens*). This habitat has been long unburned and saw palmetto forms a dense thicket. The herbaceous species are found primarily in breaks in the shrub layer, along field roads or game trails and consists of wiregrass (*Aristida stricta*), blue maidencane (*Amphicarpum muhlenbergianum*), Carolina redroot (*Lachnanthes carolina*), beaksedges (*Rhynchospora* spp.), and maidencane (*Panicum hemitomon*). Due to this site being fire suppressed, the shrub layer is more abundant compared to the herbs.

Wet flatwoods tend to have a longer fire interval than upland pine flatwoods in the order of 4 to 7 years. If the interval is too long, 7 to 10 years, it can lead to an increase in woody species cover and a decline in grasses and forb cover (or palmetto cover, as evidenced in this habitat on DLSCP). Many factors other than frequency of fire, such as season of fire, pre and post-fire soil moistures, groundwater levels, weather, plant size or age at the time of fire, can greatly influence tree mortality and vegetation response to fire. Fire in the growing season can reduce the stature of woody vegetation, particularly hardwoods, prevent increases in shrub densities, and promote flowering of herbaceous groundcover.

This habitat will require mechanical fuel reduction through forestry mowing or similar techniques. Canopy thinning and harvest is recommended, however, due to difficulty of access, is not likely to occur. Once mechanical fuel reduction has occurred, the site will be burned repetitively in winter months to further reduce palmetto and shrub layer coverage. Once the fuel loads are deemed appropriate, growing season fire will be implemented on a 4-7 year fire return interval. When fire is not logistically possible, fire surrogate activities will be implemented once a burn unit is more than one year beyond the desired fire return interval.

Mesic Flatwoods – Mesic flatwoods are generally characterized by an open canopy of tall pines and dense ground cover including shrubs, grasses, and forbs. Historically, this community's canopy was dominated by longleaf pine (*Pinus palustris*). Today the majority of mesic flatwoods found throughout central and northeastern Florida are dominated by dense stands of slash pine due to the pine silviculture industry and furthermore by prolonged periods of fire exclusion.

The canopy found within the mesic flatwoods of the Preserve is comprised primarily of slash pine, however, longleaf pine does occur throughout much of this habitat on DLSCP. The ground cover is dominated by a heavy cover of saw palmetto and gallberry. In its natural state, mesic flatwoods herbaceous cover is dominated by wiregrass (*Aristida stricta*), dropseeds (*Sporobolus* spp.), panic grasses (*Dichantheium* spp.), and broomsedges (*Andropogon* spp.). Limited areas of wiregrass, and these other herbaceous species, are found within the mesic flatwoods of the Preserve due to fire exclusion.

Mesic flatwoods require frequent fire (2 to 4 year intervals). Longleaf pines have thick bark to protect them from fire and their seeds need the mineral soil and open sunlight that fire provides to germinate. Longleaf pine during the grass stage is fire resistant. Several species require fire to reproduce. Wiregrass requires fire to flower, along with a number of other characteristic herbs.

The need for frequent fire to control hardwoods, shrub thickets and unnaturally dense pine stands has been documented for many years. It is also well documented that fire stimulates flowering in many flatwoods herbs and that frequent fire increases species richness and abundance. Controlled burns in mesic flatwoods also indirectly determine the fire frequency and season for all the adjacent natural communities.

Statistics from lightning caused fires suggest that most areas in Florida would naturally burn at the beginning of the lightning season. Growing season fires (April to mid-August) are known to be necessary for flowering and seed set in wiregrass.

The mesic flatwoods on DLSCP will initially receive fire surrogate treatments to reduce fuel loads in the shrub layer. Following this fuel reduction, burning will be implemented where and when feasible. The Preserve is surrounded by numerous smoke sensitive areas, so fire surrogate activities will continue to be used when fire has not been able to be prescribed within the range of recommended fire return intervals. The fire return interval for the DLSCP mesic flatwoods is 2-4 years.

Scrubby Flatwoods – Scrubby flatwoods have an open canopy of widely spaced pine trees and a low, shrubby understory dominated by scrub oaks and saw palmetto. Scrubby flatwoods differ

from the aforementioned scrub in the presence of wiregrass, a greater abundance of saw palmetto, and/or the presence of typical flatwoods shrubs such as gallberry and fetterbushes. Structurally it differs from scrub in its lack of a continuous cover of scrubby oaks.

The scrubby flatwoods at the Preserve have a canopy of longleaf pine (*Pinus palustris*, slash pine (*Pinus elliotii*), and sand pine (*Pinus clausa*). The understory consists of a closed cover of sand live oak, myrtle oak, Chapman's oak, saw palmetto, gallberry, rusty Lyonia and fetterbush. Some instances of grasses were found which include wiregrass (*Aristida stricta*), broomsedge bluestem (*Andropogon virginicus*), and shiny blueberry (*Vaccinium myrsinites*). The majority of the scrubby flatwoods found within the Preserve have a closed canopy of scrub oaks in the 3 to 4 meter range in height due to the lack of fire. Scrubby flatwoods are often associated with scrub and/or mesic flatwoods. Therefore, many of the rare species associated with the aforementioned scrub are also likely to inhabit scrubby flatwoods.

Scrubby flatwoods have a more continuous ground cover and more pine needle leaf litter than scrub, therefore historically have burned more readily than scrub. Due to less ground cover grasses, scrubby flatwoods tend to burn less readily than mesic flatwoods due to less ground grasses. Therefore, scrubby flatwoods historically have burned at a frequency intermediate of the two, most likely in the 5 to 15 year range. Light ground fires in the surrounding mesic flatwoods tend to enter scrubby flatwoods and extinguish, leading to a patchwork of recently burned and unburned portions, a situation which has been found to be favorable for scrub-jays. Therefore, variability in season and frequency of prescribed fires to produce a mosaic of burned and unburned patches would be the most desirable for maintaining high biotic diversity within this community.

The scrubby flatwoods on the Preserve will be treated similar to the mesic flatwoods, in terms of introduction of fire surrogates prior to initiation of fires. Upon initiation of fire implementation, scrubby flatwoods will be incorporated into mesic flatwoods burn units, thereby producing the typical patchiness described above. That is, fires will be started in the mesic flatwoods and allowed to carry into or burn out in the scrubby flatwoods. The target return interval will be 5 to 15 years. If a section of scrubby flatwoods within a larger unit has not burned for more than 10 years, prescribed fire will be utilized within that community during the next burn rotation.

Maritime Hammock – Maritime hammock is predominantly evergreen hardwood forest growing on stabilized coastal dunes occurring at varying distances from the shore.

The maritime hammocks found within the Preserve have a closed canopy dominated by live oak, cabbage palm, southern magnolia, and pignut hickory. The subcanopy is dominated by red cedar (*Juniperus virginiana*), yaupon holly (*Ilex vomitoria*), saw palmetto, Brazilian pepper, red bay (*Persea borbonia*), wild coffee (*Psychotria nervosa*), wax myrtle, and wild orange (*Citrus* spp.). The invasive exotic Australian pine (*Casuarina equisetifolia*) was also noted within the maritime hammock communities of the Preserve, although it is limited in occurrence.

As with mesic hammocks, fire is naturally rare in this community and is not proposed within this habitat. Where fire hazards exist near maritime hammocks, fuel reduction will be implemented. Due to location, this will occur in areas where adjacent habitats are in areas where fire is not likely feasible, thus, fire surrogates will be used to control adjacent habitat fuel loads.

Wet Prairie – Wet prairie is an herbaceous community found on continuously wet, occasionally inundated, soils on somewhat flat or gentle slopes between lower lying depression marshes, shrub bogs, or dome swamps and within slightly higher wet or mesic flatwoods, or dry prairies..

The wet prairies found within the Preserve are small depressions within wet flatwoods and mesic flatwoods. The groundcover consists primarily of yellow eyed grass (*Xyris* spp.), St. John's wort (*Hypericum fasciculatum*), maidencane, panic and witch grasses (*Panicum* spp, and *Dichanthelium* spp.), beaksedges (*Rhynchospora* spp), and Carolina redroot (*Lachnanthes caroliana*).

Natural fires likely entered wet prairies from surrounding pine flatwoods and burned through them when they were dry enough to carry fire. It is estimated that wet prairies found adjacent to pine flatwoods historically had a fire interval of 2 to 4 years. In absence of fire, shrubs and trees invade wet prairie and shade out the light-loving herbaceous species. Further evidence of fire interval is the necessity of many of the dominant grasses that require fire to stimulate flowering. Wet prairies are sensitive to relatively slight physical alterations to the soil surface which can permanently alter the hydrology. Such disturbances include soil rutting by human disturbance or hog rooting. These disturbances can cause major changes in species composition that require expensive restoration to repair.

Wet Prairie in the Preserve can undergo extreme water fluctuations as within a given year. Despite fire exclusion, this community generally resembles historic conditions. Increased fire return intervals would reduce the prevalence of encroaching woody vegetation that commonly occurs in the higher elevation areas on the edge of the prairies.

No fire surrogate activities are necessary prior to fire introduction in this habitat. The wet prairies will be burned in conjunction with the surrounding land type (primarily wet flatwoods) and included within adjacent burn units. The potential of a muck fire exists when allowing fire to encroach into a wet prairie lacking proper soil moisture. Soil moisture will be evaluated prior to inclusion of the wet prairie into the adjacent burn unit. Fire breaks will be utilized when the potential for a muck fire exists. Fire return intervals will be based on adjacent habitats and soil moisture at the time of burning adjacent habitats. No fire surrogate activities are recommended at this time. However, should hardwood encroachment exceed 10% of a prairie, herbicide application to reduce hardwoods may be implemented.

Coastal Hydric Hammock – Coastal hydric hammock is an evergreen hardwood and/or palm forest with a variable understory typically dominated by palms and ferns occurring on moist soils, often with limestone very near the surface. While species composition varies, the community generally has a closed canopy of oaks and palms, an open understory, and a sparse to a moderate groundcover of grasses and ferns. The coastal hydric hammock found within the Preserve has a canopy dominated by cabbage palm. The herbaceous cover is dominated by Virginia chain fern (*Woodwardia virginica*), cinnamon fern (*Osmunda cinnamomea*), and royal fern (*Osmunda regalis* var. *spectabilis*).

Fire is not considered an important component of coastal hydric hammock dynamics; however they do burn occasionally. Cabbage palms are fire tolerant and intense fires favor the species.

No fire surrogate activities or direct fires are proposed for this habitat. Due to size and location, wildfire is unlikely in this habitat.

Bottomland Forest – Bottomland forest is a deciduous, or mixed deciduous/evergreen closed canopy forest within riverine floodplains and in shallow depressions.

The dominant canopy species found within this community at the Preserve include laurel oak (*Quercus laurifolia*), sweetbay (*Magnolia virginiana*), cabbage palm, swamp tupelo (*Nyssa sylvatica* var. *biflora*), water oak (*Quercus nigra*), sugarberry (*Celtis laevigata*), American elm (*Ulmus americana*), and red maple (*Acer rubrum*). The understory consists of swamp dogwood (*Cornus foemina*), dahoon holly (*Ilex cassine*), swamp bay, shiny lyonia (*Lyonia lucida*), buttonbush (*Cephalanthus occidentalis*) and wax myrtle.

Bottomland forests are not considered fire-adapted communities. The bottomland forests will be treated in a manner similar to the mesic hammocks described above. Note that most of the bottomland forest is bordered by mesic hammock, making this a feasible implementation.

Salt Marsh – Salt marsh is a largely herbaceous community that occurs in the portion of the coastal zone affected by tides and seawater. It is protected from large waves, either by the broad, gently sloping topography of the shore, by a barrier island, or by location along a bay or estuary.

The dominant species are smooth cordgrass (*Spartina alterniflora*) and needle rush (*Juncus roemerianus*). The landward edge of the marsh consists of sawgrass (*Cladium jamaicense*), saltmeadow cordgrass (*Spartina patens*), marsh elder (*Iva frutescens*), sea oxeye daisy (*Borrchia frutescens*), and christmasberry (*Lycium carolinianum*). The salt marshes within the Preserve also have sporadic black mangroves (*Avicennia germinans*).

Fire is known to occur in salt marshes, although sporadically, either by spreading from adjacent uplands or from lightning strikes in the marsh itself.

The salt marsh on the Preserve will be utilized as a natural fire break for adjacent habitat burn zone units, when the water depths are sufficient to allow fire to encroach without threat of muck fires.

Mangrove Swamp – Mangrove swamps are dense forests occurring along relatively flat, low wave energy, marine and estuarine shorelines. Four species of mangroves occur in Florida consisting of red mangrove (*Rhizophora mangle*), black mangrove, white mangrove (*Laguncularia racemosa*), and buttonwood (*Conocarpus erectus*). The four species can occur either in mixed stands or often in differentiated, monospecific zones that reflect varying degrees of tidal influence, levels of salinity, and types of substrate. Red mangroves often dominate the lowest (deep water) zone, followed by black mangroves, then white, and finally buttonwoods which are normally found within the transition zone between the upland and wetland limits.

Black mangroves primarily dominate the mangrove swamps on DLSCP, although both red and white mangroves occur as well. Many of the mangrove systems are bordered by salt marsh on the waterward edge. Some areas, typically near US Hwy 1, continue to be invaded by Brazilian pepper, a topic addressed in later sections of this plan.

No fire or fire surrogate activities will occur within the mangrove swamps.

Blackwater Stream and Impoundment - No fire activities are related to these communities.

Improved pasture – A small portion of improved pasture is included within the Preserve. This area consists of actively maintained bahiagrass (*Paspalum notatum*). It is currently used for parking equestrian trailers used by visitors of the Preserve. Gopher tortoises actively use this area for forage and a few burrows were also identified.

This habitat will be utilized as a fire break in conjunction with the surrounding habitats.

Successional Hardwood Forest – Successional hardwood forests are best described as closed canopied forest dominated by fast growing hardwoods. These forests are either invaded natural habitat due to lengthy fire-suppression or old fields that have succeeded to forest. The subcanopy and shrub layers of these forests are often dense and dominated by smaller individuals of the canopy species.

This habitat is found along a canal which was historically draglined through a wetland hardwood forest. The existing vegetation consists of a canopy of laurel oak, slash and longleaf pine, cabbage palm, sugarberry, and southern magnolia. This community is expected to reach a climax community similar to the mesic hammocks described above, through natural succession.

No fire activity is to occur within this habitat. Should a wildfire occur, the area will be reevaluated to determine if fire should be re-introduced.

Xeric Hammock - Xeric hammock is a well-developed evergreen hardwood and/or palm forest on soils that are rarely inundated. The canopy is typically closed and dominated by live oak (*Quercus virginiana*), with cabbage palm (*Sabal palmetto*) generally common in the canopy and subcanopy. Southern magnolia (*Magnolia grandiflora*) and pignut hickory (*Carya glabra*) may be occasional in the subcanopy. Xeric hammock is located in fire shadow areas, culturally sensitive area, and in compromise areas to provide for outdoor recreation. Hammocks represent the late successional stage and shall be managed as is. It should not be considered a fire dependent community and is not targeted for restoration.

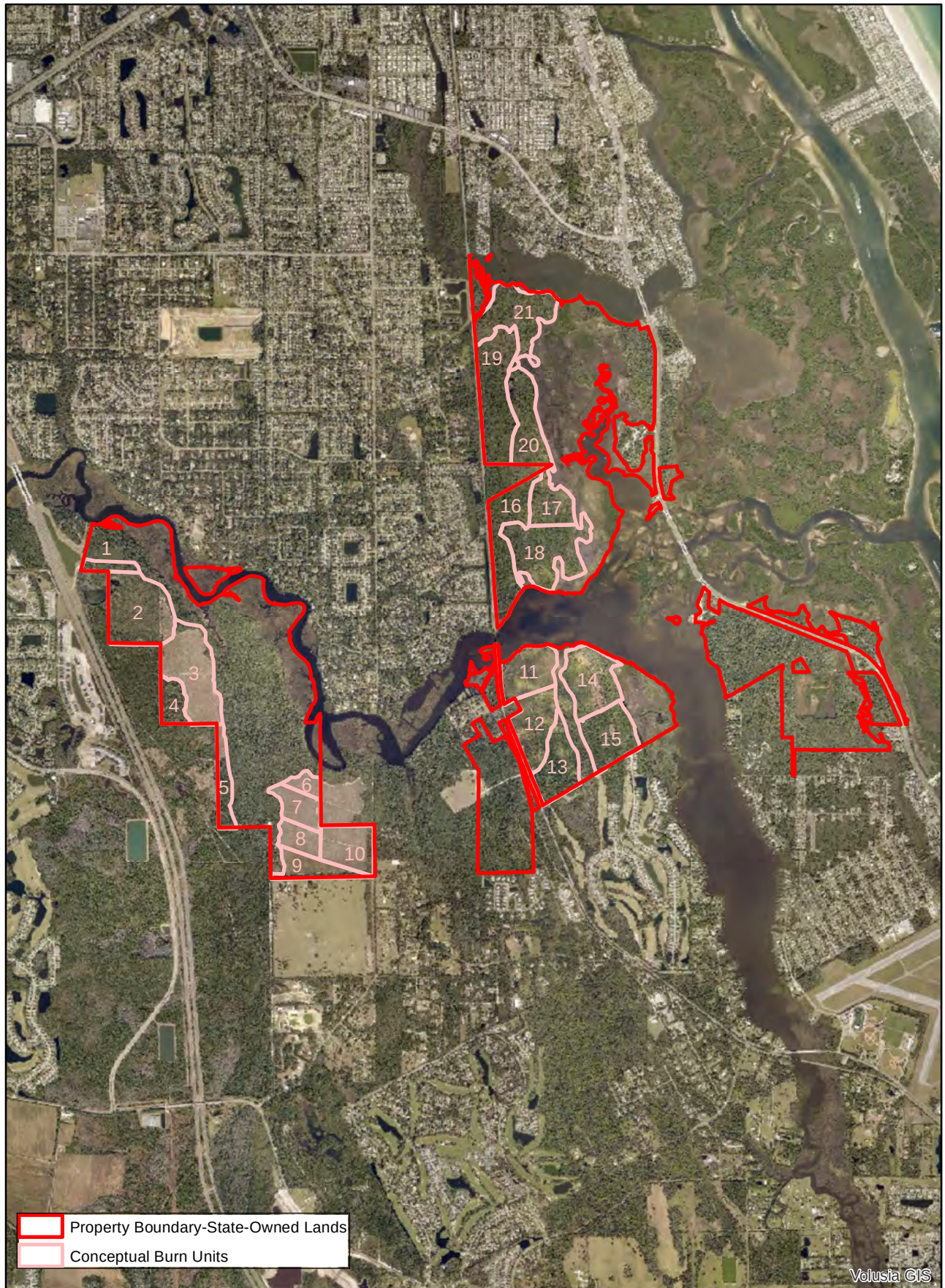
PRESCRIBED BURNING PROGRAM

Restoration of a pre-Columbian landscape is impractical and probably impossible on DLSCP because of the area's close proximity to several smoke-sensitive areas. Accounts of pre-settlement communities are vague and based largely on general inferences from post settlement communities, thus, precluding replication. Some former plant community attributes, however, can be restored by applying a variety of fire regimes. There is no single fire regime that can be applied across communities to achieve ecological restoration and maintain community heterogeneity. Therefore, fire frequency, intensity, pattern of spread, and regularity must be varied among and within burn units. The DLSCP Burn Plan has been divided into multiple burn units based on existing fire breaks and habitat boundaries. Where a fire-dependent community exists, but is not shown as a burn unit,

it is due to logistics precluding fire as a feasible management tool and fire surrogates will be used to achieve the Management Plan goals.

The following parameters will be defined within each burn prescription submitted to Florida Forest Service (FFS) for approval.

- Fireline
- Size and Arrangement of Burns
- Type of Burn
- Season and Time of Day
- Optimal Weather Conditions
- Smoke Management
- Personnel
- Equipment
- Notification and Emergency Contact Information
- Evaluation of Burn



0 650 1,300 2,600 3,900 5,200
Feet

Conceptual Burn Unit Map

Doris Leeper Spruce Creek Preserve
1-12
Volusia County Florida



Resource Stewardship Division
April 2022

APPENDIX J:

Timber Assessment / Timber Plan

Doris Leeper Spruce Creek Preserve

Timber Assessment & Plan

Purpose

This document is intended to fulfill the forestry assessment requirement for the Doris Leeper Spruce Creek Preserve (DLSCP). The goal of this assessment is to evaluate the potential and feasibility of utilizing silviculture techniques to assist managers in achieving objectives at this facility.

General Information

Eighteen (18) ecological communities exist within the boundary of this property. These communities range from Scrub uplands to Blackwater Stream and various wetland and upland habitats in between. Some communities have been altered due to past land use.

To better understand timber management methods, knowledge of a few silviculture terms is useful. The cross sectional area (in square feet) of an individual tree measured four and one-half feet above the ground is its Basal Area (BA). Basal Area per acre is the sum of the Basal Area of every tree within a stand divided by the number of acres in the stand. It is used as a measure of a forested area's tree stocking and density. The diameter of an individual tree taken at this height (four and one-half feet above the ground) is referred to as its diameter breast height or DBH. This measurement is used in calculating the Basal Area and combined with height can determine volume of each tree. When the term Basal Area is used as a stand alone term, it is referring to the Basal Area per acre of a stand.

Slash pine exhibits very fast height growth averaging 3 feet annually until about age 9, after this age growth begins to stall due to competition within the stand. More than half of the annual height growth (52%) is completed by April of each growing season. Diameter growth is affected by stand density about 5 years after seeding. Mean annual diameter growth for the first 20 years is about ½ inch for a density of 194 trees per acre. Between the ages of 5 and 9 tree diameter growth drops about 56 % with this density (Bennett, Frank 1963).

Restoration of longleaf pine within its former range is advocated by a number of public and private associations and by governmental agencies, and is advocated by Volusia County where mesic and xeric flatwoods occur. Some land managers desire to employ lower intensity management, particularly longer rotation ages, for which longleaf pine is well suited (Boyer 1990). Very little growth and yield modeling has been accomplished with longleaf pine plantations. The only existing model is restricted to unthinned stands (Lohrey and Bailey 1977). There is however, a large volume of data on growth and yield for naturally occurring and naturally regenerated longleaf pine (Goelz and Leduc) (Somers and Farrar 1991).

Fully stocked pine stands have enough trees per acre of a size large enough to utilize the growing space without causing over-crowding. Pine stands with 70 to 100 sq. ft. BA are considered fully stocked, although lower BA's are typically used in managing for natural pine flatwood stands (refer to County's Desired Future Conditions). It requires more smaller diameter trees than it does larger diameter trees to equal one square foot of basal area. (For example: It takes 357 evenly spaced, six-inch diameter breast height trees per acre to equal 70 sq. ft. BA. Whereas, only 89 twelve-inch DBH trees per acre equals the same 70 sq. ft. BA.).

Pine plantations should be thinned when live crowns in the majority of the dominant and co-dominant trees have been reduced to approximately 1/3 of their total height. Simply, these stands should be thinned to 60 – 70 sq. ft. BA per acre each time they reach 100 sq. ft. BA per acre or more. This will help ensure a stand of vigorous healthy trees. An added benefit of opening up the canopy is that more sunlight will reach the forest floor increasing forage production for wildlife. Once the stand has reached maturity, it may be harvested, then planted or naturally regenerated. If prescribed fire is used prior to any thinning, it is recommended a winter burn be used to condition the stand and lower the chance of high mortality.

A variety of thinning methods can be utilized. Thinning options to consider are: normal thinning with relatively even spacing, group selection, group seed tree, or a combination of all three. Once the plantation becomes mature enough to produce seed, natural regeneration should become established without much difficulty.

One advantage of thinning is that the understory will regenerate the vegetation necessary to allow for the safe application of fire and eliminate the potential for canopy fires. However, immediately after any kind of ground disturbance the area may be susceptible to invasion by exotic/invasive plant species. This is something to be especially concerned with in this part of Florida, and it is recommended that a plan be in place to address this potential problem prior to any harvest activities.

Tracts

Bolt Property: Description

The Bolt tract consists of coastal hydric hammock, mangrove swamp, maritime hammock, mesic flatwoods, salt marsh, and scrub. Only the scrub and mesic flatwoods are suggested for potential thinning. These areas are somewhat restricted in size on the site.

Recommendation:

The site has moderately difficult access, primarily off of Art Center Avenue on the south boundary of the tract, which may have weight restrictions and is located adjacent to a residential subdivision, making transport to and from the site problematic. No thinning or harvesting of pine is recommended at this time.

Ground level clearing within the scrub and mesic flatwoods, through mechanical thinning is recommended. Following this thinning, the site should be evaluated for winter burns, and following these events, re-evaluated for potential silviculture activities.

Martin's Dairy: Description

The Martin's Dairy tract is comprised of several habitats including salt marsh, black water stream, impoundment, wet prairie, bottomland forest, mesic hammock, scrubby flatwoods, scrub, and improved pasture. The flatwoods and scrub habitats are areas with potential to utilize silviculture activities, and these habitats are abundant onsite. The pine stand density and BA are low overall, especially in the scrub community. The scrub has some remnant mature sand pine, but is primarily converting to an oak and *Lyonia* dominated scrub with little pine regeneration. The flatwoods communities contain several species of pines with large DBH, but low densities.

Recommendation:

For the scrub habitat, mechanical thinning of the shrub / subcanopy layer is recommended, followed by prescribed fire. As part of the thinning process, it is recommended to determine the viability of oak and *Lyonia* harvesting to assist in associated costs. There are several known *Lyonia* harvesting operations located in Volusia County. The likelihood of obtaining revenue from oak harvesting is low.

For the flatwoods habitats, it is recommended to conduct two winter burns prior to any growing season burn. For harvesting, commence harvest of non-longleaf pines to promote longleaf as the dominant pine in these habitats.

Rose Bay: Description

The Rose Bay tract is comprised of several habitats including maritime hammock, mesic flatwoods, salt marsh, scrubby flatwoods, wet flatwoods, and wet prairie.

Recommendation:

This is the only site in DLSCP with a sufficient BA to warrant pine harvest / thinning. However, it is not readily accessible by the equipment necessary to conduct the operation. The only access is from US Highway 1, and across a salt marsh. As the stand matures, it may become valuable enough to allow the necessary modifications to reach the timber stand. At this time, the stand is of sufficient BA, but individual trees are not large enough in DBH to warrant high enough value to overcome accessibility issues. This parcel should be re-evaluated if timber prices undergo any dramatic increase in price, or once the individual pines are of significant DBH (e.g., >24").

Sleepy Hollow: Description

This stand is about 20 acres of maritime hammock. Typical species are present throughout this tract and little timber management is necessary for optimal conditions.

Recommendation:

Management in this area will be limited to removal of exotic species encroachment. No burning or silviculture activities are recommended for this tract.

Turnbull: Description

The Turnbull tract is comprised of several habitats including salt marsh, mangrove swamp, maritime hammock, mesic flatwoods, scrubby flatwoods, scrub, and successional hardwood forest. The scrub and flatwoods communities east of the FEC Railroad do not currently have sufficient density or BA for harvest or thinning. Some areas of the flatwoods west of the FEC, including flatwoods extending onto publicly managed lands that are not under state ownership, do have sufficient BA for pine thinning.

Recommendation:

The scrub and flatwoods east of the FEC should be mechanically thinned, and burned when possible. The stand should be re-evaluated in five to ten years to determine if sufficient BA exists at that time to warrant silviculture operations. For areas west of the FEC, mechanical thinning of the understory/ groundcover, and repeated winter burns prior to any growing season burns are recommended. Thinning of extant pine stands are warranted here.

Prescribed Fire

Prescribed fire is an important tool for ecosystem management in Florida. Before European settlement, natural fires occurred at regular intervals on an average of two to five years. These fires reduced the fuel load, produced a seedbed for pine regeneration and released nutrients back into the soil. Prescribed fire, coupled with a well-planned timber harvest, is often the most economical and responsible method for conducting ecosystem management, and restoring areas back to natural conditions.

The major objective when prescribed burning in timber and overgrowth in natural areas should be minimal mortality of the trees. Historic natural fires caused very little tree mortality except in small seedlings because they burn mostly on the finer fuels of wiregrass and pine straw. For fire-suppressed ecosystems, a major regional conservation goal has been ecological restoration, primarily through the reinitiating of historic fire regimes. Unfortunately, fire reintroduction in long unburned stands can have novel, undesirable effects. When burning, even in mature timber, it must be kept in mind that not all fire is good. A hot fire may not initially kill trees, but will stress them enough to dramatically increase their susceptibility to insect and disease attack. This is especially true when combined with other stresses, such as drought or flood.

Many of the stands in DLSCP are long unburned stands. Therefore, mechanical clearing and winter burning are necessary in several areas prior to re-introduction of natural, growing season, fire regimes.

Economics

Timber sales are common practice in this region, and several pine plantations exist in the vicinity, west of New Smyrna Beach and Port Orange. With such readily available timber and large acreage available nearby, combined with the identified access difficulties noted above, revenue from timber sales is expected to be inconsequential. The best available opportunity at this time is the potential sale of Lyonia (known as dragonwood in the floral market) from Martin's Dairy.

Access

DLSCP maintains access gates providing entry point for each tract. Access to Martin's Dairy tract is from a County-maintained road and this tract has the best access. The west side of Turnbull also has readily available access. The east side of Turnbull and Bolt tracts only have access through a residential subdivision, which limits the load capacity of the trucks and the likelihood of successful large harvest operations. Rose Bay is only accessible across an existing, at-grade field road through a salt marsh. Access here would require roll out mats or aerial access. Each severely limits the viability of conducting silviculture on the tract.

Summary

DLSCP currently has limited acreage of timber stands in which silviculture treatments may prove beneficial to achieving the stated habitat restoration and management goals. It is possible to manage this area in such a manner to provide a more natural appearance, meet local objectives and produce limited revenue through timber harvests in the future. The revenue producing potential of the area is low. The most practical application of silviculture on this property is a tool in achieving forestry objectives and for reducing wildfire hazards.

Literature Cited or Used

Bennett, Frank A. 1963 Growth and Yield of Slash Pine Plantations. USDA Forest Service, Research Paper SE-1. Southeastern Forest Experiment Station, Asheville, NC. 22 p.

Bennett, Frank A. 1980 Growth and Yield in Natural Stands of Slash Pine and Suggested Management Alternatives. USDA Forest Service, Research Paper SE-211. Southeastern Forest Experiment Station, Asheville NC. 8 p.

Boyer, W.D. 1990. *Pinus palustris* Mill. Longleaf Pine. In *Silvics of North America*. Vol. 1, Conifers. Coordinated by R.M. Burns and B.H. Honkala. USDA Forest Service, Washington, D.C. Agriculture Handbook 654 pp. 405-412.

Goelz, J.C.G. and D.J. Leduc. [in press, a]. Long term studies on development of longleaf pine plantations. In *Proceedings of the Third longleaf Alliance Regional Conference*. Forest for our Future. 16-18 October 2000, Alexandria, LA. Edited by J.L. Kush. The Longleaf Alliance and Auburn University, AL.

Johansen, R.W. and Wade, D.D. 1987. An insight into thinning young slash pine stands with fire, pp 103-106. In: Douglas R. Phillips (comp.) *Proceedings of the Fourth Biennial Southern Silvicultural Research Conference*; 1986 November 4-6; Atlanta, GA. USDA Forest Service Southeastern Forest Experiment Station General Technical Report, SE-42.

Lohrey, R.E. and R.L. Bailey. 1977. Yield tables and stand structure for unthinned longleaf pine plantations in Louisiana and Texas. USDA Forest Service, Southern Forest and Range Experiment Station. Res. Paper SO-133. 53p.

Somers, G.L. and R.M. Farrar, Jr. 1991. Biomathematical growth equations for natural longleaf pine stands. *Forest Science* 37: 227-244.

United States Department of Agriculture. 1987 (rev.). *Twenty-Six Ecological Communities of Florida*. Soil Conservation. Service.

Soil Survey Staff, Natural Resources Conservation Service, United States

Department of Agriculture. Web Soil Survey. Available online at <http://websoilsurvey.nrcs.usda.gov/> accessed [03/19/2009].

Varner, M.J., III, D.R. Gordon, F.E. Putz, and J.K. Hiers. 2005. Restoring fire to long-unburned *Pinus palustris* ecosystems: Novel fire effects and consequences for long-unburned ecosystems. *Restoration Ecology* 13: 1-9.

THE COUNTY OF VOLUSIA
Doris Leeper Spruce Creek Preserve
Volusia County, Florida

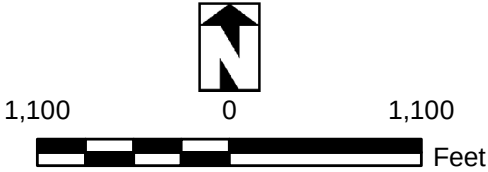
Timber Stand Map
2019 Aerial Photo

PROPERTY	COMPARTMENT ID	STAND ID	STAND CODE	LAND COVER CLASSIFICATION	ACRES
Doris Leeper Spruce Creek Preserve	3	101	HWDnb	Natural Timber, Bottomland	40
		102	HWDnh	Natural Timber, Upland	574
		106	MSnm	Marsh, Bottomland	546
		107	NPf	Natural Pine	119
		112	NPu	Natural Pine	733
		120	Scrub	Natural Timber, Upland	399
		991	Borrow Pit	Open, Non-Timber	5
		993	Wildlife Openings	Open, Non-Timber	3
		994	Pasture	Open, Non-Timber	25
		998	Water	Water	31
Doris Leeper Spruce Creek Preserve Total					2476

- Property Boundary
- Marsh, Bottomland
- Natural Pine
- Natural Timber, Bottomland
- Natural Timber, Upland
- Open, Non-Timber
- Water
- Hydrography
- Roads



NOTICE:
THIS MAP IS NOT A SURVEY. THEREFORE, ANY DERIVED ACREAGE NUMBERS
ON THIS MAP OR ACCOMPANYING REPORT ARE APPROXIMATE AND SHOULD
ONLY BE USED FOR PLANNING OR MANAGEMENT.
THIS MAP IS NOT SUITABLE FOR ENGINEERING DESIGN OR CONSTRUCTION.
FURTHER, THE USE OF ANY ASSOCIATED ACREAGE NUMBERS FOR SALES
OR NEGOTIATIONS IS ENTIRELY AT THE RISK OF THE BUYER AND SELLER.
MAP CREATED BY: J. J. SAARELA
MAP CREATED ON: 10/24/2020



Appendix K:

Recreation Plan

1.0 INTRODUCTION

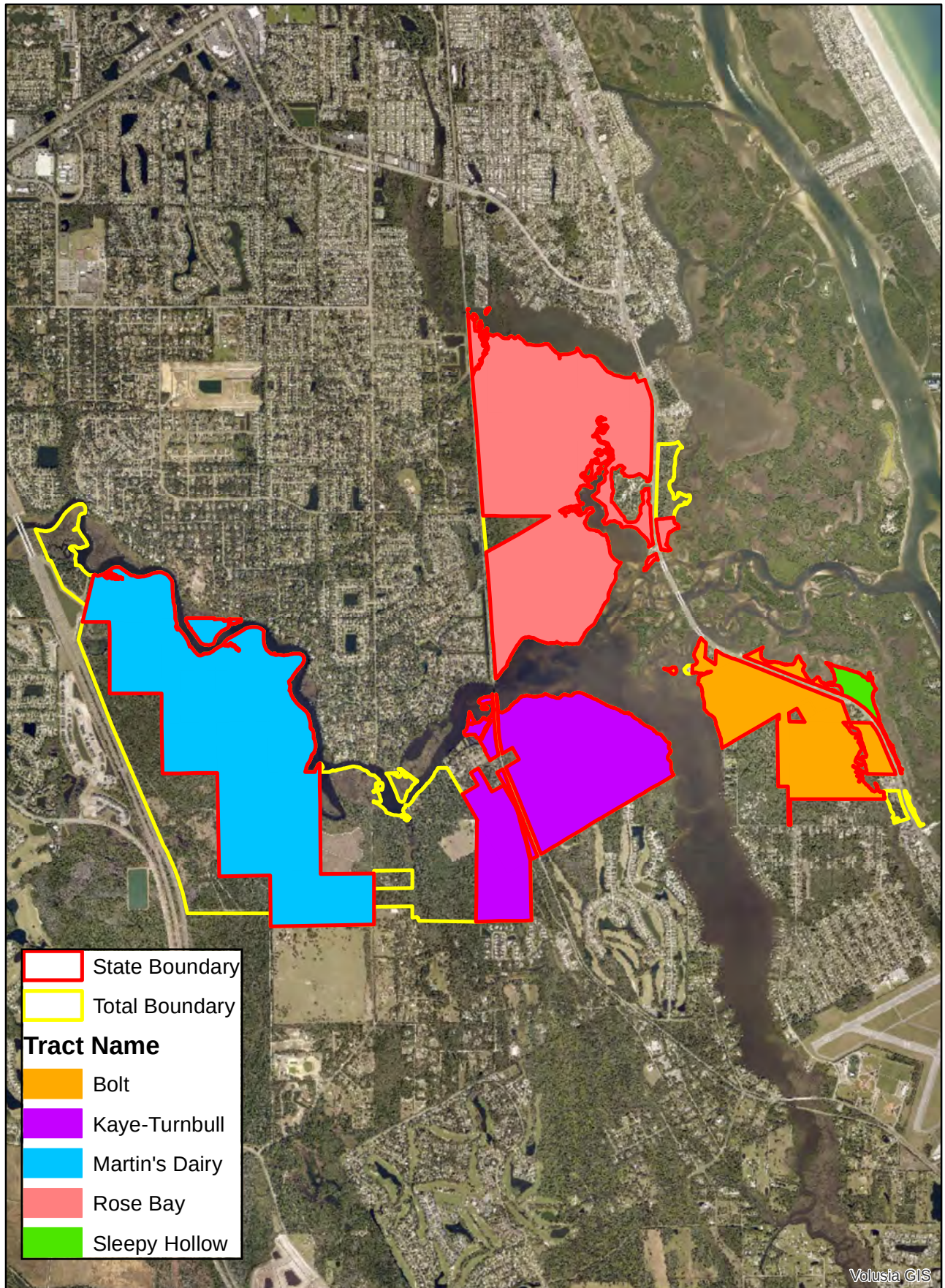
Doris Leeper Spruce Creek Preserve (DLSCP, Preserve) is nearly 2,500 acre multi-habitat preserve managed by Volusia County. The Preserve provides public access and outdoor, resource-based recreational and educational opportunities to the public.

DLSCP consists of numerous parcels owned by various public entities. The total size of the Preserve under public ownership is 2,513 acres. Due to reasons outlined in the following section, the focus of this Recreation Plan (RP) is aimed at lands that are owned in full or part by the State of Florida (Board of Trustees of the Internal Improvement Trust Fund, or simply BOT). For the purpose of management, the County considers the entire Preserve as one complete managed area; however, regulations exist that require analysis of specifically owned parcels.

Thus, two levels of identification exist: The Preserve in its entirety (2,513 acres) and the state-owned lands portion of the Preserve (1,932 acres). Throughout this document, both levels will be discussed. The focus of this Plan is on those particular state-owned parcels, and unless otherwise noted, references are to the state-owned parcels. The exception is use of the word “Preserve” which will refer to the entire Preserve, regardless of ownership.

DLSCP is located in eastern Volusia County, approximately 8 miles southeast of Daytona Beach and 43 miles northeast of Orlando. The property lies within three (3) local jurisdictions: the City of Port Orange, the City of New Smyrna Beach, and Volusia County. DLSCP is generally bordered on the north by Spruce Creek and Rose Bay, on the west by Interstate 95, on the south by developed and undeveloped private residential lands and on the east by US Hwy 1, although some parcels do occur east of US 1.

The Preserve consists of tracts separated by Spruce Creek, Strickland Bay, Turnbull Bay, Murray Creek, the FEC railroad and US 1. These features result in tracts that are somewhat disjunct in terms of connectivity and management. As such, the individual tracts are referred to by name and evaluated individually. Only state-owned lands are labeled and identified by tract; non-state owned lands are simply shown to occur within the overall boundary.



0 650 1,300 2,600 3,900 5,200 Feet

Recreation Master Plan



Resource Stewardship Division
April 2022

2.0 PURPOSE AND SCOPE

This Recreation Plan is developed as a supplement to the overall unit Management Plan, which was governed by requirements of the Florida Statutes, Florida Administrative Code, and guidelines in the State Lands Management Plan. The particular regulations mandate that public lands held in title by the BOT, in full or in conjunction with other entities, must be evaluated to determine that the lands are being managed for the purpose of acquisition.

This document is intended to provide information on public access and outdoor recreation on the Preserve as it relates to the two primary goals of acquisition; a) the conservation and protection of natural and historical resources and b) resource-based, public outdoor recreation which is compatible with the conservation and protection of these public lands.

This RP includes establishing the goals and objectives that will direct land managers to inventory current recreational uses and facilities, plan future uses and create a priority schedule for implementation. While determining uses or evaluating existing ones, staff will use facilities and capital improvements to support the needs of the public. The uses evaluated in the management plan are in concert with the stated objectives. Some of the uses may require specific conditions. For this assessment of all uses evaluated, refer to the Management Plan, Section III.

All planned infrastructure facilities are outlined in this document and subject to the granting of appropriate permits, easements, licenses, and other required legal instruments.

3.1 GOALS AND OBJECTIVES

When deciding on goals and objectives, they must be compatible with the conservation and protection of the natural and cultural resources. The goals and objectives listed below relate to public access, outdoor resource-based recreation, and environmental education with the conservation and protection of the current natural and cultural resources. Note that facilities and infrastructure are included, as these are necessary to support the public use element.

The specific goals and objectives for the Preserve have been developed with input from the public. Public involvement may include public meetings, user group meetings, advisory group meetings, staff contact, and other applicable forms of communication.

Goal 1: Facilities and Infrastructure
--

- | |
|---|
| <ul style="list-style-type: none">- <i>Develop and Maintain/Improve the capital facilities and infrastructure necessary to meet the goals and objectives of this management plan.</i> |
|---|

The facilities and infrastructure are numerous and are supported by additional resources located on adjacent County-managed lands within the Preserve. For the purpose of DLSCP facility and infrastructure management, the County considers the entire managed area, regardless of ownership, as one complete unit. Overall, the facilities and infrastructure currently available and in operation are sufficient to meet the stated goal.

Objectives:

- Continue to monitor, maintain and relocate as necessary a system of multi-use trails
- Continue to use existing facilities on adjacent County managed lands for support of DLSCP state-owned lands
- Construct, maintain and update signage, public parking areas, and kiosks
- Maintain gates at appropriate locations to regulate traffic and visitation
- Monitor existing facilities for illegal activities and vandalism
- Consider the development of additional facilities/infrastructure for security purposes
- Acquire additional land within the Optimal Boundary as funding allows

Goal 2: Public Access, Recreational and Educational Opportunities
--

- | |
|---|
| <ul style="list-style-type: none">- <i>Provide public access, recreational and educational opportunities.</i> |
|---|

The Preserve provides recreational activities including mountain biking, equestrian access, hiking, birding, boardwalks, canoeing, fishing, pavilions and picnic areas, overlook towers, and restrooms. Additional resources, including canoe and kayak launches and/or landings, fishing piers, and overlook platforms are planned as funding becomes available but are not critical to meet the goals established here.

Objectives:

- Update/edit Recreation Plan as needed
- Cooperate with other agencies, cities, stakeholders, to provide educational and recreational opportunities
- Continue educating the public on the presence of protected resources and the importance of preservation
- Monitor and maintain a system of multi-use trails
- Exclude off-road vehicle (ORV) use
- Provide and enhance interpretive/education programs (i.e., website, kiosk)
- Continue to support the Project IBIS
- Provide additional recreational and education facilities as funding allows

4.0 EXISTING USES AND FACILITIES

In its current state, the Preserve provides numerous opportunities for public access and outdoor recreation and education. This includes trails for hiking, biking and equestrian use, expansive forests for observing natural ecosystems, native flora and fauna, access to waterways for fishing, kayaking and canoeing, and unique opportunities to observe historical features. The facilities are inventoried below and are discussed and shown by tract in the Master Recreation Plan by Tract section.

The Preserve contains several miles of trails that traverse throughout the five state owned tracts and in some locations are interconnected to one another, or provided access via the adjacent, non-stated owned parcels. Access to multiple habitats, some of which are considered imperiled (such as the Florida scrub), topographic changes unique to the area, and scenic vistas are unlike any other in the region.

The waters within and surrounding the Preserve are popular for canoeing, kayaking, recreational boating and fishing. These waters also provide nature enthusiasts an alternative viewpoint for observing wildlife that utilizes the estuarine shorelines and aquatic habitats. Spruce Creek has been recognized as a State paddling trail by DEP's Office of Greenways and Trails (the Spruce Creek Paddling Trail brochure is attached). Spruce Creek is also listed by the State as an Outstanding Florida Water and has a designated Riparian Habitat Protection Zone, both of which provide for greater protection from runoff pollutants from upstream sources and development along the river.

Hunting is prohibited on the Preserve at this time. The County will coordinate with the Florida Fish and Wildlife Conservation Commission on this topic, if needed. Any changes to the current program will be considered based on their analysis and recommendations.

Another opportunity for resource-based recreation is presented by the ability to observe a site on the Martin's Dairy tract which is listed the National Historic Register - the Spruce Creek Mound. Additional program information is to be developed and utilized for this resource as an interpretive site for the cultural resources in the area. In general, and in conformance with state regulations, the locations of the archaeological resources are not provided to the public in order to protect the resource.

Revenue is not generated via access, recreational or educational opportunities. The County does obtain nominal revenue for group camping on the adjacent Spruce Creek Park and the Turnbull Tract.

Below is a summary of uses and related facilities and capital improvements that exist on DLSCP.

Table 1. Inventory of Doris Leeper Spruce Creek Preserve Public recreational and access facilities, January, 2022.

Current Use / Infrastructure	Tract				
	Martin's Dairy	Turnbull	Bolt	Sleepy Hollow	Rose Bay
Access Point	4	1	1	1	2, 1*
Parking Area	1		1	1	1*
Information Kiosk	3		1	1	3*
Trails**(H,B,E,V)***	H B E V	H B	H B V	H	H B
Pavilion	1****			1	1, 1*
Boardwalk					1
Observation Tower					1
Camp Sites (Special use – permit required)		1			17*
Fishing Access			1	1	1*
Canoe/Kayak Landing/ Launch		2	1	1	1*
Picnic Area	1	1	1	1	3*
Playground					1*
Restroom					2*
Historic Site Open to Public	1				

*Located on adjacent Spruce Creek Park for Rose Bay;

***H,B,E = Hiking, Biking, Equestrian. Vehicle trails are for staff and approved use only.

****Located on adjacent public land between Turnbull and Martin's Dairy Tracts

Updates to this table in subsequent years will provide easy tracking for accomplishments achieved by the County.

5.0 CHALLENGES AFFECTING MANAGEMENT

An important focus here will be conducting public meetings with the user groups and provide more interface between the managing agency and the user groups.

This section focuses on discussion items that affect management and implementation of the Recreation Plan. The issues listed have been discussed in various places throughout the Management Plan and this Recreation Plan, and are provided here to ensure attention is paid to these details or comments that may otherwise be lost amongst the vast data provided elsewhere.

Periodic closures to the public: Notify users via signage, meetings, and/or website on area closures / trail re-routing during habitat restoration projects. Educate the public on schedule of events, reasons for restoration, estimated re-opening dates and follow up information on the results of the restoration.

Protected and/or rare species: The presence of listed species provides environmental education opportunities for the general public. However, user group management is an important component of these species continued existence or restoration efforts. Identification of the protected species and notification that they are protected by law and an important part of the ecosystem should be a major point of education as it relates to these species. This education can be accomplished through kiosks, brochures, and/or internet resources made available to user groups. Warnings against the taking of these or any wildlife species, should be included in such educational materials. An example would be a kiosk display about scrub-jays that would display the importance of the habitat restoration practices that require occasional area closures to restore habitat for this federally endangered species. This should include what the current scrub habitat looks like and what it is intended to look like in the managed condition.

Archaeological and cultural resources: To protect archeological and cultural resources, the County does not provide the general public with information regarding location of these sites, with the exception of Spruce Creek Mound, where an interpretive kiosk is planned. Protection of these identified cultural resources is a key management objective for the Preserve. Interpretation of this resource along with the other lesser mounds and shell middens scattered through the surrounding areas is a key component to the educational programs proposed for the Preserve.

Erosion control and resource impact issues: During the planning of recreational activities, slope is a more important concern than actual elevations with regards to minimizing ecological impacts. On the project site, the steepest slopes are associated with bluff areas in the western portion of the project site (primarily the Martin's Dairy tract). Multi-use trails, especially equestrian and bike trails, proposed in proximity to these areas should be field verified to avoid excessively sloped bluffs. This will minimize sedimentation and erosion problems in the future and protect surface water quality.

6.0 PRIORITY SCHEDULE FOR IMPLEMENTATION

The short and long term goals established in the unit Management Plan, along with their designated priority levels were used to develop a Priority Schedule. The schedule is divided into three chronological sections; 1-2 years, 3-5 years, and 6-10 years. The schedule will be used to prioritize expenditures related to capital facility improvements. Objectives may occur prior to the schedule as funding or other opportunities arise.

Schedule of Events Years 1 -2:

Goal / Objectives		Parameter(s)
1	Facilities and Infrastructure	
	Continue to monitor, maintain and relocate as necessary a system of multi-use trails	Recurring, ongoing task
	Monitor existing facilities for illegal activities and vandalism	Recurring, ongoing task
	Construct \outdoor learning center/classroom	As funding allows
2	Public Access, Recreational and Educational Opportunities	
	Educate the public on the presence of protected resources and the importance of preservation	Kiosk and website information
	Exclude off-road vehicle (ORV) use	Recurring, ongoing task
	Continue to support the Project IBIS	Recurring, ongoing task

Construction of new facilities or improvements is addressed in the DLSCP 5 year Amenities Plan, 2022-2027. Public access and recreation is currently deemed adequate, with improvements focusing on trail marking, trail improvement, interpretive kiosks and educational/information panels, which include cultural information.

Schedule of Events Years 3-5:

Goal / Objectives		Parameter(s)
1	Facilities and Infrastructure	
	Continue to monitor, maintain and relocate as necessary a system of multi-use trails	Recurring task
	Continue to use existing facilities on adjacent County managed lands for support of DLSCP state-owned lands	Recurring task
	Construct, maintain and update signage, public parking areas, and kiosks	Provided on an as-needed basis
	Maintain gates at appropriate locations to regulate traffic and visitation	Provided on an as-needed basis
	Monitor existing facilities for illegal activities and vandalism	Recurring task
2	Public Access, Recreational and Educational Opportunities	
	Cooperate with other agencies, cities, stakeholders, to assist with the development of educational and recreational opportunities	Host public meeting, Keep communication open between LM and other entities
	Monitor and maintain a system of multi-use trails	Recurring task
	Exclude off-road vehicle (ORV) use	Recurring task
	Provide and enhance interpretive/education programs (i.e., website, kiosk, guides website)	Kiosk, website information
	Project IBIS	Recurring task

An important task in the 3-5 year time period is keeping user group(s) informed of any changes within the Preserve. This includes items such as trail alignment, access concerns, uses on trails and/or tracts, and providing a source for general comments/input.

Schedule of Events Years 6-10:

Goal / Objectives		Parameter(s)
1	Facilities and Infrastructure	
	Continue to monitor, maintain and relocate as necessary a system of multi-use trails	Recurring task
	Continue to use existing facilities on adjacent County managed lands for support of DLSCP state-owned lands	Recurring task
	Construct, maintain and update signage, public parking areas, and kiosks	Install remaining kiosks; signage
	Maintain gates at appropriate locations to regulate traffic and visitation	Recurring task
	Monitor existing facilities for illegal activities and vandalism	Recurring task
	Consider the development of additional facilities/infrastructure for security purposes	TBD
	Evaluate the potential for additional land acquisition within the Optimal Boundary as funding allows	As funding allows
2	Public Access, Recreational and Educational Opportunities	
	Implement a Recreation and Land Use Concept Plan	Update inventory; determine priority for development / implementation; develop at least 1 water landing / access
	Cooperate with other agencies, cities, stakeholders, to assist with the development of educational and recreational opportunities	Conduct 1 public meeting – status update
	Monitor and maintain a system of multi-use trails	Recurring task
	Exclude off-road vehicle (ORV) use	Recurring task
	Provide and enhance interpretive/education programs (i.e., website, kiosk, guides website)	Update as necessary
	Continue to support the Project IBIS	Recurring task
	Provide additional recreational facilities as funding allows	Develop at least 1 water landing, as funding allows

The public meeting during this time frame will be conducted within the 10 year Management Plan update process. This requires meetings open to the public with other agencies, cities, private landowners, user-groups and an environmental organization involved.

7.1 MASTER RECREATION PLAN BY TRACT

Following the direction of the objectives identified above, a Conceptual Recreation Plan has been developed. The Plan is depicted on aerial photographs and shows the overall Preserve and then provides details regarding each tract.

Tract Name: Martin's Dairy:

Description: The Martin's Dairy tract is approximately 665 acres in size fronting Spruce Creek it features the largest topographic change within the Preserve. It is comprised of several habitats provides access to scenic vistas and bluffs that overlook Spruce Creek. The diversity of habitats, from water to scrub, presents conditions favorable to view diverse flora and fauna with limited time or effort. This site also contains Spruce Creek Mound which is listed on the National Register of Historic Places; an interpretive kiosk is planned for this location. Educational information is provided at the kiosk located at the Martin's Dairy Road entrance.

Acreage: 665

Location: Southwest of Spruce Creek

Access: Vehicular via Martin Dairy Road
Connector trails from adjacent public lands

Current Hours of Operation: Sunrise to sunset – parking area not gated

Existing Recreational Uses: Hiking, biking, and equestrian use

Planned Additional Recreational Uses: Group camping, bluff viewing platform, water landing / access point

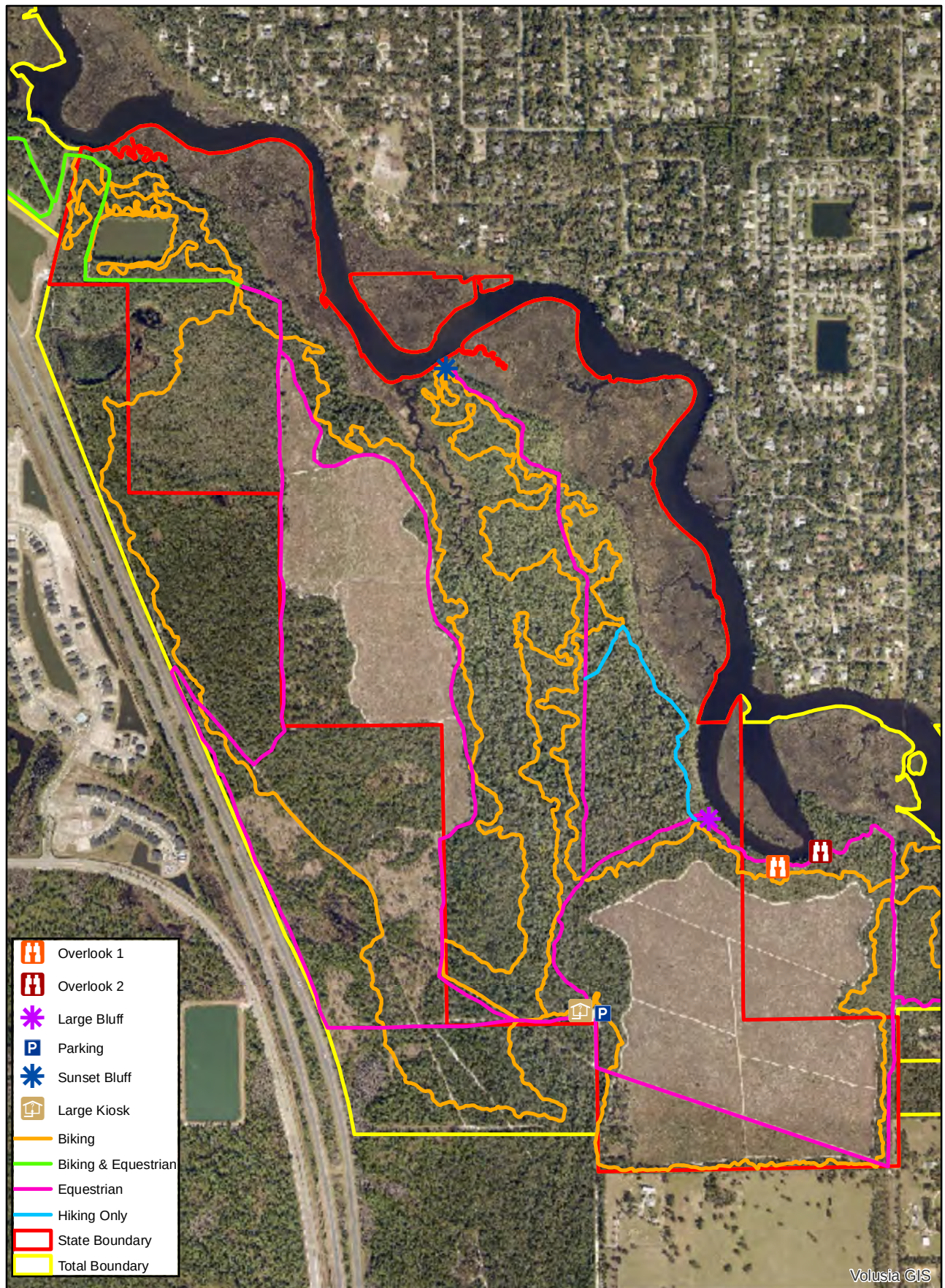
Parking: Yes – north end of Martin Dairy Road

Habitats: salt marsh, blackwater stream, bottomland forest, wet prairie, impoundment, mesic hammock, pasture, scrubby flatwoods, scrub

Potential impacts / mitigative measures:

- Erosion on bluffs / trail relocations and closures, develop overlook and/or landing
- Resource impacts / monitor trails and use, finalize trail locations and uses associated with each, develop primitive campsite that includes waste containers and signage, require permits
- Illegal dumping activities – gated access and monitoring by staff
- Spread of invasive species – monitoring by staff, early detection rapid response, evaluate further restrictions should introduction(s) be attributable to specific uses

Comments: The natural features, in combination with the extensive trail system, make this tract one of the most used on a daily basis. This area will face closures during habitat restoration efforts and may require significant public notice and involvement.



Martin's Dairy Tract

0 237.5 475 950 1,425 1,900 Feet



Tract Name: Turnbull:

Description: The Turnbull tract is approximately 392 acres in size fronting on Strickland Bay. This tract is really divided into two separate tracts, east and west of the FEC railroad. The eastern tract is only open via special events or coordination with County. Tract is open daily and provides vehicular access, parking and connection to adjacent public lands.

Acreage: 392

Location: South of Strickland Bay, north of Turnbull Bay Country Club.

Access: East tract: No public vehicular access via Turnbull Estates Drive (inside Turnbull Bay Country Club). Can be accessed by water.

West tract: Vehicular via west side of Creek Shore Trail and connector trails from adjacent public lands.

Current Hours of Operation: East side: Only by prior arrangement,
West side: (via Creek Shore Trail) 8 AM to sunset

Existing Recreational Uses: East Side: camping, trail
West Side: Parking, (vehicular and equestrian)

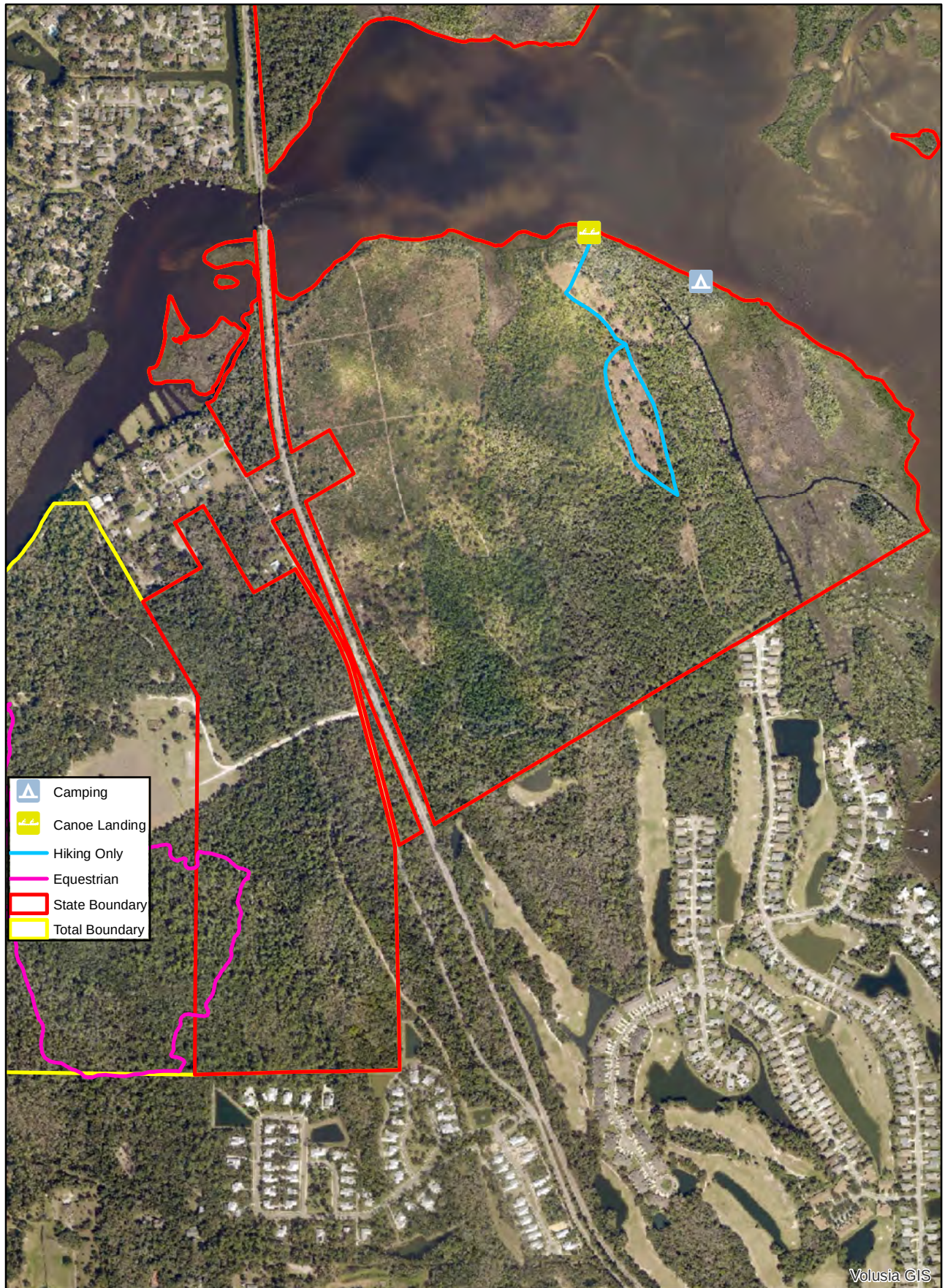
Parking: Gated: The most southwesterly portion of the site (west of the FEC) provides opportunity for vehicular and equestrian trailer parking

Habitats: salt marsh, mangrove swamp, bottomland forest, successional hardwood forest, improved pasture, mesic hammock, mesic flatwoods, scrubby flatwoods and scrub

Potential impacts / mitigative measures:

- Erosion on shoreline / develop canoe landing
- Resource impacts / limited access, develop primitive campsite that includes waste containers and signage, require permits
- Illegal dumping & ORV use / limited access
- Illegal activities – gated access and monitoring by staff

Comments: Tract is split by FEC railroad, east side is accessible by water. West is contiguous with non-state owned lands and is used for parking, equestrian use, and hiking.



0 187.5 375 750 1,125 1,500 Feet

Kaye/Turnbull Tract

Volusia GIS



Resource Stewardship Division
April 2022

Tract Name: Bolt Property:

Description: The Bolt tract is a 230 acre tract adjacent to US 1, Turnbull Bay and Murray Creek. The northern portion of the site, on the south side of US 1 is heavily used. The site contains an impoundment which has converted naturally to a salt marsh system, and has enough deep sections to allow access by canoe/ kayak.

Acreage: 230

Location: South and east of Turnbull Bay, primarily west of US 1, split by Murray Creek

Access: Vehicular: via US 1

Current Hours of Operation: via the north end gate – open 8 AM closes 4:30 PM

Existing Recreational Uses: Picnic, parking, fishing, canoeing

Planned Additional Recreational Uses: outdoor learning center, story walk, bat house

Parking: Available at north end, access from US 1

Habitats: salt marsh (includes impoundment), mangrove swamp, coastal hydric hammock, maritime hammock, mesic flatwoods, scrub and developed

Potential impacts / mitigative measures:

- Erosion on shoreline / hardened shore exists
- Resource impacts / limited access
- Illegal dumping & ORV use / limited access
- Illegal activities – gated access and monitoring by staff

Comments: N/A

Tract Name: Sleepy Hollow:

Description: This tract is about 20 acres of maritime hammock fronting US 1 and ICW tributaries. The site includes a paved strip of old US 1, parking and a pavilion.

Acreage: +/- 20

Location: South of Spruce Creek, East of US 1

Access: Gated, vehicular via US 1

Current Hours of Operation: 8 AM to 4:30 PM (Gated)

Existing Recreational Uses: Fishing, covered pavilion for picnicking

parking

Planned Additional Recreational Uses: additional kayak landing/launch

Parking: Yes

Habitats: Maritime hammock, mangrove swamp

Potential impacts / mitigative measures:

Erosion on shoreline / develop launch or landing facility

Resource impacts / control access via trail management and signage

Illegal activities – gated access and monitoring by staff

Comments: Contains portion of old US 1, paved entrance, grass parking. This will be a prime location for a water access/canoe launch as it is easily accessible to the public.



-  Large Kiosk
-  Canoe Launch
-  Fishing
-  Parking
-  Pavilion
-  Hiking Only
-  State Boundary
-  Total Boundary



0 180 360 720 1,080 1,440 Feet

Bolt & Sleepy Hollow Tracts

Volusia GIS



Resource Stewardship Division
April 2022

Tract Name: Rose Bay:

Description: The Rose Bay tract is a 642 acres tract adjacent to Rose Bay (to the north) and Strickland Bay (to the south). The portion east of the salt marsh has approved trails and multiple uses. This site is well supported by the adjacent Spruce Creek Park.

Acreage: 642

Location: South of Rose Bay, North of Strickland Bay

Access: Vehicular from US 1 via adjacent Spruce Creek Park

Current Hours of Operation: 7:00 AM and closes at sunset.

Existing Recreational Uses: Canoeing/kayaking (launch is provided from Spruce Creek Park), fishing, boardwalks, lookout observation tower, pavilion and multi- use trails.

Planned Additional Recreational Uses: Informational kiosk and educational classes

Parking: Offsite at Spruce Creek Park

Habitats: Salt marsh, mangrove swamp, wet prairie, wet flatwoods, mesic flatwoods, scrubby flatwoods, mesic hammock, clearing (proposed wetland restoration area)

Potential impacts / mitigative measures:

- Erosion on shoreline from canoe launch or landing / a specific access point is provided on Spruce Creek Park
- Resource impacts / establish final trail locations and signage
- Illegal dumping activities – gated access and monitoring by staff

Comments: Flatwoods west of salt marsh has infrequent visitors/use. A management access field road crosses the salt marsh into the western flatwoods. This is occasionally utilized by hikers, but is not a currently approved trail.

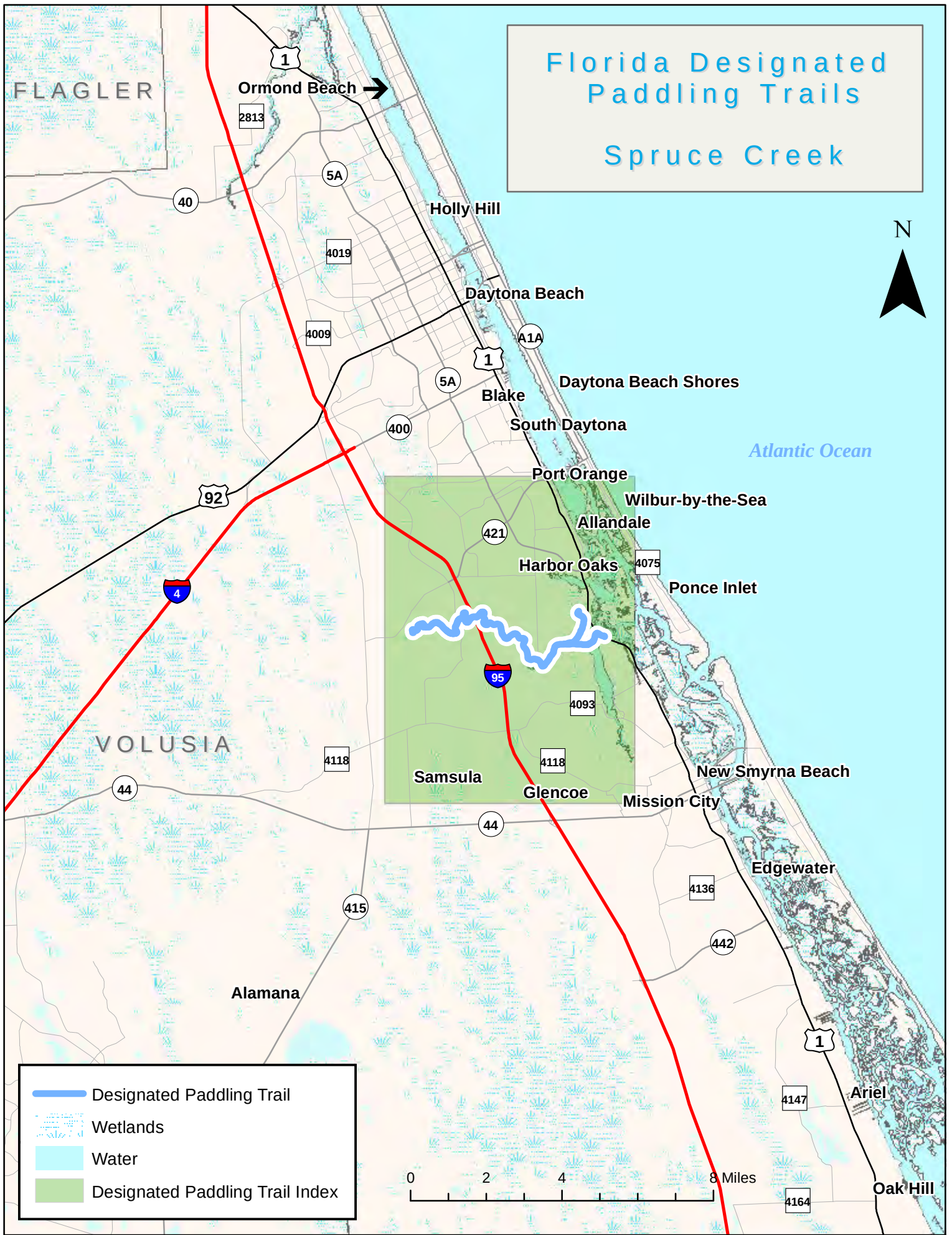


Rose Bay Tract

0 215 430 860 1,290 1,720 Feet



Resource Stewardship Division
April 2022



Spruce Creek Paddling Trail

N



Access #3 Cracker Creek Outfitters
N: 29.089940 W: -81.042275

Access #1: Spruce Creek Park
N: 29.0931 W: -80.9739

Access #2: Strickland Bay Bridge
N: 29.0825 W: -80.9638



FLORIDIA

0 1.75 3.5 7 Miles

 Spruce Creek Paddling Trail



Canoe/Kayak Launch



Restrooms



Camping



Potable Water



Florida Conservation Lands



Wetlands



Spruce Creek Paddling Trail Guide

The Waterway

Paddlers begin their journey from a wide brackish bay, but as they head north, the creek narrows and marshy expanses give way to shoreline trees. Historically, a large indigenous Native American habitation was nestled around the Spruce Creek basin. Between Interstate 95 and the railroad bridge, visitors will find the [Doris Leeper Spruce Creek Preserve](#) on both sides of the river. Farther to the west, the water turns brackish with more marshlands and mudflats. Finally, past Interstate 95 to the west and further upstream, the water is fresh with more tropical plants and animal species.

The Paddling Experience

This 16-mile round trip is suitable for beginners. However, if you launch from Spruce Creek Park, make sure you use it **only at high tide**. Because of deep mud, the ramp is unusable at low tide. Strickland Bay Bridge or Cracker Creek are better options and can be accessed on any tide. The trip is the same distance, regardless of access choice. Note that the Strickland Bay Bridge and Spruce Creek Park are launch sites on the east side of the river where Cracker Creek is located farther upstream and west.

Access Points

Paddling on Spruce Creek is a round trip, so choose from the following access points to start and end your trip:

#1 [Spruce Creek Park](#),

Spruce Creek Park's 536-foot boardwalk begins more than three miles of nature trails leading to the 15-foot observation tower and continues to Rose Bay. **It's not recommended to launch at Spruce Creek Park unless your short trip starts and ends with a high tide.** Nestled under tall pines just northwest of the US 1 Bridge, Spruce Creek Park has restrooms, picnic tables, nature trails, and a camping area. There is a canoe launch next to the park's fishing pier, however boats must be dragged quite a distance and it is unusable at low tide (too much mud). **It is much easier to launch from the sandy beach off of US 1 or from Cracker Creek.** *From I-95 Take Dunlawton Avenue (SR 421) east, turn south on Nova Road (Hwy 5A), then south on US 1 for about one mile to Spruce Creek Park*

#2 Strickland Bay Bridge (US 1), both sides of the road.

There is a small park property off Divito Drive on the southwest side of the US 1 Bridge. A split-rail fence has a couple of openings allowing a short walk to launch. On the opposite side (southeast) of the US 1 bridge is a sandy beach launch area. Go under the bridge and paddle west through Strickland Bay about a mile towards a railroad bridge, the start of Spruce Creek. *From the intersection of SR 44 and US 1 in New Smyrna travel north on US 1 4.8 miles. Look for a small, sandy beach on the east side of US 1, at the south end of the bridge.*

#4 Cracker Creek Outfitters,

[Cracker Creek](#) is an outfitter offering boat tours and a 20-acre sanctuary located on the west side of Spruce Creek and adjacent to [Gamble Place](#). The outfitter provides tours to this interesting historic home or you can take your own self-guided tour of the grounds Wednesday-Sunday. Launch from Cracker Creek for a fee and



Spruce Creek Paddling Trail Guide

travel west to see more tropical canopies and habitats. Travel east to see the freshwater ecosystems transition into brackish marshes and mudflats then into the open saltwater bays. Directions: *From I-95, take exit 256 for FL 421 toward Port Orange then continue until Taylor Road to turn left. After about 1.5 miles, turn left at a sign next to the entrance to Cracker Creek.*

Outfitters and Shuttle Service

[Cracker Creek](#), 386-304-0778 (open Wednesday through Sunday)



Photos: FWC

Appendix L:

**Land Management Review and FDEP
Response**

2021 Land Management Review Team Report for Doris Leeper Spruce Creek Preserve

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Introduction

Section 259.036, F.S. requires a periodic on-site review of conservation and recreation lands titled in the name of the Board of Trustees to determine (1) whether the lands are being managed for the purposes for which they were acquired and (2) whether they are being managed in accordance with their land management plan adopted pursuant to s. 259.032, F.S. In cases where the managed areas exceed 1,000 acres in size, such a review must be scheduled at least every five years. In conducting this review, a statutorily constructed review team “shall evaluate the extent to which the existing management plan provides sufficient protection to threatened or endangered species, unique or important natural or physical features, geological or hydrological functions or archaeological features. The review shall also evaluate the extent to which the land is being managed for the purposes for which it was acquired and the degree to which actual management practices, including public access, are in compliance with the adopted management plan.”

The land management review teams are coordinated by the Division of State Lands and consist of representatives from the Division of Recreation and Parks (DEP), the Florida Forest Service (DACS), the Fish and Wildlife Conservation Commission, the local government in which the property is located, the DEP District in which the parcel is located, the local soil and water conservation district or jurisdictional water management district, a conservation organization member, and a local private land manager.

Each Land Management Review Report is divided into three sections. Section 1 provides the details of the property being reviewed as well as the overall results of the report. Section 2 provides details of the Field Review, in which the Review Team inspects the results of management actions on the site. Section 3 provides details of the Land Management Plan Review, in which the team determines the extent to which the Management Plan provides for and documents adequate natural and recreational resource protection.

Finally, each report may also contain an Appendix that lists individual team member comments. This is a compilation of feedback, concerns or other thoughts raised by individual team members, but not necessarily indicative of the final consensus reached by the Land Management Review Team.

Property Reviewed in this Report

Name of Site: Doris Leeper Spruce Creek Preserve

Managed by: Florida Fish and Wildlife Conservation Commission

Acres: 2,489.22

County: Volusia

Purpose(s) for Acquisition: To protect one of the largest undeveloped tracts in the region, help maintain water quality of the adjacent creeks and bays, and provide protection to important historical resources, including portions of the Andrew Turnbull plantation.

Acquisition Program(s): CARL/Florida Forever

Original Acquisition Date:

Area Reviewed: Entire Property

Last Management Plan Approval Date: 7/31/12

Review Date: 8/4/21

Agency Manager and Key Staff:

- Nick Dunnam, Manager

- Cindy Venuti

Review Team Members (voting)

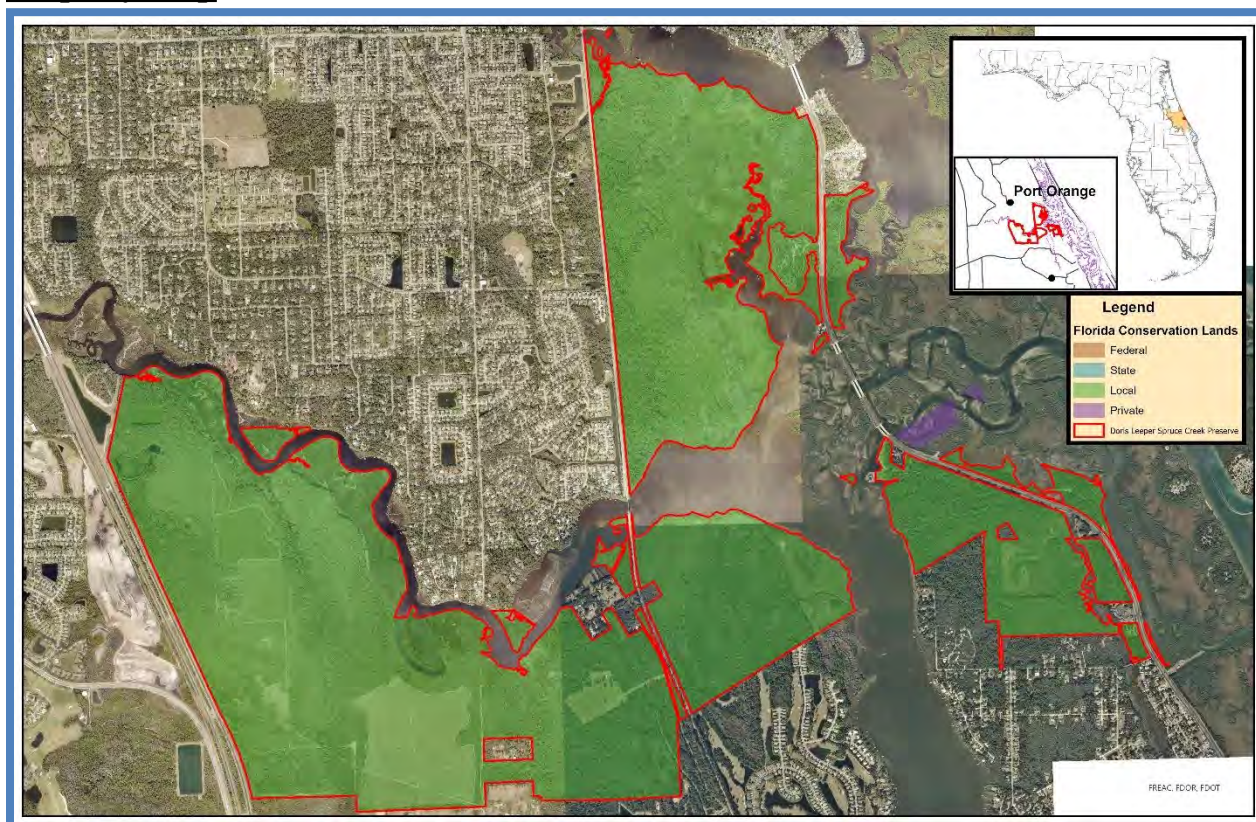
- Mark Romagosa, DRP District
- Crystal Morris, Local Gov't.
- Lauren Akins, FWC
- Rain Yates, DEP District

- Mike Edwards, FFS
- Amanda Lee, SJRWMD
- Sonya Guidry, Conservation Org.
- Private Land Manager, None

Non-Team Members (attending)

- Keith Singleton, DEP/DSL

Property Map



Overview of Land Management Review Results

Is the property managed for purposes that are compatible with conservation, preservation, or recreation?

Yes = 7, No = 0

Are the management practices, including public access, in compliance with the management plan?

Yes = 7, No = 0

Table 1 shows the average scores received for each applicable category of review. *Field Review* scores refer to the adequacy of management actions in the field, while *Management Plan Review* scores refer to adequacy of discussion of these topics in the management plan. Scores range from 1 to 5 with 5 signifying excellence. For a more detailed key to the scores, please see *Appendix A*.

Table 1: Results at a glance.

Major Land Management Categories	Field Review	Management Plan Review
Natural Communities / Forest Management	4.66	4.56
Prescribed Fire / Habitat Restoration	4.18	4.64
Hydrology	4.04	4.14
Imperiled Species	4.42	4.50
Exotic / Invasive Species	4.19	4.31
Cultural Resources	4.57	4.57
Public Access / Education / Law Enforcement	4.76	4.44
Infrastructure / Equipment / Staffing	4.69	N/A
Color Code (See Appendix A for detail)		
Excellent	Above Average	Below Average
		Poor

Consensus Commendations for the Managing Agency

The following commendations resulted from discussion and vote of the review team members:

1. The team commends the staff for the efforts made on scrub restoration using roller chopping and prescribed burns. (7+, 0-)
2. The team commends staff for working with recreational groups while working to restore habitats. (7+, 0-)
3. The team commends staff for using Survey123 for wildlife monitoring, incorporating it into public participation, and GIS database maintenance. (7+, 0-)

Consensus Recommendations to the Managing Agency

The following recommendations resulted from a discussion and vote of review team members. The next management plan update should include information about how these recommendations have been addressed:

1. The team recommends that regular spraying of the Art Center boundary fence to prevent further vine/vegetation encroachment. (7+, 0-)
- Managing Agency Response:

Field Review Details

Field Review Checklist Findings

The following items received high scores on the review team checklist, which indicates that management actions exceeded expectations.

1. Natural communities, specifically mesic hammock, scrub, mesic/wet flatwoods, scrubby flatwoods, maritime hammock, wet prairie, coastal hydric hammock, bottomland forest, salt marsh, mangrove swamp and blackwater stream.
2. Listed species, listed animal and plant species in general, and specifically scrub jay, gopher tortoise, bald eagle, Atlantic salt marsh snake, and eastern indigo snake.
3. Natural resources survey/monitoring resources; specifically listed species or their habitat monitoring, fire effects monitoring, other habitat management effects monitoring, and invasive species survey and monitoring.
4. Cultural resources, specifically cultural resource survey, and protection and preservation.
5. Prescribed fire, specifically area being burned, frequency and quality.
6. Restoration, specifically scrub/scrubby flatwoods.
7. Forest management, specifically timber inventory.
8. Non-native, invasive, and problem species, specifically prevention and control of plants and animals, and control of pests/pathogens.
9. Hydro-alteration, specifically roads/culverts and ditches.
10. Surface water monitoring, specifically quantity.
11. Resource protection, specifically boundary survey, gates and fencing, signage and law enforcement presence.
12. Adjacent property concerns, specifically residential development.
13. Public access, specifically parking and boat access.
14. Environmental education and outreach, specifically wildlife, invasive species, habitat management activities, interpretive facilities and signs, recreational opportunities, and management of visitor impacts.
15. Management resources, specifically waste disposal, sanitary facilities, buildings, equipment, staff, and funding.

Items Requiring Improvement Actions in the Field

The following items received low scores on the review team checklist, which indicates that management actions noted during the Field Review were not considered sufficient (less than 3.0 score on average). Please note that overall good scores do not preclude specific recommendations by the review team requiring remediation. The management plan update should include information on how these items have been addressed:

The review team scores did not identify items requiring improvement actions in the field.

Field Review Checklist and Scores

Field Review Item	Reference #	Anonymous Team Members								Average
		1	2	3	4	5	6	7	8	

Natural Communities (I.A)										
Mesic Hammock	I.A.1	4	4	5	4	4	4	5		4.29
Scrub	I.A.2	4	5	5	4	5	5	5		4.71
Mesic/Wet Flatwoods	I.A.3	4	4	5	5	5	5	5		4.71
Scrubby Flatwoods	I.A.4	5	5	5	4	5	5	5		4.86
Maritime Hammock	I.A.5	5	5	5	4	4	5	5		4.71
Wet Prairie	I.A.6	4	5	5	4	4	X	5		4.50
Coastal Hydric Hammock	I.A.7	4	5	5	4	4	X	5		4.50
Bottomland Forest	I.A.8	4	5	5	4	4	X	5		4.50
Salt Marsh	I.A.9	4	5	5	4	5	5	5		4.71
Mangrove Swamp	I.A.10	4	5	5	4	4	X	5		4.50
Blackwater Stream	I.A.11	4	5	5	4	5	X	5		4.67
Natural Communities Average Score										4.61
Listed species: Protection & Preservation (I.B)										
Animals	I.B.1	5		5	4			5		4.75
Scrub Jay	I.B.1.a	4	5	5	4	5	4	5		4.57
Gopher Tortoise	I.B.1.b	5	5	5	4	5	5	5		4.86
Bald Eagle	I.B.1.c	5	4	5	4	5	3	5		4.43
Atlantic Salt Marsh Snake	I.B.1.d	4	4	5	4	3	3	5		4.00
Eastern Indigo Snake	I.B.1.e	4	5	5	4	3	3	5		4.14
Plants	I.B.2	4	3	5	4			5		4.20
Listed Species Average Score										4.42
Natural Resources Survey/Management Resources (I.C)										
Listed species or their habitat monitoring	I.C.2	3	3	5	4	5	4	5		4.14
Other non-game species or their habitat monitoring	I.C.3	4	3	5	4	3	3	4		3.71
Fire effects monitoring	I.C.4	5	4	4	4	5	3	5		4.29
Other habitat management effects monitoring	I.C.5	4	4	5	4	5	3	4		4.14
Invasive species survey / monitoring	I.C.6	4	5	5	4	5	4	5		4.57
Cultural Resources (Archeological & Historic sites) (II.A, II.B)										
Cultural Res. Survey	II.A	5	4	4	5	5	5	4		4.57
Protection and preservation	II.B	4	5	5	5	5	4	4		4.57
Cultural Resources Average Score										4.57
Resource Management, Prescribed Fire (III.A)										
Area Being Burned (no. acres)	III.A.1	4	4	3	4	4	3	5		3.86
Frequency	III.A.2	4	3	5	4	4	3	5		4.00
Quality	III.A.3	4	5	5	4	5	4	5		4.57
Resource Management, Prescribed Fire Average Score										4.14
Restoration (III.B)										
Mosquito Ditch (Salt Marsh)	III.B.1	4	4	3	3	3	3	5		3.57
Scrub/Scrubby Flatwoods	III.B.2	4	5	5	5	5	5	5		4.86
Restoration Average Score										4.21
Forest Management (III.C)										
Timber Inventory	III.C.1	5	5	5	4	5	4	5		4.71
Forest Management Average Score										4.71

Non-Native, Invasive & Problem Species (III.D)										
Prevention										
prevention - plants	III.D.1.a	3	5	5	4	3	3	5		4.00
prevention - animals	III.D.1.b	4	5	5	4	3	5	5		4.43
prevention - pests/pathogens	III.D.1.c	4	3	4	4	3	3	5		3.71
Control										
control - plants	III.D.2.a	4	5	5	4	5	3	5		4.43
control - animals	III.D.2.b	4	5	5	4	4	5	5		4.57
control - pests/pathogens	III.D.2.c	5	3	4	4	4	3	5		4.00
Non-Native, Invasive & Problem Species Average Score										4.19
Hydrologic/Geologic function Hydro-Alteration (III.E.1)										
Roads/culverts	III.E.1.a	4	4	5	4	3	4	5		4.14
Ditches	III.E.1.b	4	4	5	4	3	3	5		4.00
Hydrologic/Geologic function, Hydro-Alteration Average Score										4.07
Surface Water Monitoring (III.E.3)										
Surface water quality	III.E.3.a	4	4	5	3	3	3	5		3.86
Surface water quantity	III.F.3.b	4	4	5	3	5	3	5		4.14
Surface Water Monitoring Average Score										4.00
Resource Protection (III.F)										
Boundary survey	III.F.1	5	5	5	4	5	4	5		4.71
Gates & fencing	III.F.2	5	5	5	4	5	5	5		4.86
Signage	III.F.3	5	5	5	4	5	5	5		4.86
Law enforcement presence	III.F.4	5	4	5	4	4	4	4		4.29
Resource Protection Average Score										4.68
Adjacent Property Concerns (III.G)										
Land Use										
Residential development	III.G.1.a	4	5	5	4	5	4	5		4.57
Inholdings/additions	III.G.2		4	5	4	2	3	5		3.83
Public Access & Education (IV.1, IV.2, IV.3, IV.4, IV.5)										
Public Access										
Parking	IV.1.b	5	5	5	5	5	4	5		4.86
Boat Access	IV.1.c	5	5	5	5	4	4	5		4.71
Environmental Education & Outreach										
Wildlife	IV.2.a	5	4	5	5	5	4	5		4.71
Invasive Species	IV.2.b	5	5	5	5	5	4	5		4.86
Habitat Management Activities	IV.2.c	5	5	5	5	5	4	5		4.86
Interpretive facilities and signs	IV.3	5	5	5	5	4	5	5		4.86
Recreational Opportunities	IV.4	5	5	5	5	5	5	5		5.00
Management of Visitor Impacts	IV.5	5	5	5	5	5	4	5		4.86
Public Access & Education Average Score										4.84
Management Resources (V.1, V.2, V.3, V.4)										
Maintenance										
Waste disposal	V.1.a	5	5	5	5	5	4	5		4.86
Sanitary facilities	V.1.b	5	5	5	5	5	4	5		4.86

Infrastructure										
Buildings	V.2.a	5	5	5	5	5	5	5		5.00
Equipment	V.2.b	5	5	5	5	5	5	5		5.00
Staff	V.3	4	5	5	5	5	2	4		4.29
Funding	V.4	4	5	5	5	3	3	4		4.14
Management Resources Average Score										4.69
Color Code:		Excellent	Above Average	Below Average	Poor	See Appendix A for detail				
			Missing Vote	Insufficient Information						

Land Management Plan Review Details

Items Requiring Improvements in the Management Plan

The following items received low scores on the review team checklist, which indicates that the text noted in the Management Plan Review does not sufficiently address this issue (less than 3.0 score on average.). Please note that overall good scores do not preclude specific recommendations by the review team requiring remediation. The next management plan update should address the checklist items identified below:

The review team scores did not identify items requiring improvements in the management plan.

Management Plan Review Checklist and Scores

Plan Review Item	Reference #	Anonymous Team Members								Average
		1	2	3	4	5	6	7	8	
Natural Communities (I.A)										
Mesic Hammock	I.A.1	5	5	3	3	5	3	5		4.14
Scrub	I.A.2	5	5	5	3	5	4	5		4.57
Mesic/Wet Flatwoods	I.A.3	5	5	5	3	5	4	5		4.57
Scrubby Flatwoods	I.A.4	5	5	5	3	5	4	5		4.57
Maritime Hammock	I.A.5	5	5	5	3	5	3	5		4.43
Wet Prairie	I.A.6	5	5	5	3	5	3	5		4.43
Coastal Hydric Hammock	I.A.7	5	5	5	3	5	3	5		4.43
Bottomland Forest	I.A.8	5	5	4	3	5	3	5		4.29
Salt Marsh	I.A.9	5	5	5	3	5	4	5		4.57
Mangrove Swamp	I.A.10	5	5	4	3	5	3	5		4.29
Blackwater Stream	I.A.11	5	5	5	3	5	2	5		4.29
Natural Communities Average Score										4.42
Listed species: Protection & Preservation (I.B)										
Animals	I.B.1	5		5	3	5		5		4.60
Scrub Jay	I.B.1.a	5	5	5	3	5	5	5		4.71

Gopher Tortoise	I.B.1.b	5	5	5	3	5	4	5		4.57
Bald Eagle	I.B.1.c	5	4	5	3	5	3	5		4.29
Atlantic Salt Marsh Snake	I.B.1.d	5	5	5	3	5	3	5		4.43
Eastern Indigo Snake	I.B.1.e	5	4	5	3	5	3	5		4.29
Plants	I.B.2	5	5	5	3			5		4.60
Listed Species Average Score										4.50
Natural Resources Survey/Management Resources (I.C)										
Listed species or their habitat monitoring	I.C.2	5	5	5	3	5	4	5		4.57
Other non-game species or their habitat monitoring	I.C.3	5	5	5	3	5	3	5		4.43
Fire effects monitoring	I.C.4	5	5	5	3	5	3	5		4.43
Other habitat management effects monitoring	I.C.5	5	5	5	3	5	3	4		4.29
Invasive species survey / monitoring	I.C.6	5	5	5	3	5	3	5		4.43
Cultural Resources (Archeological & Historic sites) (II.A, II.B)										
Cultural Res. Survey	II.A	5	5	5	3	5	4	5		4.57
Protection and preservation	II.B	5	5	5	3	5	4	5		4.57
Cultural Resources Average Score										4.57
Resource Management, Prescribed Fire (III.A)										
Area Being Burned (no. acres)	III.A.1	5	5	5	4	5	5	5		4.86
Frequency	III.A.2	4	5	4	4	5	5	5		4.57
Quality	III.A.3	4	5	5	4	5	5	5		4.71
Resource Management, Prescribed Fire Average Score										4.71
Restoration (III.B)										
Mosquito Ditch (Salt Marsh)	III.B.1	5	5	3	4	5	3	5		4.29
Scrub/Scrubby Flatwoods	III.B.2	5	5	5	4	5	5	5		4.86
Restoration Average Score										4.57
Forest Management (III.C)										
Timber Inventory	III.C.1	5	4	5	4	5	5	5		4.71
Forest Management Average Score										4.71
Non-Native, Invasive & Problem Species (III.D)										
Prevention										
prevention - plants	III.E.1.a	5	4	5	4	5	3	5		4.43
prevention - animals	III.E.1.b	5	4	5	4	5	3	5		4.43
prevention - pests/pathogens	III.E.1.c	5	3	4	4	5	3	5		4.14
Control										
control - plants	III.E.2.a	5	5	5	4		3	5		4.50
control - animals	III.E.2.b	5	4	5	4		3	5		4.33
control - pests/pathogens	III.E.2.c	5	3	4	4		3	5		4.00
Non-Native, Invasive & Problem Species Average Score										4.31
Hydrologic/Geologic function, Hydro-Alteration (III.E.1)										
Roads/culverts	III.F.1.a	4	4	5	4	5	3	5		4.29
Ditches	III.F.1.b	4	5	5	4	5	3	5		4.43
Hydrologic/Geologic function, Hydro-Alteration Average Score										4.36
Surface Water Monitoring (III.E.3)										

Surface water quality	III.F.3.a	5	4	5	1	5	3	5		4.00
Surface water quantity	III.F.3.b	5	3	5	1	5	3	5		3.86
Surface Water Monitoring Average Score										3.93
Resource Protection (III.F)										
Boundary survey	III.G.1	5	5	5	3	5	3	5		4.43
Gates & fencing	III.G.2	5	5	5	3	5	3	5		4.43
Signage	III.G.3	5	5	5	3	5	3	5		4.43
Law enforcement presence	III.G.4	5	4	5	3	5	4	4		4.29
Resource Protection Average Score										4.39
Adjacent Property Concerns (III.G)										
Land Use										
Residential development	III.H.1.a	5	5	5	4	5	4	5		4.71
Inholdings/additions	III.H.2	5	4	5	4		3	5		4.33
Discussion of Potential Surplus Land Determination	III.H.3	5	5	5	2	5	3	5		4.29
Surplus Lands Identified?	III.H.4	5	5	5	5	5	4	5		4.86
Public Access & Education (IV.1, IV.2, IV.3, IV.4, IV.5)										
Public Access										
Parking	IV.1.b	5	5	5	3	5	3	5		4.43
Boat Access	IV.1.c	5	5	5	3	5	3	5		4.43
Environmental Education & Outreach										
Wildlife	IV.2.a	5	4	5	3	5	3	5		4.29
Invasive Species	IV.2.b	5	4	5	3	5	3	5		4.29
Habitat Management Activities	IV.2.c	5	5	5	3	5	3	5		4.43
Interpretive facilities and signs	IV.3	5	5	5	3	5	4	5		4.57
Recreational Opportunities	IV.4	5	5	5	3	5	5	5		4.71
Management of Visitor Impacts	IV.5	5	5	5	3	5	5	5		4.71
Public Access & Education Average Score										4.48
Managed Area Uses (VI.A, VI.B)										
Existing Uses										
Picnicking	VI.A.1	5	5	5	4	4	5	5		4.71
Nature Trails	VI.A.2	5	5	5	4	4	5	5		4.71
Fishing	VI.A.3	5	5	5	4	5	5	5		4.86
Canoeing/Kayaking	VI.A.4	5	5	5	4	5	5	5		4.86
Off-Road Bicycling	VI.A.5	5	5	5	4	3	5	5		4.57
Horseback Riding	VI.A.6	5	5	5	4	5	5	5		4.86
Canoe Launches	VI.A.7	5	5	5	4	3	5	5		4.57
Canoe Landing(s)	VI.A.8	5	5	5	4	3	5	5		4.57
Group Camping	VI.A.9	5	5	5	4	4	5	5		4.71

Color Code:

Excellent

Above
Average

Below
Average

Poor

Missing
Vote

Insufficient
Information

See
Appendix A
for detail

Appendix A: Scoring System Detail

Explanation of Consensus Commendations:

Often, the exceptional condition of some of the property's attributes impress review team members. In those instances, team members are encouraged to offer positive feedback to the managing agency in the form of a commendation. The teams develop commendations generally by standard consensus processes or by majority vote if they cannot obtain a true consensus.

Explanation of Consensus Recommendations:

Subsection 259.036(2), F.S., specifically states that the managing entity shall consider the findings and recommendations of the land management review. We ask team members to provide general recommendations for improving the management or public access and use of the property. The teams discuss these recommendations and develop consensus recommendations as described above. We provide these recommendations to the managing agency to consider when finalizing the required ten-year management plan update. We encourage the manager to respond directly to these recommendations and include their responses in the final report when received in a timely manner.

Explanation of Field Review Checklist and Scores, and Management Plan Review Checklist and Scores:

We provide team members with a checklist to fill out during the evaluation workshop phase of the Land Management Review. The checklist is the uniform tool used to evaluate both the management actions and condition of the managed area, and the sufficiency of the management plan elements. During the evaluation workshop, team members individually provide scores on each issue on the checklist, from their individual perspective. Team members also base their evaluations on information provided by the managing agency staff as well as other team member discussions. Staff averages these scores to evaluate the overall conditions on the ground, and how the management plan addresses the issues. Team members must score each management issue 1 to 5: 1 being the management practices are clearly insufficient, and 5 being that the management practices are excellent. Members may choose to abstain if they have inadequate expertise or information to make a cardinal numeric choice, as indicated by an "X" on the checklist scores, or they may not provide a vote for other unknown reasons, as indicated by a blank. If a majority of members failed to vote on any issue, that issue is determined to be irrelevant to management of that property or it was inadequately reviewed by the team to make an intelligent choice. In either case staff eliminated the issue from the report to the manager.

Average scores are interpreted as follows:

Scores 4.0 to 5.0 are *Excellent*

Scores 3.0 to 3.99 are *Above Average*

Scores 2.0 to 2.99 are *Below Average*

Scores 1.0 to 1.99 are considered *Poor*

Appendix M:

Letter of Compliance



**Growth and Resource Management Department
Planning and Development Services**

February 1, 2022

Brad Burbaugh
Resource Stewardship Director
123 West Indiana Avenue, Room 200
DeLand, Florida 32720

Re: Comprehensive Plan Consistency Determination for the
Doris Leeper Spruce Creek Preserve Management Plan

The Volusia County Growth and Resource Management Department has reviewed the management plan for the Doris Leeper Spruce Creek Preserve for consistency with the Volusia County Comprehensive Plan. Our department finds the management plan is consistent and furthers the intent of the Volusia County Comprehensive Plan by increasing recreational opportunities for its residents, balanced with preserving and protecting natural resources.

Please contact Patricia Smith, AICP, Planner III at 386-736-5959, extension 12943, or via email at pssmith@volusia.org if you have any questions.

Sincerely,

Carol McFarlane, AICP
Director of Planning & Development Services
cmcfarlane@volusia.org

Appendix N:

Anthropod 2022



Florida Department of Agriculture and Consumer Services
Division of Agricultural Environmental Services

ARTHROPOD MANAGEMENT PLAN - PUBLIC LANDS

NICOLE "NIKKI" FRIED
COMMISSIONER

Section 388.4111, F.S.
Telephone: (850) 617-7997

For use in documenting an Arthropod Control Plan for lands designated by the State of Florida or any political subdivision thereof as being environmentally sensitive and biologically highly productive therein. Fill this form out if control work is necessary or planned.

Name of Designated Land:

Doris Leeper Spruce Creek Preserve

Is Control Work Necessary: ☒ Yes ☐ No

Location:

Where Spruce Creek touches and/or its tributaries run through DLSCP. There are several parcels associated with this portion of the preserve.

Land Management Agency:

**County of Volusia
Resource Stewardship Division
Land Management Activity**

Are Arthropod Surveillance Activities Necessary? ☒ Yes ☐ No

If "Yes", please explain:

Required as the primary component of an Integrated Mosquito Management (IMM) program.

Which Surveillance Techniques Are Proposed?

Please Check All That Apply:

☒ Landing Rate Counts ☒ Light Traps ☐ Sentinel Chickens
☒ Citizen Complaints ☒ Larval Dips ☒ Other

If "Other", please explain:

Portable "light trap" style trap baited with adult mosquito attractant i.e. carbon dioxide, octenol and/or BG Lure.

Arthropod Species for Which Control is Proposed:

Diptera: Culicidae

Aedes species including but not limited to *Ae. sollicitans*, *Ae. taeniorhynchus*, *Ae. atlanticus*, *Ae. infirmatus*.

Culex species including but not limited to *Cx. quinquefasciatus*, *Cx. nigripalpus* and *Cx. salinarius*.

Others inc. but not limited to *Psorophora ferox*, *Psorophora columbiae*, *Anopheles quadrimaculatus*

Proposed Larval Control:

Proposed larval monitoring procedure: **Dipping, utilizing standard dipper methodology.**

Are post treatment counts being obtained: ☒ Yes ☐ No

Biological Control of Larvae:

Might predacious fish be stocked: ☒ Yes ☐ No

VCMC utilizes *Gambusia holbrooki* obtained from an onsite fish hatchery and natural local habitats.

Other biological controls that might be used:

See below Biorational agents including *Bti* and *Bs*.

Material to be Used for Larvaciding Applications:

(Please Check All That Apply:)

☒ Bti

☒ Bs

☒ Methoprene

☒ Non-Petroleum Surface Film

☒ Other, please specify: **Spinosad and Mineral Oil Surface Film**

Please specify the following for each larvacide:

Chemical or Common name: ***Bacillus thuringiensis subsp. israelensis (Bti)*, *Bacillus sphaericus (Bs)*, *Bti/Bs* combination, Methoprene, Spinosad, and Mineral Oil Surface Film**

☒ Ground ☒ Aerial

Rate of application: **Application rate is based on the rates prescribed on the EPA approved product label.**

Examples of approved application rates:

VectoBac (*Bti*) = 0.25-2pts/acre (liquid) or 2.5-20lbs/acre (granular), VectoLex (*Bs*) = 5-20lbs/acre (granular), VectoMax (*Bti/Bs*) = 5-20lbs/acre (granular) or 1 WSP (water soluble pouch = 10g)/50 sq ft.

Natular (Spinosad) = 1.1-2.8fl oz/acre (liquid) or 3.5-20lbs/acre (granular) or 5-20lbs/acre (extended release granular).

Altosid (Methoprene) = 0.75-1fl oz/acre (liquid) or 5-20lbs/acre (extended release granular).

Method of application: **Hand, Backpack, Buffalo Turbine, ATV, or other Truck-mounted applicator and/or Helicopter.**

Proposed Adult Mosquito Control:

Aerial adulticiding ☒ Yes ☐ No

Ground adulticiding ☒ Yes ☐ No

Please specify the following for each adulticide:

Chemical or common name:

Bifenthrin, Etofenprox, Naled, Permethrin, Prallethrin, Sumithrin, Malathion, Chlorpyrifos, Deltamethrin, Resmethrin

Rate of application: **Application rate is based on the rates prescribed on the EPA approved product label.**

Examples of approved application rates:

Bifenthrin = 0.056-0.225 lb AI/acre (0.25-1.0 fl oz/1000 sq ft)

Etofenprox = 0.00175-0.007 lb AI/acre (0.1513-.6054 fl oz/acre).

Naled = 0.05-0.1 lb AI/acre (0.5-1 fl oz/acre).

Permethrin = 0.00175-0.007 lb AI/acre (0.09-0.36 fl oz/acre).

(Duet) Prallethrin = 0.00024-0.00072 lb AI/acre, PBO = 0.0012-0.0036 lb AI/acre, Sumithrin = 0.0012-0.0036 lb AI/acre (all at 0.41-1.23 fl oz/acre).

Malathion = 0.03-0.06 lb AI/acre (0.38-0.75 fl oz/acre).

Method of application: **Ultra Low Volume (ULV); Hand-held ULV, ATV-mounted ULV unit, Truck-mounted ULV unit and/or Aerial ULV**

Proposed Modifications for Public Health Emergency Control: Arthropod control agency may request special exception to this plan during a threat to public or animal health declared by State Health Officer or Commissioner of Agriculture.

Proposed Notification Procedure for Control Activities:

Ground and aerial ULV adulticiding will occur following surveillance and required FDACS criteria. Notification will occur 24 hours in advance of an aerial adulticiding event and will include an email to the Land Manager as well as any other previously identified land management personnel. Ground and aerial ULV adulticiding operations are posted at Volusia.org/mosquito on the online webmap of spray operations.

We coordinate closely with the local and state Dept of Health, Division of Env. Public Health that annually publishes the Surveillance and Control of Selected Arthropod-Borne Diseases in Florida -2014 Guidebook which includes a "Response Plan for Mosquito-Borne Diseases" that identifies various levels of threats, the thresholds for those levels, and their respective management responses. <https://www.floridahealth.gov/diseases-and-conditions/mosquito-borne-diseases/guidebook.html>

FDACS-13668 05/15

Page 3 of 4

Records:

Are records being kept in accordance with Chapter 388, F.S.:

☒ Yes

☐ No

Records Location: **VCMC, 801 South St, New Smyrna Beach, FL**

How long are records maintained: **5+ years**

Vegetation Modification:

What trimming or altering of vegetation to conduct surveillance or treatment is proposed?

Trimming would only occur if access was required for a specific area and after coordination with the Land Manager.

Proposed Land Modifications: **N/A**

Is any land modification, i.e., rotary ditching, proposed: **N/A**

Include proposed operational schedules for water fluctuations: **N/A**

List any periodic restrictions, as applicable, for example peak fish spawning times. **N/A**

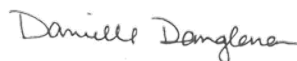
Proposed Modification of Aquatic Vegetation: **N/A**

Land Manager Comments:

Arthropod Control Agency Comments:

VCMC has an extensive Integrated Pest (Mosquito) Management Program. We are governed and abide by Chapter 388, F.S. and F.A.R. 5E-13. In addition to regulatory compliance, we follow Best Management Practices for mosquito control as defined by the American Mosquito Control and Florida Mosquito Control Association. Current program details are documented in the Volusia County Mosquito Control Pesticide Discharge Management Plan.

Please find Volusia County Mosquito Control's Mission Statement as follows - To proactively use Integrated Pest Management (IPM) strategies to reduce nuisance mosquitoes and risk of mosquito-borne illness in Volusia County. To sustain quality of life, foster stewardship of the environment, provide stellar customer service, and support economic vitality for the community.



4/22/2022

Signature of Lands Manager or Representative

Date



22APR2022

Signature of Mosquito Control Director / Manager

Date

Appendix O:

Holistic Stewardship

Public Conservation Lands (Non-State Ownership)

In addition to the properties owned by the State of Florida, the Preserve is comprised of conservation lands held by several public agencies and units of government. These entities are the St. Johns River Water Management District (District), the County of Volusia, and the City of Port Orange. The District and the County each own properties individually and jointly with one another. The County is also a joint owner of property with the City of Port Orange (see Table 1).

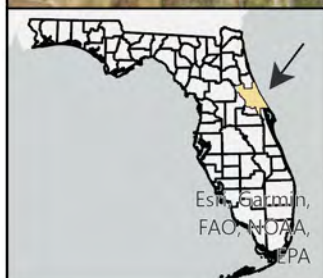
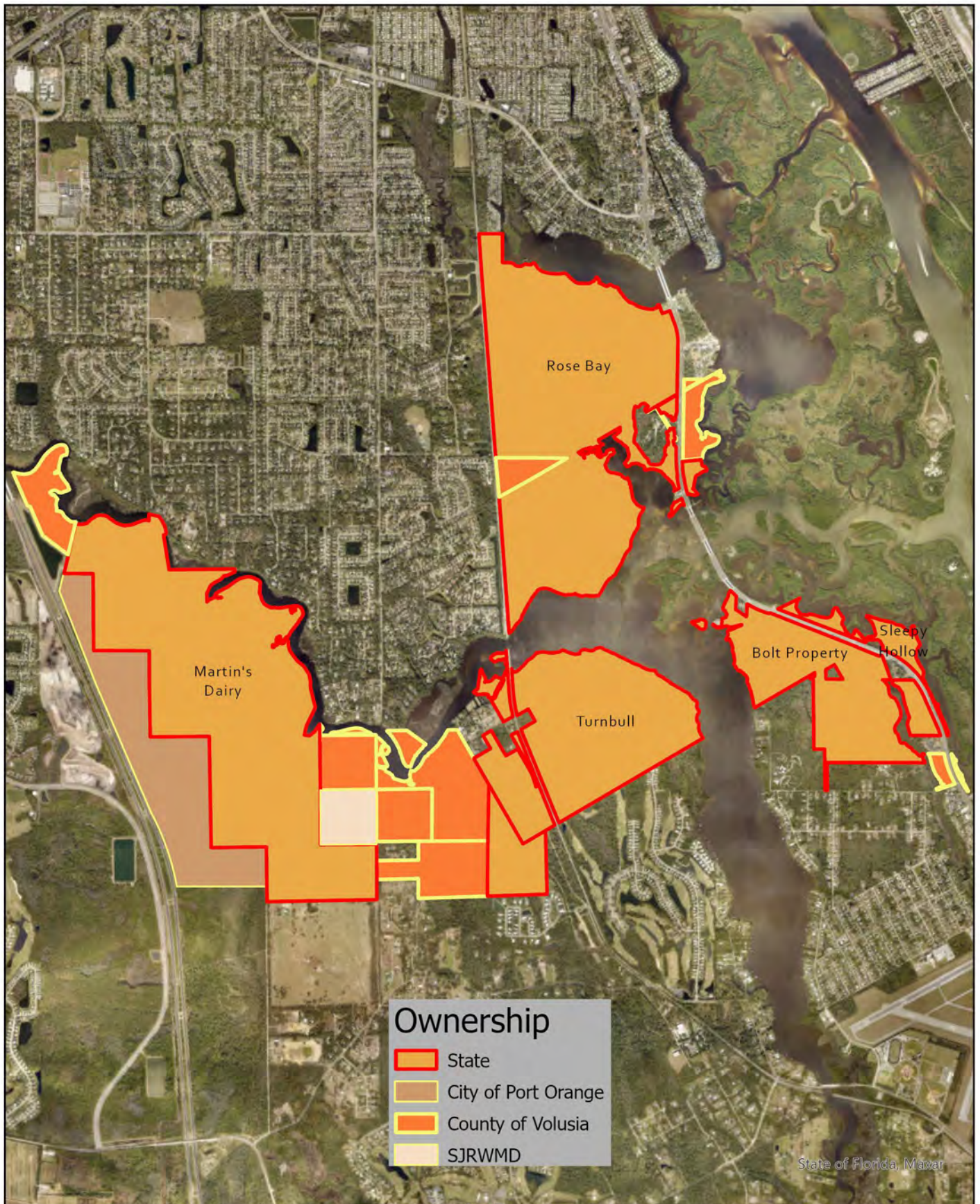
This mosaic is reflective of the County and our partners' strong dedication to the preservation of this highly significant area. Collectively these non-State ownerships comprise about one-fifth of the total acreage of the publicly owned conservation lands of the Preserve.

Table 1. Public Ownerships of the Doris Leeper Spruce Creek Preserve.

Ownership	Approximate Acreage	Year(s) of Acquisition
County (sole)	214	2002, 2004, 2007 , 2009 & 2014
District (sole)	40	2000
County/District (joint)	98	2006 and 2008
County/City of Port Orange (joint)	225	2007 / 2012 *

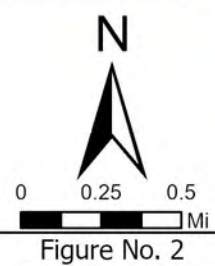
*Purchased by the City in 2007. County obtained ownership interest in 2012.

All of these properties in which the County has ownership (sole and joint) have been acquired since purchase of the State-owned lands. By aggressively pursuing and successfully acquiring these properties, which link to and close gaps between the State owned lands, the County and our partners have significantly furthered the overall integrity of the Preserve.



Parcel Identification Map

DORIS LEEPER SPRUCE CREEK PRESERVE
VOLUSIA COUNTY, FL



Holistic Management

While the publicly owned properties of the Preserve present differing characteristics and conditions, the juxtaposition of these lands also inherently implies that a significant level of commonality exists among the tracts.

As the manager of all the public lands within the Preserve, regardless of ownership, the County's stewardship is founded upon the recognition that resources and opportunities for users to experience the Preserve transcend ownership boundaries.

Accordingly, the County manages the Preserve in a comprehensive, holistic, manner rather than as a set of potentially disjointed practices based solely upon ownership.

Management Plans / Agreements for Non-State Owned Public Lands

The commitment of these public property owners to protection of this unique area through comprehensive, holistic, stewardship is evidenced by the associated management plans and agreements.

Several of the County-owned properties within the Preserve were acquired with the assistance of *The Florida Communities Trust* (FCT).

The approved management plan for the County properties acquired with FCT's assistance, a copy of which is enclosed, addresses many of the same issues (i.e. public access and recreation, natural resource enhancement /restoration, exotic species control, archaeological and historical resources, water quality, etc.) as does this Plan for properties owned by the State.

This FCT plan also expressly reinforces the principle that the Preserve will be managed in totality, as opposed to a collection of unrelated, individual, properties. As an example, the following text is excerpted from the *Introduction* section (page 3) of the FCT plan -

“...It is intended that the Preserve, including the FCT project area, be managed in a holistic manner. The management plan for this FCT project includes excerpts and concepts for the State approved management plan for the Preserve. It is intended that the management plan for this FCT project compliment and further the management plan for the entire Preserve ...“

This plan also reinforces this concept of common management when addressing specific stewardship activities. An example is the following language pertaining to prescribed burning –

“ - An active, on-going, program of prescribed burning is not envisioned for the project. To promote effectiveness and address constraints and conditions, prescribed burning of the project, if undertaken, will generally be managed / conducted as part of the comprehensive burning program for the entire Preserve.” (page 46)

The FCT also supported acquisition of the property (formerly known as the Stanaki tract) jointly owned by the County and the City of Port Orange situated at western edge of the Preserve. The following excerpts from the management plan for this property, a copy of which is enclosed, support and further unity of stewardship;

“.. Port Orange’s partner, Volusia County’s Volusia Forever management team, will manage the 225 acres for the conservation, protection and enhancement of natural resources..” (page 3)

“Volusia County is the manager of the Doris Leeper Spruce Creek Preserve (DLSCP). The County, by assuming similar role for the Stanaki property, will further management of the Preserve in a unified, holistic, manner.” (page 8)

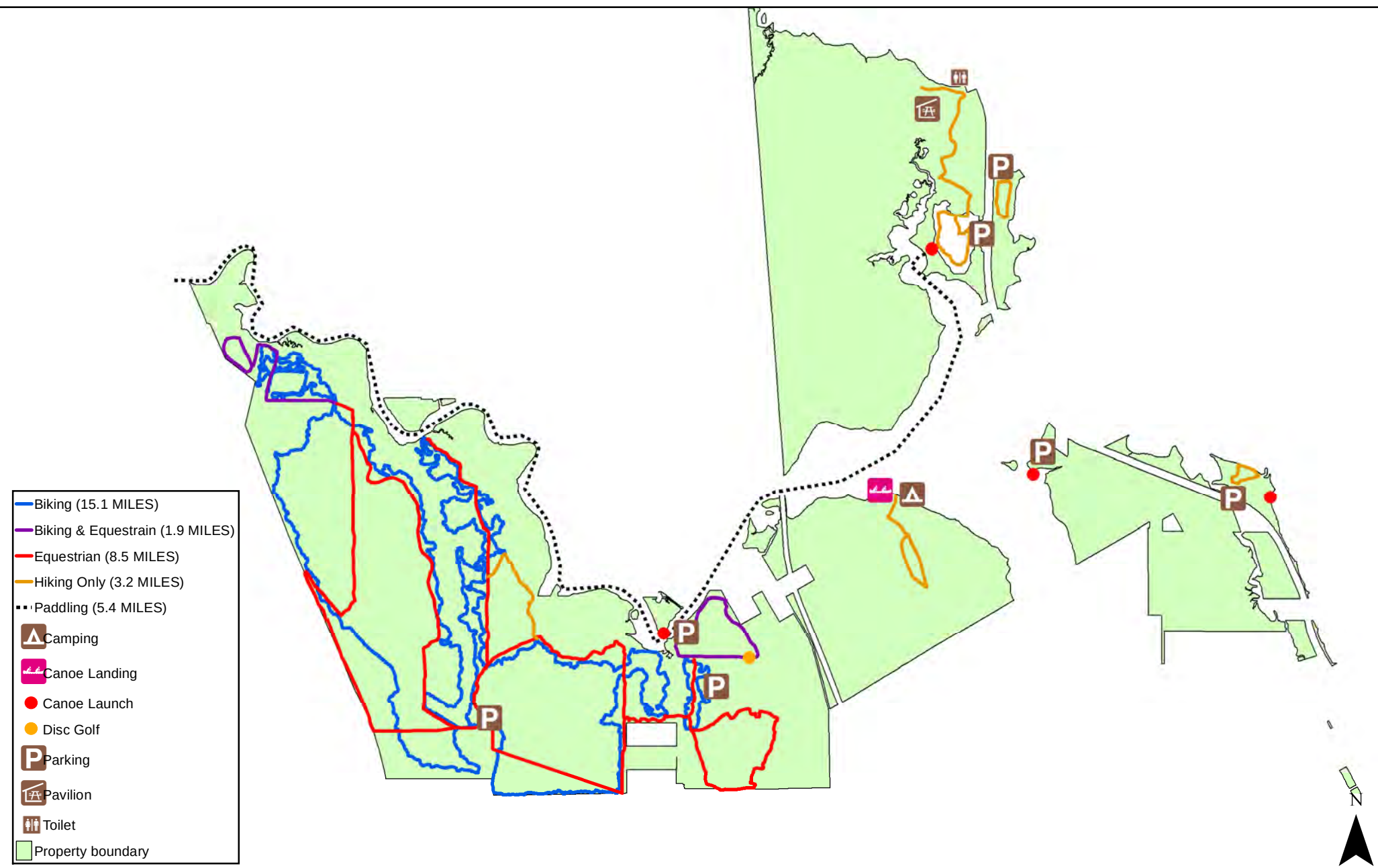
Holistic, unified, stewardship of the Preserve is also reinforced by the cooperative management agreement between the County and the St. Johns River Water Management District, a copy of which is enclosed, for jointly owned property which specifies that “.. the County will assume primary management responsibility for the Property, unless an alternative management entity is mutually agreed upon.”

Public Access / Resource-based Recreation Opportunities

The provision of access and recreational opportunities exemplify holistic management of the public lands of the Preserve, regardless of ownership. The entirety of the public lands and the uses thereon, whether located on State or non-State owned properties, are available for all visitors. No fences have been erected or are proposed for precluding a visitor transiting between adjacent public lands, regardless of ownership. Features that transcend ownership boundaries will be coordinated to ensure uniformity and continuity. Educational and other informational signage, whether placed on State or non-State owned lands, will, as appropriate, reference the Preserve in its entirety.

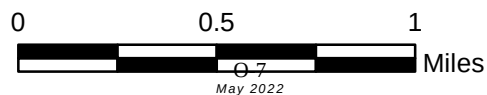
Uses/facilities located on non-State owned properties which enable linkages to other public lands within the Preserve, include trails and parking. It is noted that the provision of these and any additional uses/facilities (previously pledged or proposed) are subject to available funding.

In addition to that depicted by the following map, a nature/hiking trail presently extends from the County's Spruce Creek Park, which is not technically part of the Preserve, to adjoining State-owned land within the Preserve. This trail provides Park visitors with a broader experience and furthers an outdoor educational program conducted by local School District staff at the Park.



NOTICE:

THIS MAP IS CONCEPTUAL AND INTENDED FOR GENERAL PLANNING PURPOSES ONLY. PROPOSED ACTIVITIES, LOCALES, AND ACREAGES MAY CHANGE DEPENDING UPON CONSIDERATIONS SUCH AS, BUT NOT LIMITED TO, SITE SPECIFIC CONDITIONS, WEATHER, MARKETS, PROJECT PRIORITIES, AND AVAILABILITY OF STAFF. ALL ACREAGES ARE APPROXIMATE.



Resource Stewardship Division
123 W. Indiana Ave
Room 200
Deland, FL 32720

Adjacent Private Ownerships

Respecting the rights of private ownership, uses or management strategies specifically applicable to the non-publicly owned tracts are not proposed.

However, reaching out to private property owners may also facilitate comprehensive management of the adjacent publicly held lands. Accordingly, appropriate steps will be taken to ensure that stewardship of the public properties is undertaken in a manner that strives to preclude or minimize any potential impact upon adjacent private property.

The Prescribed Burn Plan incorporated in this management plan as Appendix I specifically provides that

“Attention will be given to the safety of neighboring private properties. The firebreaks along these property lines will be reinforced; a pumper unit and/or fire-plow will be stationed nearby to expedite response time, if required... ..”

Private landowners may also be informed of a proposed prescribed burn through the use of local signage, Volusia County’s website, distribution of flyers, reverse 911 or other appropriate methods.

Should the public subsequently acquire any of these privately held properties, the tracts will be incorporated in the next scheduled management plan update.

Capital Projects

The characteristics and diversity of the Preserve, along with its location amid an urbanizing region, presents outstanding opportunities for outdoor experiences by the public.

However, the abilities of the County to initiate and sustain public use projects and efforts are determined by funding availability. The provision of appropriate uses has been, and continues to be, an important component of the County's stewardship of this unique and valuable area. The County, to the best of its ability, is committed to facilitating appropriate resource-based opportunities for the public's use and enjoyment and will continue to make proposed improvements as funds are available.

Summary

The County recognizes the necessity for the comprehensive, holistic, and stewardship of the public lands of the Preserve, regardless of ownership. Staff has created trails for different user groups, passive recreation, and other activities that spread throughout the entire preserve. There are no fabricated barriers between state-owned property and other public owned properties. This allows for fluid movement for all users within the entire Preserve.

Appendix P

Habitat Restoration Plan and Desired Future Conditions (DFC)

Doris Leeper Spruce Creek Preserve (DLSCP)

Habitat Restoration Plan

Revised February 2022

Introduction

This Habitat Restoration Plan is developed as a supplement to the 2012 Doris Leeper Spruce Creek Preserve (DLSCP, Preserve) Management Plan, which is governed by requirements of the Florida Statutes, Florida Administrative Code, and guidelines in the State Lands Management Plan. Public lands held in title by the Board of Trustees, in full or in conjunction with other entities, must be evaluated to determine that the lands are managed for the purpose of acquisition. Management plans for State owned lands are reviewed every 5 years with an updated management plan every 10 years; this review does not apply to non-state owned lands in the Preserve. The Division of State Lands conducted a scheduled 5 year review specific to the state owned lands located within DLSCP in 2007, 2012, and 2021.. The management plan was scheduled for a 10 year update in 2022. As of August 2012, the Division of State Lands had approved the updated management plan submitted by Volusia County Land Management.

Doris Leeper Spruce Creek Preserve is a 2,513 acre multi-habitat preserve managed by Volusia County. There are two primary goals of acquisition stated for DLSCP: a) the conservation, restoration and protection of natural and historical resources and b) resource-based, public outdoor recreation which is compatible with the conservation, restoration and protection of these public lands.

The Preserve consists of tracts separated by Spruce Creek, Strickland Bay, Rose Bay, Murray Creek, the FEC railroad and US 1. These features result in tracts that are somewhat detached in terms of connectivity and management. As such, the individual tracts have been identified and evaluated individually. For the purpose of management, the County considers the entire Preserve one complete managed area; however, different management plans and regulations exist that determine management needs and actions on specific parcels due to different ownership and funding partners.

This document is intended to provide information and guidance for Volusia County Land Management staff on specific habitat restoration needs within Doris Leeper Spruce Creek Preserve.

This Habitat Restoration Plan includes the approved goals and objectives that will guide land management restoration activities, a priority for implementing those land management activities, and a habitat description.

As with any restoration plan, this document is fluid and never considered static. As additional information is gathered, or as restoration science improves over time, restoration strategies are subject to change.

Parcel Ownership within DLSCP

Doris Leeper Spruce Creek Preserve is comprised of many parcels owned by various public agencies. The entire Preserve is managed by Volusia County. Most of the Preserve (77%) is owned by the State of Florida. Volusia County owns or co-owns, with the City of Port Orange and the St. John's Water Management District (SJRWMD) (21%) of the acreage within DLSCP. The SJRWMD holds full fee title to a single parcel (2%).

Funding sources for the public lands vary with each acquisition. With one exception, those parcels wholly owned by Volusia County and in combination with the City of Port Orange were acquired with assistance from the Florida's Community Trust. These tracts are managed under separate management plans that were developed with consideration to the State approved plan. Volusia County intends to manage DLSCP holistically across boundaries but also will need to follow management guidelines and conceptual plans set forth by the purchasing partners. For the purposes of this document, all community types and their acreages will be for DLSCP as a single entity. See Figure 1.

Doris Leeper Spruce Creek Preserve Ownership

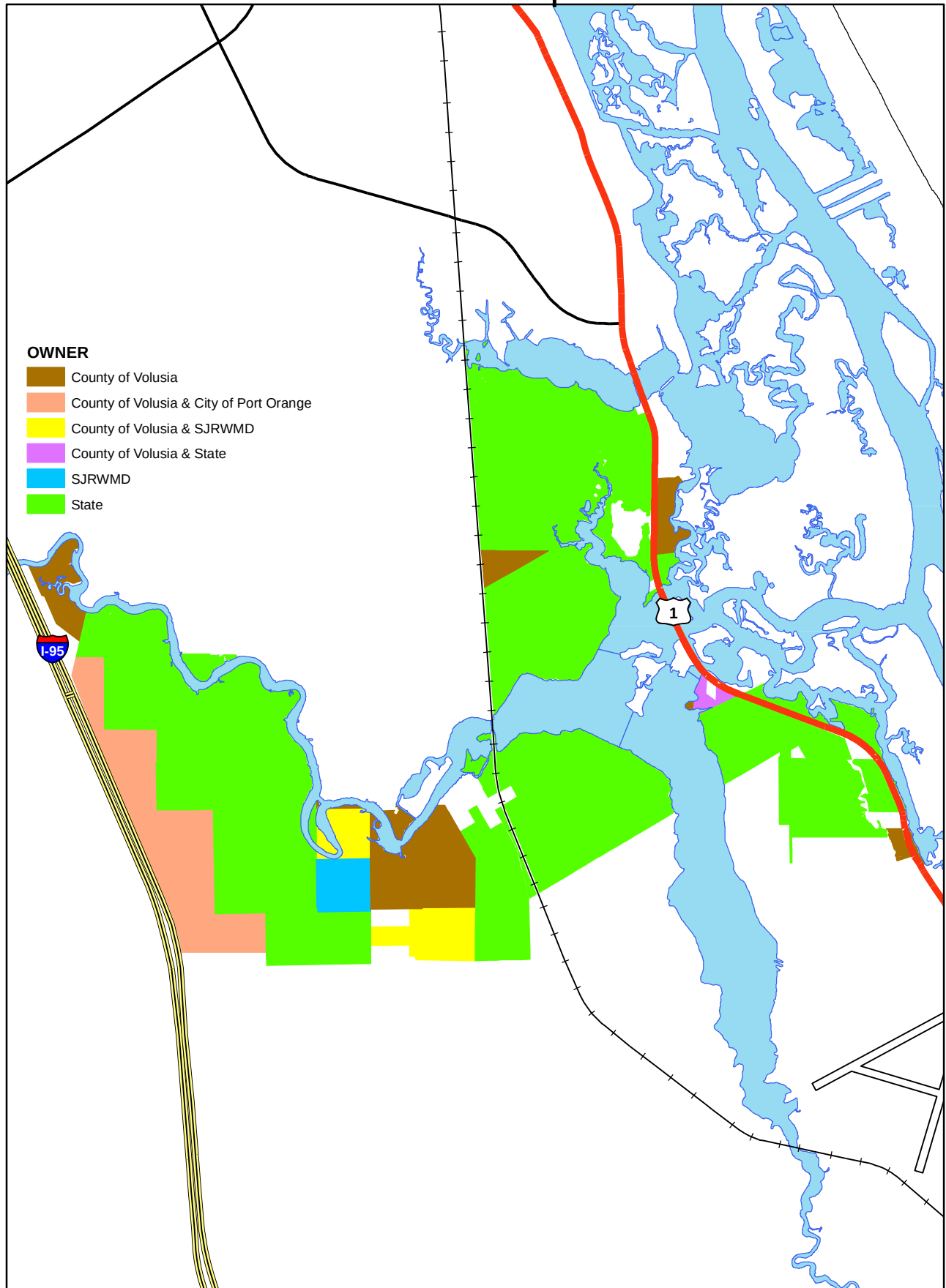


Figure 1

Tract Identification

For ease of explanation, DLSCP has been divided into various tracts. See Figure 2. These tracts roughly are based on access and ownership. As stated above, the management of DLSCP is coordinated holistically across parcels or ownership boundaries.

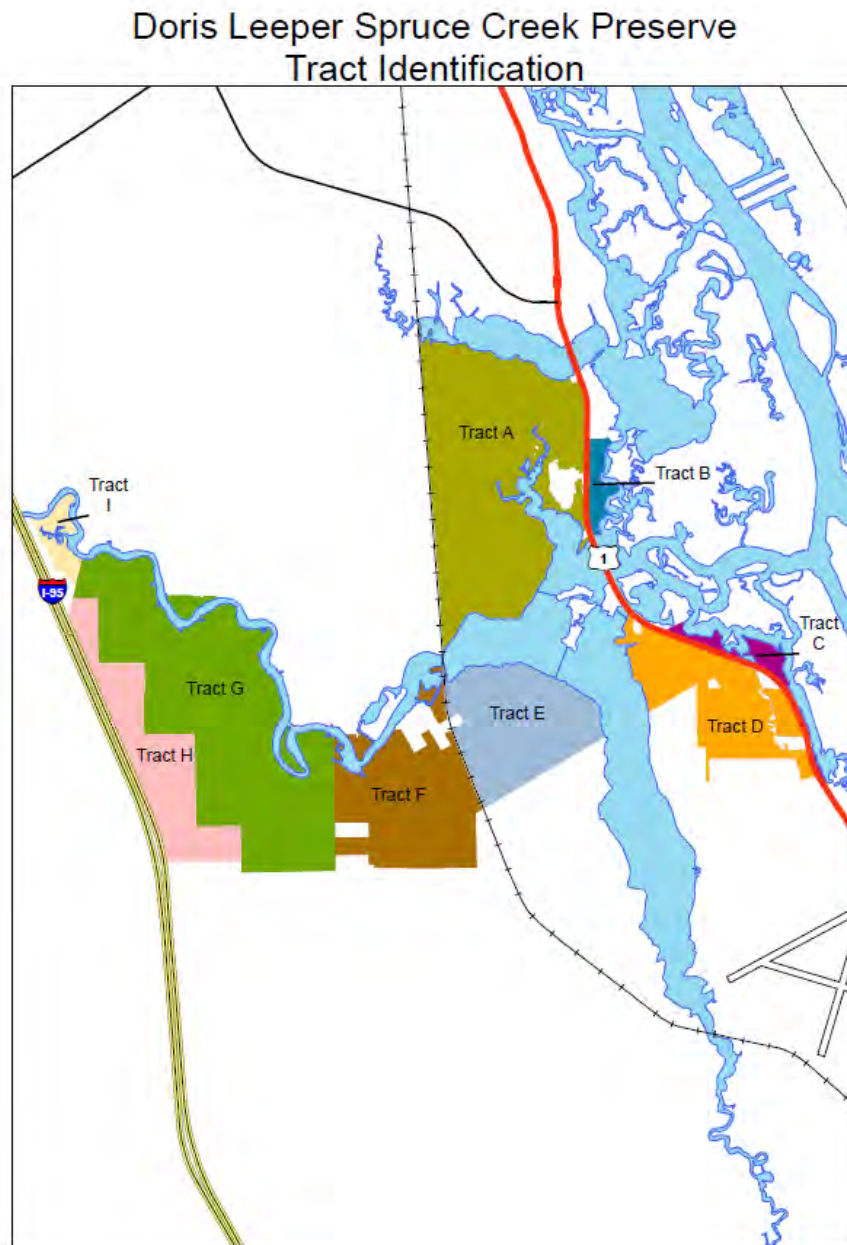


Figure 2

Goals and Objectives

The State approved 2012 DLSCP Management Plan includes goals and objectives related to management activities associated with habitat restoration for those lands owned by the State within the Preserve. These specific goals and objectives have been applied to the entire boundary of DLSCP, regardless of ownership or other management plans. The goals and objectives related to habitat management and restoration are referenced below.

1. Goal: To protect, restore and improve native habitats trending away from optimal conditions located within DLSCP

Objective: Implement techniques to trend towards Desired Future Conditions / Habitat Maintenance Condition

Many of the natural communities on the Preserve were not burned for many years, resulting in dense canopies and/or subcanopies. Areas with a dense canopy or sub-canopy have decreased diversity and provide minimal habitat for listed plant and animal species due to increased shade, decreased space availability, decreased food availability, decreased herbaceous vegetation in the groundcover stratum, and decreased open patches. Xeric hammocks were historically rarer and smaller in acreage than present day and are formed as a result of fire suppression, usually due to human intervention.

Several communities on DLSCP were overgrown and required significant biomass reduction. The most critical occurrence of this was within the scrub communities, especially those on Tract G. The oaks and other shrub species had reached a height and caliper that had created a closed canopy. The structure of the scrub was inappropriate at this time, including height and density of the canopy/sub-canopy, lack of open ground space, and reduction in herbaceous vegetation in the ground stratum.

Since 2012, mechanical techniques and fire have been introduced to many areas of Tract G. Approximately 41% of Scrub and Scrubby flatwoods habitats across the Preserve have been treated by the removal of the dense canopy and/or sub- canopy of pines, oaks and other common shrub strata species through prescribed fire, manual removal or a combination of both. This reverses the unnatural conditions noted above and, with fire, can return nutrients to the soil and create favorable conditions for a diverse assemblage of species, including listed species..

Prescribed fire in the appropriate habitats is an important abiotic factor in the maintenance, restoration and improvement of many habitats. Other abiotic factors affecting habitat quality include hydrologic preservation and protection, and infrastructure management to protect habitats from potential multiple-use impacts.

Due to the extensive amount of fire suppressed vegetation within many of the habitats in the Preserve, mechanical treatments are necessary for the safety of prescribed fire personnel and the general public. The ultimate goal in a typical burning program is to allow for growing season burns to occur within the fire-dependent communities and to reach a stage where fire is being utilized as a habitat maintenance tool, rather than a restoration tool. Many of the areas on the project site do not require management by fire, including the mesic hammocks, mangrove areas, salt marsh, and bottomland hardwood communities on the property. Although some areas, such as the salt marshes and the ecotones adjacent to the mesic hammocks, may benefit from periodic prescribed burns,

other concerns including access constraints and the risk of muck fires may limit the viability of prescribed fire for these areas.

2. Goal: Establish a priority ranking of community habitats in need of restoration, starting with the Imperiled Habitats located within DLSCP

Objective: Implement techniques to trend towards Desired Future Conditions / Habitat Maintenance Condition

Three (3) natural communities, maritime hammock, scrub, and scrubby flatwoods, on the Preserve are listed by FNAI as Imperiled Natural Communities. These important areas will be assigned the “High” priority ranking with restoration activities focused on them. The Preserve includes 176 acres of maritime hammock, 335 acres of scrub, and 325 acres of scrubby flatwoods. Management activities include protection from illegal access related to dumping and off-road vehicle (ORV) use and prevention and maintenance of invasive exotic species. The scrub and scrubby flatwoods require more intensive restorative land management activities to reach acceptable conditions.

3. Goal: To share information with the general public regarding activities associated with Land Management on DLSCP

Objective: To allow recreational users that utilize DLSCP to become informed of any access that might become restricted or suspended due to land management activities

Numerous access points located throughout DLSCP have become important for recreational users. Communicating with the public as far as temporary closures or detours in these areas is necessary. Informational signage, along with media announcements, will be the primary means of communicating upcoming temporary closures

Desired Future Conditions

Volusia County has developed an objective-based approach to habitat management based on prescriptive Desired Future Conditions (DFCs). These DFCs are aimed at achieving a range of preferred habitat conditions that would benefit a diversity of plant and animal species. The DFCs represent long range preferred conditions and may be modified based upon implementation experience and evaluation of management activities.

Often, multiple phases of restoration activities may be necessary. In addition, vegetative response may require a long period of time to reach acceptable conditions, i.e. a forty year old tree needs forty years to grow. Therefore, compliance with DFCs may take years. It is more important to implement and monitor the restoration phases to ensure the habitat is trending toward the restoration goals. The restoration activities ultimately should lead to successful compliance with DFCs.

Monitoring will involve sampling for variables associated with particular DFCs within given areas. Land managers will use results obtained from monitoring to ascertain if the unit has met or are trending toward the DFC objectives. Additional management considerations and implementation may be utilized for those units that do not meet DFC objectives and are not trending toward desired conditions.

Priority Levels

It is anticipated that restoration activities will be initiated within the given time frames. Full compliance with all DFCs may take multiple restoration treatments over an extended period of time. Potential restoration of some habitats need more detailed analysis. Pending further analysis, priorities and restoration actions may be modified. Habitat restoration priorities are based on the following criteria:

- **High – 0 to 3 years**
 - Imperiled status (scrub, scrubby flatwoods, maritime hammock)
 - High presence of endemic species
 - Declining listed species populations
 - High potential of restoration success
 - Cost effectiveness
 - Area does not meet DFCs
 - Management plan requirements
- **Medium – 2 to 5 years**
 - Habitat conditions at present provide a moderate level of natural functions
 - Needs additional site information to determine suitable restoration techniques
 - Area meets or within range of some DFCs
 - DFCs trending beyond acceptable range(s)
 - Management plan requirements
- **Low – 4 to 10 years**
 - Most DFCs are acceptable
 - DFCs trending beyond acceptable range(s)
 - Small fragmented acreage
 - Restoration options logistically or practically limited
 - Restoration options limited or unproven
 - Management plan requirements
- **Maintenance**
 - Habitat meets all DFCs
 - Prescribed fire is used to maintain current conditions
 - No restoration is needed
 - Spot treatments of exotics may be needed
 - Management plan requirements

Priorities of DLSCP are relative to the other conservation lands managed by Volusia County. Other properties may be subjected to restoration actions prior to those of DLSCP. Decisions on implementation are based on many factors including cost, efficiency, potential restoration success, timing in conjunction with other activities, specific site conditions and equipment and staff availability.

Doris Leeper Spruce Creek Preserve Habitats

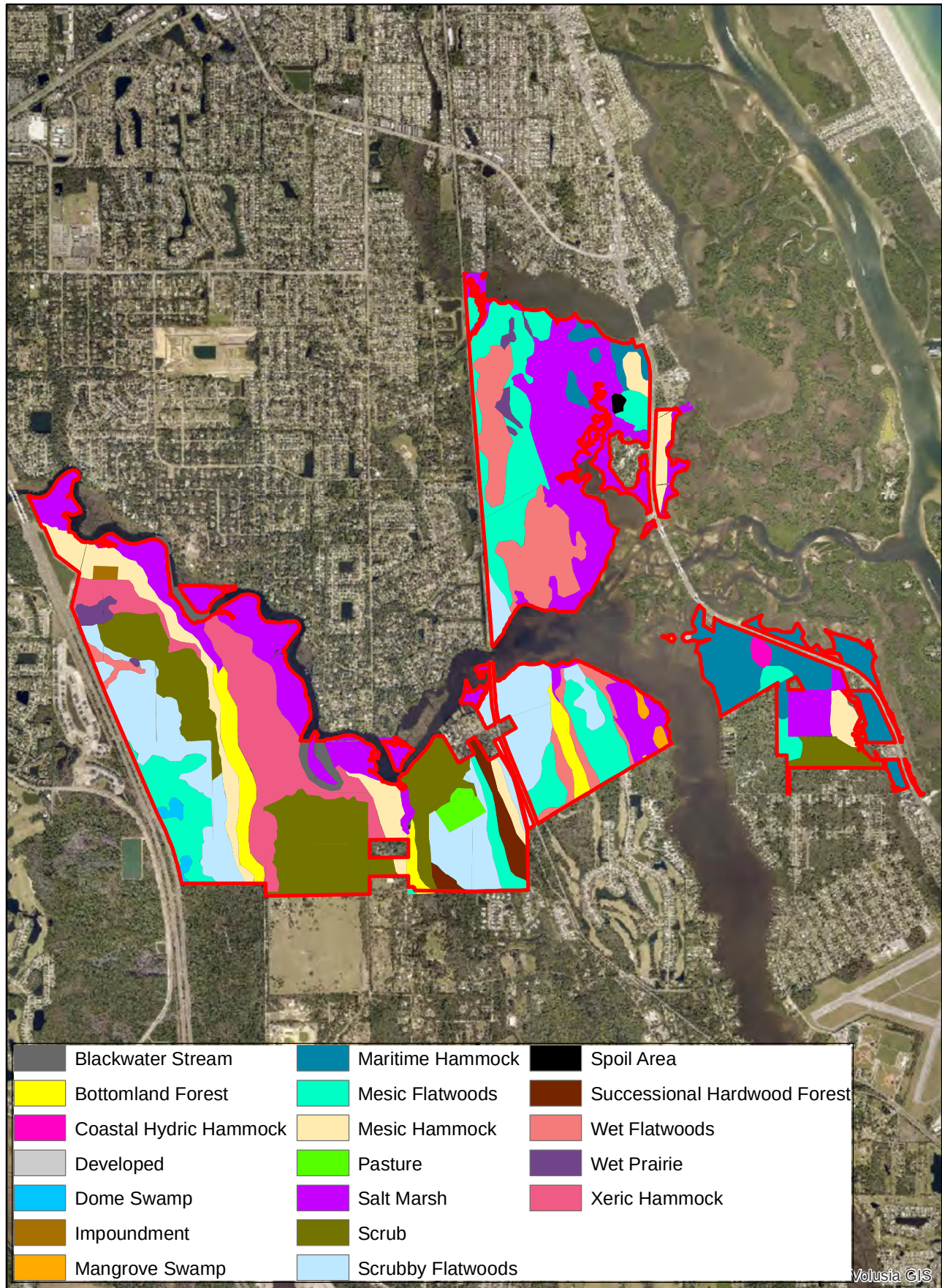
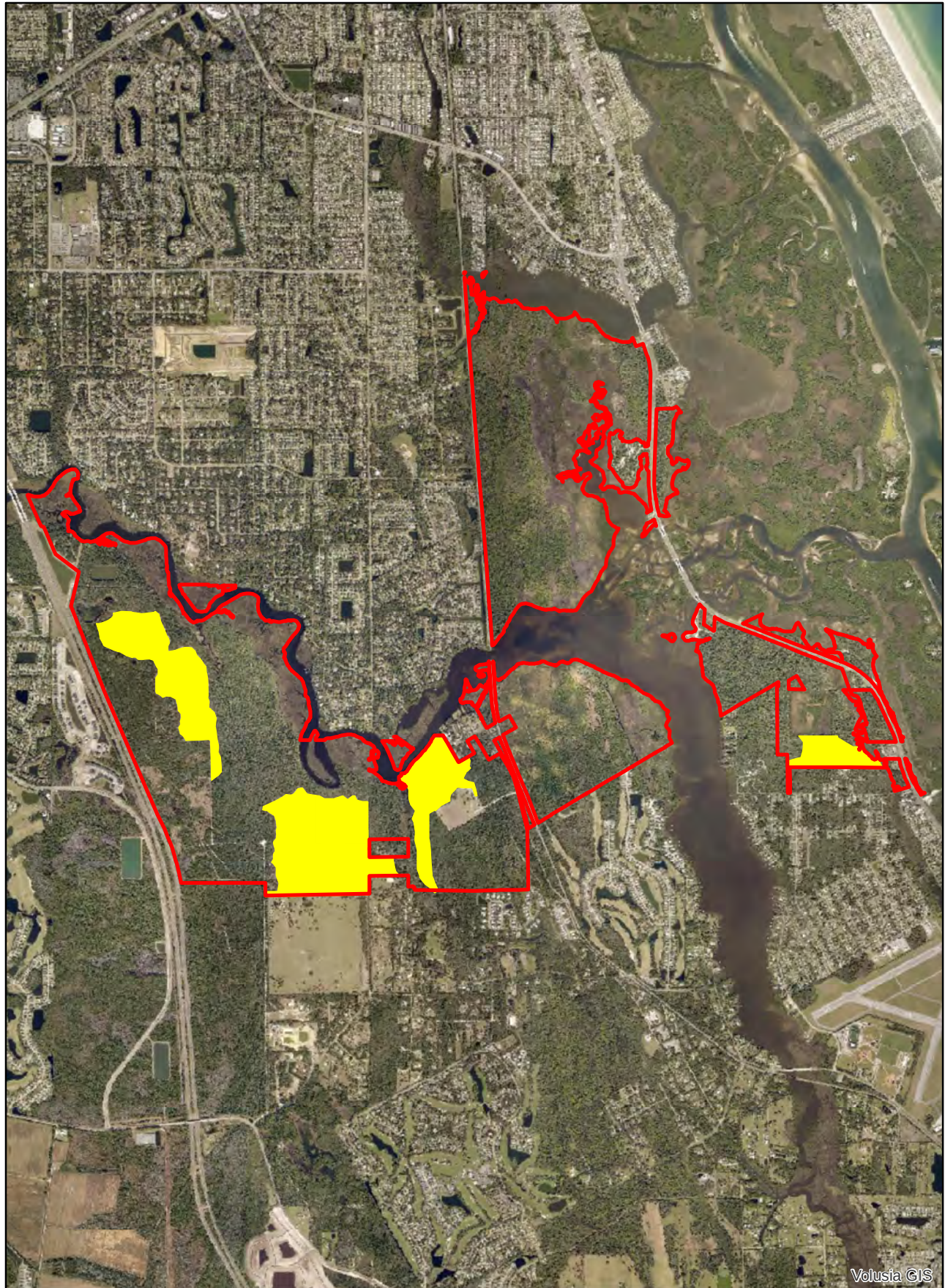


Figure 3

Doris Leeper Spruce Creek Preserve

Scrub-335 Acres



0 650 1,300 2,600 3,900 5,200 Feet

Figure 4

P-11



Resource Stewardship Division
April 2022

Scrub- Figure 4

Background:

- Scrub is an imperiled community and provides habitat for the Florida scrub-jay
- Scrub is a shrub dominated evergreen community, primarily comprised of sand live oak, myrtle oak and Chapman oaks, with or without a canopy of sand pines
- Sand pine scrub, oak scrub and rosemary scrub are variants of scrub
- Scrub-jays are an “umbrella species” for oak scrub habitat, meaning that if the habitat is managed properly for scrub-jays then a large number of additional species will benefit
- Since 2012 46%, of the scrub located at DLSCP has undergone restoration techniques to bring the Scrub into suitable Scrub Jay habitat outlined in the FWC Scrub Jay Guidelines.
 - Scrub-jay survey July 2010, mid-gasline
 - Volusia County Land Management staff, February, March 2012, powerline
 - Scrub-jay survey July 2021
- Evidence of quality scrub indicated in historic aerials and current onsite vegetative composition
- Fire is the preferred restoration and management tool Urban interface conditions restrict the use of prescribed fire
- Fire has not been introduced into all of the Scrub areas and restoration is still in progress
- Fire suppressed scrub creates extreme hazard conditions
- The long term goal of scrub restoration within DLSCP is to return scrub habitats to a natural structure that can be managed with prescribed fire, and ultimately, to increase the amount of high quality scrub suitable for scrub dependent species, including the Florida scrub-jay
- Access within areas of some tracts may be restricted for the safety of the public due to the presence of heavy machinery used during restoration activities

Desired Future Conditions:

- Canopy cover
 - trees 0-10%
 - height less than 10 feet
- Sub-canopy
 - shrubs 10-30% cover
 - shrub height 4 to 5.5 feet
- Ground cover
 - herbs & grasses 20-40%
 - bare ground 20-40%
- Maintain 70 % of area in optimal condition
- Fire Frequency
 - 5- 20 years

General Restoration Strategies:

- Delineate scrub area and assess need of restoration
- Determine appropriate methods for restoration
- Survey restoration area for cultural resources
 - Continue field inspections as restoration progresses

- Establish photo monitoring locations
 - GPS locations for future reference
 - Photographs taken every 6 months for the first 2 years
- Mark gopher tortoise burrows found within restoration area
- Secure restoration area to ensure public safety
- Reduce the canopy cover to comply with DFC for Florida scrub
 - Harvest mature sand pine via a timber operation or individually by other means (Fellerbuncher, mulcher, chainsaw etc.)
- Rollerchop or utilize similar technique to alter the vegetative structure of the sub-canopy so that fire can be reintroduced safely
- Small groups or islands of scrubby oaks (1-3 trees) may remain as seed, nesting or sentinel trees provided they are not taller than 10'
- Trees not harvested or too large for equipment to chop would be cut selectively at a later date, leaving them on the ground to assist with prescribed fire
- Identify and remove refuse or garbage piles
- Establish fire breaks and delineate burn zones
 - Fire breaks should be between 10-20' wide
 - Utilize natural fire breaks where possible
 - Conduct prescribed fire following mechanical treatment, prescribed fire should be conducted as soon as fuel conditions are appropriate
 - Alternative methods may be utilized if conditions do not warrant the use of prescribed fire within the optimal time frame
 - Develop scheduled rotation of burn zones for mosaic of scrub height
- Monitor restoration area
 - Exotic and invasive species
 - Scrub-jay activity
 - Gopher tortoise activity
 - Photo points

Specific Restoration Strategies by Tract:

G - Priority – Medium

- Mechanically treat dense areas of shrubs
- Portions of the scrub have seceded to xeric hammock, and the limit of chopping will be determined by the density of the trees too large to be roller chopped

D – Priority - Medium

- Additional evaluation of existing conditions and options is needed before initiating restoration operations

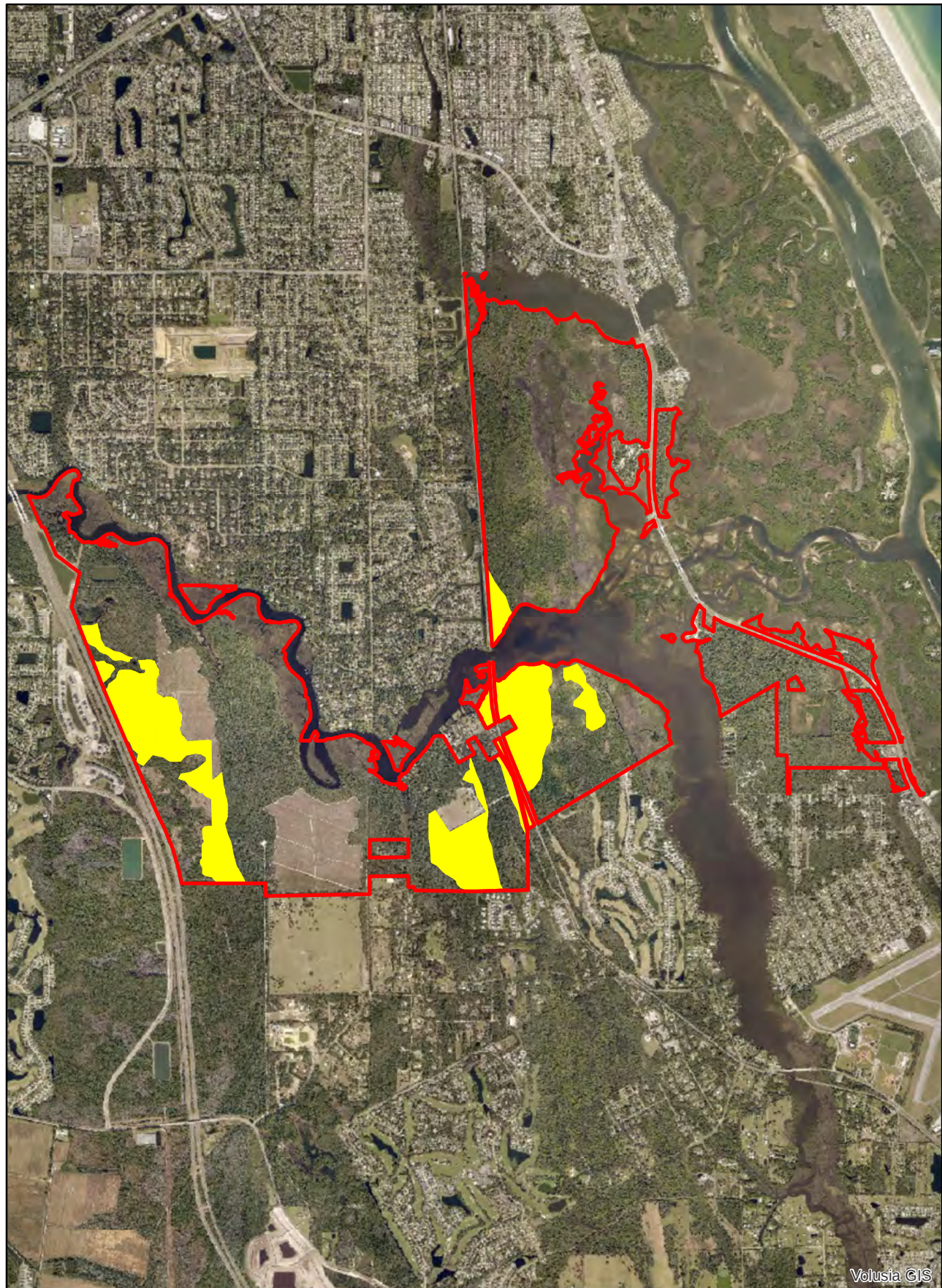
H - Priority - Medium

- Additional evaluation of existing conditions and options is needed before initiating restoration operations

F - Priority - Low

- Additional evaluation of existing conditions and options needed before initiating restoration operations

Doris Leeper Spruce Creek Preserve Scrubby Flatwoods-325 Acres



0 650 1,300 2,600 3,900 5,200 Feet

Figure 5

P-14



Resource Stewardship Division
April 2022

Scrubby flatwoods - Figure 5

Background:

- Scrubby flatwoods is an imperiled community and provides moderate habitat for scrub- jay utilization especially where the pine overstory is sparse
- Pine flatwoods that have an open canopy of sparsely spaced tall slash or longleaf pines with a low sub-canopy of scrubby oaks and saw palmetto are classified as scrubby flatwoods
- Pine flatwoods forests are of special interest because they may provide nesting habitat for the bald eagle
- Usually shares some common traits with scrub habitat and is likely to harbor some species associated with scrub as well as species common to typical pine flatwoods
- Fire has not been introduced into all of the scrubby flatwoods and restoration is still in progress
- Fire suppressed scrubby flatwoods creates extreme hazard conditions
- Fire is the preferred restoration and management tool
- Urban interface conditions restrict the use of prescribed fire
- With the exclusion of fire, these areas become overgrown as the oak sub-canopy reaches heights in excess of 15-20 feet tall
- Most scrubby flatwoods areas on the Preserve have received mechanical treatment, but still require prescribed fire
- Either mechanical treatment or prescribed fire is needed to reduce the sub-canopy to a lower height

Desired Future Conditions:

- Canopy cover
 - o trees 10-50%
- Sub-canopy cover
 - o shrubs 20-40%
 - o palmetto 20-50%
 - o shrub height 4-5.5 feet
- Ground cover
 - o wiregrass 30-99%
 - o herbs & grasses 10-50%
- Fire Frequency
 - o 5-15 years

General Restoration Strategies:

- Delineate area and assess need of restoration
- Determine appropriate methods for restoration
- Survey restoration area for cultural resources
 - o Continue field inspections as restoration progresses
- Establish photo monitoring locations
 - o GPS locations for future reference
 - o Photographs taken every 6 months for the first 2 years

- Mark gopher tortoise burrows found within restoration area
- Secure restoration area to ensure public safety
- Reduce the canopy cover to comply with DFC
 - Harvest pine sub-canopy via a timber operation or individually by other means (Fellerbuncher, mulcher, chainsaw etc.)
- Rollerchop or utilize similar technique to alter the vegetative structure of the sub-canopy so that fire can be reintroduced safely
- Identify and remove refuse or garbage piles
- Establish fire breaks and delineate burn zones
 - Fire breaks should be between 10-20' wide
 - Utilize natural fire breaks where possible
- Conduct prescribed fire
 - Following mechanical treatment, prescribed fire should be conducted as soon as fuel conditions are appropriate
 - Alternative methods may be utilized if conditions do not warrant the use of prescribed fire within the optimal time frame
- Monitor restoration area
 - Exotic and invasive species
 - Scrub-jay activity
 - Gopher tortoise activity
 - Photo points

Specific Restoration Strategies by Tract:

E - Priority - Medium

- Mechanically treat dense/thick areas of shrubs
- Conduct mechanical treatment near documented eagle nest only during May to September

G - Priority - Medium

- Mechanically treat overgrown scrubby flatwoods

H - Priority - Medium

- Additional evaluation of existing conditions and options is needed

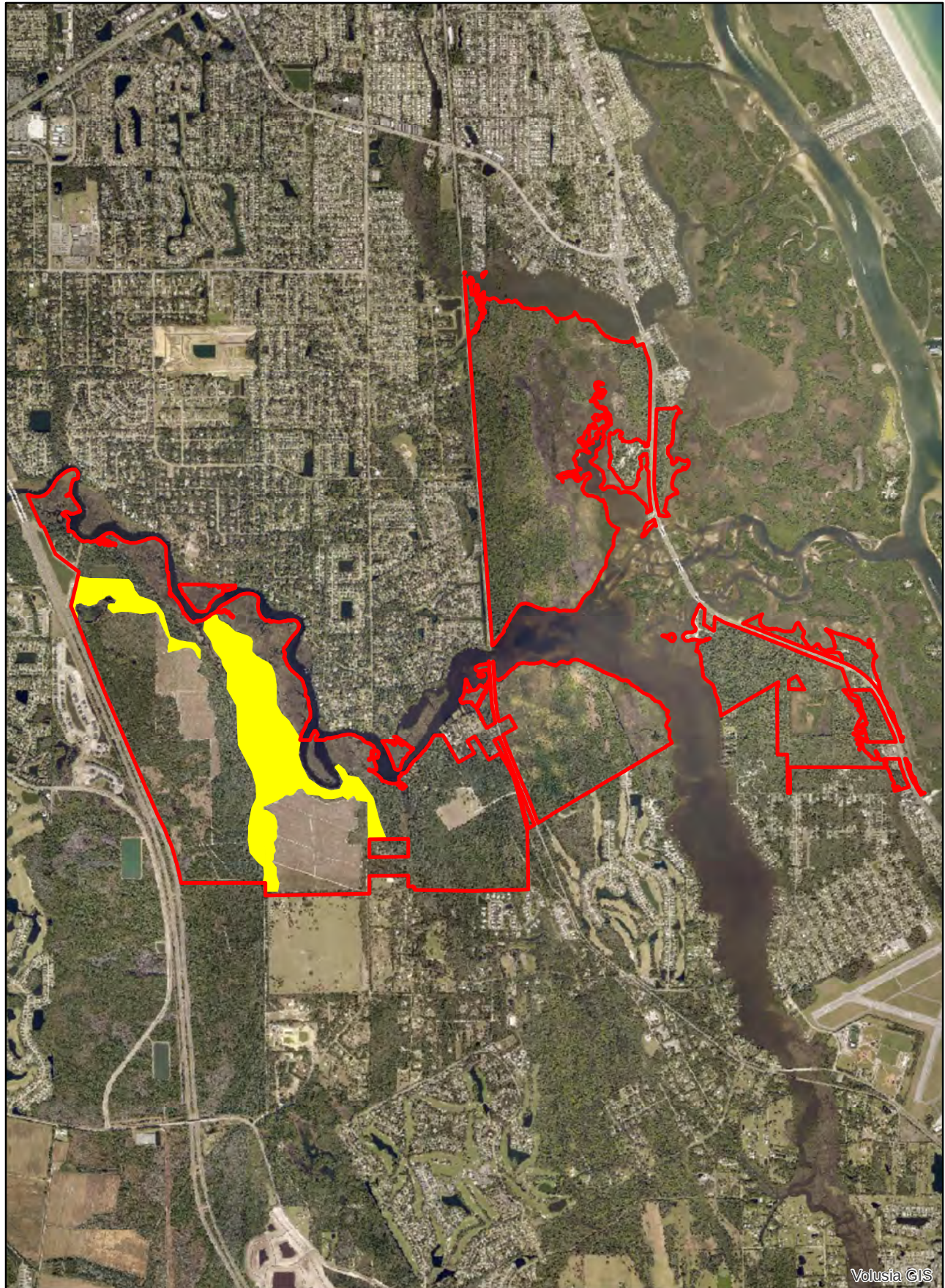
A - Priority – Low

- Due to the small area and access issues, no restoration is planned at this time

F - Priority - Low

- Additional evaluation of existing conditions and options is needed before initiating restoration operations

Doris Leeper Spruce Creek Preserve Xeric Hammock-206 Acres



0 650 1,300 2,600 3,900 5,200 Feet

Figure 6

P-17



Resource Stewardship Division
April 2022

Xeric Hammock- Figure 6

Background:

- Xeric hammock is a high canopy of sparse pine, either sand, slash or scattered longleaf, and a lower closed sub canopy consisting of sand live oak, chapman oak, myrtle oak, and rusty lyonia.
- Fire suppressed for 60+ years
- Fire exclusion has altered this once scrub habitat to mesic hammock, and the under story will be open and have characteristics of either Sandhill or Scrub, depending on the original makeup of the habitat.
- Advanced condition and locality of the xeric hammock, especially located in the Martins Dairy area, restoration back to scrub is not being considered at this time.

Desired Future Conditions:

- Canopy (high)
 - o 10-20%
- Canopy (sub or mid)
 - o 70-100%
- Understory
 - o 20-60%
- Groundcover
 - o 0-20%
- Fire Frequency
 - o Rare

General Restoration Strategies:

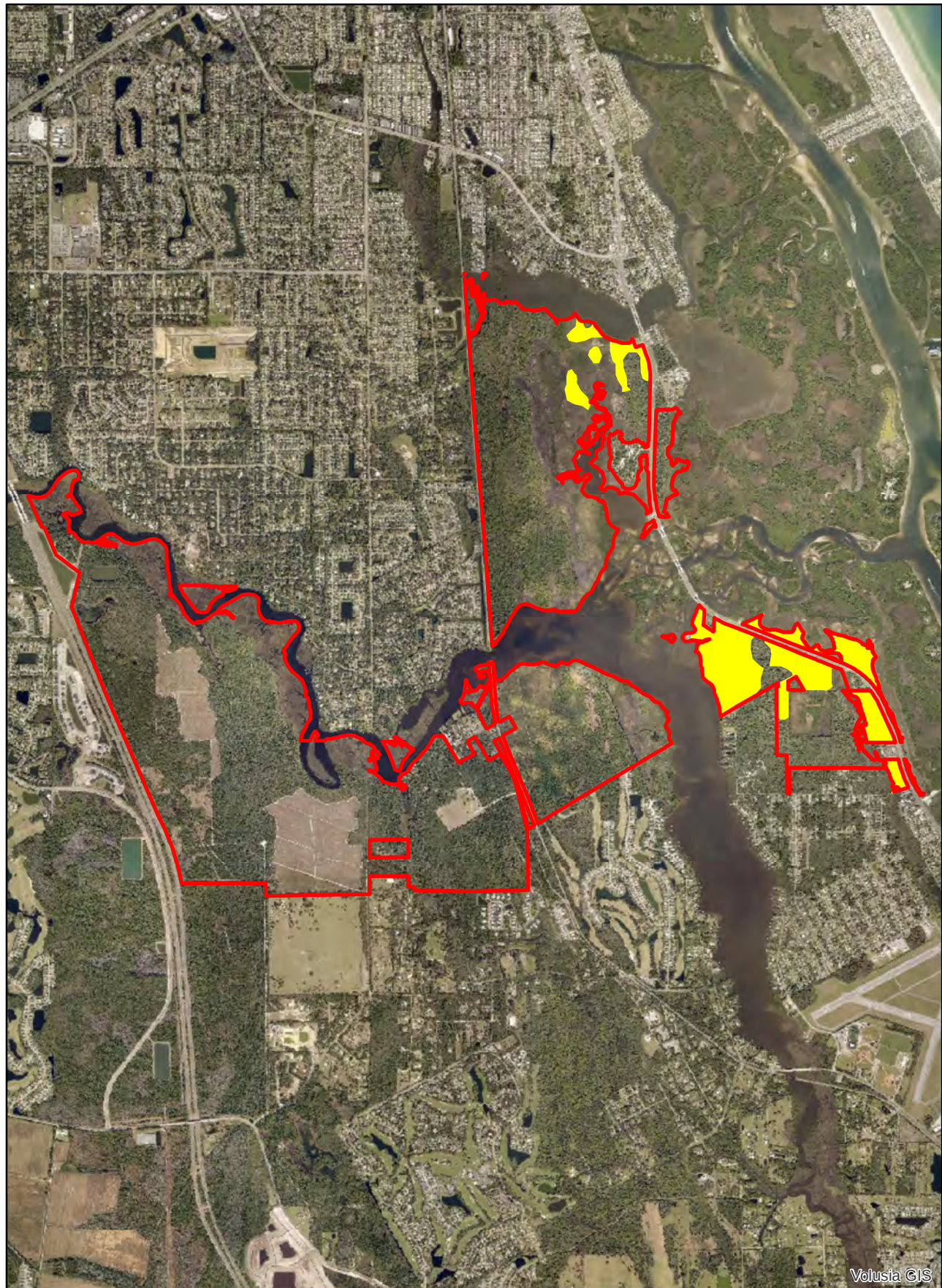
- Xeric Hammock is not a fire adapted community
- Monitor and treat for exotic and invasive species of plants and animals
- Identify and remove refuse or garbage

Specific Restoration Strategies by Tract:

Priority-Maintenance

- All xeric hammock located on DLSCP are considered in maintenance condition and will be monitored for both exotic plants and animals

Doris Leeper Spruce Creek Preserve Maritime Hammock-176 Acres



0 650 1,300 2,600 3,900 5,200 Feet

Figure 7

P-19



Resource Stewardship Division
April 2022

Maritime Hammock - Figure 7

Background:

- Maritime hammock is predominantly evergreen hardwood forest growing on stabilized coastal dunes lying at varying distances from the shore
- The maritime hammocks found within the Preserve have a closed canopy dominated by live oak, cabbage palm, southern magnolia, and pignut hickory
- The invasive exotic Australian pine is also present within the maritime hammock communities of the Preserve, although it is limited in occurrence
- Aside from continual threat of invasive exotics along edges, this system is considered good quality and in maintenance condition. No large stands of exotics are present and no major restoration activities appear necessary
- Fire is naturally rare in this community and is not planned as a management tool

Desired Future Conditions:

- Canopy
 - 80-100%
- Sub-canopy
 - shrubs 10-30%
- Ground cover
 - herbs & grasses 10-20%
- Fire Frequency
 - rare

General Restoration Strategies:

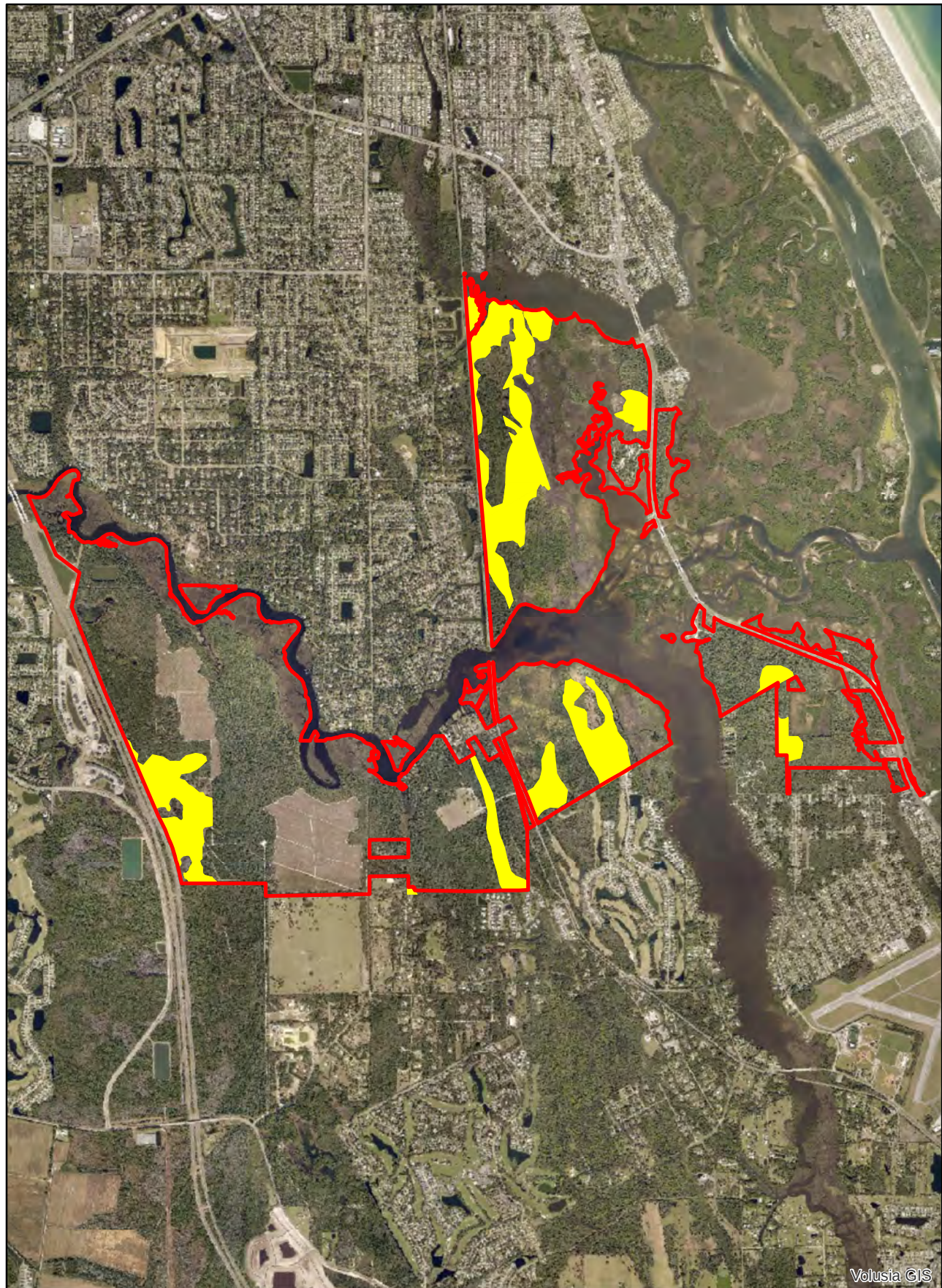
- Survey restoration area for cultural resources
 - Continue field inspections as restoration progresses
- Monitor and treat for exotic and invasive species of plants and animals
- Identify and remove refuse or garbage

Specific Restoration Strategies by Tract:

Priority – Maintenance

- No restoration needs or strategies for maritime hammock located on DLSCP have been identified

Doris Leeper Spruce Creek Preserve Mesic Flatwoods-342 Acres



0 650 1,300 2,600 3,900 5,200 Feet

Figure 8

P-21



Resource Stewardship Division
April 2022

Mesic Flatwoods – Figure 8

Background:

- Mesic flatwoods is characterized by an open canopy of tall pines, shrubs and a dense groundcover including many species of grasses and forbs
- Historically this community's canopy was dominated by longleaf pine
- Fire exclusion has altered the herbaceous groundcover
- Fire is the preferred restoration and management tool
- Urban interface conditions may restrict the use of prescribed fire
- Much of the Mesic flatwoods found on DLSCP are in maintenance condition due to the occurrence of multiple wildfires

Desired Future Conditions:

- Canopy
 - 10-50%
- Sub-canopy
 - shrubs 20-40%
 - palmetto 20-30%
- Ground cover
 - wiregrass 10-70%
 - herbs & grasses 10-20%
- Fire Frequency
 - 2-4 years
 - Growing season burns favored

General Restoration Strategies:

- Delineate area and assess need of restoration
- Determine appropriate methods for restoration
- Survey restoration area for cultural resources
 - Continue field inspections as restoration progresses
- Establish photo monitoring locations
 - GPS locations for future reference
 - Photographs taken every 6 months for the first 2 years
- Mark gopher tortoise burrows found within restoration area
- Secure restoration area to ensure public safety
- Reduce the canopy cover to comply with DFC
 - Harvest sub-canopy pine via a timber operation or individually by other means (Fellerbuncher, mulcher, chainsaw etc.)
 - Limit damage to remaining canopy trees
- Rollerchop or utilize similar technique to alter the vegetative structure of the sub-canopy so that fire can be reintroduced safely
- Identify and remove refuse or garbage piles
- Establish fire breaks and delineate burn zones
 - Fire breaks should be between 10-20' wide
 - Utilize natural fire breaks where possible

- Conduct prescribed fire
 - Following mechanical treatment, prescribed fire should be conducted as soon as fuel conditions are appropriate
 - Alternative methods may be utilized if conditions do not warrant the use of prescribed fire within the optimal time frame
- Monitor restoration area
 - Exotic and invasive species
 - Gopher tortoise activity
 - Photo points

Specific Restoration Strategies by Tract:

A - Priority – Medium

- Occurs in a remote area of A that is challenging to apply prescribed fire

D - Priority - Medium

- Additional evaluation of existing conditions and options is needed before initiating restoration operations

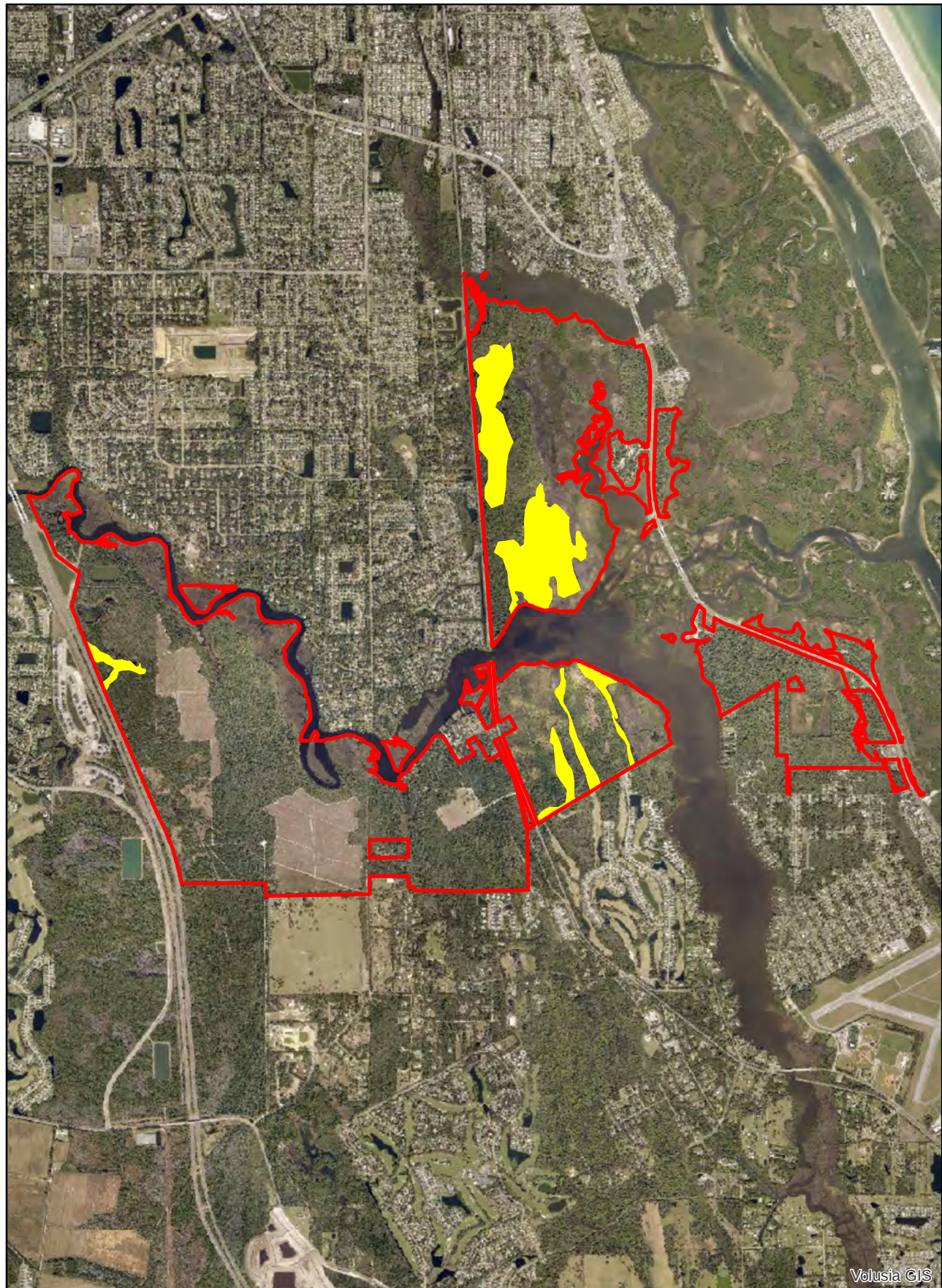
E - Priority - Medium

- Mechanically treat sub-canopy layer
- Larger pine trees will limit roller chopping

F - Priority - Low

- Additional evaluation of existing conditions and options is needed before initiating restoration operations

Doris Leeper Spruce Creek Preserve Wet Flatwoods-191 Acres



Volusia GIS

Figure 9

P-24



Resource Stewardship Division
April 2022

Wet Flatwoods – Figure 9

Background:

- Pine forests with a sparse or absent sub-canopy and a dense groundcover of hydrophytic grasses, herbs, and low shrubs
- Due to fire suppression, the groundcover layer is suppressed and the shrub layer dominates
Fire is the preferred restoration and management tool
- Urban interface conditions may restrict the use of prescribed fire
-

Desired Future Conditions:

- Canopy cover
 - trees 50-80%
- Sub-canopy cover
 - shrubs 0-10%
- Ground cover
 - herbs & grasses 30-100%
 - wiregrass dominated
- Fire frequency
 - 5-7 years
 - growing season burns favored

General Restoration Strategies:

- Delineate area and assess need of restoration
- Determine appropriate methods for restoration
- Survey restoration area for cultural resources
 - Continue field inspections as restoration progresses
- Establish photo monitoring locations
 - GPS locations for future reference
 - Photographs taken every 6 months for the first 2 years
- Mark gopher tortoise burrows found within restoration area
- Secure restoration area to ensure public safety
- Reduce the canopy cover to comply with DFC
 - If applicable, harvest mature pine via a timber operation or individually by other means (Fellerbuncher, mulcher, chainsaw etc.)
 - Limit damage to remaining canopy trees
- Rollerchop or utilize similar technique to alter the vegetative structure of the sub-canopy so that fire can be reintroduced safely
- Identify and remove refuse or garbage piles
- Establish fire breaks and delineate burn zones
 - Fire breaks should be between 10-20' wide
 - Utilize natural fire breaks where possible
- Conduct prescribed fire
 - Following mechanical treatment, prescribed fire should be conducted as soon as fuel conditions are appropriate

- o Alternative methods may be utilized if conditions do not warrant the use of prescribed fire within the optimal time frame
- Monitor restoration area
 - o Exotic and invasive species
 - o Gopher tortoise activity
 - o Photo points

Specific Restoration Strategies by Tract:

A - Priority - Medium

- Continue to investigate alternative timbering techniques
- Occurs in a remote area of A that might be challenging for prescribed burns.
-

E - Priority - Medium

- Continue to investigate alternative timbering techniques

G - Priority - Medium

- Continue to investigate alternative timbering techniques

H - Priority - Medium

- Continue to investigate alternative timbering techniques

Doris Leeper Spruce Creek Preserve Mesic Hammock-166 Acres

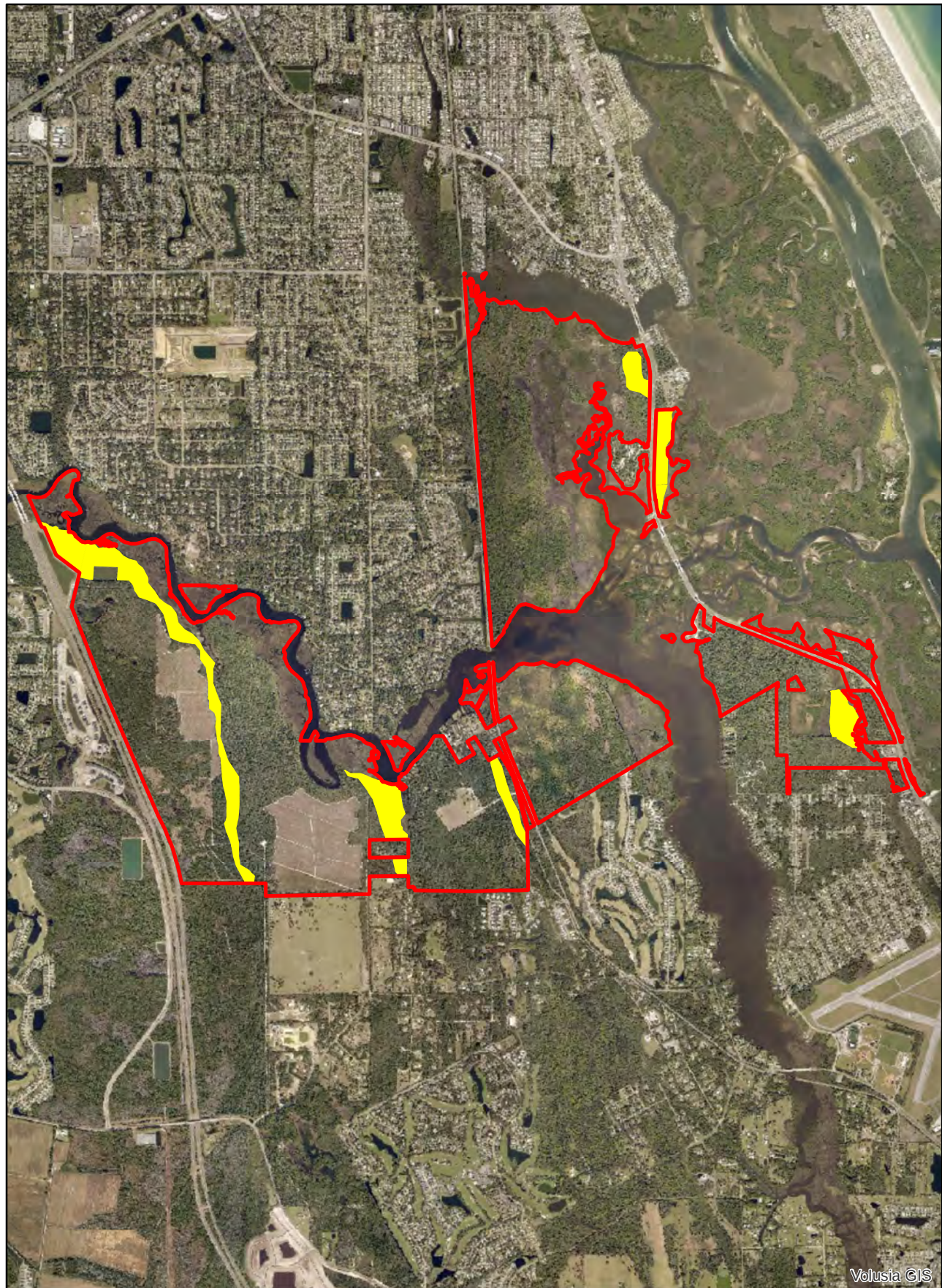


Figure 10

Mesic Hammock –Figure 10

Background:

- Dominated by canopy trees which include large oaks, cabbage palm, southern magnolia and hickory
- Canopy usually closed
- Understory consists of saw palmetto, scrub olive and yaupon holly
- Restoration of mesic hammock to scrub may not be feasible
- Parent habitat historically was scrub. Fire suppression resulted in succession to mesic hammock
- Historic range of habitat was limited to areas protected from natural fires, i.e. islands in swamps
- Not fire adapted
- Healthy and functioning at optimum levels

Desired Future Conditions:

- Canopy
 - tree 50-100%
- Sub-canopy
 - shrubs 20-60%
- Ground cover
 - herbs & grasses 10-20%
- Fire Frequency
 - Rare

General Restoration Strategies:

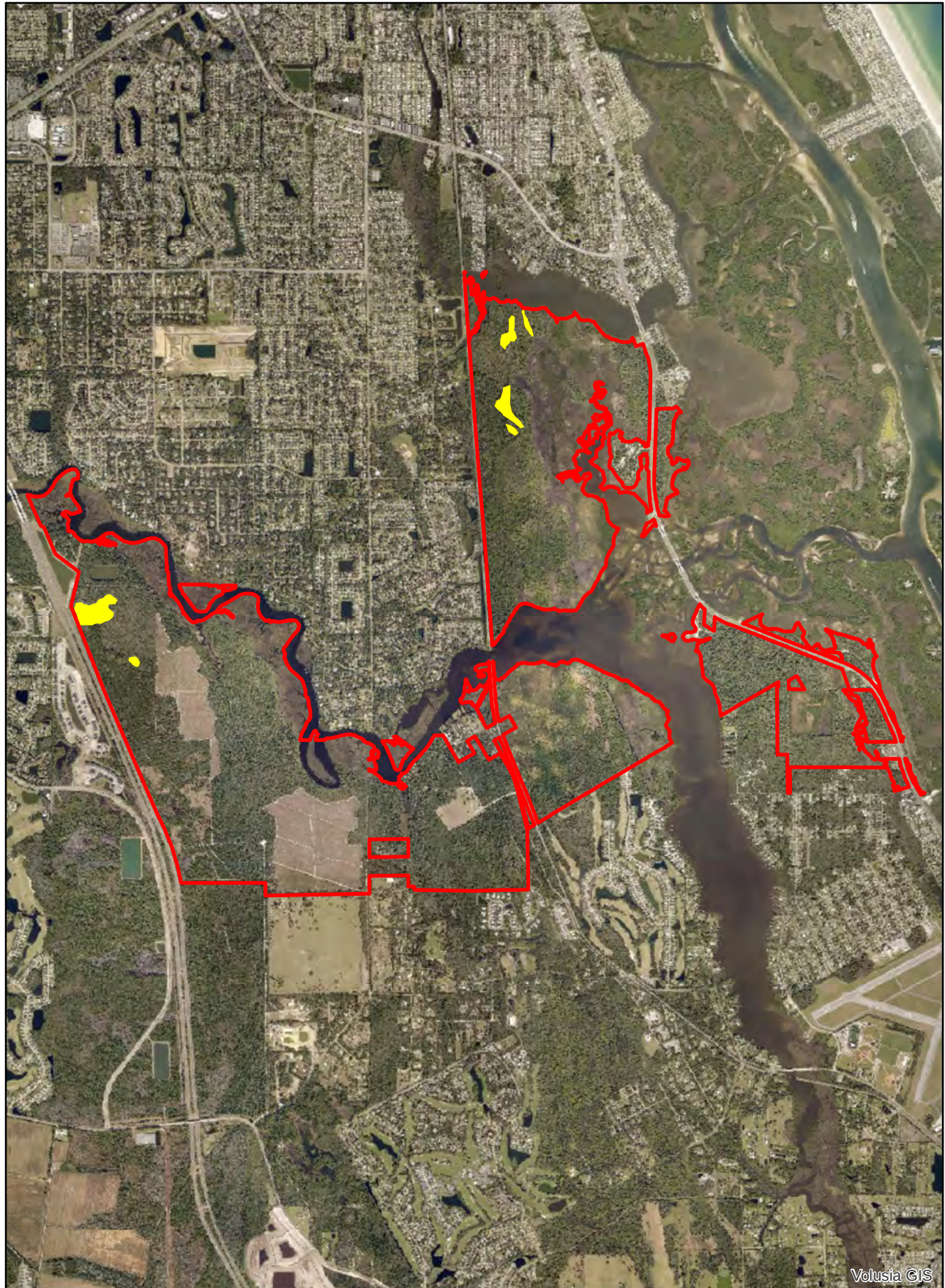
- Survey restoration area for cultural resources
 - Continue field inspections as restoration progresses
- Mesic hammock is not a fire adapted community
- Monitor and treat for exotic plant and animal species
- Identify and remove refuse or garbage

Specific Restoration Strategies by Tract:

Priority - Maintenance

- All mesic hammock located on DLSCP are considered in maintenance condition and will be monitored for both exotic plants and animals
- Consider experimental restoration of small areas of mesic hammock in the future

Doris Leeper Spruce Creek Preserve Wet Prairie-23 Acres



Volusia GIS



0 650 1,300 2,600 3,900 5,200 Feet

Figure 11

P-29



Resource Stewardship Division
April 2022

Wet Prairie – Figure 11

Background:

- Wet prairies are small herbaceous depressions found on wet and inundated soils within wet and mesic flatwoods
- Fire is the preferred restoration and management tool
- Fire frequency is subject to conditions of surrounding landscape
- Urban interface conditions may restrict the use of prescribed fire
- In the absence of fire, habitat will become overgrown with trees and shrubs

Desired Future Conditions:

- Canopy cover
 - trees 0-20%
- Sub-canopy cover
 - shrubs 0-20%
- Ground cover
 - herbs & grasses 30-100%
 - wiregrass dominated
- Fire frequency
 - 2-4 years

General Restoration Strategies:

- Survey restoration area for cultural resources
 - Continue field inspections as restoration progresses
- When a wet prairie is within or adjacent to an upland fire adapted community, it may be included in the burn plan for that individual zone
- Monitor restoration area
 - Exotic and invasive species
 - Vehicle or human traffic
 - Feral hog damage
- Identify and remove refuse or garbage

Specific Restoration Strategies by Tract:

Priority - Low

- Wet prairie communities imbedded within fire dependent habitats will be included into conceptual burn zone of the surrounding habitat

Doris Leeper Spruce Creek Preserve Coastal Hydric Hammock-8 Acres



0 650 1,300 2,600 3,900 5,200 Feet

Figure 12

P-31



Resource Stewardship Division
April 2022

Coastal Hydric Hammock – Figure 12

Background:

- DLSCP coastal hydric hammock is 100% cabbage palm canopy
- understory dominated by palms and ferns occurring on moist
- soils Open understory
- Not a fire dependent community

Desired Future Conditions:

- Canopy cover
 - trees 50-100%
- Sub-canopy
 - shrubs 0-20%
- Ground cover
 - herbs & grasses 0-20%
- Fire frequency
 - rare

General Restoration Strategies:

- Survey restoration area for cultural resources
 - Continue field inspections as restoration
- progresses Identify and remove refuse or garbage
- Monitor to keep ground disturbance minimal
- Monitor and treat for exotic species

Specific Restoration Strategies by Tract:

Priority - Maintenance

- No restoration planned or anticipated at this time

Doris Leeper Spruce Creek Preserve Bottomland Forest-81 Acres

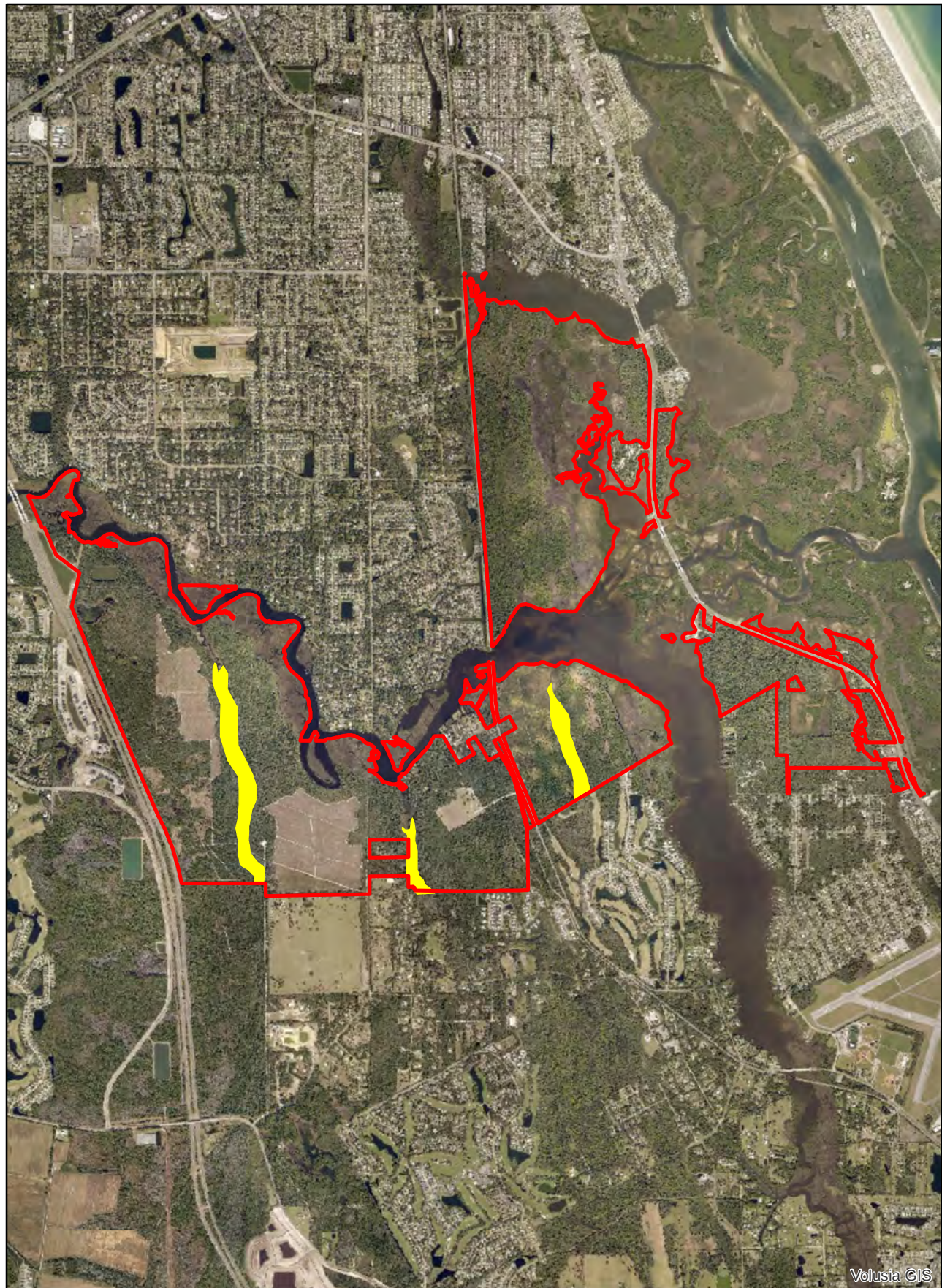


Figure 13

Bottomland Forest – Figure 13

Background:

- Closed canopy forest associated with riverine floodplains and
 - depressions Dominated by large laurel oak, sweetbay, magnolia and
 - cabbage palm
- Preferred habitat of the Florida black bear
Not a fire adapted community

Desired Future Conditions:

- Canopy cover
 - trees 80-100%
- Sub-canopy
 - shrubs 20-50%
- Ground cover
 - herbs & grasses 0-20%
- Fire frequency
 - rare

General Restoration Strategies:

- Survey restoration area for cultural resources
 - Continue field inspections as restoration progresses
- Monitor to keep ground disturbance minimal
- Monitor and treat for exotic species
- Identify and remove refuse or garbage

Specific Restoration Strategies by Tract:

Priority - Maintenance

No restoration planned or anticipated at this time

Doris Leeper Spruce Creek Preserve Salt Marsh-549 Acres

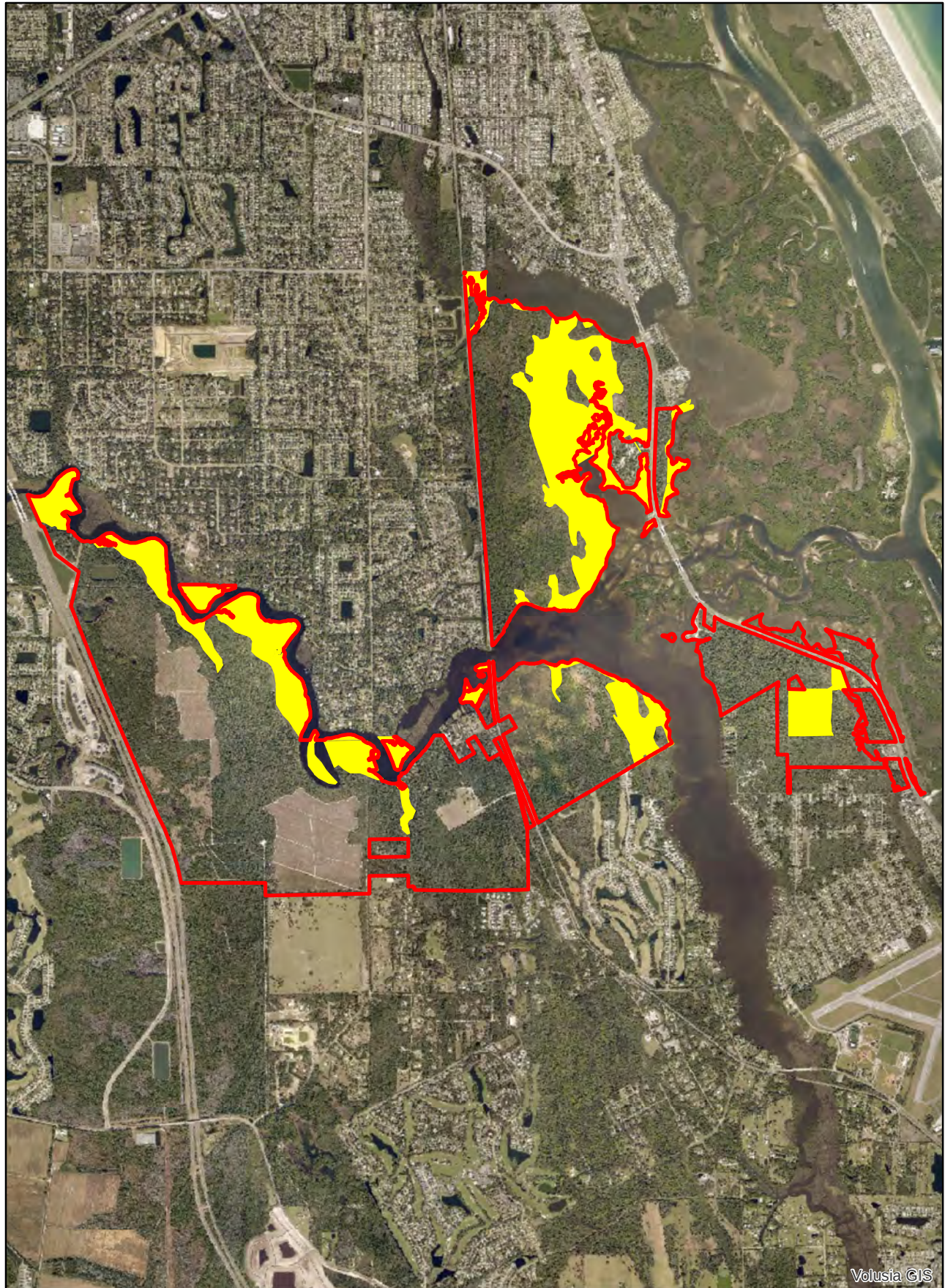
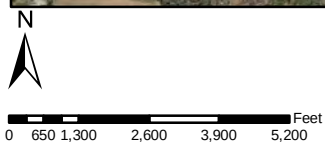


Figure 14

P-35



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Salt Marsh – Figure 14

Background:

- A tidally influenced aquatic herbaceous community dominated by cordgrass and needle rush
- Protected from wave activity by barrier islands
- Highly productive natural community providing a base for the food chain
- Numerous ditches are located within DLSCP, probably constructed in the 50's and 60's for mosquito control

Desired Future Conditions:

- Canopy cover
 - trees 0-10%
- Sub-canopy
 - shrubs 50-100%
- Ground cover
 - herbs & grasses 0-10%
- Fire frequency
 - occasional

General Restoration Strategies:

- Survey restoration area for cultural resources
- Continue field inspections as restoration progresses

Specific Restoration Strategies by Tract:

B - Priority - Medium

- Remove approximately 250' of old U.S. 1 causeway to improve tidal flow
- Evaluate need for planting appropriate species after causeway removal

Priority - Maintenance

- The largest quantity of ditching appears to be located on Tract A.
- Additional evaluation of existing conditions and options is needed before initiating restoration operations
- Coordinate with Mosquito Control if needed
- Monitor and treat for exotic species

Doris Leeper Spruce Creek Preserve Mangrove Swamp-9 Acres



Figure 15

Mangrove Swamp – Figure 15

Background:

- Dominated by black mangroves but red and white mangrove may be present
- Extremely sensitive to exotic species encroachment
 - Brazilian pepper
 - Australian pine
- Extremely important biological community
- Marine and estuarine organisms rely on the mangrove swamp to complete their life cycle
- Mangrove leaf shedding makes up most of the organic material available in the aquatic food web
- Provides important habitat for many rare and endangered flora and fauna
- Functions as a nursery for fish and shell fish

Desired Future Conditions:

- Canopy cover
 - trees 50-100%
- Sub-canopy
 - shrubs 50-100%
- Ground cover
 - herbs & grasses 0-10%
- Fire frequency
 - n/a

General Restoration Strategies:

- Survey restoration area for cultural resources
 - Continue field inspections as restoration progresses
- Monitor and treat for exotic species
- Exclude all recreational access to the adjacent open waters through intact mangrove areas
- Identify and remove refuse or garbage

Specific Restoration Strategies by Tract:

Priority - Maintenance

- Monitor and treat for exotic species

Doris Leeper Spruce Creek Preserve Impoundment-5 Acres



Figure 16

Impoundment – Figure 16

Background:

- Freshwater borrow pit located on the west portion of Tract G approximately 15 acres
 - narrow littoral zone
 - large pelagic zone

Desired Future Conditions:

- Canopy cover
 - trees 0-10%
- Sub-canopy
 - shrubs 0-10%
- Ground cover
 - n/a
- Fire frequency
 - n/a

General Restoration Strategies:

- Survey restoration area for cultural resources
 - Continue field inspections as restoration progresses
- The two areas classified as Impoundment will be monitored for exotic invasive plants and animals but no restoration has been discussed at this time
- If restoration is to be performed on either of these areas a plan would be formulated to guide the restoration
- Identify and remove refuse or garbage

Specific Restoration Strategies by Tract:

G - Priority - Maintenance

- Monitor and treat for exotic species

Doris Leeper Spruce Creek Preserve Successional Hardwood Forest-34 Acres



Figure 17

Successional Hardwood Forest – Figure 17

Background:

- Climax community for multiple parent
- Habitats created due to fire exclusion
 - o Closed canopy hardwood forest
 - o Dense sub-canopy, usually young trees of the canopy

Desired Future Conditions:

- Canopy cover
 - o Trees - To be determined
- Sub-canopy
 - o shrubs - To be determined
- Ground cover
 - o herbs - To be determined
- Fire frequency
 - o To be determined

General Restoration Strategies:

- Survey restoration area for cultural resources
 - o Continue field inspections as restoration progresses
- Additional evaluation of existing conditions and options is needed to evaluate parent habitat and DFCs
- Identify and remove refuse or garbage

Specific Restoration Strategies by

Tract:

Priority - Low

- Additional evaluation of existing and historic conditions and options is needed before initiating restoration operations

Doris Leeper Spruce Creek Preserve Improved Pasture-19 Acres



0 650 1,300 2,600 3,900 5,200 Feet

Figure 18



Improved Pasture – Figure 18

Background:

- Tract F - cleared and planted with bahia grass in the mid 1970's
 - Used as equestrian trail head
- Tract G –site of historic and abandoned dairy
- Portions of pastures to be maintained for public use
 - Equestrian area
 - Group camping
- Potentially historic habitat is sandhill

Desired Future Conditions:

- Canopy cover
 - Trees – 30-60%
- Sub-canopy
 - shrubs – 10-40%
- Ground cover
 - herbs & grasses – 20-80%
 - wiregrass
- dominated • Fire frequency
 - rare

General Restoration Strategies:

- Survey restoration area for cultural resources
 - Continue field inspections as restoration progresses
- Apply herbicide and mechanical removal to pasture as necessary
- Identify and remove refuse or garbage
- Establish groundcover by reseeding or planting
- Monitor and treat residual bahia grass
- Establish fire breaks and delineate burn zones
 - Fire breaks should be between 10'-20' wide
 - Utilize natural fire breaks where possible
- Conduct prescribed fire
- Plant longleaf pine in appropriate densities
- Monitor restoration area
 - Exotic and invasive species
 - Gopher tortoise activity
 - Photo points

Specific Restoration Strategies by Tract:

F - Priority – Medium

- Identify 10-15 acres of pasture to restore Maintain trail access
- Take steps to limit public access in the restoration area during restoration Apply herbicide to existing bahia grass
- Reseed restoration area with appropriate groundcover mixture Spot treat residual bahia grass as needed
- Conduct prescribed fire
- Plant longleaf pines at appropriate densities

G - Priority – Maintenance

- Maintain area for public use (group camping)

Doris Leeper Spruce Creek Preserve Blackwater Stream-26 Acres

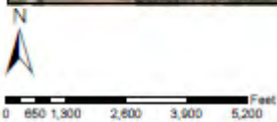


Figure 19

Resource Stewardship Division
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Blackwater Stream- Figure 19

Background:

- Flowing waters from Spruce Creek to the downstream limits of tidal influence and bounded by channel banks occurring on tracts G.

Desired Future Conditions:

- Canopy cover
 - trees n/a
- Sub-canopy
 - n/a
- Ground cover
 - n/a
- Fire frequency
 - n/a

General Restoration Strategies:

- Identify and remove refuse or garbage

Specific Restoration Strategies by Tract:

G - Priority - Maintenance

- Monitor and treat for exotic species

Priority Summary –

Habitat	Tract		Priority
	Name	Acres	
Scrub	D	30	Medium
Scrub	G	246	Medium
Scrub	H	1	Medium
Scrubby Flatwoods	E	92	Medium
Scrubby Flatwoods	G	33	Medium
Scrubby Flatwoods	H	106	Medium
Mesic Flatwoods	A	158	Medium
Mesic Flatwoods	D	19	Medium
Mesic Flatwoods	E	69	Medium
Wet Flatwoods	A	146	Medium
Wet Flatwoods	E	34	Medium
Wet Flatwoods	G	2	Medium
Wet Flatwoods	H	9	Medium
Salt Marsh	B	9	Medium
Improved Pasture	F	19	Medium
Scrub	F	68	Low
Scrubby Flatwoods	A	14	Low
Scrubby Flatwoods	F	80	Low
Mesic Flatwoods	F	23	Low
Mesic Flatwoods	H	73	Low
Wet Prairie	A	11	Low
Wet Prairie	G	4	Low
Wet Prairie	H	8	Low
Successional Hardwood Forest	F	34	Low
Xeric Hammock	F	6	Maintenance
Xeric Hammock	G	188	Maintenance
Xeric Hammock	H	12	Maintenance
Maritime Hammock	A	28	Maintenance
Maritime Hammock	C	43	Maintenance
Maritime Hammock	D	97	Maintenance
Maritime Hammock	G	8	Maintenance

Mesic Hammock	A	11	Maintenance
Mesic Hammock	B	18	Maintenance
Mesic Hammock	D	17	Maintenance
Mesic Hammock	F	37	Maintenance
Mesic Hammock	G	63	Maintenance
Mesic Hammock	H	4	Maintenance
Mesic Hammock	I	16	Maintenance
Coastal Hydric Hammock	D	8	Maintenance
Bottomland Forest	E	22	Maintenance
Bottomland Forest	F	11	Maintenance
Bottomland Forest	G	40	Maintenance
Bottomland Forest	H	8	Maintenance
Salt Marsh	A	249	Maintenance
Salt Marsh	D	37	Maintenance
Salt Marsh	E	48	Maintenance
Salt Marsh	F	21	Maintenance
Salt Marsh	G	141	Maintenance
Salt Marsh	I	24	Maintenance
Mangrove	D	2	Maintenance
Mangrove	E	7	Maintenance
Impoundment	G	5	Maintenance
Blackwater Stream	G	26	Maintenance

Maritime Hammock	C	30	Maintenance
Maritime Hammock	D	113	Maintenance
Mesic Hammock	A	11	Maintenance
Mesic Hammock	F	95	Maintenance
Mesic Hammock	G	164	Maintenance
Salt Marsh	A	275	Maintenance
Salt Marsh	C	1	Maintenance
Salt Marsh	D	43	Maintenance
Salt Marsh	E	45	Maintenance
Salt Marsh	F	23	Maintenance
Salt Marsh	G	81	Maintenance
Shaded habitats need further evaluation			

Scrub restoration project completed in 2014. This area of scrub is now within maintenance condition.

Appendix 1

November 14, 2012

Draft Buffer Plan for 170 Acres in the Martin's Dairy Tract of Doris Leeper Spruce Creek Preserve

Project Boundary: The scrub restoration area represents approximately 170 acres of the Doris Leeper Spruce Creek Preserve (DLSCP). This area is located on the Martin's Dairy tract, at the end of Martin's Dairy Road, bounded by the power line to the east and Spruce Creek to the north. The area has been identified as scrub habitat on surveys as far back as 1833, and is now overgrown primarily due to 60 years of fire suppression. This Buffer Plan corresponds to the November 6, 2012 DLSCP map.

Purpose: The buffer plan is a management strategy for a portion of the Martin's Dairy Tract of the DLSCP, which reduces the chance of a catastrophic fire, restores historic scrub habitat, and promotes compatible recreation activities, while ensuring safe conditions for the public and land managers.

Action Steps:

Zone A: Maintain the existing vegetation throughout a buffer of variable width, not less than 50 feet, throughout the western portion of the site. This buffer is expected to be 50-100 feet due to the transition of habitat types in this area.

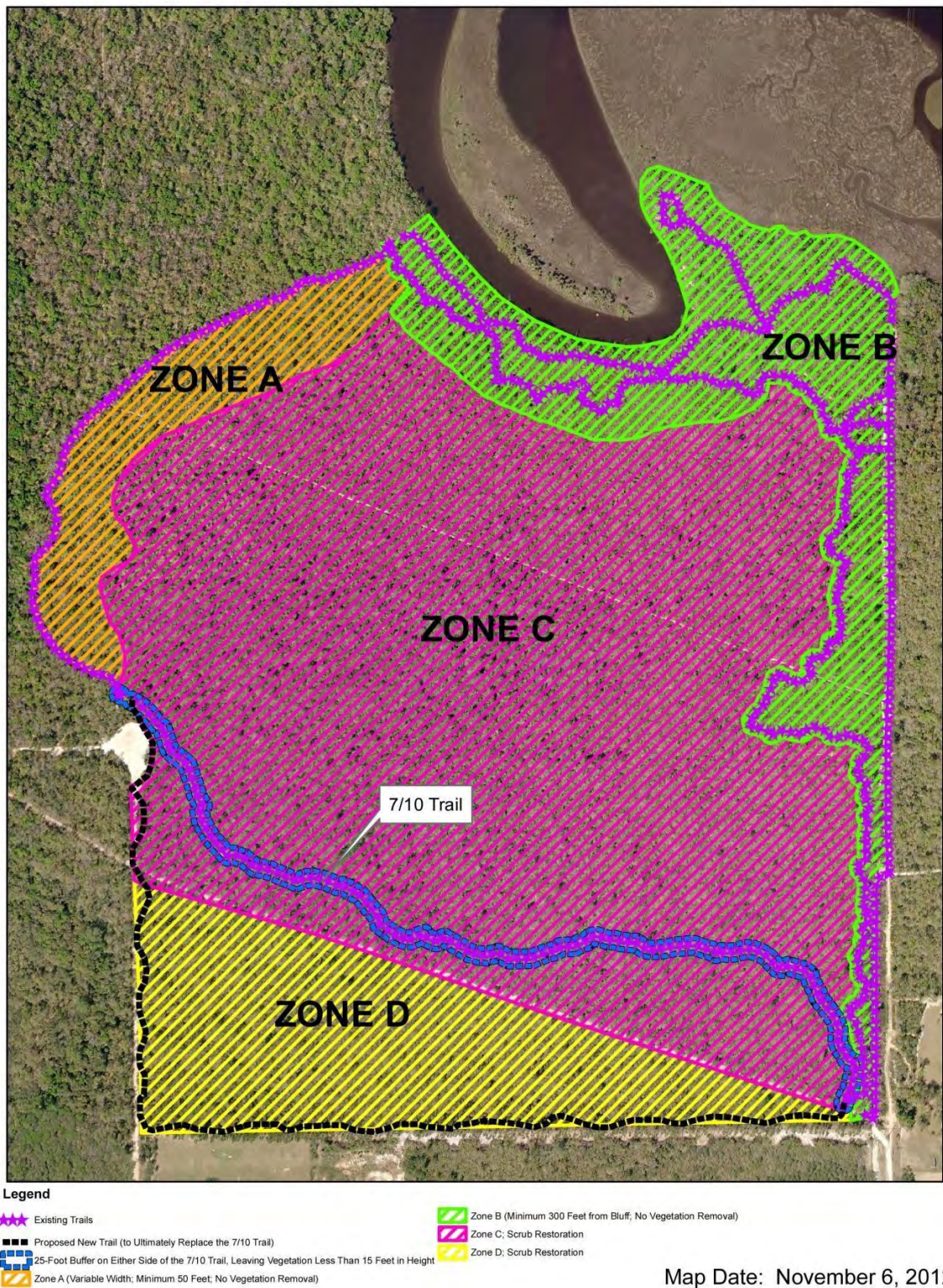
Zone B: Maintain the existing vegetation throughout a buffer that is at least 300 feet from the Spruce Creek bluff on the north and at least 25 feet along the south and west of the trail.

Zone C: Relocate the "7/10 Trail" to the bottom of Zone D and eventually remove the trail through Zone C. Continue use of the "7/10 Trail" with buffers of 25 ft. on both sides during the construction of the new trail, leaving vegetation of less than 15 ft. in place. The remainder of Zone C will be roller chopped. During the restoration, portions of this trail may be closed for public safety.

Zone D: Establish a new trail at the southern border of the property to replace the “7/10 Trail” and meet the recreational needs of users.

Zones C and D will be treated with prescribed fire within one year.

Doris Leeper Spruce Creek Preserve



Appendix Q

Doris Leeper Biography

ARTICLE

Doris Leeper

Canaveral National Seashore

A resident of New Smyrna Beach since 1958, the late Doris “Doc” Leeper’s lifelong interest in the relationship of natural and built environments has created three testimonials to her vision – Canaveral National Seashore, the Doris Leeper Spruce Creek Preserve, and the Atlantic Center for the Arts, an artist community responsible for giving New Smyrna Beach an international arts reputation. In 1999, she was inducted into the Florida Artists Hall of Fame, the highest and most prestigious cultural honor that can be bestowed upon an individual in the State of Florida.

Born on April 4, 1929 Doc graduated from Duke University in 1951 with a degree in art history and eventually earned an honorary doctorate. Until the mid 60’s she lived off a small income of \$3,000 a year selling paintings periodically to supplement her income.

After moving to Eldora she began creating non-representational art in her newly built art studio/guest house located on her beachside property. She enjoyed having guests over and playing tennis at her tennis court. The tennis court asphalt remnants are still present on the historic property.

Doris lived with two great danes in pure solitude. She didn’t however live a lonely life throwing parties at her home that often had business undertones. She was constantly engaged in community relations and worked to raise money for her Atlantic Center for the Arts vision that she shared with others. Art and politics were quite intertwined.

She slowly made a name for herself. Doris was commissioned to create large modern sculptures which are displayed throughout the country by various businesses, museums and private collectors. One such commission known as the “Steel Quilt” is displayed at the Orlando International Airport.



Doris with her great danes at her original home located at Canaveral National Seashore. Her dane Sugar walks to the waters edge.

NPS/Photo: photo courtesy Atlantic Center for the Arts

In 1961 John D. MacArthur one of the richest men in the world at that time purchased 5 miles of land just south of Leeper's beachside residence. MacArthur for a period of time owned the largest portion of land throughout the state of Florida at 100,000 acres. His intention was to develop this property with portions being ocean front the majority of which was in Palm Beach.

Doris was concerned of the possibility of a bridge being constructed to reach this future development. In the 1960's she was a force within the newly formed Friends of Canaveral that sought to keep the land preserved. She participated until Canaveral National Seashore was established in 1975. She was likely given a lifetime lease or payment for her property by the federal government.



NPS/Photo courtesy ACA

Soon after Doris sought for the same peaceful tranquility by the waters edge for the purpose of creating her art. This lead her to a 67 acre property on Turnbull Bay.

"We said if we could arrange to get some waterfront somewhere, and keep the natural environment, and do everything we could not to disturb the environment, the wonderful sense that I had at my place there could be transferred to the center, and, in fact, that's what happened...The model for the Atlantic Center in spirit was my place down at Canaveral National Seashore," - Doris Leeper

The center was designed to leave a minimalistic footprint and blends in with the environment. The properties themselves are only built on 10 acres of the 67 acres. She initiated the Friends of Spruce Creek which created the Spruce Creek Preserve adjacent to the Atlantic Center for the Arts that she established. After her passing in 2,000 the Spruce Creek Preserve was renamed the Doris Leeper Spruce Creek Preserve.

Doris suggested in one interview to put on her epitaph, "Doris Leeper: Never Lazy". Later in her life she was known for working on as many as half a dozen projects at a time. She even got to a point where she contemplated turning requests down. Her passion for her art definitely attracted many. With her sculptures she was able to create works of art that were completely open for interpretation. Many eventually came without a title so as not to limit the viewers own interpretations of the art. She often had the viewers in mind when creating her pieces. Art with open interpretation may have been the major selling point for many museums and businesses who ultimately placed these sculptures in there gardens or entryways.

Some adjectives people have used to describe her are "visionary, an awesome force, persuasive, talented, strong, focused, a great artist, and a great free-thinker." Her focus, strength and free-thinking helped her create major works of art and would be the legacy that she valued. To quote Doris, "If I had my druthers, I would rather be known as an artist".

The beauty and solace of nature are also her legacy for future generations to enjoy and explore here at Canaveral National Seashore. Canaveral National Seashore was authorized as a unit of the National Park Service on January, 3rd 1975. It was through efforts of concerned citizens such as Doris Leeper that it is now preserved and protected for future generations.

Resources:

About John D. & Catherine T. MacArthur. (n.d.). Retrieved November 16, 2020, from <https://www.macfound.org/about/our-history/about-the-macarthurs/>

Florida Frontiers: Artist Was a Visionary Environmentalist. (2014, July 7). Retrieved November 11, 2020, from . <https://www.floridatoday.com/story/news/local/2014/07/07/florida-frontiers-artist-visionary-environmentalist/12325023/>

Norman, N. L. (2016). *Doris Leeper: Legacy of a visionary*. Cocoa, FL: Florida Historical Society Press.

Parker, S. R. (2008). *Canaveral National Seashore Historic Resource Study*. Atlanta, GA: Cultural Resources Division, Southeast Regional Office, National Park Service.



This sculpture Doris Leeper created greets visitors to the Atlantic Center for the Arts.

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