

A Management Plan for  
Split Oak Forest  
Wildlife and Environmental Area  
2017 – 2027



Orange and Osceola Counties, Florida

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**Florida Fish and Wildlife Conservation Commission**  
620 South Meridian Street  
Tallahassee, Florida 32399-1600

**A Management Plan  
for  
Split Oak Forest Wildlife and Environmental Area**

Orange and Osceola Counties, Florida

Owned by Orange and Osceola Counties

Managed by the Florida Fish and Wildlife Conservation Commission



November 2016

Approved Thomas H. Eason

Thomas H. Eason, Ph.D.  
Director, Division of Habitat and Species Conservation

## LAND MANAGEMENT PLAN EXECUTIVE SUMMARY

Lead Agency: Florida Fish and Wildlife Conservation Commission (FWC)

Common Name of Property: Split Oak Forest Wildlife and Environmental Area

Location: Orange and Osceola Counties, Florida

Acreage Total: 1,689 acres

Acreage Breakdown:

<u>Land Cover Classification</u>	<u>Acres</u>	<u>Percent of Total Area</u>
Scrubby flatwoods	465.38	26.30%
Mesic flatwoods	365.14	26.30%
Wet flatwoods	212.83	12.00%
Baygall	126.8	7.20%
Basin marsh	117.41	6.60%
Dome swamp	80.78	4.60%
Mesic hammock	77.07	4.40%
Flatwoods lake	60.31	3.40%
Spoil area	57.74	3.30%
Pasture - improved	54.29	3.10%
Xeric hammock	49.86	2.80%
Scrub	38.78	2.20%
Impoundment/artificial pond	26.14	1.50%
Clearing/regeneration	12.58	0.10%
Depression marsh	13.97	0.10%
Canal/ditch	3.15	<0.1%
Sandhill	8.46	<0.1%
Wet prairie	0.88	<0.1%

\*GIS-calculated acreage for land cover classification varies slightly from actual total acreage.

Interagency Agreement No.: 93078 (Appendix 13.1)

Use: Single \_\_\_\_\_

Multiple X

Management Responsibilities:

Agency FWC

Responsibilities

LEAD, SUBLESSEE (Wildlife and Environmental Area, resource protection, law enforcement)

Designated Land Use: Wildlife and Environmental Area

Sublease (s): None

Encumbrances: List: None

Type Acquisition: Mitigation Park Program

Unique Features: Natural: Split Oak, Unique assemblage of imperiled wildlife species and natural communities and Lake Hart.

Archaeological/Historical: None documented within the area.

Management Needs: Habitat restoration and improvement; public access and recreational opportunities; hydrological preservation and restoration; exotic and invasive species maintenance and control; imperiled species habitat maintenance, enhancement, and restoration.

Acquisition Needs/Acreage: Currently no parcels or acreage are on the FWC Additions and Inholdings list; However the OCBP Shows Additional Lands Recommended for Potential Conservation (Figure 4 & Figure 11).

Surplus Lands/Acreage: None

Public Involvement: Management Advisory Group consensus building meeting and Public Hearing (Appendix 13.5)

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

ARC Approval Date \_\_\_\_\_ BTIITF Approval Date: \_\_\_\_\_

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Land Management Plan Compliance Checklist

Required for State-owned conservation lands over 160 acres

### 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	ii, 1
2	The land acquisition program, if any, under which the property was acquired.	18-2.018 & 18-2.021	3-6
3	Degree of title interest held by the Board, including reservations and encumbrances such as leases.	18-2.021	3-7
4	The legal description and acreage of the property.	18-2.018 & 18-2.021	ii, 1, 3, Appendix 13.1 and 13.2
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	10-14, 92
6	An <b>assessment</b> as to whether the property, or any portion, should be declared surplus. <i>Provide Information regarding <b>assessment and analysis</b> in the plan, and provide <b>corresponding map</b>.</i>	18-2.021	54-56
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	74-77
8	Identification of adjacent land uses that conflict with the planned use of the property, if any.	18-2.021	9, 15
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)	3-4
10	Proximity of property to other significant State, local or federal land or water resources.	18-2.021	7-9,13

### 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	54-56
12	A description of past and existing uses, including any unauthorized uses of the property.	18-2.018 & 18-2.021	51-54
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	54-55
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	6-7, 78
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	50, 74, 78, 86-87

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	73-78
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)	52-55
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	52-54
19	Letter of compliance from the local government stating that the LMP is in compliance with the Local Government Comprehensive Plan.	BOT requirement	Appendix 13.16 and 13.17
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	16-18, 25-26, 50, 54-55, 61-69, 73-80
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	54-55
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	Appendix 13.13
23	A statement regarding incompatible use in reference to Ch. 253.034(10).	253.034(10)	55

\*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	16, Appendix 13.5
25	The management prospectus required pursuant to paragraph (9)(d) shall be available to the public for a period of 30 days prior to the public hearing.	259.032(10)	Appendix 13.5
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)	16, Appendix 13.5
27	Summary of comments and concerns expressed by the advisory group for parcels over 160 acres	18-2.021	Appendix 13.5
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)	Appendix 13.5
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	58-59
30	Summary of comments and concerns expressed by the management review team, if required by Section 259.036, F.S.	18-2.021	N/A
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	N/A

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	17-18, 25-26, Appendix 13.7
33	Insert FNAI based natural community maps when available.	ARC consensus	38-39
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	18, 27-37

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	18. 27-37, 50-52
36	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding beaches and dunes.	18-2.021	50
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	50
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	37-49
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	46-49
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	49, Appendix 13.8
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)	58-116
42	<b>Habitat Restoration and Improvement</b>	259.032(10) & 253.034(5)	
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.	↓	58-116
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.		81-108
42-C.	The associated measurable objectives to achieve the goals.		81-108
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>		58-116, Appendix 13.3
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.		112-114, Appendix 13.12
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)	18-39
44	<b>Sustainable Forest Management, including implementation of prescribed fire management</b>	18-2.021, 253.034(5) & 259.032(10) ↓	



44-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).		58-116
44-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		81-108
44-C.	Measurable objectives (see requirement for #42-C).		81-108
44-D.	Related activities (see requirement for #42-D).		58-116, Appendix 13.3
44-E.	Budgets (see requirement for #42-E).		112-114, Appendix 13.12
45	Imperiled species, habitat maintenance, enhancement, restoration or population restoration	259.032(10) & 253.034(5)	
45-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	58-116
45-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		81-108
45-C.	Measurable objectives (see requirement for #42-C).		81-108
45-D.	Related activities (see requirement for #42-D).		58-116
45-E.	Budgets (see requirement for #42-E).		112-114, Appendix 13.12
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)	68-70
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	Appendix 13.14 and 13.15
48	Exotic and invasive species maintenance and control	259.032(10) & 253.034(5)	
48-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	58-116
48-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		81-108
48-C.	Measurable objectives (see requirement for #42-C).		81-108
48-D.	Related activities (see requirement for #42-D).		58-116
48-E.	Budgets (see requirement for #42-E).		112-114, Appendix 13.12

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</i>		49-50

	<i>appropriate managing agencies that have been notified of the proposed plan.</i>	18-2.018 & 18-2.021	
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	49-50
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	49-50
52	***Quantitative description of the land regarding an inventory of hydrological features and associated acreage. <i>See footnote.</i>	253.034(5)	49-50
53	<b>Hydrological Preservation and Restoration</b>	259.032(10) & 253.034(5)	
53-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	73
53-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		81-108
53-C.	Measurable objectives (see requirement for #42-C).		81-108
53-D.	Related activities (see requirement for #42-D).		58-116
53-E.	Budgets (see requirement for #42-E).		112-114, Appendix 13.12

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	50
55	***Quantitative data description of the land regarding an inventory of significant land, cultural or historical features and associated acreage.	253.034(5)	50, 74
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	74, Appendix 13.11
57	<b>Cultural and Historical Resources</b>	259.032(10) & 253.034(5)	
57-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	58-116
57-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		81-108
57-C.	Measurable objectives (see requirement for #42-C).		81-108
57-D.	Related activities (see requirement for #42-D).		58-116
57-E.	Budgets (see requirement for #42-E).		112-114, Appendix 13.12

**\*\*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)	74-77, 92
59	<b>Capital Facilities and Infrastructure</b>	259.032(10) & 253.034(5)	
59-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	81-108
59-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		58-116
59-C.	Measurable objectives (see requirement for #42-C).		58-116
59-D.	Related activities (see requirement for #42-D).		81-108
59-E.	Budgets (see requirement for #42-E).		112-114, Appendix 13.12
60	*** Quantitative data description of the land regarding an inventory of recreational facilities and associated acreage.	253.034(5)	74-77, 92
61	<b>Public Access and Recreational Opportunities</b>	259.032(10) & 253.034(5)	
61-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	81-108
61-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		58-116
61-C.	Measurable objectives (see requirement for #42-C).		58-116
61-D.	Related activities (see requirement for #42-D).		81-108
61-E.	Budgets (see requirement for #42-E).		112-114, Appendix 13.12

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	iv-xi
63	Place the Executive Summary at the front of the LMP. Include a physical description of the land.	ARC and 253.034(5)	ii-iii
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	56-58
65	Key management activities necessary to achieve the desired outcomes regarding other appropriate resource management.	259.032(10)	81-108

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)	112-114, Appendix 13.12
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)	112-114, Appendix 13.12
68	A statement of gross income generated, net income and expenses.	18-2.018	112-114, Appendix 13.12

\*\*\* = 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.

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## Management Plan Acronym Key

ADA	Americans with Disabilities Act
ACSC	Area of Critical State Concern
ARC	Acquisition and Restoration Council
BEBR	Bureau of Economic and Business Research
CAS	Conservation Action Strategy
CLIP	Critical Lands and Waters Identification Project
DACS	Department of Agriculture and Consumer Services
DEP	Department of Environmental Protection
DOD	Department of Defense
DSL	Division of State Lands
FAC	Florida Administrative Code
FFAIAL	Florida Forever Addition and Inholding Acquisition List
FFS	Florida Forest Service
FLEPPC	Florida Exotic Pest Plant Council
FLUE	Florida Land Use Element
FNAI	Florida Natural Areas Inventory
FNST	Florida National Scenic Trail
FS	Florida Statute(s)
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Fish and Wildlife Research Institute
FWHAP	FWC's Fish and Wildlife Habitat Acquisition Program
GFC	Florida Game and Freshwater Fish Commission
GIS	Geographic Information Systems
GPS	Geographic Positioning System
IMPP	Internal Management Policies and Procedures
IPCC	Intergovernmental Panel on Climate Change
IWHRS	Integrated Wildlife Habitat Ranking System
LAP	Landowner Assistance Program
LATF	Land Acquisition Trust Fund
LMR	Land Management Review
MAG	Management Advisory Group
NPS	National Park Service
OBVM	Objective-Based Vegetation Management
OCPB	Optimal Conservation Planning Boundary
OFW	Outstanding Florida Waters
OGT	Office of Greenways and Trails
ORB	Optimal Resource Boundary
RSPH	Rare Species Potential Habitat
SCHA	Strategic Habitat Conservation Areas

SFWMD	South Florida Water Management District
SJRWMD	St. John's River Water Management District
SWFWMD	Southwest Florida Water Management District
TNC	The Nature Conservancy
TPL	Trust for Public Land
UCF	University of Central Florida
USFWS	United States Fish and Wildlife Service
WCPR	Wildlife Conservation Prioritization and Recovery
WEA	Wildlife and Environmental Area
WMA	Wildlife Management Area

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## 1 Introduction and General Information

Buffering the southern boundary of Lake Hart, with Lake Mary Jane to the northeast, and Lake Ajay to the west, just 1 mile south of metropolitan Orlando, the Split Oak Forest Wildlife and Environmental Area (SOFWEA) conserves 1,689 acres of important wildlife habitat. Providing important habitat and wildlife corridor links to nearby conservation lands, the SOFWEA serves as vital habitat for a rich diversity of imperiled and focal wildlife including the, gopher tortoise (*Gopherus polyphemus*), swallow-tailed kite (*Elanoides forficatus*), Sherman's fox squirrel (*Sciurus niger shermani*), and other more prevalent wildlife. Setting astride the southern border of Orange County and the northern border of Osceola County within an increasingly urbanized region, visitors to SOFWEA have opportunities to find solace from the nearby urban bustle and see a diverse assemblage of Florida's imperiled, rare and other wildlife, rare plants and colorful wildflowers along trails winding through verdant scrubby and mesic flatwoods forests that are still emblematic of the primeval landscape of Florida.

Located in a landscape of ranchlands, citrus groves, conservation lands, prairies, flatwoods, and scrub flatwoods; the SOFWEA's natural communities, including ancient scrub lands, hammocks, flatwoods, marshes and swamp habitats, provide a wide diversity of wildlife habitats. Given its confluence with adjacent and nearby lakes the area also conserves important watershed and water quality attributes.



SOFWEA is managed by the Florida Fish and Wildlife Conservation Commission (FWC), in cooperation with Orange and Osceola counties, to conserve and restore natural wildlife habitat for a wide range of imperiled wildlife species such as the gopher tortoise, and other wildlife species, focusing primarily on the conservation of gopher tortoise habitat. The area was acquired and conserved in part with FWC Gopher Tortoise Mitigation Program funds, to offset development impacts to gopher tortoises, funding from Wetland Mitigation permits to conserve wetlands, along with grant funding from the Florida Community Trust Program to conserve natural resources, and in order to provide high-quality fish and wildlife based public outdoor recreational opportunities that are compatible with the primary purposes for acquisition and management of the area such as hiking, wildlife viewing, and environmental education. The diverse array and quality of habitat types found on the SOFWEA, results in a variety of resident and migratory birds that can be found on the area

throughout the year, providing excellent birding opportunities, as well as other wildlife viewing opportunities.

## **1.1 Management Plan Purpose**

This Management Plan serves as the basic statement of policy and direction for the management of SOFWEA. It provides information including the past usage, conservation acquisition history, and descriptions of the natural and historical resources found on SOFWEA. Furthermore, it identifies FWC's future management intent, goals and associated short and long-term objectives, as well as identifying challenges and solutions. This Management Plan has been developed to guide each aspect of SOFWEA's management for the next ten years.

Although the lands covered by this Management Plan are not titled to the Board of Trustees, they are being submitted to the ARC and Board of Trustees for review and approval for a variety of important reasons. Foremost among these, is that the FWC has determined that it is essential for all of the conservation areas that it manages, including those lands titled to agencies other than the Board of Trustees, to have conservation land management plans that are in conformance with the State's statutory framework and criteria for the development of management plans for state-owned conservation lands. This ensures that each conservation area that FWC manages has a comprehensive, consistent, accountable, land management plan that is developed under and meets the current ARC, Board of Trustees, and FWC planning framework and requirements.

Further, FWC may also request for the SOFWEA to be included on the list of FWC managed conservation lands that receive funding through the Land Acquisition Trust Fund (LATF) conservation land management funding formula. Since, in order for a public conservation area to be eligible to continue to qualify to receive land management funding through the LATF land management funding formula, the area is required to have an ARC and Board of Trustees approved land management plan that meets the State's management plan requirements for state-owned conservation lands. For these reasons, this Management Plan is submitted and required to meet the ARC and Board of Trustees criteria for approval.

Moreover, this Management Plan will also be submitted to the Orange and Osceola counties for review and approval in keeping with the terms of the SOFWEA Partnership Agreement.

This Management Plan is submitted for review to the Acquisition and Restoration Council (ARC) acting on behalf of Orange and Osceola Counties in compliance to Chapters 253 and 259, Florida Statutes (FS), and Chapters 18-2 and 18-4, Florida Administrative Code (FAC). Format and content were drafted in accordance with ARC requirements for management plans and the model plan outline provided by the staff of DSL. Terms

(Appendix 13.4) used in this Management Plan describing management activities and associated measurable goals and objectives conform to those developed for the Land Management Uniform Accounting Council Biennial Land Management Operational Report.

### **1.1.1 FWC Planning Philosophy**

The FWC’s planning philosophy includes emphasizing management recommendation consensus-building among stakeholders and input from user groups and the general public at the beginning of the planning process. The FWC engages stakeholders by convening a Management Advisory Group and solicits additional input from user groups and the general public at a public hearing (Appendix 13.5). The FWC also engages area, district, and regional agency staff, as well as other FWC staff expertise, in developing this Management Plan, thereby facilitating area biologist and manager “ownership” of the Management Plan, and thus the development of meaningful management intent language, goals with associated measurable objectives, timelines for completion, and the identification of challenges and solution strategies for inclusion in the SOFWEA Management Plan (Sections 5 – 8).

Furthermore, FWC maintains transparency and accountability throughout the development and implementation of this Management Plan. A “living document” concept, linking this updated Management Plan to the previous one, is accomplished by reporting on the objectives, management activities, and projects accomplished over the last planning timeframe (previous ten years; see Section 4), thereby ensuring agency accountability through time. Also, in an effort to remain adaptive for the duration of this Management Plan, continuous input and feedback will be collected from FWC staff, stakeholders, user groups, and other interested parties and individuals. As needed, amendments to this Management Plan will be presented to DSL and ARC for review and consideration.

## **1.2 Location**

As noted above, the SOFWEA is located along the border of Orange and Osceola counties, approximately five miles north of St. Cloud and eight miles east of Kissimmee. Comprising approximately 1,689 acres, SOFWEA lies in all or portions of Sections 2 and 3, Township 25S, Range 31E, with a small portion of the area also located in Section 27, Township 24S, and Range 31E. Public access to the area is provided directly off of Cyril’s Drive and Clapp Simms Duda Road.

## **1.3 Acquisition**

### **1.3.1 Purpose for Acquisition of the Property**

In accordance with the SOFWEA Partnership Agreement between FWC, Orange and Osceola counties described in more detail below, SOFWEA was acquired and established for



the purpose of conserving natural and cultural resources, and for conserving wildlife species habitat as a conservation measure designed to offset environmental impacts caused by existing and proposed development, as well as other purposes enumerated below with funding from the Florida Communities Trust Program (FCT), Orange and Osceola Counties' Wetland Mitigation Permits and the FWC Mitigation Park Program. Lands acquired by FWC through its FWC Mitigation Park Program, such as SOFWEA, were acquired as a means to provide an offsite compensation alternative to state and federal listed species regulatory decisions. In general, the primary acquisition and conservation goals and purposes of the FWC Mitigation Park Program for acquiring Mitigation Parks such as SOFWEA were:

- 1) Promote habitat conditions critical to meeting the life history requirements of the gopher tortoise and associated upland species; conserve, protect, and restore landscapes, forests, watershed, water resources, historical resources, and other elements important to ecosystem functions;
- 2) Provide an off-site mitigation alternative to the traditional method of on-site preservation of habitat within the boundaries of a development project requiring state and federal listed species permits; and
- 3) Provide public outdoor fish and wildlife-based recreational opportunities that are compatible with the conservation and management of the area's natural and historical resources.

The following mission statement was developed and approved by the FWC and Orange and Osceola Counties to guide management activities at the SOFWEA. "It shall be the primary management missions at SOFWEA to manage plant communities and public use in a manner that gives first consideration to the habitat needs and life history requirements of the gopher tortoise."

Additionally, the FCT Split Oak Forest Grant Project funding has perpetual obligations, covenants and restrictions that cover the purposes for acquiring the Project Site. Specifically, the covenants stipulate: "the Project Site shall be managed for the conservation, protection and enhancement of natural and cultural resources and for passive natural resource-based public outdoor recreation that is compatible with the conservation, protection and enhancement of the Project Site, along with related uses necessary for the accomplishment of this purpose."

Consistent with these purposes, the SOFWEA conserves habitat for the gopher tortoise as well as other imperiled, rare and occurring wildlife species and is managed by FWC, in cooperation with Orange and Osceola counties, to provide ecological diversity, high quality wildlife habitat, and wildlife-oriented public outdoor recreational opportunities.

### 1.3.2 Acquisition History

In 1991, Osceola County and Orange County respectively approved a partnership application in cooperation with the FWC, then the Florida Game and Freshwater Fish Commission, which was submitted to the FCT, formerly within the now defunct Department of Community Affairs, now housed within the Florida Department of Environmental Protection (DEP), to acquire SOFWEA. With the assistance of grant funds awarded to Orange and Osceola Counties by the FCT, the Counties jointly acquired the parcel. Subsequently, the FCT approved the SOFWEA Partnership Application and Agreement noted above in 1992. On March 15, 1994, Orange and Osceola Counties approved an interagency agreement between the counties and FWC. This agreement established the FWC as the managing agency of SOFWEA, with the purpose of establishing the area as a Mitigation Park to protect vital habitat for the gopher tortoise. The area also served as a Wetland Mitigation Bank, and both Orange and Osceola counties sold mitigation credits to private/public entities to offset wetland impacts. In 1995 the FCT approved a conservation easement vested in the FWC. As a part of the agreement between FWC and Orange and Osceola counties, FWC reimbursed Orange and Osceola counties for a part of the cost of acquiring the area with funds from the FWC Mitigation Park Program, in return for the Counties granting the FWC a perpetual conservation easement on the area. In short, the SOFWEA Conservation Easement provides the FWC perpetual management authority and responsibility for the SOFWEA, in cooperation with Orange and Osceola counties, under the FWC Mitigation Park Program.



FWC implemented the now defunct Mitigation Park Program in 1988 under Section 372.074 of the Florida Statutes (FS), (since replaced by Chapter 379, FS), to help protect gopher tortoises from the impacts of development, by providing an offsite alternative to the previous method of on-site preservation of habitat within the boundaries of a development. When developers proposed to develop habitat for gopher tortoises through this program, they paid mitigation “taking” fees that were used to buy and manage high quality habitat elsewhere. As a result, the program provided an alternative method to preserve wildlife habitat, while allowing developers to develop imperiled species habitat on their development project sites. It also consolidates mitigation within a geographical region by buying larger and more manageable tracts, which are established as Wildlife and Environmental Areas (WEAs) and can be utilized by the public for low-intensity, natural resource-based public outdoor recreation. All of the WEAs established through this program are managed primarily to protect and enhance habitat important to upland

endangered or threatened wildlife, especially the gopher tortoise. The Mitigation Park Program has since been discontinued, but the 14 mitigation tracts acquired through the program continue to be actively managed by FWC for their original purposes of acquisition and conservation.

Gopher Tortoise Mitigation Parks, now established by the FWC as WEAs, provide conservation of important fish and wildlife habitat while allowing for public outdoor recreation within a multiple-use management regime that is primarily focused on restoration and management of gopher tortoise habitat. For this reason, management activities emphasize the maintenance and restoration of optimum listed species habitat.

### **1.3.3 Mitigation Credits**

Based upon mitigation criteria outlined in the Interagency Agreement for SOFWEA, between Orange and Osceola Counties and the FWC, any property owner or developer may apply for upland or wetland mitigation permits/credits, to utilize allotted mitigation credits at SOFWEA, to use as mitigation to offset development impacts on imperiled wildlife species and wetlands respectively.

Essentially, the formula for establishing the number of potential mitigation credits that are assigned to a respective mitigation area such as SOFWEA, is based on the number of acres of viable, sustainable habitat calculated for each species of imperiled wildlife, which is determined through wildlife and habitat surveys that are determined to be on the mitigation area. In this way, the total acreage qualified to be used as mitigation is calculated. In general, mitigation credits are assigned for each acre of functional habitat as calculated for those species of imperiled wildlife that are projected to be sustainable on the area with genetically viable stable populations over time.

However, it should be noted that all previously available wetland and upland mitigation credits have been purchased and utilized for SOFWEA; consequently, there are no remaining mitigation credits available for use on SOFWEA.

## **1.4 Management Authority**

The FWC is the designated lead managing agency for SOFWEA under the authority granted by the interagency agreement between Orange and Osceola Counties and the FWC, and the conservation easement vested in the FWC by the FCT. Further management authority derives from Article IV, Section 9 of the Florida Constitution as well as the guidance and directives of Chapters 253, 259, 327, 370, 373, 375, 378, 379, 403, 487, 870, and 597 and of the Florida Statutes. These constitutional provisions and laws provide FWC the authority to protect, conserve, and manage the State's fish and wildlife resources.

## **1.5 Management Directives**

The Interagency Agreement with FWC and Orange and Osceola Counties directs FWC to “establish the Project as a Wildlife and Environmental Area pursuant to Rule 39-17.002...assignment of management responsibility shall not preclude Orange or Osceola from recreational use of the Project as long as said recreational uses comply with specific regulations promulgated by FWC pursuant to Rule 39-17.005, F.A.C.” Also, under the Conservation Easement vested in FWC directs FWC to “ensure that the area...shall be used and managed at a FWC Mitigation Park...to perform habitat management activities and to enforce the right herein granted by the Grantor, its heirs, successors, or assigns... to preserve and protect and...enhance the natural and ecological features of the Property.”

## **1.6 Title Interest and Encumbrances**

Title to the original 1,689 acres of the lands acquired within SOFWEA is vested in Orange and Osceola counties, along with a conservation easement vested in the FWC. Consequently, as noted above, under the SOFWEA conservation easement, the FWC has lead management authority and responsibility, in cooperation with Orange and Osceola counties, for all resources within the established boundary of SOFWEA.

Additional FWC management authority derives from Article IV, Section 9 of the Florida Constitution as well as the guidance and directives of Chapters 253, 259, 327, 370, 372, 375, 378, 379, 403, 487, 597, and 870 of the Florida Statutes. These laws establish the authority of the FWC with regard to protection and management of the State’s fish and wildlife resources.

According to the Land Management Uniform Accounting Council’s biennial report, SOFWEA is documented as having an area of 1,689 acres. However, GIS-calculated acreage data for the area from the FNAI maintained FLMA shapefiles (April 2016), indicates the area has an acreage of 1,772 acres. The FWC will continue to work with FNAI, Orange and Osceola counties, and DEP to reconcile this apparent acreage discrepancy and will recommend an updated boundary survey in the SOFWEA Management Plan to aid in rectifying this apparent acreage discrepancy. There are no known encumbrances or outstanding mineral rights or other interests within the established boundary of SOFWEA.

## **1.7 Proximity to Other Public Conservation Lands**

As noted above, the SOFWEA is located in the vicinity of an extensive network of conservation lands, including Eagles Roost Preserve, Isle of Pine Preserve, and Moss Park, which are managed by Orange County and located directly adjacent to the area, as well as other conservation lands managed by the FWC, Osceola County, University of Central Florida (UCF), the SFWMD, the SJRWMD, and several private conservation organizations.

Several Florida Forever projects are also located in the vicinity of the area shown in Table 1 and in Figure 4. Tables 1 and 2 list the Florida Forever projects and conservation lands within a 15-mile radius of the SOFWEA, including lands managed by public and private entities, that conserve cultural and natural resources within this region of Florida. Most of the conservation lands listed in Table 2 are owned in full-fee by a public entity. However, some of these areas fall within a less-than-fee ownership classification, where the land is owned and being managed by a private landowner while a public agency or not-for-profit organization holds a conservation easement on the land.

**Table 1. Florida Forever Projects within a 15 mile Radius of SOFWEA**

<b>Project Name</b>	<b>GIS Acres</b>
Big Bend Swamp/Holopaw Ranch	56,729.44
Conlin Lake X	9,074.82

**Table 2. Conservation Lands within a 15 mile Radius of SOFWEA**

<b>State of Florida</b>	<b>Managing Agency</b>
Paradise Island	FWC
Tosohatchee Wildlife Management Area	FWC
University of Central Florida East Parcel	UCF
University of Central Florida McKay Tract	UCF

<b>Water Management District</b>	<b>Managing Agency</b>
Dietrich Conservation Easement	SJRWMD
Hal Scott Preserve Conservation Easement	SJRWMD
Hal Scott Regional Preserve and Park	SJRWMD
Oak Street Extension Preserve	SFWMD
Shingle Creek	SFWMD

<b>County/City</b>	<b>Managing Agency</b>
Cherokee Point Conservation Area	Osceola County
Crosby Island Marsh Preserve	Orange County
Eagles Roost	Orange County
Evans Property	Orange County
Isle of Pine Preserve	Orange County
Ken Bosserman Econlochatchee River Preserve	Orange County
Lake Lizzie Conservation Area	Osceola County
Long Branch Park	Orange County

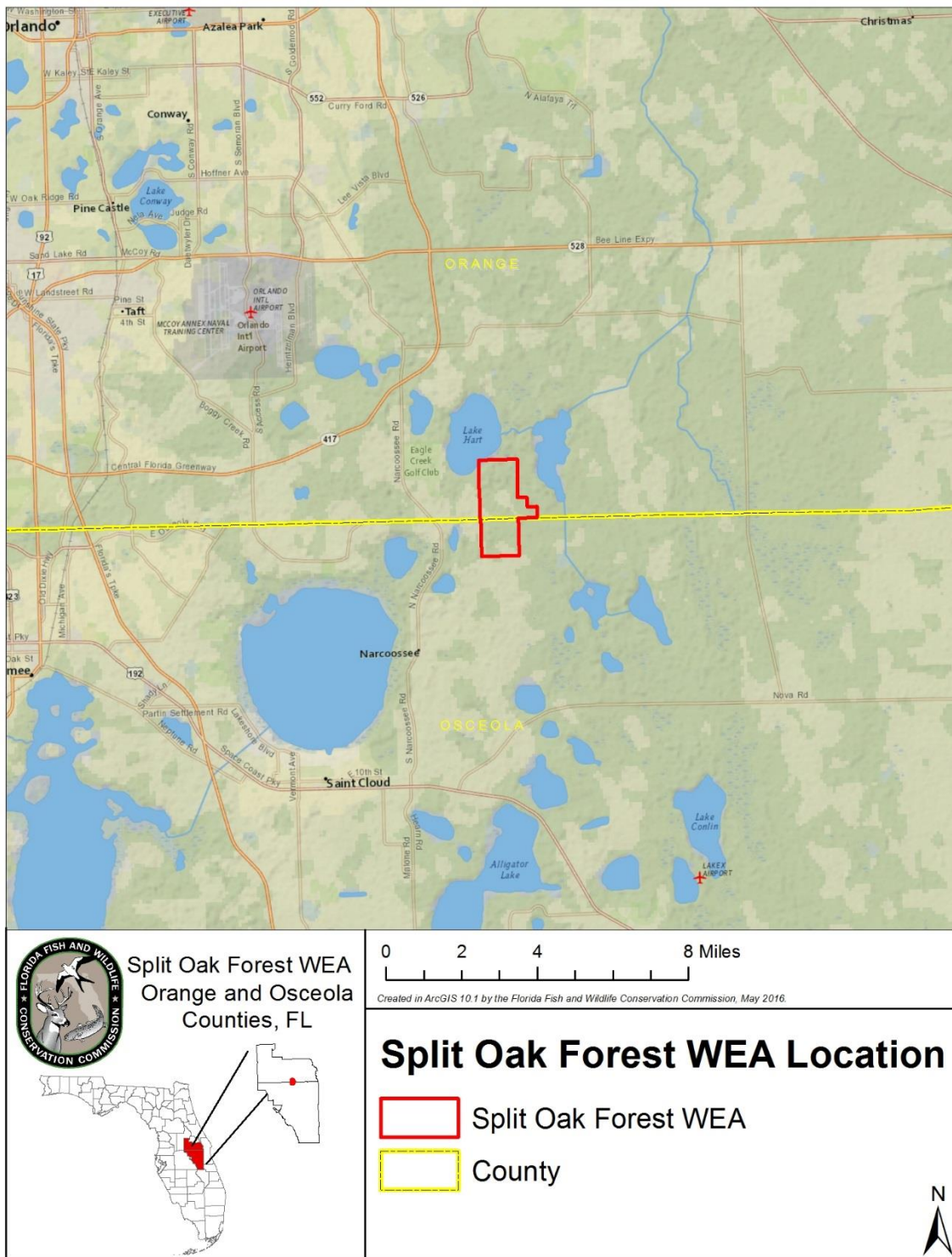
Makinson Island Conservation Area	Osceola County
Moss Park	Orange County
Nunnally Property	Orange County
Pine Lily Preserve	Orange County
Ranger Property	Orange County
Savage/Christmas Creek Preserve	Orange County
Shingle Creek Regional Park	Osceola County
Sunflower Property	Orange County
TM Ranch 4 Mitigation Bank	Orange County
Tupperware Island Conservation Area	Osceola County
Twin Oaks Conservation Area	Osceola County
Vienna Property	Orange County

<b>Private/Public Conservation Organization</b>	<b>Managing Agency</b>
Big Econlochatchee River Sanctuary	Florida Audubon Society, Inc.
Homestead News Sanctuary	Florida Audubon Society, Inc.
TM-Econ Phases 123 Mitigation Bank	Holland Properties

Acronym Key	Agency Name
FWC	Florida Fish and Wildlife Conservation Commission
SFWMD	South Florida Water Management District
SJRWMD	St. John's River Water Management District
UCF	University of Central Florida

## 1.8 Adjacent Land Uses

As described above, the SOFWEA is located in Central Florida in the southeastern region of Orange County and the northeastern region of Osceola County. Approximately 1 mile west of SOFWEA is Highway 15 and bordering the southern portion of the area is Cyrila Drive. The Central Florida Greenway is located approximately 4 miles west of SOFWEA, and the Orlando International Airport is located approximately 15 miles northwest of the area.



**Figure 1. SOFWEA Location**





**Figure 2. SOFWEA Aerial Imagery**

Florida Fish and Wildlife Conservation Commission | Split Oak Forest WEA Management Plan





**Figure 3. SOFWEA- Township, Range, and Section**

Florida Fish and Wildlife Conservation Commission | Split Oak Forest WEA Management Plan



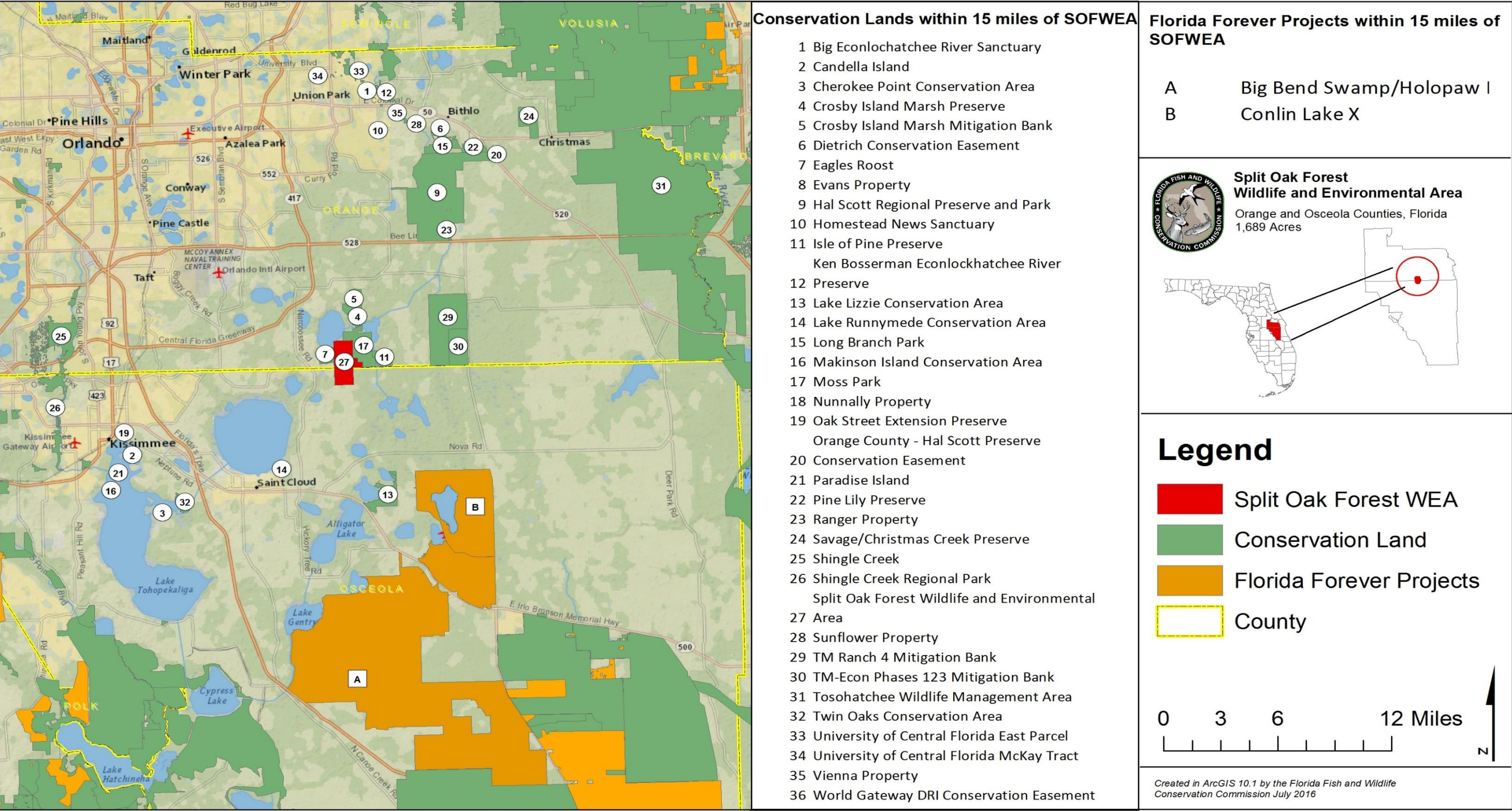


Figure 4. SOFWEA Conservation Lands and Florida Forever Projects within a 15 mile Vicinity

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The 2015 U.S. Census estimates that there are 1,288,126 people living in Orange County and 323,993 people living in Osceola County. The Department of Economic Affairs, Bureau of Economic and Business Research's (BEBR) medium-range population projection indicates that in the year 2025, there will be 427,900 people living in Osceola County and 1,551,400 people living in Orange County. The BEBR population projections for the counties surrounding Orange and Osceola counties for the year 2025 are as follows: Brevard County-621,000; Indian River County-166,400; Lake County-394,000; Okeechobee County-42,600; Polk County-744,600; and Seminole County-502,100.

The current zoning ordinance for the SOFWEA is conservation/preservation. According to Osceola and Orange County's comprehensive plan, conservation/preservation lands allows for 1 unit/5 acres. According to the Orange and Osceola counties' Recreation Master Plan, the following activities are allowed: hiking, fishing, wildlife viewing, nature study, geocaching, and equestrian usage thru permit only. Activities that are not approved on the SOFWEA include biking, hunting, and camping. Orange and Osceola counties' future land use maps indicate that the SOFWEA will continue to be designated and zoned as conservation and preservation/rural lands.

The current land use designations for areas in the vicinity of the SOFWEA in the Osceola county portion are low density residential and mixed use. In Orange County the areas surrounding SOFWEA are designated as rural, conservation, and planned development.

Osceola and Orange counties are among the most heavily-developed counties in central Florida and many of the lands in the immediate vicinity of the SOFWEA have been platted and are designated as low-density residential. So, although the SOFWEA is located in moderately developed area of Orange and Osceola counties, there are ongoing plans for increased residential development adjacent or in the immediate vicinity of SOFWEA. The Osceola Parkway Extension route is being considered to run adjacent to or thru SOFWEA. Careful coordination between FWC, Osceola County and adjacent Deseret Ranch will be required for evaluation of the potential environmental impacts, and for the required mitigation of such impacts, if potential consideration of routing the Osceola Parkway is proposed for the area. Additionally, as stated above, much of the land within the immediate vicinity of the area are designated as conservation and preservation lands according to Orange and Osceola counties' current zoning ordinance and future land use maps.

The SOFWEA is not within an area of critical state concern or presently under study for such a designation.

## **1.9 Public Involvement**

The FWC conducted a Management Advisory Group (MAG) meeting in Orlando, Florida on June 8<sup>th</sup>, 2016, to obtain input from both public and private stakeholders regarding

Florida Fish and Wildlife Conservation Commission | Split Oak Forest WEA Management Plan



management of SOFWEA. Results of this meeting were used by FWC to develop management goals and objectives and to identify opportunities and strategies for inclusion in this Management Plan. A summary of issues and opportunities raised by the SOFWEA MAG, as well as a listing of participants, is included as Appendix B. Further, a public hearing, as required by Chapter 259.032(10), FS, was held in Kissimmee, Florida on July 14<sup>th</sup>, 2016. The report of that hearing is also contained in Appendix 13.5.4. A website is also maintained for receipt of public input at <http://myfwc.com/conservation/terrestrial/management-plans/develop-mps/>. Further testimony and input is also received at a public hearing held by ARC when this Management Plan is considered for approval. Input received from all public involvement efforts has been considered in the development of this Management Plan.

## **2 Natural and Historical Resources**

### **2.1 Physiography**

The SOFWEA is located within the mid-peninsular physiographic zone south of the Orlando ridge and to the east of the northern portion of the Lake Wales Ridge. The mid-peninsular zone contains discontinuous highlands separated by broad valleys and is composed of distinct physiographic divisions. The SOFWEA lies within the Osceola Plain physiographic division. The area is predominantly flat, with only gentle slopes and slight changes in elevation.

#### **2.1.1 Climate**

The climate of Orange and Osceola Counties, like most of peninsular Florida, is humid and subtropical, with long, warm, and humid summers and mild, dry winters. In the summer, temperature tends to remain relatively constant from day to day, with high temperatures being tempered by clouds and frequent afternoon rain showers. In the winter, on the other hand, temperatures tend to vary considerably due to dry, cold air coming in the form of cold fronts from the north. The average annual temperature is 82° Fahrenheit (F) in the summer and 62° F in the winter. The average annual rainfall is approximately 51 inches, with approximately 60% of the rainfall occurring in the wettest months from June to September. Temperatures tend to be the highest in July and August, when the average maximum temperature is 92° F and the average minimum is nearly 74° F. January tends to be the coldest month, with an average maximum temperature of around 71° F and an average minimum temperature of 49° F.

#### **2.1.2 Topography**

SOFWEA occurs in a physiographic district known as the Eastern Flatwoods District. Elevations within the area vary from a maximum of 93 feet above Mean Sea Level (MSL),

to a minimum MSL of 60 feet. SOFWEA's elevation usually ranges from 60-70 feet. The topography of this area is generally low and flat, with sandy soils and wide-ranging areas of flatwoods.

The SOFWEA does not contain beaches, dunes, or virgin timber.

### **2.1.3 Soils**

The U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) data were used to identify SOFWEA's soil series and soil depth to water table (Figures 5 and 6). Five map units described in the soil survey of SOFWEA are distributed as shown in Figure 5. Analyses of depth to water table for map units occurring within SOFWEA are also provided in Figure 6. The NRCS defines a soil map unit as: "a collection of soil areas or non-soil areas (miscellaneous areas) delineated in a soil survey." Soil map units may contain multiple soil components, which are given names that are unique identifiers. Figure 5 provides aggregation data for SOFWEA map units.

Soils found within the SOFWEA are generally associated with improved pasture and prairies and are thus poorly to very poorly drained sandy or organic soils. Smyrna fine sand makes up nearly 20% of the area, Samsula muck and Immokalee fine sand together make up nearly a third of the area, Pomello fine sand makes up a little more than 10% of the area, and Myakka fine sand makes up about 10% of the area. Various other sands occur on the area including Basinger fine sand, Hontoon muck, Narcoossee fine sand, Placid fine sand, Sanibel muck, St. John's fine sand, Tavares fine sand, and Zolfo fine sand. More extensive soils series descriptions may be found in Appendix 13.7.

### **2.1.4 Geologic Conditions**

The Central Highlands Region of peninsular Florida consists of a series of rather localized high grounds, comprising near subparallel north-south ridges that are remnants of beach and sand-dune systems associated with Early Pleistocene shorelines. The region consists of xeric residual sandhills, beach ridges and dune fields, the whole of which is interspersed with numerous sinkhole, lakes and basins caused by erosion of the underlying limestone bedrock. The main axis of the Central Highlands is the Central Ridge, extending from south-eastern Lake County in the north to southern Highlands County in the south. Undifferentiated Quaternary Sediments geological unit is what makes up SOFWEA.

Undifferentiated Quaternary Sediments (Pleistocene/Holocene) - Much of Florida's surface is covered by a varying thickness of undifferentiated sediments consisting of siliciclastics, organics and freshwater carbonates. Where these sediments exceed 20 feet (6.1 meters) thick, they were mapped as discrete units. In an effort to subdivide the undifferentiated sediments, those sediments occurring in flood plains were mapped as alluvial and flood plain deposits. Sediments showing surficial expression of beach ridges and dunes were

mapped separately as were the sediments composing Trail Ridge. Terrace sands were not mapped refer to Healy [1975] for a discussion of the terraces in Florida. The subdivisions of the Undifferentiated Quaternary Sediments are not lithostratigraphic units, but are utilized in order to facilitate a better understanding of the State's geology. The siliciclastics are light gray, tan, brown to black, unconsolidated to poorly consolidated, clean to clayey, silty, unfossiliferous, variably organic-bearing sands to blue green to olive green, poorly to moderately consolidated, sandy, silty clays. Gravel is occasionally present in the panhandle. Organics occur as plant debris, roots, disseminated organic matrix and beds of peat. Freshwater carbonates, often referred to as marls in the literature, are scattered over much of the State. In southern Florida, freshwater carbonates are nearly ubiquitous in the Everglades. These sediments are buff colored to tan, unconsolidated to poorly consolidated, fossiliferous carbonate muds. Sand, silt and clay may be present in limited quantities. These carbonates often contain organics. The dominant fossils in the freshwater carbonates are mollusks.

## 2.2 Vegetation

Through the services of the Florida Natural Areas Inventory (FNAI), FWC has mapped the current natural and anthropogenic communities of SOFWEA which describes 18 natural and anthropogenic community types existing on SOFWEA, (Table 3, and Figure 7). FWC



biologists, along with contracted surveys through FNAI, have documented a variety of rare species (Table 5) and numerous species of invasive exotic plant species (Table 6) as occurring on the SOFWEA. Figure 8 displays the historic natural communities of SOFWEA, which depicts the composition of native plant communities on the area prior to substantial alteration of the region's hydrology and land for agricultural and development uses.

**Table 3. Natural Community Types on SOFWEA**

Community Type	GIS Acres	Percentage
Basin marsh	117.41	6.6%
Baygall	126.80	7.2%
Canal/ditch	3.15	<0.1%
Clearing/regeneration	12.58	0.1%
Depression marsh	13.97	0.1%
Dome swamp	80.78	4.6%
Flatwoods lake	60.31	3.4%

Impoundment/artificial pond	26.14	1.5%
Mesic flatwoods	365.14	20.6%
Mesic hammock	77.07	4.4%
Pasture - improved	54.29	3.1%
Sandhill	8.46	<0.1%
Scrub	38.78	2.2%
Scrubby flatwoods	465.38	26.3%
Spoil area	57.74	3.3%
Wet flatwoods	212.83	12.0%
Wet prairie	0.88	<0.1%
Xeric hammock	49.86	2.8%

**Table 4. Plant Species Observed at SOFWEA**

<b>Common Name</b>	<b><i>Scientific Name</i></b>
American beautyberry	<i>Callicarpa americana</i>
American bluehearts	<i>Buchnera americana</i>
American white waterlily	<i>Nymphaea odorata</i>
Atlantic St. John's wort	<i>Hypericum tenuifolium</i>
Bahiagrass	<i>Paspalum notatum</i>
Ballmoss	<i>Tillandsia recurvata</i>
Bartram's airplant	<i>Tillandsia bartramii</i>
Blackroot	<i>Pterocaulon pycnostachyum</i>
Bladderwort	<i>Utricularia</i> sp.
Blue huckleberry	<i>Gaylussacia frondosa</i> var. <i>tomentosa</i>
Blue maidencane	<i>Amphicarpum muhlenbergianum</i>
Bluestem	<i>Andropogon</i> sp.
Bogbutton	<i>Lachnocaulon</i> sp.
Bottlebrush threeawn	<i>Aristida spiciformis</i>
Bracken fern	<i>Pteridium aquilinum</i>
Broadleaf cattail	<i>Typha latifolia</i>
Broomsedge bluestem	<i>Andropogon virginicus</i>
Bulltongue arrowhead	<i>Sagittaria lancifolia</i>
Bushy bluestem	<i>Andropogon glomeratus</i>
Cabbage palm	<i>Sabal palmetto</i>
Caesar's weed	<i>Urena lobata</i>
Carolina redroot	<i>Lachnanthes caroliana</i>
Chalky bluestem	<i>Andropogon virginicus</i> var. <i>glaucus</i>
Chapman's oak	<i>Quercus chapmanii</i>
Chinese tallowtree	<i>Triadica sebifera</i>



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Cinnamon fern	<i>Osmunda cinnamomea</i>
Climbing hempvine	<i>Mikania scandens</i>
Clustered mille graines	<i>Oldenlandia uniflora</i>
Coastalplain chaffhead	<i>Carphephorus corymbosus</i>
Coastalplain milkwort	<i>Polygala setacea</i>
Coastalplain palafox	<i>Palafoxia integrifolia</i>
Coastalplain staggerbush	<i>Lyonia fruticosa</i>
Cogongrass	<i>Imperata cylindrica</i>
Combleaf mermaidweed	<i>Proserpinaca pectinata</i>
Common buttonbush	<i>Cephalanthus occidentalis</i>
Creeping bramble fern	<i>Hypolepis repens</i>
Creeping primrosewillow	<i>Ludwigia repens</i>
Crowngrass	<i>Paspalum</i> sp.
Dahoon	<i>Ilex cassine</i>
Deerberry	<i>Vaccinium stamineum</i>
Dogfennel	<i>Eupatorium capillifolium</i>
Dwarf huckleberry	<i>Gaylussacia dumosa</i>
Dwarf live oak	<i>Quercus minima</i>
Earleaf greenbrier	<i>Smilax auriculata</i>
Eastern poison ivy	<i>Toxicodendron radicans</i>
Elliott's milkpea	<i>Galactia elliotii</i>
Erect pricklypear	<i>Opuntia stricta</i>
Falsefennel	<i>Eupatorium leptophyllum</i>
Fascicled beaksedge	<i>Rhynchospora fascicularis</i>
Fetterbush	<i>Lyonia lucida</i>
Flatsedge	<i>Cyperus</i> sp.
Florida indian plantain	<i>Arnoglossum floridanum</i>
Forked bluecurls	<i>Trichostema dichotomum</i>
Fourpetal St. John's wort	<i>Hypericum tetrapetalum</i>
Fringed yelloweyed grass	<i>Xyris fimbriata</i>
Gallberry	<i>Ilex glabra</i>
Giant airplant	<i>Tillandsia utriculata</i>
Giant bristlegrass	<i>Setaria magna</i>
Glade lobelia	<i>Lobelia glandulosa</i>
Golden polypody	<i>Phlebodium aureum</i>
Gopher apple	<i>Licania michauxii</i>
Green arrow arum	<i>Peltandra virginica</i>
Green fly orchid	<i>Epidendrum conopseum</i>
Groundsel tree	<i>Baccharis halimifolia</i>
Guava	<i>Psidium guajava</i>
Hairy chaffhead	<i>Carphephorus paniculatus</i>

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Hooded pitcherplant	<i>Sarracenia minor</i>
Large gallberry	<i>Ilex coriacea</i>
Laurel greenbrier	<i>Smilax laurifolia</i>
Lemon bacopa	<i>Bacopa caroliniana</i>
Licoriceweed	<i>Scoparia dulcis</i>
Little bluestem	<i>Schizachyrium scoparium</i>
Live oak	<i>Quercus virginiana</i>
Lizard's tail	<i>Saururus cernuus</i>
Loblolly bay	<i>Gordonia lasianthus</i>
Longleaf pine	<i>Pinus palustris</i>
Longleaf threeawn	<i>Aristida palustris</i>
Lopsided indiangrass	<i>Sorghastrum secundum</i>
Maiden ferns	<i>Thelypteris</i> sp.
Maidencane	<i>Panicum hemitomon</i>
Maleberry	<i>Lyonia ligustrina</i> var. <i>foliosiflora</i>
Meadow-beauty	<i>Rhexia</i> sp.
Michaux's croton	<i>Croton michauxii</i>
Mohr's thoroughwort	<i>Eupatorium mohrii</i>
Muscadine	<i>Vitis rotundifolia</i>
Myrtle oak	<i>Quercus myrtifolia</i>
Myrtleleaf St. John's wort	<i>Hypericum myrtifolium</i>
Narrowfruit horned beaksedge	<i>Rhynchospora inundata</i>
Narrowleaf silkgrass	<i>Pityopsis graminifolia</i>
Netted chain fern	<i>Woodwardia areolata</i>
Netted pawpaw	<i>Asimina reticulata</i>
Nutrush	<i>Scleria</i> sp.
Nuttall's meadowbeauty	<i>Rhexia nuttallii</i>
October flower	<i>Polygonella polygama</i>
Panic grass	<i>Panicum</i> sp.
Peelbark St. John's wort	<i>Hypericum fasciculatum</i>
Pennywort	<i>Hydrocotyle</i> sp.
Pickerelweed	<i>Pontederia cordata</i>
Piedmont pinweed	<i>Lechea torreyi</i>
Pond cypress	<i>Taxodium ascendens</i>
Pond pine	<i>Pinus serotina</i>
Pricklypear	<i>Opuntia humifusa</i>
Queensdelight	<i>Stillingia sylvatica</i>
Rattlepods	<i>Crotalaria</i> sp.
Red maple	<i>Acer rubrum</i>
Resurrection fern	<i>Pleopeltis polypodioides</i> var. <i>michauxiana</i>
Rose rush	<i>Lygodesmia aphylla</i>

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Rosy camphorweed	<i>Pluchea baccharis</i>
Rough hedgehyssop	<i>Gratiola hispida</i>
Roundleaf thoroughwort	<i>Eupatorium rotundifolium</i>
Roundpod St. John's wort	<i>Hypericum cistifolium</i>
Royal fern	<i>Osmunda regalis</i> var. <i>spectabilis</i>
Running oak	<i>Quercus pumila</i>
Rusty staggerbush	<i>Lyonia ferruginea</i>
Sand cordgrass	<i>Spartina bakeri</i>
Sand holly	<i>Ilex ambigua</i>
Sand live oak	<i>Quercus geminata</i>
Sandyfield beaksedge	<i>Rhynchospora megalocarpa</i>
Sarsaparilla vine	<i>Smilax pumila</i>
Saw greenbrier	<i>Smilax bona-nox</i>
Saw palmetto	<i>Serenoa repens</i>
Sawgrass	<i>Cladium jamaicense</i>
Sawtooth blackberry	<i>Rubus argutus</i>
Scrubland goldenaster	<i>Chrysopsis subulata</i>
Sedge	<i>Carex</i> sp.
Seminole false foxglove	<i>Agalinis filifolia</i>
Shiny blueberry	<i>Vaccinium myrsinites</i>
Shoestring fern	<i>Vittaria lineata</i>
Shortleaf gayfeather	<i>Liatris tenuifolia</i>
Shortleaf rosegentian	<i>Sabatia brevifolia</i>
Slash pine	<i>Pinus elliottii</i>
Slender club-moss	<i>Lycopodiella caroliniana</i>
Slender flattop goldenrod	<i>Euthamia caroliniana</i>
Slimleaf pawpaw	<i>Asimina angustifolia</i>
Smallfruit beggarticks	<i>Bidens mitis</i>
Soft rush	<i>Juncus effusus</i> subsp. <i>solutus</i>
Southern bogbutton	<i>Lachnocaulon beyrichianum</i>
Southern needleleaf	<i>Tillandsia setacea</i>
Southern umbrellasedge	<i>Fuirena scirpoidea</i>
Spadeleaf	<i>Centella asiatica</i>
Spanish moss	<i>Tillandsia usneoides</i>
Sphagnum moss	<i>Sphagnum</i> sp.
Spikerush	<i>Eleocharis</i> sp.
St. Andrew's cross	<i>Hypericum hypericoides</i>
Sugarcane plumegrass	<i>Saccharum giganteum</i>
Summer farewell	<i>Dalea pinnata</i>
Sundews	<i>Drosera</i> sp.
Swamp bay	<i>Persea palustris</i>

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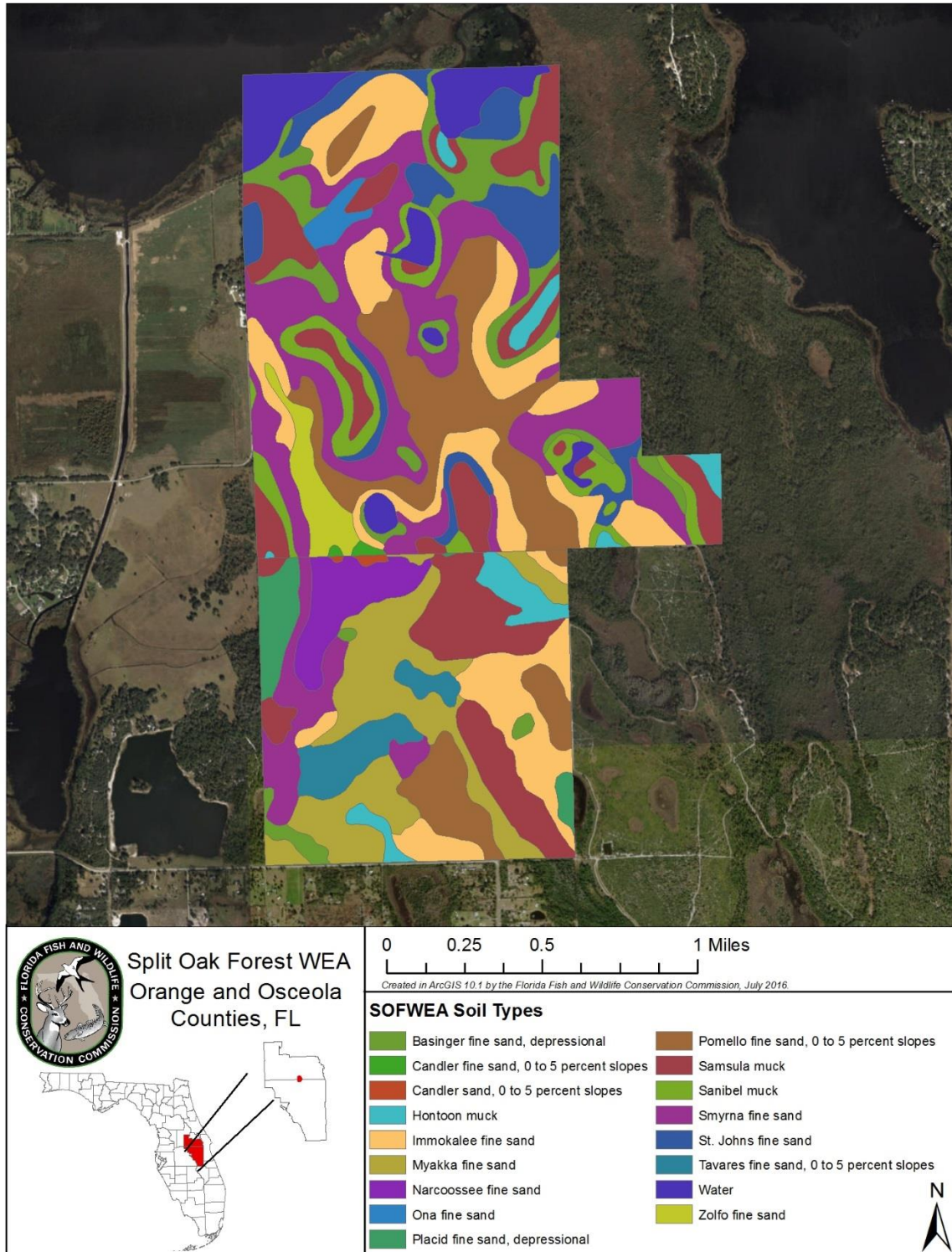
Laurel oak	<i>Quercus laurifolia</i>
Swamp tupelo	<i>Nyssa sylvatica</i> var. <i>biflora</i>
Sweetbay	<i>Magnolia virginiana</i>
Tall elephantsfoot	<i>Elephantopus elatus</i>
Taperleaf waterhorehound	<i>Lycopus rubellus</i>
Tarflower	<i>Bejaria racemosa</i>
Tenangle pipewort	<i>Eriocaulon decangulare</i>
Toothed midsorus fern	<i>Blechnum serrulatum</i>
Torpedograss	<i>Panicum repens</i>
Tropical soda apple	<i>Solanum viarum</i>
Turkey oak	<i>Quercus laevis</i>
Virginia buttonweed	<i>Diodia virginiana</i>
Virginia chain fern	<i>Woodwardia virginica</i>
Virginia marsh St. John's wort	<i>Triadenum virginicum</i>
Warty panicgrass	<i>Panicum verrucosum</i>
Water cowbane	<i>Oxypolis filiformis</i>
Water oak	<i>Quercus nigra</i>
Wax myrtle	<i>Myrica cerifera</i>
Whitetop aster	<i>Sericocarpus tortifolius</i>
Wild pennyroyal	<i>Piloblephis rigida</i>
Winged sumac	<i>Rhus copallinum</i>
Wiregrass	<i>Aristida stricta</i> var. <i>beyrichiana</i>
Witchgrass	<i>Dichanthelium</i> sp.
Woodsgrass	<i>Oplismenus hirtellus</i>
Yellow hatpins	<i>Syngonanthus flavidulus</i>
Yellow-eyed grass	<i>Xyris</i> sp.

**Table 5. Rare Plant Species of the SOFWEA**

<b>Common Name</b>	<b><i>Scientific Name</i></b>	<b><i>Status</i></b>
Erect pricklypear	<i>Opuntia stricta</i>	<i>ST</i>
Balbis' airplant	<i>Tillandsia balbisiana</i>	<i>SE</i>
Giant airplant	<i>Tillandsia utriculata</i>	<i>SE</i>
Giant orchid	<i>Eulophia ecristata</i>	<i>ST</i>
Hooded pitcherplant	<i>Sarracenia minor</i>	<i>ST</i>
Manyflowered grasspink	<i>Calapogon multiflorus</i>	<i>ST</i>
Pine lily	<i>Lilium catesbaei</i>	<i>ST</i>
Yellow fringed orchid	<i>Platanthera ciliaris</i>	<i>ST</i>

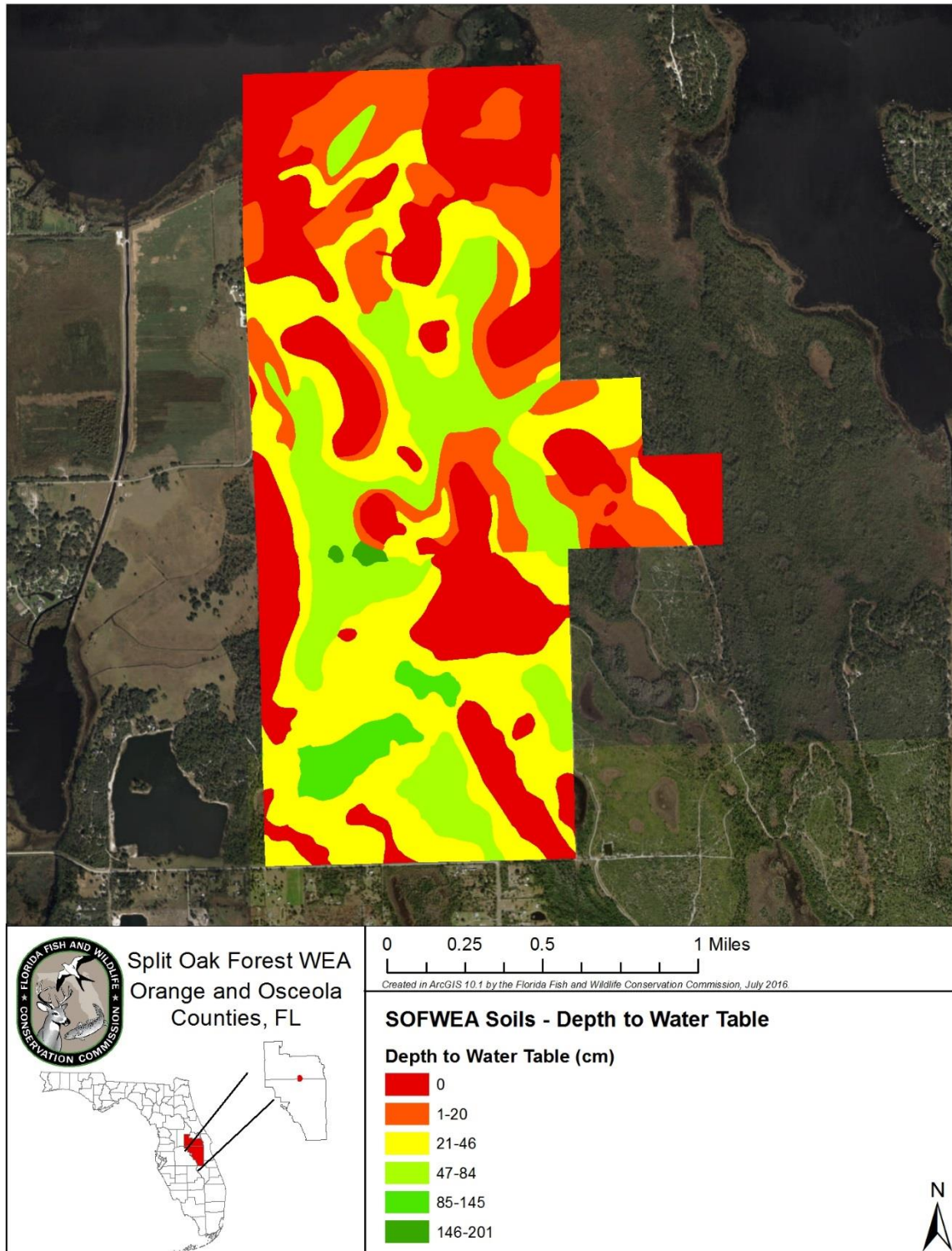
**Table 6. Exotic Invasive Plant Species Known to Occur on the SOFWEA**

<b>Common Name</b>	<b>Scientific Name</b>	<b>FLEPPC Category</b>
Alligatorweed	<i>Alternanthera philoxeroides</i>	II
Brazilian pepper	<i>Schinus terebinthifolius</i>	I
Caesar's weed	<i>Urena lobata</i>	I
Camphor tree	<i>Cinnamomum camphora</i>	I
Chinaberry	<i>Melia azedarach</i>	II
Chinese tallowtree	<i>Triadica sebifera</i>	I
Citrus tree	<i>Citrus sp.</i>	
Cogongrass	<i>Imperata cylindrica</i>	I
Cuban bulrush	<i>Oxycoryum cubense</i>	
Guava	<i>Psidium guajava</i>	I
Guinea grass	<i>Panicum maximum</i>	II
Heart-of-flame	<i>Bromelia balansae</i>	
Lantana	<i>Lantana camara</i>	I
Natalgrass	<i>Melinis repens</i>	I
Old world climbing fern	<i>Lygodium microphyllum</i>	I
Primrose willow	<i>Ludwigia peruviana</i>	I
Queen palm	<i>Syagrus romanzoffiana</i>	II
Skunk-vine	<i>Paederia foetida</i>	I
Smutgrass	<i>Sporobolus indicus</i>	I
Strawberry guava	<i>Psidium cattleianum</i>	I
Sweet viburnum	<i>Viburnum odoratissimum</i>	
Sword fern	<i>Nephrolepis cordifolia</i>	I
Torpedograss	<i>Panicum repens</i>	I
Tropical soda apple	<i>Solanum viarum</i>	I
Vasey grass	<i>Paspalum urvillei</i>	



**Figure 5. SOFWEA Soil Types**





**Figure 6. SOFWEA Soils - Depth to Water Table**

## 2.2.1 FNAI Natural Community Descriptions

### Basin Marsh (~117.41 acres)

Basin marshes are herbaceous or shrubby wetlands situated in large and irregularly shaped depressions. Basin marsh is an herb-dominated community that occurs in large, often irregularly shaped depressions. Basin marshes are regularly inundated freshwater herbaceous wetlands that may occur in a variety of situations, but in contrast to depression marshes, are not small or shallow inclusions within a fire-maintained natural community. Plant species composition is heterogeneous, both within and between marshes, but can generally be divided into submersed, floating-leaved, emergent, and grassy zones from deepest to shallowest portions; shrub patches may be present within any of these zones. Species composition may be similar to that of generally smaller, more isolated depression marshes, and variations occur because basin marshes accumulate thicker peat deposits, have a longer, more permanent hydroperiod, and burn far less often than do depression marshes, generally every 1-10 years.

At SOFWEA, basin marsh occurs primarily around Lake Hart and Lake Mary Jane that border the property to the northeast and northwest respectively. Also, there are several other isolated marshes on the area that usually contain baygall and swamp communities within them. The primary vegetative components of these marshes are hydrophytic herbs, especially maidencane, fascicled beaksedge, narrowfruit horned beaksedge, and sand cordgrass. In deeper central portions or lakeshores, sawgrass, bulltongue arrowhead, and American white waterlily may become dominant. Other common herbs include blue maidencane, lemon bacopa, spadeleaf, Virginia buttonweed, dogfennel, slender flattop goldenrod, southern umbrellasedge, Carolina redroot, rosy camphorweed, and combleaf mermaidweed.

Woody vegetation is sparse and typically represented by a few stunted trees including swamp tupelo and pond cypress, as well as shrubs such as peelbark St. John's wort, fetterbush, wax myrtle, and swamp bay mainly around the shallow perimeter.

Disturbances to basin marshes at SOFWEA have been caused primarily by the alteration of three marshes in preparation for development that occurred before the land was acquired by Orange and Osceola counties and FWC. The marshes were dug out to develop ponds with higher surrounding areas created by the spoil. These are now virtually unrecognizable as natural communities with the exception of the easternmost marsh, of which half the former area now remains intact. For the rest of the wetlands, overall hydrologic change likely caused by ditching and groundwater drawdown may be having a significant effect on an increasing weedy cover.



### **Baygall (~ 126.80 acres)**

Baygalls are generally characterized as dense evergreen hardwood forests in seepage depressions, often at the base of sandy slopes that occur in depressions or seepage areas where groundwater is at or near the surface for long periods of time. Although most baygalls are small in acreage, some form large, mature forests. Soils are generally composed of peat, with seepage from uplands, rainfall, and capillary action from adjacent wetlands maintaining a saturated substrate. Baygall typically develops at the bases of slopes, edges of floodplains, in depressions, and in stagnant drainages. Generally influenced by flowing water, baygall is often drained by small blackwater streams.

At SOFWEA, there are two large (>40 acres) and two small (~5 acres) baygalls as well as several areas of baygall that form ecotones between swamps and surrounding flatwoods. The larger baygalls grade into and form a mosaic with swamp and marsh vegetation.

In general, the canopy is dominated by loblolly bay and sweetbay, with an understory of dahoon, large gallberry, fetterbush, wax myrtle, St. Andrew's cross, and swamp bay. In wetter areas, pond cypress may become common. Herbs are sparse and may include toothed midsorus fern, Carolina redroot, royal fern, green arrow arum, lizard's tail, sphagnum moss, netted chain fern, and Virginia chain fern. Laurel greenbrier is a common vine.

Disturbances are mainly due to hydrologic alteration and the historic lack of fire that occurred prior to the area being acquired for conservation which alters the edge of the baygall and allows expansion of the shrubby components into otherwise non-baygall dominated communities.

### **Depression Marsh (~ 13.97 acres)**

Depression marsh, an herbaceous wetland community found in low flatlands, forms the characteristic pockmarked landscape seen on aerial photographs of the flat landscapes of the Florida peninsula. Depression marsh is usually characterized as a shallow, rounded depression in sand substrate with herbaceous vegetation and shrubs, often in concentric bands. These marshes also frequently form an outer rim around swamp communities such as dome swamps. They form when the overlying sands slump into depressions dissolved in underlying limestone. Depression marshes often burn with the surrounding landscape, and are seasonally inundated. Depression marshes typically occur in landscapes occupied by fire-maintained natural communities such as mesic flatwoods, dry prairie, or sandhill. Depression marshes are typically small wetlands that are circular or oval in shape and are dominated by herbaceous species. Hydroperiods can range widely from as few as 50 days or less to more than 200 days of inundation per year. Depression marshes often dry out during periods of low rainfall, and as a result, burn when fires occur in the surrounding

uplands. The substrate is usually acid sand with possibly some deepening peat toward the center. Because water depth in depression marshes usually increases toward the center, vegetation may form distinctive natural community zones corresponding to the depth of the water.

At SOFWEA, depression marshes are usually dominated by falsefennel, creeping primrosewillow, maidencane, rosy camphorweed, narrowfruit horned beaksedge, and fringed yelloweyed grass. Weedier elements such as bushy bluestem, broomsedge bluestem, and dogfennel are also common. Trees and shrubs, if present, are few and may include stunted slash pine, common buttonbush, and peelbark St. John's wort, typically occurring around the edges of the marsh.

Depression marshes make up a small percentage of SOFWEA, and disturbances to those depression marshes are mainly due to hydrologic changes over time probably resulting from groundwater drawdown. These drier marshes are exploited by weedy herbs and encroaching shrubs.

### **Dome Swamp (~80.78 acres)**

Dome swamp is an isolated, forested, depression wetland occurring within a fire-maintained community such as mesic flatwoods. These swamps are generally small, but may also be large and shallow. The characteristic dome shape is created by smaller trees that grow in the shallower waters of the outer edge, while taller trees grow in the deeper water in the interior of the swamp. Pond cypress often dominates, but swamp tupelo, may also form pure stands or occur as a co-dominant. Other canopy or subcanopy species include red maple, dahoon, swamp bay, slash pine, sweetbay, and loblolly bay. Shrubs are typically sparse to moderate, but often are absent in dome swamps with a high fire frequency or dense in swamps where fire has long been absent. Shrubs common in dome swamps include Virginia willow, fetterbush, common buttonbush, coastalplain willow, wax myrtle, titi, and St. John's wort. Herbaceous species can be dense or absent and include a wide variety of ferns, graminoids, and herbs. Sphagnum moss often occurs in patches where the soil is saturated but not flooded. The center of the dome swamp contains the largest cypress trees and the understory can be open with deeper water and floating and emergent species such as alligatorflag, big floatingheart, floating water spangles, duckweeds, and bulltongue arrowhead.

At SOFWEA, dome swamps make up about 5% of the area and are most often found on flat terraces, where they develop when the overlying sand has slumped into a depression in the underlying limestone, creating a rounded depression connected to a shallow water table. In uplands with clay subsoils, dome swamps may occupy depressions over a perched water table. Soils in dome swamps are variable but are most often composed of a layer of peat,

which may be thin or absent at the periphery, becoming thicker toward the center of the dome. This peat layer is generally underlain with acidic sands or marl and then limestone or a clay lens.

### **Flatwoods Lake (~60.31 acres)**

The distinctions between this community, and Depression Marsh, are often quite subtle, because of their successional interrelationships. Depression Marsh is characterized as a shallow, generally round or elliptical depression vegetated with concentric bands of hydrophytic herbaceous plants. Depending upon the depth and slope of the depression, an open water zone with or without floating plants may occur at the center. The open water zone is considered to be a Marsh Lake if it is small in comparison to the surrounding marsh.

Otherwise, the system is considered to be a Flatwoods Lake or a Prairie Lake, depending upon the surrounding community.

Flatwoods Lake is surrounded by either a sparse, Wet Prairie-like zone or a dense ring of saw palmetto and other shrubs.

Typical plants include spikerush, yellow-eyed grasses, St. John's wort, chain fern, coastalplain willow, maidencane, wax myrtle, and creeping primrosewillow. Many animals utilize marshes primarily for feeding and breeding areas but spend most of their time in other habitats. Other animals are more dependent on marshes, spending most of their time within them. Typical animals include green treefrog, American alligator, great blue heron, great egret, little blue heron, tricolored heron, and limpkin.



The depressions in which these communities develop are typically formed by one of two geological processes: (1) solution holes form in the underlying limestone, causing surface sands to slump into a circular depression; or (2) during higher sea levels, offshore currents, waves, and winds scoured depressions that became seasonally or permanently inundated after the seas regressed. Soils in these depressions generally consist of acidic sands with some peat and occasionally a clay lens.

Water is derived mostly from runoff from the immediately surrounding uplands. These natural communities' function as aquifer recharge areas by acting as reservoirs which release groundwater when adjacent water tables drop during drought periods. Water

generally remains throughout the year in a Flatwoods/Prairie Lake or a Marsh Lake, although water levels may fluctuate substantially.

At SOFWEA, this community occurs on the southern end of Lake Hart which borders the area.

### **Mesic Flatwoods (~ 365.14 acres)**

Mesic flatwoods historically were the most widespread natural community in Florida, covering the flat sandy terraces left behind by former high sea levels. Mesic flatwoods are open, pine forests with a diverse understory of shrubs and herbs occurring on low, flat terrain. Soils are acidic, nutrient-poor, fine sands with upper layers darkened by organic matter. Drainage in this flat terrain can be impeded by a loosely cemented organic layer (spodic horizon) formed within several feet of the soil surface. The soils may be alternately xeric during dry periods, and saturated or even inundated after heavy rain events. Fire is an important factor in maintaining high plant diversity and naturally occurs primarily during the late spring/early summer lightning season.

At SOFWEA, mesic flatwoods are mostly found in the southern half of the property. To the north, the mesic flatwoods are commonly restricted to wide borders around wetlands. The canopy is dominated by longleaf pine or slash pine, although pines may be sparse or even absent in some areas. In addition to saw palmetto, the shrub layer commonly includes tarflower, dwarf huckleberry, blue huckleberry, Atlantic St. John's wort, gallberry, coastalplain staggerbush, dwarf wax myrtle, running oak, dwarf live oak, and shiny blueberry. The herbaceous layer is diverse and dominated by wiregrass in less disturbed areas.

### **Mesic Hammock (~ 77.07 acres)**

Mesic hammocks are forests of temperate evergreen hardwood species occurring along wetlands or as islands within wetlands where they are sheltered from fire. Mesic hammock is a well-developed evergreen hardwood and/or palm forest, typically with a closed canopy of live oak. Mesic hammock may occur as “islands” on high ground within basin or floodplain wetlands, as patches of oak/palm forest in dry prairie or flatwoods communities, on river levees, or in ecotones between wetlands and upland communities. Historically, mesic hammocks were likely restricted to fire shadows, or other naturally fire-protected areas such as islands and peninsulas of lakes. Other landscape positions that can provide protection from the spread of fire are likely places for mesic hammock development, including edges of lakes, sinkholes, other depressional or basin wetlands, and river floodplains. Although mesic hammock is not generally considered a fire-adapted community, some small patches of hammock occurring as islands within marshes or prairies may experience occasional low-intensity ground fires. Mesic hammocks occur on

well-drained sands mixed with organic matter and are rarely inundated. High moisture is maintained by heavy shading of the ground layer and accumulation of litter. Where limestone is near the surface, rocky outcrops are common in mesic hammocks. Fire is rare, and when mesic hammocks burn they may convert to the community they border.

At SOFWEA, mesic hammocks have relatively low species diversity. They are characterized by a closed canopy of mostly live oak with occasional slash pine. Other oaks, namely swamp laurel oak and water oak are common and cabbage palm is occasional in the subcanopy. Both the shrub and herb layers are sparse.

### **Sandhill (~8.46 acres)**

Sandhills are open canopy, pine-dominated communities occurring on rolling hills of deep sands with deep, often yellowish, well-drained sands. These are open, xeric communities dominated by widely spaced longleaf pine trees with a sparse midstory of deciduous oaks and a moderate to dense groundcover of grasses, herbs, and low shrubs. The midstory trees and low shrubs can be sparse to dense, depending on fire history, and typically include turkey oak, bluejack oak, sand live oak, sand post oak, sparkleberry, dwarf huckleberry, pricklypear, and gopher apple. The diverse herbaceous groundcover is often dominated by wiregrass, with other grasses and herbs including pineywoods dropseed, lopsided indiagrass, and a variety of forbs with many species of legumes and asters. Sandhills are dependent on frequent, low intensity ground fires every 1 to 3 years to reduce hardwood competition and to perpetuate pines and grasses.

At SOFWEA, the sandhill community is restricted to a single remnant. Two other probable historic sandhills are currently xeric hammock. In the remnant sandhill located in the southwest corner of the area, longleaf pines form a sparse canopy with sand live oak and turkey oak common in the subcanopy layer. Shrubs are scattered and low and include gopher apple, Chapman's oak, myrtle oak, and saw palmetto. Wiregrass is a frequent herb with Elliott's milkpea, and lopsided indiagrass also common.

Overall this community is very similar to the nearby scrubby flatwoods and scrub communities that occur on SOFWEA. The percentage of the area occupied by sandhill, even historically, is small and there is not good development of the sandhill structure. The sandhills have been historically fire suppressed, and oaks have become well established.

### **Scrub (~ 38.78 acres)**

Scrub is a community composed of evergreen, xerophytic shrubs, with or without a canopy of pines, and is found on dry, infertile, sandy ridges. Scrub communities dominated by a canopy of sand pine are usually found on the highest sandy ridgelines. The pine canopy may range from widely scattered trees with a short, spreading growth form, to tall thin

trees forming a dense canopy of uniform height. Scrub is located on dry, infertile, sandy ridges which often mark the location of former shorelines. Scrub occurs in many forms, but is often characterized by thickets of scrub oaks and other shrubs occurring on xeric, sandy soils with numerous open patches of barren sand. The ground cover is generally very sparse, and is typically dominated by ground lichens or, rarely, herbs.

At SOFWEA, scrub occurs in at least three patches and has probably succeeded to present-day xeric hammock in a fourth patch. No sand pine was found in these scrubs, but xeric oaks such as sand live oak, Chapman's oak, and myrtle oak are abundant in the shrub layers. Saw palmetto may be common as well as other, more scrubby, shrubs including rusty staggerbush, pricklypear, and scrub wild olive. Herbs are rare, including sandyfield beaksedge, rose rush, and October flower. Epiphytes such as ballmoss and Spanish moss may be common on oak branches.

At SOFWEA, scrub grades into and may be hard to distinguish from scrubby flatwoods. Past fire suppression magnifies this difficulty, since the overgrowth of scrubby oaks and shading of wiregrass creates the overall appearance of scrub rather than flatwoods. Recent prescribed fires have made this distinction easier, but some areas seem to be naturally intermediate between scrubby flatwoods and true scrub. In general, scrub was mapped in areas that were completely lacking wiregrass and with very few or no longleaf pines.

At least one historic scrub was cleared by the time of the 1947 aerials. This area has since developed into a xeric hammock with a closed canopy of sand live oak. Current roads are minor disturbances in the existing scrubs.

### **Scrubby Flatwoods (~ 465.38 acres)**

Scrubby flatwoods have elements characteristic of both mesic flatwoods and scrub communities. Scrubby flatwoods have an open canopy of widely spaced pine trees and a low, shrubby understory dominated by scrub oaks and saw palmetto, often interspersed with areas of barren white sand. Principal canopy species are longleaf pine and slash pine in northern and Central Florida. The shrub layer consists of oak species and shrubs typical of mesic flatwoods, as well as grasses and dwarf varieties of other shrubs. Scrubby flatwoods occur on slight rises within mesic flatwoods and in transitional areas between scrub and mesic flatwoods. Soils of scrubby flatwoods are moderately well-drained sands with or without an organic layer (spodic horizon).

At SOFWEA, scrubby flatwoods are widespread, especially in the northern half of the area. These flatwoods generally have an open canopy of longleaf pine, although slash pine may also be present. Sand live oak can form sparse subcanopy trees. Shrub dominants include saw palmetto, rusty staggerbush, fetterbush, Chapman's oak, sand live oak, myrtle oak,

running oak, netted pawpaw, tarflower, shiny blueberry, and dwarf huckleberry. Herbs are frequent and dominated by wiregrass.

This community grades into and can be indistinguishable from scrub particularly in areas of oak overgrowth, and this is discussed further in the scrub description. Also, a few areas of canopy sized sand live oaks have been partly or entirely converted to xeric hammock with the accumulation of oak litter and shading in the understory that inhibits frequent fires. There are several small oak dome xeric hammocks that are considered as inclusions within the scrubby flatwoods. In the central portions of SOFWEA, some areas of scrubby flatwoods are very prairie-like in appearance with no pines and low shrubs; however adjacent less frequently burned units have much taller shrubs.

### **Wet Flatwoods (~ 212.83 acres)**

Wet flatwoods occur in broad, low flatlands, often in a mosaic with these communities. They are found in the ecotones between mesic flatwoods, shrub bogs, wet prairies, dome swamps, or strand swamps. Wet flatwoods are pine forests with a sparse or absent midstory and a dense groundcover of hydrophytic grasses, herbs, and low shrubs. The relative density of shrubs and herbs varies greatly in wet flatwoods. Shrubs tend to dominate where fire has been absent for a long period or where cool season fires predominate; herbs are more abundant in locations that are frequently burned. Soils and hydrology also influence the relative density of shrubs and herbs. Soils of shrubby wet flatwoods are generally poorly to very poorly drained sands. These soils generally have a mucky texture in the uppermost horizon. Loamy sands are typical of soils in grassy wet flatwoods.

At SOFWEA, wet flatwoods make up about 12% of the area and are located primarily on the northern portion of SOFWEA. They are found in the ecotones between mesic flatwoods, shrub bogs, wet prairies, dome swamps, or strand swamps. Wet flatwoods are pine forests with a sparse or absent midstory and a dense groundcover of hydrophytic grasses, herbs, and low shrubs. The relative density of shrubs and herbs varies greatly in wet flatwoods. Shrubs tend to dominate where fire has been absent for a long period or where cool season fires predominate; herbs are more abundant in locations that are frequently burned. Soils and hydrology also influence the relative density of shrubs and herbs. Soils of shrubby wet flatwoods are generally poorly to very poorly drained sands. These soils generally have a mucky texture in the uppermost horizon. Loamy sands are typical of soils in grassy wet flatwoods. Wet flatwoods typically have an open pine canopy with an understory of hydrophytic herbs and shrubs. Wet flatwoods that burn frequently typically have a sparse understory and a dense complement of herbs and smaller shrubs. Conversely, thick, shrubby understory layers tend to suppress groundcover plants.

### **Wet Prairie (~ <1 acre)**

Wet prairies are nearly treeless flatlands dominated by wiregrass or wiry beaksedges with a diverse assemblage of hydrophytic herbs, grasses, and dwarf shrubs. Wet prairie is an herbaceous community found on continuously wet, but not inundated, soils of gentle slopes between lower lying depression marshes, shrub bogs, or dome swamps, and slightly higher wet or mesic flatwoods, or dry prairie. Wet prairies are grass- and sedge-dominated wetlands maintained by a high or perched ground water table and frequent fires. They also occur in narrow seepage zones of saturated soil at the base of gentle slopes of stream drainages and in flat lowlands. Wet prairie usually occurs on acidic, nutrient-deficient, saturated soils.

At SOFWEA, only one wet prairie was located. This small patch (~1 acre) of prairie vegetation was located adjacent to a larger basin marsh. The canopy and shrub layers consisting of longleaf pine and St. John's wort accounted for less than 2% of the total cover. The majority of vegetation cover was a dense layer of wiregrass, blue maidencane, and other herbs. A few plants of hooded pitcherplant were found in this community.

Wet prairies may have been more widespread on the area historically. It is impossible to say, however, whether the lack of trees pictured in the historic photographs in certain areas which are currently flatwoods is a natural state or caused by logging. Wet prairie vegetation may also be present in narrow bands forming an ecotone between flatwoods and marshes.

### **Xeric Hammock (~49.86 acres)**

Xeric hammock is an evergreen forest found on well-drained sandy soils. The low canopy is typically closed and usually dominated by sand live oak. An emergent canopy of pine may be present. Xeric hammock typically develops where fire-exclusion allows for the establishment of the oak canopy. This may occur naturally when the area has significant barriers to fire, or more commonly, as the result of human intervention. In these areas, xeric hammock can form extensive stands or can occur as small patches within or near sandhill or scrub. Xeric hammock can also occur on high islands within flatwoods, or on a high, well-drained ridge within a floodplain. Xeric hammock also can occur on barrier islands and in other coastal environs as an advanced successional stage of scrub.





A mature, closed canopy of scrub oaks reaching stature of short trees and an occasionally dense shrub layer characterizes the xeric hammock community.

At SOFWEA, xeric hammock is located in a few patches on historic sandhills, scrub, and scrubby flatwoods. This community type is often the product of long-term fire suppression and other anthropogenic effects. The largest of the hammocks occurs in an area that was cleared in the past, and has since become oak dominated. Because xeric hammock may be derived from several communities, the species composition is quite varied.

The canopy of xeric hammock at SOFWEA is dominated by sand live oak with longleaf pine occasionally emerging above. In historic sandhill, a few turkey oaks may also be present. The shrub layer can be dense to sparse and dominated by saw palmetto, Chapman's oak, myrtle oak, rusty staggerbush, and deerberry. The herbaceous layer is sparse and often contains remnant, suppressed wiregrass as well as other species. Epiphytes are occasional and include ballmoss, and Spanish moss.

### **FNAI Altered Community Descriptions**

#### **Canal/Ditch (~3.15 acres)**

Canal/ditch areas are areas where the historic natural community has been altered by an artificial drainage way. Approximately 3.15 acres of the SOFWEA are classified as canals and ditches.

#### **Clearing/regeneration (~12.58 acres)**

Clearing/regeneration areas are dove fields, wildlife food plots, old homesites, or recent or historic clearings that have significantly altered the groundcover and/or overstory of the original natural community. There are several small patches scattered throughout SOFWEA that are classified as clearing/regeneration.

#### **Impoundment/Artificial pond (~26.14 acres)**

Artificial pond is a created habitat meant for water retention, including impoundments and cattle ponds. There are at least three artificial ponds on the SOFWEA.

#### **Pasture –Improved (~ 54.29 acres)**

Improved pastures are typically grass-dominated features with evidence of current or recent pasture activity such as mowing, chopping or burning. Extant taxonomic elements include longleaf pine in the canopy and sand live oak and live oak in the tall shrub layer. Species present as short shrubs include wax myrtle, sand live oak and saw palmetto.

Primary species in the herbaceous layer are bluestem, broomsedge bluestem, flatsedge, slender flattop goldenrod, pricklypear, bahiagrass, blackroot, and smutgrass. This community is dominated by weedy, herbaceous pasture species.

At SOFWEA, there is one such pasture located on the western edge of the property that has been converted from a historic basin marsh. This area is an open expanse of bahiagrass and other weeds with a few longleaf pines scattered near the neighboring flatwoods. There is a small area of disturbed baygall occurring within the pasture.

### **Spoil area (~57.74 acres)**

Spoil areas include places where dredge or spoil material is deposited. At SOFWEA, a total of 58 acres of the area are classified as spoil areas, with individual spoil areas ranging in size from less than an acre to more than seven acres. Most of these spoil areas are located along the northern portion of the SOFWEA which were created as a result of development activities prior to acquisition of the area for conservation. The largest spoil areas surround the wet flatwoods on the area.

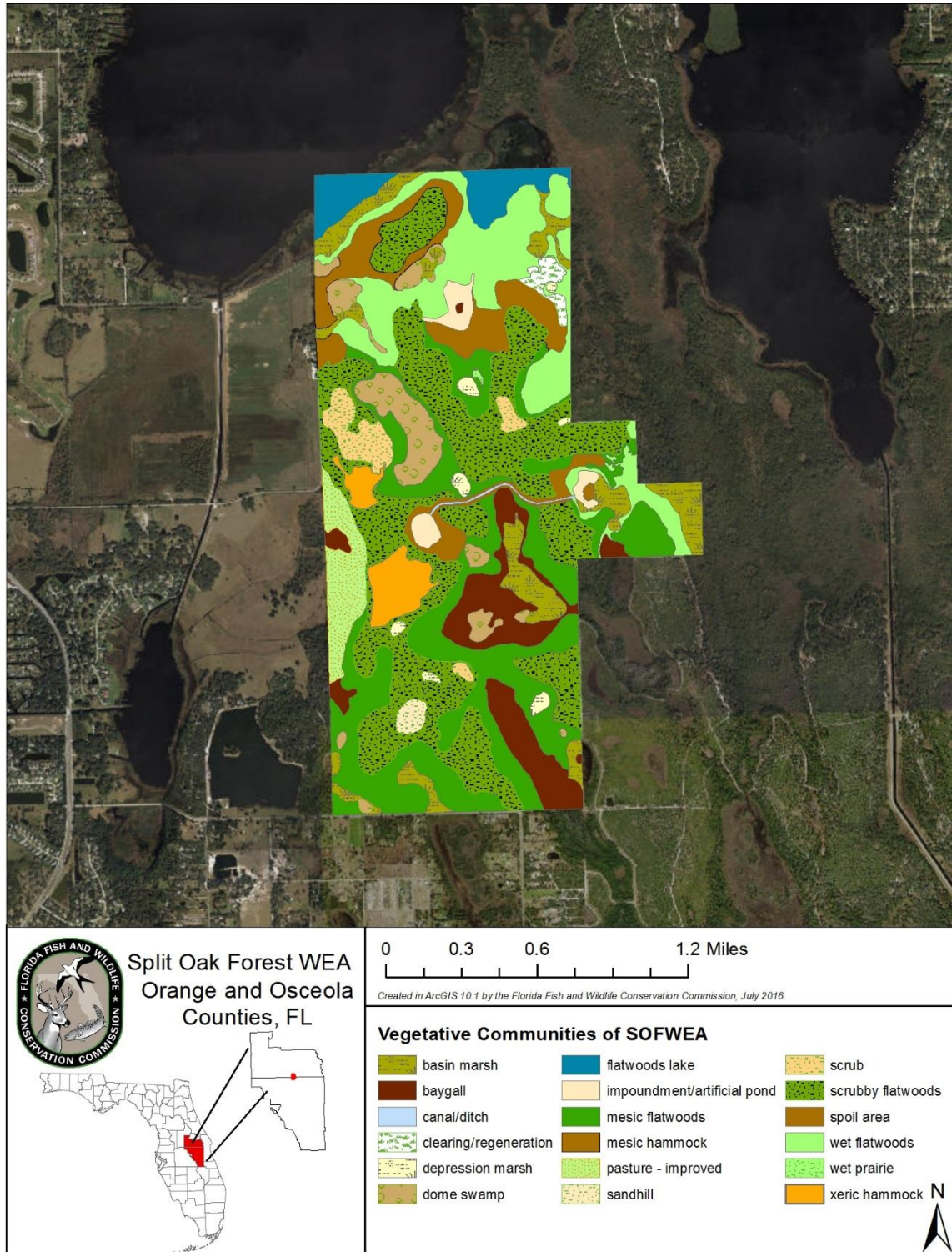
### **2.2.2 Forest Resources**

Predominate forest resources existing on SOFWEA are its high-quality mesic, scrubby and wet flatwoods communities and to a lesser its mesic hammock, scrub and floodplain forest communities. The FWC has obtained a timber assessment from the Florida Forest Service (FFS). The timber assessment is incorporated into the Appendix of this Management Plan.

## **2.3 Fish and Wildlife Resources**

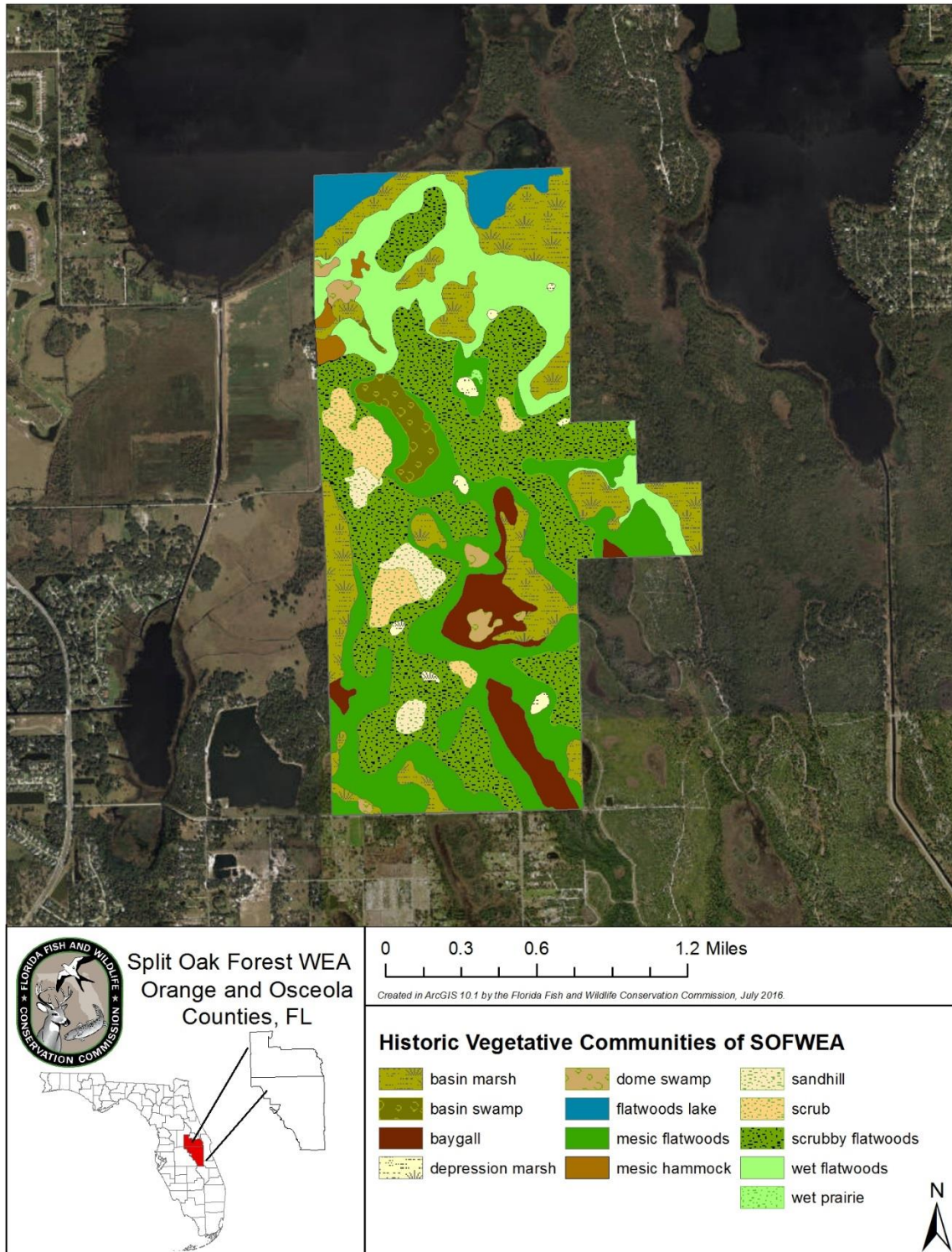
As described above, the SOFWEA has a variety of natural communities and habitat types that support a wide array of imperiled, rare, and more prevalent wildlife species. Active, ongoing wildlife management practices and the high quality of habitat make the SOFWEA an excellent place to view wildlife. The SOFWEA's mesic, wet, and scrubby flatwoods, marshes, swamps, and other communities provide critical habitat for resident and migratory wildlife.

Additionally, the FWC maintains an inventory of fauna occurring on or near the SOFWEA listed in the following tables, including amphibians and reptiles (Table 7), birds (Table 8), mammals (Table 9), fish (Table 10), butterflies (Table 11). Table 12 contains an inventory of the exotic wildlife species that have been documented on or near the SOFWEA.



**Figure 7. SOFWEA Current Vegetative Communities**





**Figure 8. SOFWEA Historic Vegetative Communities**

**Table 7. Amphibian and Reptile Species Known or Expected to Occur on SOFWEA**

<b>Common Name</b>	<b>Scientific Name</b>
American alligator	<i>Alligator mississippiensis</i>
Dusky pigmy rattlesnake	<i>Sistrurus miliarius barbouri</i>
Eastern coral snake	<i>Micrurus fulvius</i>
Eastern diamondback rattlesnake	<i>Crotalus adamanteus</i>
Eastern garter snake	<i>Thamnophis sirtalis sirtalis</i>
Florida box turtle	<i>Terrapene carolina bauri</i>
Florida cottonmouth	<i>Agkistrodon piscivorus conanti</i>
Florida pine snake	<i>Pituophis melanoleucus mugitus</i>
Florida redbelly turtle	<i>Pseudemys nelsoni</i>
Florida snapping turtle	<i>Chelydra serpentina osceola</i>
Florida softshell	<i>Apalone ferox</i>
Gopher frog	<i>Lithobates capito</i>
Gopher tortoise	<i>Gopherus polyphemus</i>
Green anole	<i>Anolis carolinensis</i>
Green treefrog	<i>Hyla cinerea</i>
Ground skink	<i>Scincella lateralis</i>
Little grass frog	<i>Pseudacris ocularis</i>
Oak toad	<i>Anaxyrus quercicus</i>
Peninsula ribbon snake	<i>Thamnophis sauritus sackenii</i>
Pig frog	<i>Lithobates grylio</i>
Pine woods treefrog	<i>Hyla femoralis</i>
Southeastern five-lined skink	<i>Plestiodon inexpectatus</i>
Southern black racer	<i>Coluber constrictor priapus</i>
Southern chorus frog	<i>Pseudacris nigrita</i>
Southern cricket frog	<i>Acris gryllus dorsalis</i>
Southern leopard frog	<i>Lithobates sphenocephalus</i>
Southern toad	<i>Anaxyrus terrestris</i>
Squirrel treefrog	<i>Hyla squirella</i>
Striped mud turtle	<i>Kinosternon baurii</i>
Yellow rat snake	<i>Pantherophis alleghaniensis</i>

**Table 8. Native Bird Species Known or Expected to Occur on SOFWEA**

<b>Common Name</b>	<b>Scientific Name</b>
American crow	<i>Corvus brachyrhynchos</i>
American goldfinch	<i>Spinus tristis</i>
American kestrel	<i>Falco sparverius</i>

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American robin	<i>Turdus migratorius</i>
Anhinga	<i>Anhinga anhinga</i>
Bachman's sparrow	<i>Peucaea aestivalis</i>
Barn swallow	<i>Hirundo rustica</i>
Barred owl	<i>Strix varia</i>
Belted kingfisher	<i>Megascops alcyon</i>
Black vulture	<i>Coragyps atratus</i>
Blue jay	<i>Cyanocitta cristata</i>
Blue-gray gnatcatcher	<i>Polioptila caerulea</i>
Boat-tailed grackle	<i>Quiscalus major</i>
Brown thrasher	<i>Toxostoma rufum</i>
Brown-headed cowbird	<i>Molothrus ater</i>
Brown-headed nuthatch	<i>Sitta pusilla</i>
Burrowing owl	<i>Athene cunicularia floridana</i>
Carolina wren	<i>Thryothorus ludovicianus</i>
Cedar waxwing	<i>Bombicilla cedrorum</i>
Chipping sparrow	<i>Spizella passerina</i>
Chuckwill's widow	<i>Antrostomus carolinensis</i>
Common grackle	<i>Quiscalus quiscula</i>
Common ground-dove	<i>Columbina passerina</i>
Common moorhen	<i>Gallinula chloropus</i>
Common nighthawk	<i>Chordeiles minor</i>
Common snipe	<i>Gallinago gallinago</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Cooper's hawk	<i>Accipiter cooperii</i>
Crested caracara	<i>Caracara cheriway</i>
Double-crested cormorant	<i>Phalacrocorax auritus</i>
Downey woodpecker	<i>Picoides pubescens</i>
Eastern bluebird	<i>Sialia sialis</i>
Eastern meadowlark	<i>Sturnella magna</i>
Eastern phoebe	<i>Sayornis phoebe</i>
Eastern screech-owl	<i>Megascops asio</i>
Eastern towhee	<i>Pipilo erythrophthalmus</i>
Fish crow	<i>Corvus ossifragus</i>
Florida mottled duck	<i>Anas fulvigula</i>
Florida sandhill crane	<i>Grus canadensis pratensis</i>
Florida scrub-jay	<i>Aphelocoma coerulescens</i>
Glossy ibis	<i>Plegadis falcinellus</i>
Great blue heron	<i>Ardea herodias</i>
Great crested flycatcher	<i>Myiarchus crinitus</i>
Great egret	<i>Ardea alba</i>

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Great horned owl	<i>Bubo virginianus</i>
Green heron	<i>Butorides virescens</i>
Grey catbird	<i>Dumetella carolinensis</i>
Hairy woodpecker	<i>Picoides villosus</i>
Killdeer	<i>Charadrius vociferus</i>
Limpkin	<i>Aramus guarauna</i>
Little blue heron	<i>Egretta caerulea</i>
Loggerheaded shrike	<i>Lanius ludovicianus</i>
Mourning dove	<i>Zenaida macroura</i>
Northern bobwhite	<i>Colinus virginianus</i>
Northern cardinal	<i>Cardinalis cardinalis</i>
Northern flicker	<i>Colaptes auratus</i>
Northern harrier	<i>Circus cyaneus</i>
Northern mockingbird	<i>Mimus polyglottos</i>
Northern parula	<i>Setophaga americana</i>
Osprey	<i>Pandion haliaetus</i>
Palm warbler	<i>Setophaga palmarum</i>
Pied-billed grebe	<i>Podilymbus podiceps</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Pine warbler	<i>Setophaga pinus</i>
Prairie warbler	<i>Setophaga discolor</i>
Read-shouldered hawk	<i>Buteo lineatus</i>
Red-bellied woodpecker	<i>Melanerpes carolinus</i>
Red-eyed vireo	<i>Vireo olivaceus</i>
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Ruby-throated hummingbird	<i>Archilochus colubris</i>
Sandhill crane	<i>Grus canadensis</i>
Sharp-shinned hawk	<i>Accipiter striatus</i>
Short-tailed hawk	<i>Buteo brachyurus</i>
Southeastern American Kestrel	<i>Falco sparverius paulus</i>
Southern bald eagle	<i>Haliaeetus leucocephalus</i>
Snowy egret	<i>Egretta thula</i>
Summer tanager	<i>Piranga rubra</i>
Swallow-tailed kite	<i>Elanoides forficatus</i>
Tree swallow	<i>Tachycineta bicolor</i>
Tricolor heron	<i>Egretta tricolor</i>
Tufted titmouse	<i>Baeolophus bicolor</i>
Turkey vulture	<i>Cathartes aura</i>
White ibis	<i>Eudocimus albus</i>

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White-eyed vireo	<i>Vireo griseus</i>
Wild turkey	<i>Meleagris gallopavo</i>
Wood duck	<i>Aix sponsa</i>
Wood stork	<i>Mycteria americana</i>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Yellow-rumped warbler	<i>Setophaga coronata</i>
Yellow-throated vireo	<i>Vireo flavifrons</i>

**Table 9. Mammal Species Known or Expected to Occur on SOFWEA**

<b>Common Name</b>	<b>Scientific Name</b>
Bobcat	<i>Lynx rufus</i>
Cotton mice	<i>Peromyscus gossypinus</i>
Cotton rat	<i>Sigmodon hispidus</i>
Coyote	<i>Canis latrans</i>
Eastern cottontail	<i>Sylvilagus floridanus</i>
Eastern gray squirrel	<i>Sciurus carolinensis</i>
Eastern mole	<i>Scalopus aquaticus</i>
Florida black bear	<i>Ursus americanus floridanus</i>
Florida mouse	<i>Podomys floridanus</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
Marsh rabbit	<i>Sylvilagus palustris</i>
Nine-banded armadillo	<i>Dasypus novemcinctus</i>
Opossums	<i>Didelphis virginiana</i>
Raccoon	<i>Procyon lotor</i>
River otter	<i>Lontra canadensis</i>
Sherman's fox squirrel	<i>Sciurus niger shermani</i>
White-tailed deer	<i>Odocoileus virginianus</i>

**Table 10. Native Fish Species Known or Expected to Occur on SOFWEA**

<b>Common Name</b>	<b>Scientific Name</b>
Bluegill sunfish	<i>Lepomis macrochirus</i>
Florida largemouth bass	<i>Micropterus salmoides floridanus</i>
Mosquito fish	<i>Gambusia affinis</i>



**Table 11. Butterflies Know or Expected to Occur on SOFWEA**

<b>Common Name</b>	<b>Scientific Name</b>
Aaron's skipper	<i>Poanes aaroni</i>
Barred yellow	<i>Eurema daira</i>
Black swallowtail	<i>Papilio polyxenes</i>
Carolina satyr	<i>Hermeuptychia sosybius</i>
Ceraunus blue	<i>Hemiargus ceraunus</i>
Checkered white	<i>Pontia protodice</i>
Cloudless sulphur	<i>Phoebis sennae</i>
Common White checkered-skipper	<i>Pyrgus sp.</i>
Common buckeye	<i>Junonia coenia</i>
Confused cloudywing	<i>Thorybes confusus</i>
Delaware skipper	<i>Anatrytone logan</i>
Dorantes longtail	<i>Urbanus dorantes</i>
Eastern tiger swallowtail	<i>Pterourus glaucus</i>
Eufala skipper	<i>Lerodea eufala</i>
Fiery skipper	<i>Hylephila phyleus</i>
Georgia satyr	<i>Neonympha areolatus</i>
Gray hairstreak	<i>Strymon melinus</i>
Great southern white	<i>Ascia monuste</i>
Gulf fritillary	<i>Agraulis vanillae</i>
Horace's duskywing	<i>Erynnis horatius</i>
Least skipper	<i>Ancyloxypha numitor</i>
Little metalmark	<i>Calephelis virginensis</i>
Monarch	<i>Danaus plexippus</i>
Northern cloudywing	<i>Thorybes pylades</i>
Ocola skipper	<i>Panoquina ocola</i>
Palamedes swallowtail	<i>Pterourus palamedes</i>
Pearl crescent	<i>Phyciodes tharos</i>
Queen	<i>Danaus gilippus</i>
Red-banded hairstreak	<i>Calycopis cecrops</i>
Sachem	<i>Atalopedes campestris</i>
Sleepy orange	<i>Abaeis nicippe</i>
Southern broken-dash	<i>Wallengrenia otho</i>
Southern skipperling	<i>Copaeodes minima</i>
Spicebush swallowtail	<i>Pterourus troilus</i>
Tawny-edged skipper	<i>Polites themistocles</i>
Twin-spot skipper	<i>Oligoria maculata</i>
Variegated fritillary	<i>Euptoieta claudia</i>

Viceroy	<i>Limenitis archippus</i>
Whirlabout	<i>Polites vibex</i>
White hairstreak	<i>Parrhasius m-album</i>
White peacock	<i>Anartia jatrophae</i>
Zarucco duskywing	<i>Erynnis zarucco</i>
Zebra swallowtail	<i>Eurytides marcellus</i>
Zebra heliconian	<i>Heliconius charitonius</i>

**Table 12. Exotic Wildlife Species Known or Expected to Occur on SOFWEA**

<b>Common Name</b>	<b>Scientific Name</b>
Brown anole	<i>Anolis sagrei</i>
Cattle egret	<i>Bubulcus ibis</i>
Cuban tree frog	<i>Osteopilus septentrionalis</i>
Feral hogs	<i>Sus scrofa</i>
Greenhouse frog	<i>Eleutherodactylus planirostris</i>
Tilapia	<i>Tilapia aurea</i>

### 2.3.1 Integrated Wildlife Habitat Ranking System

The FWC has developed the Integrated Wildlife Habitat Ranking System (IWHRS) as a Geographic Information Systems (GIS)-based assessment tool that incorporates a wide variety of land cover and wildlife species data. The IWHRS evaluates the Florida landscape based upon the habitat needs of wildlife as a way to identify ecologically significant lands in the state, and to assess the potential impacts of management and land-use changes. The IWHRS was developed to provide technical assistance to various local, regional, state, and federal agencies, and entities interested in wildlife needs and conservation in order to: (1) determine ways to avoid or minimize project impacts by evaluating alternative placements, alignments, and transportation corridors during early planning stages, (2) assess direct, secondary, and cumulative impacts to habitat and wildlife resources, and (3) identify appropriate parcels for public land acquisition for wetland and upland habitat mitigation purposes. The IWHRS (2009) indicates that the SOFWEA has a very high mean wildlife value of 8.2. The IWHRS may also serve as a part of the GIS Model analyses available for evaluating the Osceola Expressway Extension impacts on the SOFWEA, if the Parkway is formally proposed for consideration and approval to route it on the area. The FWC's IWHRS map for the SOFWEA is shown in Figure 9.

### 2.3.2 Imperiled Species

For the purposes of this Management Plan, the term “imperiled species” refers to plant and animal species that are designated as endangered, threatened, or a species of special concern by FWC, or that are designated as endangered or threatened by the U.S. Fish and

Wildlife Service. This designation is also commonly known as “listed species.” Table 13 lists the focal and imperiled wildlife species that have been documented as occurring on or in the vicinity of the SOFWEA. Figure 10 displays FWC wildlife observations and FNAI element occurrences that have been documented within the SOFWEA. Eleven imperiled animal species have been documented at the SOFWEA.

All abbreviations and status determinations were derived from Florida’s Endangered and Threatened Species published by the FWC in October 2012. The FWC maintains the state list of animals designated as Federally Endangered or Threatened, State-designated Threatened or Species of Special Concern, in accordance with Rules 68A-27.003 and 68A-27.005, respectively, of the Florida Administrative Code <https://www.flrules.org/>.

In January 2013, new threatened species rules approved by the FWC went into effect. The list of wildlife presented here reflects those changes to the rules. All federally listed species that occur in Florida are now included on Florida’s list as Federally Endangered or Threatened species. In addition, the state has a listing process to identify species that are not federally listed but at risk of extinction. These species will be called State-designated Threatened. All State-designated species that have recently undergone status reviews were presented and approved at the June 2011 Commission meeting. The FWC will continue to maintain a separate Species of Special Concern category until all the species have been reviewed and those species are either designated as State-Threatened and given a management plan or removed from the list. More detailed species descriptions and associated management prescriptions are available on the FWC website: <http://www.myfwc.com/wildlifehabitats/profiles/>.

**Table 13. Imperiled Wildlife Species occurring on or near the SOFWEA**

Common Name	Scientific Name	Status
<b>Birds</b>		
Burrowing owl	<i>Athene cunicularia floridana</i>	ST
Florida sandhill crane	<i>Grus canadensis pratensis</i>	ST
Florida scrub-jay	<i>Aphelocoma coerulescens</i>	FT
Little blue heron	<i>Egretta caerulea</i>	ST
Southeastern American kestrel	<i>Falco sparverius paulus</i>	ST
Tricolored heron	<i>Egretta tricolor</i>	ST
Wood stork	<i>Mycteria americana</i>	FT
<b>Mammals</b>		
Sherman's fox squirrel	<i>Sciurus niger shermani</i>	SSC
<b>Reptiles</b>		
American alligator	<i>Alligator mississippiensis</i>	FT (S/A)
Florida pine snake	<i>Pituophis melanoleucus mugitus</i>	ST

Gopher tortoise	<i>Gopherus polyphemus</i>	ST
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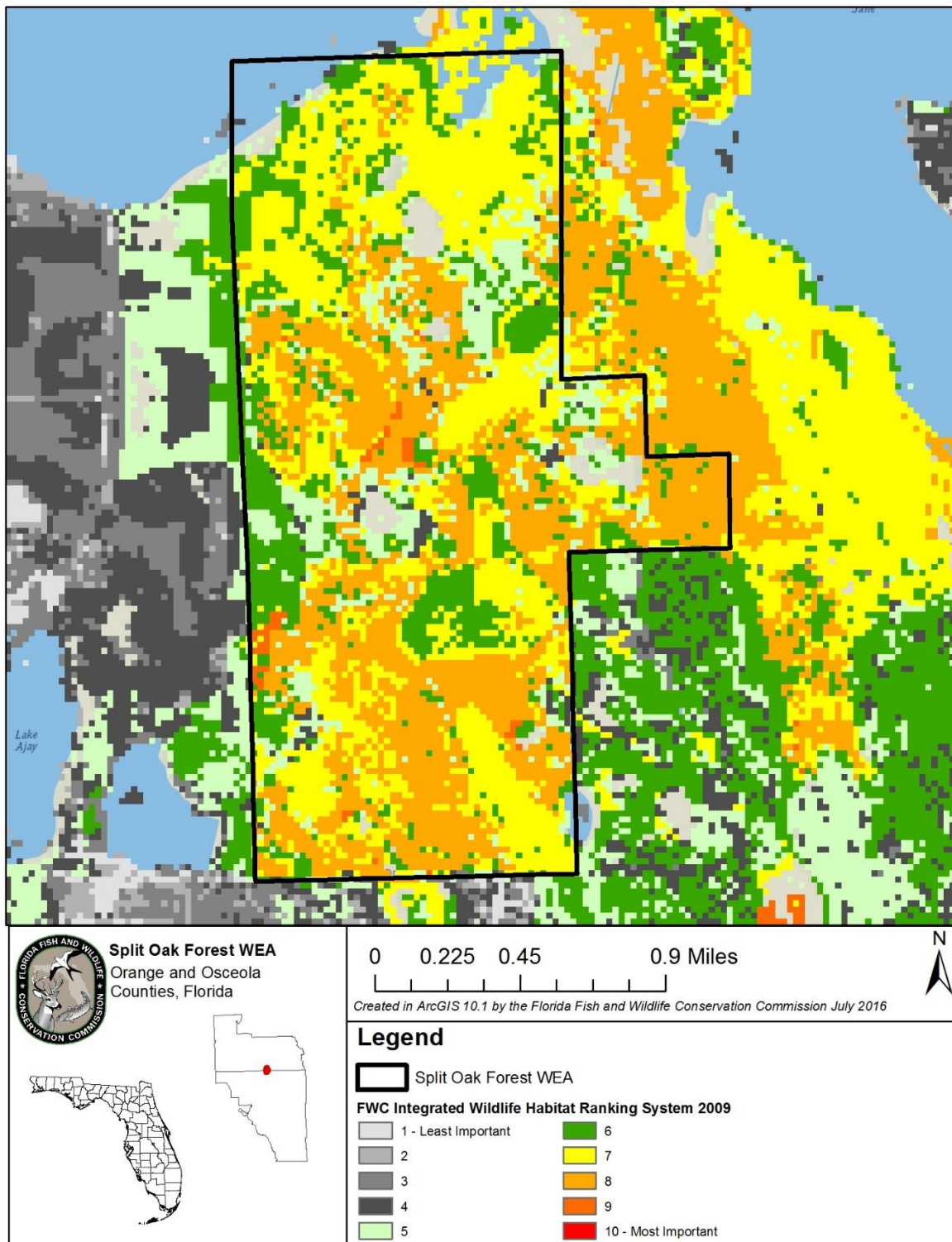
Abbreviation	Status
FE	Federal Endangered
FT	Federal Threatened
FT(S/A)	Federally Threatened due to similarity of appearance
SSC	State Species of Special Concern
ST	State Threatened
NL	Not Listed

### 2.3.3 FWC Wildlife Observations and FNAI Element Occurrences

A diversity of wildlife species is found on the SOFWEA. The FNAI element occurrence records include six imperiled species and a notable migratory bird concentration area. As defined by the FNAI, an “element” is any exemplary or rare component of the natural environment, such as a species, natural community, bird colony, spring, sinkhole, cave, or other ecological feature. An element occurrence is a single extant habitat which sustains or otherwise contributes to the survival of a population or a distinct, self-sustaining example of a particular element. The FNAI assigns a rank to each “element” occurrence. This ranking system was developed by The Nature Conservancy and the Natural Heritage

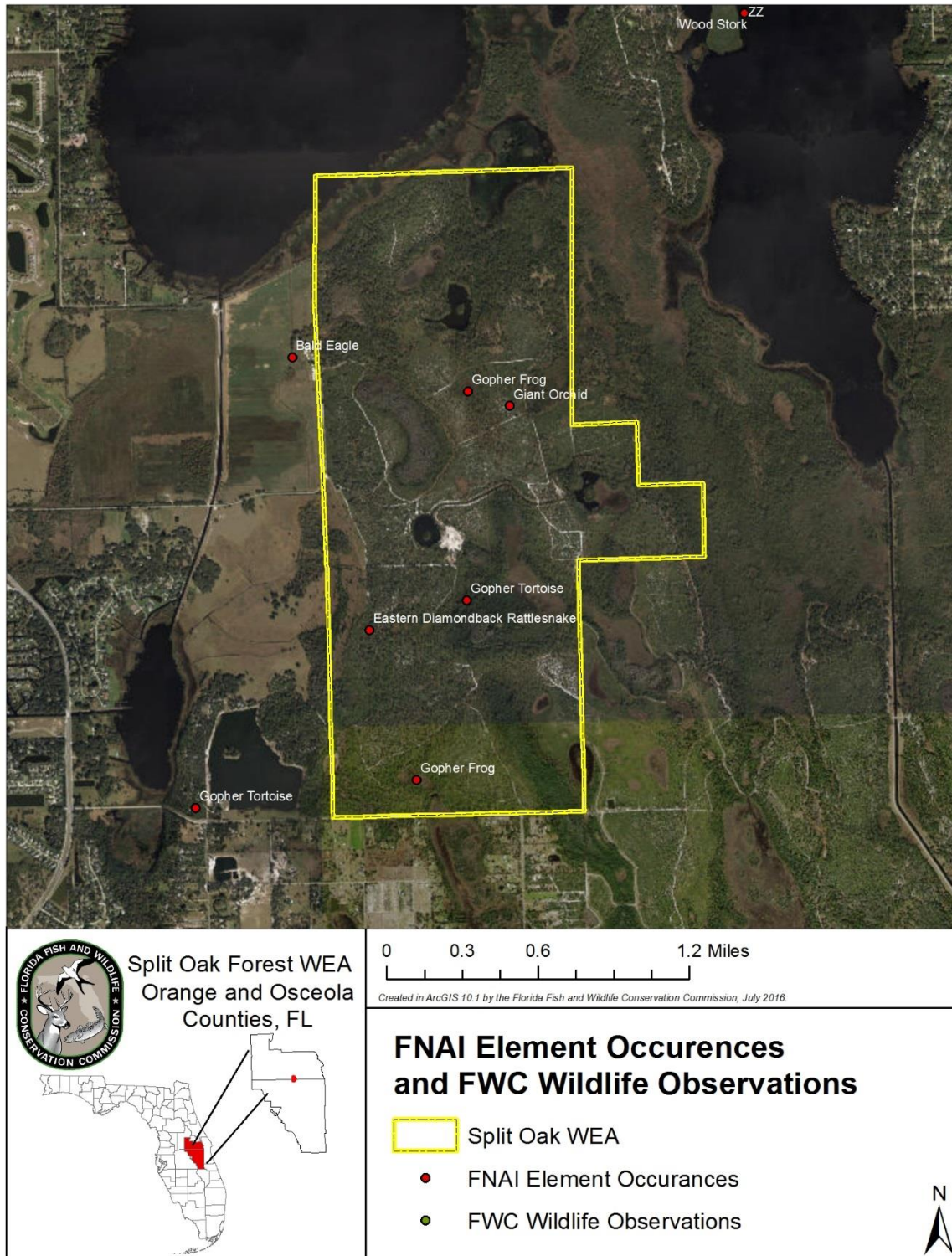
Program Network based on the element’s global rank (element’s worldwide status) or state rank (status of element in Florida). The FNAI ranking system and definitions are located on the following website: [www.fnai.org/ranks.cfm](http://www.fnai.org/ranks.cfm).

Known locations of FWC wildlife occurrences and FNAI element occurrences from the most recent GIS databases of the respective agencies are displayed in Figure 10. Appendix 13.8 contains a letter from the FNAI authorizing the FWC to utilize their database for the purpose of displaying known plant and animal resources.



**Figure 9. SOFWEA Integrated Wildlife Habitat Ranking**





**Figure 10. SOFWEA - FNAI Element Occurrences and FWC Wildlife Observations**

## **2.4 Native Landscapes**

The predominant native landscapes occurring on the SOFWEA are scrubby flatwoods, mesic flatwoods, and wet flatwoods. Other significant native landscapes present on the area include baygall, depression marsh, and scrub. As described in detail above, complete descriptions of the natural communities found the SOFWEA can be found in Section 2.2 of this Management Plan.

## **2.5 Water Resources**

All surface waters of the State are classified by DEP according to designated uses as described in Chapter 62-302.44 FAC. The surface waters of SOFWEA are designated as Class III, and classified for fish consumption; recreation, as well as propagation and maintenance of a healthy, well-balanced population of fish and wildlife.

One major lake, Lake Hart, is found in association with SOFWEA, roughly a half mile of lakeshore within the SOFWEA boundary. The SOFWEA does not contain a first magnitude spring, nor is it designated as an aquatic preserve and is not under consideration for such designation, and there are no portions of SOFWEA that are designated as Outstanding Florida Waters (OFW).

## **2.6 Beaches and Dunes**

There are no beach or dune resources on the SOFWEA.

## **2.7 Mineral Resources**

There are no known commercial mineral deposits on the SOFWEA.

## **2.8 Archaeological and Historical Resources**

The DHR Master Site File indicates that there are no recorded archaeological sites within the boundaries of the SOFWEA. However, the FWC will coordinate with DHR to assess the need for conducting a cultural resource survey.

As a part of the objectives of this management plan, the FWC will ensure that management staff receive Archaeological Resource Management (ARM) training. Furthermore, the FWC will ensure all known sites are recorded in the DHR Master Site File.

## **2.9 Scenic Resources**

The SOFWEA offers remarkably scenic views of Lake Hart and hardwood hammocks. As a result, the area has long been valued for its scenic wilderness-like quality currently unaffected by development and other human alterations of the landscape. Wildlife is abundant year-round throughout the area. The scenery of the SOFWEA can be enjoyed by



hiking on the area's trails. Some of the scenic sites on the SOFWEA have been developed with interpretive signage and wildlife viewing platforms.

### **3 Uses of the Property**

#### **3.1 Previous Use and Development**

Florida was inhabited for thousands of years before Spanish explorer Ponce de Leon landed on the peninsula he named La Florida in 1513. Among those early indigenous people were the Ais, Apalachee, Calusa, Timucua and Tocobago tribes. Here in the central part of the state, the Timucua and Tocobago people roamed the land. It is estimated that about 50,000 Timucua lived in Florida at the time that European explorers arrived.

Consequently, prior to European settlement, the landscape of Florida, including this area of the Florida peninsula, was settled and used by a variety of Native American peoples whose culture relied mainly on hunting, fishing, and subsistence agriculture. Though some land alteration occurred, only minor alteration of the landscape is thought to have taken place until the advent of European settlement beginning with the Spanish occupation of Florida in the sixteenth century. During the 17<sup>th</sup> and 18<sup>th</sup> centuries, the native tribes throughout the Southeastern United States were displaced, resettled or enslaved by European settlers and their governments during this era. Many were either forced into slavery, their land was taken away, their homes destroyed, and many were decimated by disease. To escape, some fled south, landing in Central Florida. Once there, tribes merged into what became known as Seminoles. The name Seminole comes from the Spanish word *cimarron*, which means "runaway."

Osceola County was named after one of the most famous Seminole leaders, Osceola, who led the Seminoles to many successes on the battlefield in their battle to remain an independent tribal nation through three separate wars with the U. S. At the conclusion of the Third Seminole War in 1858, many Native Americans had been removed from Florida. Eventually, the Seminoles were either removed to a reservation in Oklahoma or fled south to the Everglades where their descendants live today as a sovereign tribal nation on the Seminole Reservation. Although most of the state's Native Americans were decimated in the onslaught of new settlers and their settlements.

Along with more advanced agricultural practices, the Spanish and other European settlers brought livestock, primarily cattle and hogs, as well as horses to Florida. This began an era of broad use of the landscape for agriculture. Rangeland cattle grazing and other agricultural practices began to be utilized in a more systematic way and occurred throughout much of the central Florida peninsula through most of the European settlement era from the 16<sup>th</sup> through the 20<sup>th</sup> centuries. Use of these agricultural practices began an

era of increased alteration of the natural landscape. However, it wasn't until the 19th and 20th centuries that major settlement and more extensive alteration of the landscape in the area began with the widespread use of agriculture and associated development.

The SOFWEA derives its name from a unique squat-trunk live oak (*Quercus virginiana*) located on the north side of the property, which split into two halves prior to acquisition of the area. Portions of the property were once used for turpentine and cattle operations. Previous owners cleared approximately 54 acres to create improved pasture along the western boundary of SOFWEA, just south of the Clapp Simms Duda Road entrance. Area staff have found evidence of clearing activities associated with a small orange grove (2-4 acres, now fallow), and possible homestead activities in the xeric oak communities just east of the improved pasture.

In the late 1980s, prior to State acquisition, the owners converted 12 acres of scrubby flatwoods on the east side of the property into pasture. The effort has left the area with scattered scrub oak varieties (*Quercus* spp.) with extensive bare ground between oak clusters. Later, 3 basin marshes were excavated to create artificial impoundments for future planned development of the site. The result of the excavations produced 3 large ponds with adjacent large spoil areas. However, the remaining acreage on SOFWEA is comprised primarily of essentially intact mesic flatwoods, scrubby flatwoods, scrub, xeric hammock, mesic hammock, wet flatwoods, basin marsh, depression marsh, sandhill, baygall, dome swamp, and wet prairie.

### 3.2 Current Use of the Property

Currently, SOFWEA is managed for the conservation and protection of fish and wildlife habitat and fish and wildlife based public outdoor recreation. A wide range of operational and resource management actions are conducted on SOFWEA each year including activities such as prescribed burning; wildlife habitat restoration and improvement; invasive exotic species maintenance and control; road repairs and maintenance; imperiled species management, monitoring and protection; facilities and infrastructure maintenance and repair; conservation acquisition and stewardship activities; archeological and historical resources monitoring and protection; and research related activities.



Current and anticipated resource uses of the property are diverse. The area also offers excellent opportunities for bird watching, especially for Florida scrub-jay and wading birds.

The diversity of vegetation not only harbors a variety of bird species but also provides good opportunities for mammalian wildlife viewing. Other uses include hiking, photography, sightseeing, and horseback riding.

Due to the proximity of population centers in Orange and Osceola Counties, public use can be expected to increase as public awareness of opportunities increases.

### Osceola Parkway Extension

Another planned land use that may impact the area is the planned Osceola Parkway Extension, as the Osceola Expressway Authority has developed plans to extend the Osceola Parkway as part of the County's growth management strategy to create an expressway system that generally follows its urban growth boundary. The Osceola Expressway Authority has proposed several alternate routes for this extension, some of which are routed across the west side of SOFWEA, just north of the Orange County line, moving eastward and exiting the property just south of the Osceola County line. The FWC is currently working, in cooperation with Orange and Osceola Counties, and with the Osceola Expressway Authority to avoid or minimize the potential impacts and fragmentation the planned roadway could have on SOFWEA if the Parkway extension is routed across the area.

#### **3.2.1 Visitation and Economic Benefits**

Visitation and public use of the area for fish and wildlife based public outdoor recreational opportunities is the primary source of economic benefits from the SOFWEA, and contributes to the overall economy for the central region of Florida. If the current maximum visitation level of 162 visitors per day were achieved, a total of 59,130 visitors per year could be expected. If the area were at carrying capacity, FWC economic analysis estimates indicate that the SOFWEA could potentially generate an estimated economic impact of \$6,755,603 for the State and the Central region of Florida. This estimated annual economic impact would aid in the support or creation of an estimated 118 jobs. However, it should be noted that the current visitation rates for the area are estimated to be far below the area's established carrying capacity.

The above figures are based on expenditure data from the 2006 National Survey of Fishing, Hunting and Wildlife-Associated Recreation (USFWS) and 2006 IMPLAN economic models assembled by Southwick Associates and the USFWS. The results were updated to 2010 based on hunting and fishing license trends and inflation. The results were combined and weighted based on the numbers of hunters, anglers and wildlife viewers statewide. The results assume participants' expenditures and the results impacts are consistent throughout the state. Users applying these results to local situations should be aware that differences might exist between these statewide averages and the site in question, and make adjustments if needed.

Further revenue generating potential of the SOFWEA will depend upon future uses to be approved in the management plan. Additional revenue from environmental lands such as the SOFWEA might include sales of various permits and recreational user fees and ecotourism activities, if such projects could be feasibly and economically developed without impacting the area's natural resources. The annual area regulations can be consulted to clarify the necessary and required permits, fees, and regulations. The long-term values of ecosystem services to local and regional land and water resources, and to human health, through the protection of air and water quality are expected to continue to be significant.

### 3.3 Single- or Multiple-use Management

SOFWEA will be managed under the multiple-use concept as a Wildlife and Environmental Area. SOFWEA will provide fish and wildlife resource based public outdoor recreation and educational opportunities, while protecting the natural and historical resources found on the area. Any natural and historical resources of SOFWEA will be managed under the guidance of ARC, the Conceptual State Lands Management Plan, and as outlined in the original purposes for acquisition.

#### 3.3.1 Analysis of Multiple-use Potential

The following actions or activities have been considered under the multiple-use concept as possible uses to be allowed on SOFWEA. Uses classified as "Approved" are considered to be in accordance with the purposes for acquisition, as well as with the Conceptual State Lands Management Plan, and with the FWC agency mission, goals and objectives as expressed in the Agency Strategic Plan (Appendix 13.9). Uses classified as "Conditional" indicate that the use may be acceptable but will be allowed only if approved through a process other than the management plan development and approval process (e.g., special-use permitting, managed-area regulation and rule development). Uses classified as "Rejected" are not considered to be in accordance with the original purpose of acquisition or one or more of the various forms of guidance available for planning and management:

	<u>Approved</u>	<u>Conditional</u>	<u>Rejected</u>
Apiaries		✓	
Astronomy		✓	
Bicycling			✓
Cattle grazing			✓
Citrus or other agriculture			✓
Ecosystem services and maintenance	✓		
Ecotourism		✓	
Environmental Education	✓		
First-responder training		✓	
Fishing		✓	

Geocaching		✓	
Hiking	✓		
Horseback riding		✓	
Hunting			✓
Linear facilities			✓
Military training			✓
Preservation of historical resources	✓		
Primitive camping			✓
Protection of imperiled species	✓		
Off-road vehicle use			✓
Shooting Sports Park			✓
Soil and water conservation	✓		
Timber harvest		✓	
Wildlife observation	✓		

### 3.3.2 Incompatible Uses and Linear Facilities

Consideration of incompatible uses and linear facilities on SOFWEA are made in accordance with the requirements of Section 253.034(10) FS, and other applicable Florida constitution, statute, rule, and policy requirements, as well as other provisions governing applications for proposed incompatible uses or linear facilities on state-owned conservation lands. Upon approval and implementation of this management plan, any proposed future uses that have been classified herein as Rejected, or other proposed future uses that are determined to be incompatible with the purposes of acquisition or other management authorizations and guidance, will be forwarded for review and approval consideration to the DEP-DSL, the ARC and the Board of Trustees prior to any incompatible use or linear facility being authorized on the SOFWEA.

### 3.3.3 Assessment of Impact of Planned Uses of the Property

To communicate FWC's planned uses and activities, specific management intentions, long- and short-term goals and with associated objectives, identified challenges, and solution strategies have been developed for SOFWEA (Sections 5 -8). A detailed assessment of the benefits and potential impacts of planned uses and activities on natural and historical resources was an integral part of the development of the management activities and intent, goals, objectives, challenges, and strategies sections of this Management Plan.

## 3.4 Acreage Recommended for Potential Surplus Review

On conservation lands where FWC is the lead manager, FWC evaluates and identifies recommended areas for a potential surplus designation by DSL, ARC, and the Board of Trustees. This evaluation consists of GIS modeling and analysis, aerial photography interpretation, analysis of fish and wildlife resources, a review of resource and operational

management needs, and a review of public access and recreational use of the area. Also, FWC considers recommendations for surplus lands as they relate to Florida’s “No Net Loss of Hunting Lands” legislation (Ch. 379.3001 F.S.), as well as surplus restrictions for lands acquired through the Federal Aid in Wildlife Restoration Act (Pittman-Robertson) or through other federal grant programs.

The evaluation of SOFWEA by FWC has determined that all portions of the area are being managed and operated for the original purposes of acquisition, and remain integral to the continued conservation of important fish and wildlife resources, and continue to provide quality fish and wildlife resource based public outdoor recreational opportunities. Therefore, no portion of the SOFWEA is recommended for potential surplus review.

#### 4 Accomplished Objectives from the SOFWEA Management Plan 1995

This section is dedicated to reporting the extent to which the Objectives described in the SOFWEA Management Plan 1995 (pages 7-8) were successfully completed. Accomplishments for SOFWEA during the previous planning timeframe are further discussed in more comprehensive detail throughout **Section 5 Management Activities and Intent** of this Management Plan.

The following **Resource Management Goals and Objectives** from the 1995 SOFWEA Management Plan describe the planned activities for SOFWEA during this period. The degree to which FWC was able to accomplish the planned activities during this period is reflected as **Percent Accomplished** for each associated Objective.

<u>Goals and Objectives</u>	<u>Percent Accomplished</u>
<b>Goal 1: To maintain, increase, and ensure the abundance and distribution of state listed wildlife within the project site.</b>	
Objective 1: Implement appropriate habitat management and restoration activities in order to satisfy the life history requirements of listed species populations. <i>Comment: The FWC has established OBVM management prescriptions and associated monitoring and has implemented resource management regimes, including prescribed burning, exotic species treatment, and mechanical treatments, etc. on the area.</i>	100%
Objective 2: Primary consideration will be directed to the needs of listed wildlife populations, even to the exclusion of user considerations.	100%

<i>Comment: All resource, operational and recreational management and uses on the area, aids and is compatible with imperiled wildlife management prescriptions.</i>	
<p>Objective 3: Establish techniques to monitor the status of listed species populations in order to evaluate and refine management activities.</p> <p><i>Comment: The FWC has developed a WCPR strategy for the area, and is implementing imperiled species management, monitoring, and survey actions to support, maintain and enhance imperiled species populations on the area.</i></p>	100%
<b>Goal 2: Provide recreational uses which are compatible with the protection and maintenance of listed wildlife populations, the retention of naturally occurring vegetative associations and protection of sensitive natural area resources.</b>	
<p>Objective 1: Provide recreational uses that feature the area's uniqueness as a diverse assemblage of high quality natural plant communities.</p> <p><i>Comment: The FWC has established and developed hiking trails, kiosks and viewing platforms at Bonnet Pond and Sawgrass Pond on the area, to facilitate wildlife viewing recreational opportunities on the area.</i></p>	100%
<p>Objective 2: Reduce wildlife disturbances and enhance wildlife visibility by limiting unsupervised access to daylight hours only.</p> <p><i>Comment: The FWC has established a daytime use only regulations on the area. ( 68A-17.005(5)(d) )</i></p>	100%
<b>Goal 3: Manage for the quality and productivity of the site's xeric plant communities.</b>	
<p>Objective 1: Promote management activities such as ecological burning which are necessary to the maintenance of these communities.</p> <p><i>Comment: The FWC has established OBVM management prescriptions and associated monitoring and has implemented resource management regimes, including prescribed burning, exotic species treatment, and mechanical treatments, etc. which includes all the xeric hammock communities on the area.</i></p>	100%
<p>Objective 2: Provide protection to sensitive plant communities and individual plant species by controlling use of motorized vehicles and by directing pedestrian traffic along established hiking trails.</p> <p><i>Comment: The FWC controls and prohibits use of motorized vehicles on the area, and has directed recreational use to designated trails. (68A-17.005(5)© )</i></p>	100%



<b>Goal 4: Increase public awareness of the importance of protecting and managing listed species populations.</b>	
Objective 1: Provide information regarding the effectiveness of mitigation parks and other habitat protection techniques. <i>Comment: The FWC has developed kiosks to interpret the importance of the habitat and resource management actions necessary to perpetuate and protect imperiled species on the area.</i>	100%
Objective 2: Demonstrate the interrelationships between listed wildlife populations and fire-adapted plant communities. <i>Comment: The FWC has developed kiosks to interpret the importance of the habitat and resource management actions necessary to perpetuate and protect imperiled species on the area, which includes information to demonstrate the interrelationships between listed wildlife populations and fire-adapted plant communities.</i>	100%
Objective 3: Provide self-interpretive hiking trails to listed species habitats and unique environmental features. <i>Comment: The FWC has established and developed hiking trails, kiosks and viewing platforms at Bonnet Pond and Sawgrass Pond on the area, to facilitate wildlife viewing recreational opportunities on the area, which provides self-interpretive hiking trails to listed species habitats and unique environmental features.</i>	100%

## 5 Management Activities and Intent

The following section provides a description of agency plans to locate, identify, protect, preserve or otherwise use fragile natural resources and nonrenewable historical resources. In general, the FWC management intent for SOFWEA is to restore and maintain natural communities in a condition that sustains ecological processes and conserves biological diversity, especially fish and wildlife resources. In conjunction with this primary emphasis, it is FWC's intent to provide quality fish and wildlife resource based public outdoor recreational opportunities on SOFWEA. The FWC will utilize the best available data, guidelines, natural resource management practices, and recreational management practices to achieve these outcomes in accordance with the original purposes for acquisition. Furthermore, as noted earlier, the management activities described in this section are in compliance with those of the Conceptual State Lands Management Plan.

## 5.1 Land Management Review

Pursuant to Chapter 259.036, FS, the DEP-DSL is required to “cause periodic management reviews to be conducted” on Board of Trustees conservation lands to determine if they “are being managed for the purposes for which they were acquired and in accordance with a land management plan adopted pursuant to s. 259.032.” However, as previously discussed, title to the SOFWEA is held by Orange and Osceola Counties, with FWC holding a conservation easement for the area and, therefore, no land management review (LMR) is statutorily required for the area. As a result, no LMR has been conducted for the SOFWEA.

## 5.2 Adaptive Management

Adaptive management is "learning by doing";<sup>1</sup> it is the adjustment or modification of conservation actions to achieve a desired conservation goal. In practice, adaptive management is a rigorous process that includes sound planning and experimental design with a systematic evaluation process that links monitoring to management.<sup>1, 2</sup> Adaptive management requires flexibility for implementation, but should be fitted over a fundamentally sound, well-planned design.

An adaptive management process produces the strongest inference and most reliable results when experimental design components are incorporated into the monitoring process. Adaptive management is most rigorously applied in an active format when components of experimental design (i.e., controls, replication, and randomization) are included in the monitoring process.<sup>2, 3</sup> Incorporating valid statistical analyses of results will further enhance the value of the adaptive management process. However, in some situations, rigorous experimental design procedures can be relaxed without invalidating monitoring results. In a passive format, adaptive management can involve applying a conservation action at a site, observing the results and adjusting the action in the future if warranted.<sup>2, 3</sup>

Proposed adaptive management, monitoring and performance measures are developed through literature reviews and FWC staff meetings. Overall, a results-based approach is incorporated into this Management Plan, for which effective monitoring is an integral component. The FWC will monitor conservation actions, species, habitats, and major threats to the conservation of the natural and historical resources of SOFWEA.

### 5.2.1 Monitoring

A well-developed monitoring protocol is also one of the principal, required criteria for the management of SOFWEA. Monitoring and performance measures are important, but often overlooked elements of conservation planning. Monitoring provides the critical link between implementing conservation actions and revising management goals.

Monitoring is the systematic, repeated measurement of environmental characteristics to detect changes, and particularly trends, in those characteristics. Monitoring provides essential feedback, the data needed to understand the costs, benefits, and effectiveness of planned conservation actions and the management projects undertaken to address them.<sup>2</sup>

For natural communities, monitoring protocols are established through FWC's Objective-Based Vegetation Management (OBVM, Section 5.3.1) program, which monitors how specific vegetative attributes are responding to FWC management. For imperiled and focal fish and wildlife species, monitoring protocols are established through FWC's Wildlife Conservation Prioritization and Recovery (WCPR, Section 5.4.2) program. FWC staff may monitor additional fish and wildlife species when deemed appropriate. Exotic and invasive plant and animal species (Section 5.5) are also monitored as needed and appropriate. Recreational uses are monitored through FWC's Public Access and Wildlife Viewing program, and work in conjunction with the establishment and adjustment of public access carrying capacities (Section 5.6.3). Historical resources (Section 5.9) are monitored with guidance from the Florida Department of State's Division of Historical Resources (DHR).

### **5.2.2 Performance Measures**

Performance measures include qualitative or quantitative measures used to provide an estimate or index of the characteristic of interest, and to chart the overall progress of conservation actions towards specific goals. Successful monitoring programs and their associated performance measures provide natural resource professionals with valuable feedback on the effectiveness of conservation actions and make it possible to implement a more flexible adaptive management approach. An adaptive management approach ultimately will be more efficient and effective when it tracks inputs, incorporates an effective monitoring program that integrates performance measures, and evaluates results against desired goals.

### **5.2.3 Implementation**

The SOFWEA Management Plan serves as the guiding framework to implement this adaptive management process. It serves as the underpinning for the integration of management programs (OBVM, WCPR, Public Access and Wildlife Viewing, Recreation Master Plans, etc.) underway to accomplish needed conservation actions that are planned to manage the natural resources of SOFWEA, and resolve conservation threats to fish and wildlife and the habitats they occupy. Based on evaluations of project results, the conservation actions are revised as necessary, and the adaptive management process is repeated.

## 5.3 Habitat Restoration and Improvement

On SOFWEA, FWC will focus on managing for native habitat diversity, emphasizing maintenance of high-quality natural communities, and restoration of disturbed areas. Restoration may be achieved on disturbed areas by the re-introduction of fire, restoring historic hydrological conditions and/or the use of mechanical or chemical forest management techniques as appropriate. Retention of the native old growth component of forests, while also providing for natural regeneration, remains an important consideration. SOFWEA has high-quality native communities including basin marsh, baygall, depression marsh, dome swamp, flatwoods lake, mesic flatwoods, mesic hammock, sandhill, scrub, scrubby flatwoods, wet flatwoods, wet prairie, and xeric hammock that FWC will continue to manage and protect. On disturbed upland sites, FWC may initiate ground cover and natural community restoration if determined feasible along with consideration of any ongoing wildlife and recreational uses on such areas.

The FNAI has conducted surveys and mapped the current vegetative communities and historic vegetation communities on SOFWEA. This information will be used to guide and prioritize management and restoration efforts on the area.

### 5.3.1 Objective-Based Vegetation Management

The FWC uses a comprehensive resource management approach to managing FWC-managed areas. Restoring the form and function of Florida's natural communities is the foundation of this management philosophy. The FWC uses OBVM to monitor how specific vegetative attributes are responding to FWC management.

The first step in implementing OBVM is to map the current, and in most cases the historic natural communities, on the managed area using the FNAI Natural Community Classification. The FWC contracts with FNAI to provide these mapping services, and plans to have natural community maps recertified on most areas on a five-year basis. A natural community, as defined by FNAI, is a distinct and recurring assemblage of populations of plants, animals, fungi and microorganisms naturally associated with each other and their physical environment.



After natural communities have been mapped, FWC land managers will identify those natural communities that will influence and guide management decisions, known as the

actively managed natural communities. Through OBVM monitoring, FWC collects data on a number of specific vegetation attributes that provide insight about the condition of the natural community. Because FWC is interested in the overall effect of management on the natural communities, OBVM data is analyzed at the natural community level.

Measurable habitat management objectives referred to as ‘desired future conditions’ are established for each actively managed natural community. Desired future conditions are the acceptable range of values for quantifiable vegetation attributes, such as basal area, shrub height and cover, and ground cover. The FWC collaborated with the FNAI to identify ‘reference sites’ for each actively managed natural community and applied the OBVM monitoring methodology at these reference sites to determine what attribute values occur in a high-quality community (<http://www.fnai.org/reference-natural-communities.cfm>). FWC staff considers the reference site attribute values when setting area-specific desired future conditions for natural communities.

Vegetation monitoring samples the selected attributes, with the results being compared to the established desired future conditions. All monitoring performed under OBVM is completed using the program’s Standard Operating Procedures.

Consistent, long-term monitoring of managed natural communities will quantify changes in habitat conditions, provide information on the cumulative effects of management activities, and measure progress towards meeting management objectives for desired habitat conditions. Measured changes in vegetation condition are intended to be used to inform future land management actions.

Initial mapping and vegetation sampling provides FWC staff with baseline data indicating natural community structure, distribution, and condition on the area. Comparing the subsequent monitoring results to desired future conditions, provides important operational information on a natural community’s vegetation structural status at a given point in time and trend over time. Using this information, managers can evaluate, adjust and modify their management practices to meet the stated objectives. By comparing natural community mapping products through the years, managers can track progress in moving altered communities to functioning natural communities.

### **5.3.2 Prescribed Fire and Fire Management**

Periodic spring and summer fires occurred in fire-adapted communities under natural conditions. Plant species composition reflects the frequency and intensity of these fires. In the absence of fire, fallow fields on former longleaf sites follow a successional pattern through mixed pine-hardwood forests to an exclusively hardwood community rather than to the original plant community. The plant species composition may differ slightly on poorer

soils of the slash pine flatwoods, but the dominant role of fire in controlling hardwoods is equally important in either ecosystem.

Timber removal, site preparation, drainage, and lack of fire have all combined to alter the plant species composition of the area resulting in a loss of fuel and inhibiting the return to a more “natural” fire management regime. Site-specific combinations of prescribed fire, mechanical and chemical vegetation control, reforestation, and restoration of natural water regimes are likely necessary actions needed to restore the area to historic natural communities.

The FWC employs a fire management regime to increase both species and habitat diversity and will continue a prescribed burning program on the SOFWEA in accordance with vegetative management objectives. As fire moves across a landscape, some areas carry fire better than others. Areas with higher vegetative fuel loads typically burn more evenly and with greater intensity. Areas with lower vegetative fuel loads or wetland areas inundated with water typically will not carry fire as evenly, and usually burn at a lower intensity. Employing a burning program with different burning frequencies, intensities, and seasonality (dormant season vs. growing season) of prescribed burns create habitat diversity and a mosaic of vegetation patterns. This mosaic is designed to have both frequently burned and infrequently burned aspects.

On some areas, prescribed burning is limited by the buildup of mid-story brush and a lack of pyrogenic groundcover fuels. This condition creates unsuitable habitat for many wildlife species. Mechanical control of brush on upland sites by roller chopping, logging, shredding, or incidentally by equipment during commercial thinning operations, can reduce shading and encourage the grasses and forbs that are necessary to sustain prescribed fire.

Single drum (with standard, not offset blades), one-pass roller chopping can be a valuable management tool, enabling the use of prescribed fires in areas heavily invaded by dense woody vegetation. However, roller chopping may damage the herbaceous ground cover, especially wiregrass. Therefore, its application will be limited to situations where burning can only be accomplished by first reducing woody vegetation by mechanical means.



Whenever possible, existing firebreaks such as roads and trails, as well as natural breaks such as creeks and wetlands, will be used to define burning compartments. Disk harrows, mowing, and foam lines will be used as necessary to minimize disturbance and damage created by fire plows.

The transitional areas between two adjacent but different vegetative cover types, such as forests and wetlands, are known as ecotones. With the possible exception of wildfire suppression, mechanical soil disturbance in ecotones will be avoided in order to protect habitats for important rare species that often occur between flatwoods and riparian drainages. Silvicultural site preparation and creation of firebreaks are avoided when possible in these zones. Additionally, fires are allowed to burn into the edges of marshes, swamps and other wetlands in order to maintain these habitats. Once fuel loads have been reduced and a more open appearance has returned, vegetative management objectives will likely dictate a fire return interval that averages 1-4 years for most of the area's fire adapted communities, preferably during the spring and early summer months.

In addition to the general prescribed fire management guidelines described above, an area-specific Prescribed Fire Plan has been developed and will be implemented for SOFWEA. This plan will include, but not be limited to, delineation of burn management units, detailed descriptions of prescribed fire methodology, safety, and smoke management guidelines.

During the previous planning period, 100% of the area's fire adapted communities have been treated with prescribed fire. Approximately 100% of the fire-adapted communities have are within are within the recommended fire return intervals. As detailed in the goals and objectives in Section 6 below, FWC plans to conduct prescribed burning on 400 acres per year of the area's fire adapted communities resulting in 100% of the area's burnable acreage being maintained within the recommended fire return intervals during this planning period. Potential projected challenges with continuing to successfully implement prescribed fire on the area are described further in Section 3 (Osceola Parkway Extension) above, Section 8 (Challenges) below. The continuing benefits of prescribed fire on the area's wildlife habitats along with other ongoing habitat restoration activities that are being implemented on SOFWEA are discussed in more detail below.

### **5.3.3 Habitat Restoration**

Significant habitat management activities have taken place within many of the natural communities of SOFWEA over the course of the previous management period beginning in 1995. As noted above, since 1995, almost all management units with fire-adapted natural communities have been treated with prescribed fires, most on a repeated basis as established within the management plan. This has aided in the restoration of native ground cover and improved wildlife habitat throughout SOFWEA. In addition to conducting prescribed burning, mechanical treatments such as roller chopping and mowing has been conducted on all areas scrub, scrubby flatwoods and some selected areas of mesic flatwoods, some on a repeated basis to further improve the habitat value of the natural communities at SOFWEA and specifically encourage better habitat conditions for listed wildlife such as the gopher tortoise.



In addition to the prescribed burning activities described above, the FWC has established OBVM management prescriptions and associated monitoring and has implemented resource management regimes, including prescribed burning, exotic species treatment, and mechanical treatments, etc. which includes all the xeric hammock communities on the area.

Continuing habitat management activities on the area will focus on enhancing natural communities, maintaining recommended fire return intervals for fire adapted communities, treating and removing exotic plant species, and controlling vegetation through mowing and roller chopping as needed. Chemical removal is also planned to be implemented on some selected hardwoods in the xeric oak habitat in order to restore to sandhill habitat. Exotic species control is more extensively discussed in Section 5.5, below. Further habitat management and improvement objectives planned for the area are delineated in Section 6 below.

## **5.4 Fish and Wildlife Management, Imperiled and Focal Species Habitat Maintenance, Enhancement, Restoration, or Population Restoration**

### **5.4.1 Fish and Wildlife**

Due to the variety of natural communities present on the area, a diversity of associated wildlife, including imperiled, rare, game and non-game species, can be found on the SOFWEA. In managing for wildlife species, an emphasis will be placed on conservation, protection, and management of natural communities. On the SOFWEA, natural communities important to wildlife include scrubby flatwoods, mesic flatwoods, wet flatwoods, and depression marsh, as well as, natural communities that are less represented on the SOFWEA, but which are still important to wildlife, including floodplain swamp, sandhill and scrub.

The size and natural community composition of the SOFWEA creates a habitat mosaic for a wide variety of wildlife species. Resident wildlife will be managed for optimum richness, diversity, and abundance. In addition to resident wildlife, the SOFWEA provides resources critical to many migratory birds including: waterfowl, passerines, raptors, and others. Habitats important to migratory species will be protected, maintained or enhanced.

Wildlife management emphasis is placed on documenting the occurrence and abundance of rare and imperiled species on the property. The FWC will continue to update inventories for certain species, with emphasis on rare and imperiled fish and wildlife species. Monitoring of wildlife species will continue as an ongoing effort for the area.

Concurrent with ongoing species inventory and monitoring activities, management practices are designed to restore, enhance, or maintain rare and imperiled species and their

habitats. This will be further augmented by following approved federal and FWC species recovery plans, guidelines, and other scientific recommendations for these species. Guided by these recommendations, land management activities including prescribed burning and timber stand improvements will address rare and imperiled species requirements and habitat needs. Section 5.4.2 below provides further information on FWC's comprehensive species management strategy for rare and imperiled wildlife and their respective habitats.

Additionally, a comprehensive species list has been developed for the area, which will be updated and modified as appropriate over time. The species list that has been developed for the area is provided above in Section 2.3.

#### **5.4.2 Imperiled and Focal Species: Wildlife Conservation Prioritization and Recovery**

The FWC has identified the need to: 1) demonstrate optimal wildlife habitat conservation on FWC-managed lands; 2) develop science-based performance measures to evaluate management; 3) recover imperiled species; and 4) prevent future imperilment of declining wildlife species. To help meet these needs, the FWC uses a comprehensive resource management approach to managing FWC-managed conservation areas. Restoring the form and function of Florida's natural communities is the foundation of this management philosophy. The FWC uses OBVM to monitor how specific vegetative parameters are responding to FWC management, and uses the WCPR program to ensure management is having the desired effect on wildlife.

The goal of WCPR is to provide assessment, recovery, and planning support for the FWC-managed areas to enhance management of focal species and the recovery of imperiled species. WCPR program objectives include prioritizing what FWC does for imperiled and focal species on FWC-managed areas; ensuring the actions taken on these areas are part of statewide conservation programs and priorities; and informing others about the work accomplished on lands FWC manages.



The WCPR program helps FWC take a proactive, science-based approach to species management on FWC-managed lands. This approach assesses information from statewide potential habitat models and Population Viability Analysis, and in conjunction with input from species experts and people with knowledge of the area, creates site-specific wildlife assessments for imperiled wildlife species and a select suite of focal species. Staff combines these assessments with area-specific management considerations to develop a wildlife management strategy for the area. Each strategy contains area-specific measurable

objectives for managing priority species and their habitat, prescribes management actions to achieve these objectives, and establishes monitoring protocols to verify progress towards meeting the objectives. By providing FWC managers with information on actions they should undertake, the FWC intends for the strategy to assure the presence and persistence of Florida's endangered and threatened fish and wildlife species (see <http://myfwc.com/media/1515251/Threatened-Endangered-Species.pdf>), as well as select focal species found on the area.

In summary, for FWC-managed areas, the WCPR program helps assess imperiled and focal wildlife species needs and opportunities, prioritize what FWC does for imperiled and focal species, prescribe management actions to aid in species recovery, prescribe monitoring protocols to allow evaluation of the species' response to management, and ensure the information is shared with others. Through the actions of this program, FWC will facilitate fulfilling the needs of focal and imperiled wildlife species on SOFWEA. In the long-term, by implementing these strategies on FWC-managed lands and continuing to assess wildlife species' needs, FWC will continue to play an integral role in aiding the recovery of imperiled species and preventing the future imperilment of declining wildlife species.

The FWC held a WCPR workshop for the SOFWEA in December 2014. After incorporating input from a review by experts, subsequently the WCPR Strategy was reviewed and approved by FWC in July 2015. Using statewide landcover-based habitat models, the SOFWEA WCPR Strategy identifies 16 focal species as having potential habitat on the area. Of the focal species identified as having habitat on the area, the SOFWEA WCPR Strategy provides measurable objectives or recommends some level of monitoring for gopher frog, striped newt, Florida pine snake, gopher tortoise, Bachman's sparrow, brown-headed nuthatch, Cooper's hawk, Florida sandhill crane, Florida mouse, Florida scrub-jay, northern bobwhite, red-cockaded woodpecker, short-tailed hawk, southern bald eagle, swallow-tailed kite, wading birds, and Sherman's fox squirrel. Limited opportunity species included Florida black bear, snail kite, and the burrowing owl.

During the previous planning period the FWC also conducted several gopher tortoise surveys and the installation of a bat house. In addition, FWC implemented a gopher tortoise restocking project on SOFWEA in order to augment the existing population as a result of a significant gopher tortoise population decline that occurred on the area as a result of an upper respiratory or similar pathogen infecting the population there. Initially, the gopher tortoises are located within a confined area of habitat until they are adapted to the area. Relocation monitoring is ongoing for these animals. Upon a determination that sufficient adaptation to the area has occurred their confinement will be discontinued and they will be free to roam the area at that time. This restocking project along with other

ongoing imperiled species management activities will be continue to be implemented in accordance with the SOFWEA WCPR Strategy.

The FWC will continue to implement the SOFWEA WCPR Strategy (Appendix 13.6). The FWC will also continue to review and revise this document as appropriate.

**Table 14. Focal Species Identified as Having Potential Habitat on the SOFWEA**

<b>Common Name</b>	<b>Scientific Name</b>
Bachman's sparrow	<i>Peucaea aestivalis</i>
Brown-headed nuthatch	<i>Sitta pusilla</i>
Burrowing owl	<i>Athene cunicularia floridana</i>
Cooper's hawk	<i>Accipiter cooperii</i>
Crested caracara	<i>Caracara cheriway</i>
Florida black bear	<i>Ursus americanus floridanus</i>
Florida mottled duck	<i>Anas fulvigula</i>
Florida mouse	<i>Peromyscus floridanus</i>
Florida pine snake	<i>Pituophis melanoleucus mugitus</i>
Florida sandhill crane	<i>Grus canadensis pratensis</i>
Florida scrub-jay	<i>Aphelocoma coerulescens</i>
Gopher frog	<i>Lithobates capito</i>
Gopher tortoise	<i>Gopherus polyphemus</i>
Limpkin	<i>Aramus guarauna</i>
Northern bobwhite	<i>Colinus virginianus</i>
Red-cockaded woodpecker	<i>Picoides borealis</i>
Sherman's fox squirrel	<i>Sciurus niger shermani</i>
Short-tailed hawk	<i>Buteo brachyurus</i>
Snail kite	<i>Rostrhamus sociabilis plumbeus</i>
Southeastern American kestrel	<i>Falco sparverius paulus</i>
Southern bald eagle	<i>Haliaeetus leucocephalus</i>
Striped newt	<i>Notophthalmus perstriatus</i>
Swallow-tailed kite	<i>Elanoides forficatus</i>

## 5.5 Exotic and Invasive Species Maintenance and Control

The FWC will continue efforts to control the establishment and spread of Florida Exotic Pest Plant Council (FLEPPC) Category I or II plants on SOFWEA. Control technologies may include mechanical, chemical, biological, and other appropriate treatments. Treatments utilizing herbicides will comply with instructions found on the herbicide label and employ the Best Management Practices for their application.

Exotic and invasive plant species known to occur on the SOFWEA and treated annually by FWC include alligatorweed, Brazilian pepper, Caesar's weed, camphor tree, Chinaberry, Chinese tallowtree, citrus tree, cogongrass, Cuban bulrush, guava, Guineagrass, Heart-of-flame, Lantana, Natalgrass, Old world climbing fern, primrose willow, queen palm, skunk-vine, smutgrass, strawberry guava, sweet viburnum, sword fern, torpedograss, tropical soda apple, and vaseygrass. Exotic and invasive plant species have been identified as occurring at varying densities on approximately 100 acres of the SOFWEA. However, the FWC's methodology for determining the number of acres "infested" with invasive exotic plants only represents a cumulative acreage, and does not reflect the degree of the invasive exotic occurrence. The degree of infestation among areas identified with invasive exotic plant occurrences often varies substantially by species, level of disturbance, environmental conditions, and the status of ongoing eradication and control efforts. The FWC will continue to focus treatments on areas identified as having invasive exotic plant occurrences, as well as treating any new occurrences as they are identified through continued monitoring.

During the previous planning period FWC completed exotic species treatments on an as needed basis. Currently, treatment and control of Chinese tallowtree and cogongrass continues to be the predominant exotic invasive plant species management challenge at SOFWEA. The FWC will continue to focus treatments on areas identified as having invasive exotic plant occurrences, as well as treating any new occurrences as they are identified through continued monitoring. Ongoing exotic species challenges are further detailed in Section 8 below.

Additionally, the FWC will continue efforts to control the introduction of exotic and invasive species, as well as pests and pathogens, on the SOFWEA by inspecting any vehicles and equipment brought onto the area by contractors and requiring that they be free of vegetation and dirt. If vehicles or equipment used by contractors are found to be contaminated, they will be referred to an appropriate location to clean the equipment prior to being allowed on the area. This requirement is included in every contract for contractors who are conducting any operational or resource management work on the area. In this way, FWC implements a proactive approach to controlling the introduction of exotic pests and pathogens to the area.

An exotic animal species of concern on the SOFWEA is the feral hog. These animals have high reproductive rates, and when populations reach high densities, feral hogs can significantly degrade natural communities through foraging activity (rooting). The FWC will consult with other regional natural resource managing agencies and private landowners to coordinate feral hog control measures as necessary. Trapping is another

measure that may be implemented to augment ongoing feral hog control efforts and to further reduce the natural community damage and degradation caused by this species.

## **5.6 Public Access and Recreational Opportunities**

The SOFWEA will be managed under a low intensity, multiple-use concept that includes providing opportunities for fish and wildlife-based public outdoor recreation. The recreational activities offered on the SOFWEA include hiking and wildlife viewing.

Authorized recreational uses are managed consistent with the purposes for acquiring the SOFWEA, including promoting habitat conditions critical to meeting the life history requirements of the gopher tortoise, and ensuring the conservation and ecological integrity of the area while managing for low intensity, multiple-uses, thus providing fish and wildlife based public outdoor recreational opportunities for Florida's citizens and visitors.

During the previous planning period FWC completed the public access, recreational and facility improvements on the SOFWEA. The FWC has established and developed hiking trails, kiosks and viewing platforms at Bonnet Pond and Sawgrass Pond on the area, to facilitate wildlife viewing recreational opportunities on the area. Further planned public access facility improvements are detailed in Section 6. Ongoing public access or recreational challenges are addressed in Section 3 above and Section 8 below. The FWC will continue to implement public access recreational and educational opportunities on the area in accordance with the SOFWEA Recreational Master Plan upon its approval and implementation.

### **5.6.1 Americans with Disabilities Act**

When public facilities are developed on areas managed by FWC, every effort is made to comply with the Americans with Disabilities Act (Public Law 101-336). As new facilities are developed, the universal access requirements of this law are followed in all cases except where the law allows reasonable exceptions. Recreation facilities in semi-primitive or primitive zones will be planned to be universally accessible to the degree possible except as allowed by the ADA<sup>4</sup> where:

1. Compliance will cause harm to historical resources, or significant natural features and their characteristics.
2. Compliance will substantially alter the nature of the setting and therefore the purpose of the facility.
3. Compliance would not be feasible due to terrain or prevailing construction practices.
4. Compliance would require construction methods or materials prohibited by federal or state statutes, or local regulations.

### **5.6.2 Recreation Master Plan**

The FWC has adopted a comprehensive approach to the planning and administration of fish and wildlife resource based public outdoor recreational opportunities at the SOFWEA. To accomplish this, the FWC will develop a Recreation Master Plan for the SOFWEA that will be used to further design and develop appropriate infrastructure that will support the recreational use of the area by the general public. This Recreation Master Plan will include planning for parking, trail design, and area resource interpretation. The plan will also include the Florida National Scenic Trail that will cross the SOFWEA from north to south and the opening of a relocated public access point on the south end of the SOFWEA in Osceola County.

### **5.6.3 Public Access Carrying Capacity**

Baseline carrying capacities for users on FWC-managed lands are established by conducting a site specific sensitivity analysis using available data for the site. The intent of the carrying capacity analysis is to minimize wildlife and habitat disturbance and provide the experience of being “immersed in nature” that visitors to FWC-managed areas desire. Carrying capacities are just a first step; management of recreational use requires a means of monitoring visitor impacts. Responding to these impacts may require adjusting the carrying capacities as necessary. The carrying capacities generated through this process are used as a tool to help plan and develop public access, wildlife viewing, and fish and wildlife resource based public outdoor recreation opportunities.

Based on an analysis of the overall approved uses and supported public access user opportunities, and the anticipated proportional visitation levels of the various user groups, the FWC has determined that the SOFWEA can currently support 162 visitors per day. However, visitation to SOFWEA is currently minimal, which provides excellent opportunities for quiet and solitude while viewing the area’s wildlife.

Importantly, public access carrying capacities are not developed to serve as a goal for expanding the public use of a particular area to match the established carrying capacity. Rather, they are developed to establish maximum thresholds for public use of the respective area in order to protect the natural and historical resources on the SOFWEA and to ensure that visitors will have a high-quality visitor experience. The public access carrying capacity will be periodically reevaluated, and additional capacity may be contemplated as part of the Recreation Master Plan implementation process.

### **5.6.4 Wildlife Viewing**

The SOFWEA is home to a variety of resident wildlife found within its flatwoods, scrub, and other natural communities. The SOFWEA’s size and variety of habitat types, create outstanding wildlife viewing opportunities. Additionally, wildlife viewing opportunities are



projected to increase upon the completion of planned improvements for public access and wildlife viewing outlined in Section 6.9 of this draft plan.

#### **5.6.5 Hunting**

Hunting is prohibited on the SOFWEA. However, hunting opportunities are offered on nearby public lands.

#### **5.6.6 Fishing**

Fishing is authorized year-round at the SOFWEA. However, fishing opportunities on the SOFWEA are limited.

#### **5.6.7 Boating**

Boating is prohibited on the SOFWEA in accordance with the purpose of acquisition covenants on the area. However, boating opportunities are offered on nearby public lakes and streams.

#### **5.6.8 Trails**

Currently, the SOFWEA offers nearly seven and a half miles of designated trails and nearly 10.7 miles of undesignated trails. The inclusion of the Florida National Scenic Trail to the trail inventory is anticipated to also utilize existing trails.

##### **5.6.8.1 Bicycling**

Bicycling is prohibited on the SOFWEA. However, bicycling opportunities are offered on nearby public lands.

##### **5.6.8.2 Equestrian**

Horseback riding is authorized through a permit only process on the SOFWEA.

#### **5.6.9 Camping**

Camping is prohibited on the SOFWEA. However, camping opportunities are offered on nearby public lands.

#### **5.6.10 Geocaching**

Geocaching, also known as Global Positioning System (GPS) Stash Hunt and GeoStash, is a contemporary combination of orienteering and scavenger hunting generally utilizing a GPS receiver unit. Geocache websites routinely promote good stewardship. However, the potential exists for resource damage, user conflicts, or safety issues caused by inappropriately placed caches and/or links that do not provide adequate information about the area.

It is the policy of the FWC to allow placement of geocaches only in those locations that do not present the potential for resource damage, user conflicts, or threats to the safety of the activity participants. The placement of geocaches on FWC-managed lands is governed by specific guidelines. These guidelines may be found on the following FWC website: [http://myfwc.com/media/1074886/FWC Geocache Guidelines.pdf](http://myfwc.com/media/1074886/FWC_Geocache_Guidelines.pdf).

## **5.7 Hydrological Preservation and Restoration**

### **5.7.1 Hydrological Assessment**

The FWC will conduct or obtain a hydrological assessment of the area to identify potential hydrology restoration needs on the SOFWEA.

## **5.8 Forest Resource Management**

Pursuant to OBVM management goals, the FWC will continue to manage timber resources for wildlife benefits and natural community restoration. Management activities including the use of timber thinning and harvesting may be utilized. Reforestation techniques often vary depending on the natural community characteristics and species composition of the area. One of the primary management techniques for reforestation involves regeneration harvests of off-site pine species once they reach merchantable pulpwood size and then replanting with a naturally occurring pine species for the area, however it has been determined that SOFWEA does not have any off-site pine species that require these reforestation management techniques. Another often used technique is to conduct a series of thinning operations gradually to reduce the pine basal area to 30-40 sq. ft./acre and then under-plant sites with an appropriate pine species to increase the uneven-aged character of the stands, overstory structure, and species diversity. However, the current density of pine forests on the SOFWEA indicate that such timber thinning activities will not be necessary in the near future.

Forested wetlands are managed for stands with old growth characteristics. Snags will be protected to benefit cavity-nesting species.

A Timber Assessment, was conducted by the Florida Forest Service in November, 2016 (Appendix 13.13). The management of timber resources will be considered in the context of this Timber Assessment, and the overall land management goals and activities. Also, the FWC will continue to consult with the FFS or a professional forestry consultant regarding forest management activities as appropriate.

## **5.9 Historical Resources**

Procedures outlined by the Florida Department of State's Division of Historical Resources (DHR) will be followed to preserve archaeological and historical resources. The FWC will

continue to consult with the DHR in an attempt to locate and preserve any historical or archaeological features on the area. As necessary, the FWC will also contact professionals from the DHR for assistance prior to any ground-disturbing activity on the area.

The DHR Master Site File indicates that there are no recorded archaeological sites within the boundaries of the SOFWEA. However, the FWC will coordinate with DHR to assess the need for conducting a cultural resource survey.

As a part of the objectives of this management plan, the FWC will ensure that management staff receive Archaeological Resource Management (ARM) training. Furthermore, the FWC will ensure all known sites are recorded in the DHR Master Site File.

## **5.10 Capital Facilities and Infrastructure**

The FWC's land management philosophy is designed to conserve the maximum amount of wildlife habitat while providing the minimal number of capital facilities and infrastructure necessary to effectively conduct operational and resource management activities, and provide ample opportunities for fish and wildlife resource based public outdoor recreation. For these reasons, planned capital facilities and infrastructure will focus on improving access, recreational potential, hydrology, or other resource and operational management objectives.

Current capital facilities and infrastructure on SOFWEA include two observation decks, two kiosks, approximately 7.5 miles of designated trails, and 10.7 miles of undesignated trails. Two trailhead entrances, with parking, are located on the western boundary in Orange County and on the southern boundary in Osceola County.

As described in Section 6.9 of this Management Plan, for any public facilities that are developed on areas managed by FWC, every effort is made to comply with the Americans with Disabilities Act (Public Law 101-336).

## **5.11 Land Conservation and Stewardship Partnerships**

The FWC utilizes a three-tiered approach to identifying, acquiring or otherwise protecting important conservation lands adjacent to or in proximity to existing FWC-managed areas. This involves development of an Optimal Resource Boundary (ORB), Optimal Conservation Planning Boundary (OCPB) and associated Conservation Action Strategy (CAS).

Increasingly, cooperative land steward partnership efforts with private landowners plays an integral role in this effort as does ongoing land conservation, either through fee-simple or less-than-fee conservation easements. In combination, this tiered model helps FWC to further the regional conservation of important fish and wildlife habitats through a proactive, comprehensive, and cooperative approach towards conservation.

### **5.11.1 Optimal Resource Boundary**

This three tiered model begins with the development of an ORB, which is a resource-based analysis on a regional scale that integrates important FWC conservation research and analysis into practical planning, acquisition, and management efforts through GIS analysis. The ORB focuses on critical and important wildlife species or habitat considerations such as rare and imperiled species habitat within a particular region or ecosystem-like area on a landscape scale within which an FWC managed area is contained while eliminating urban areas or lands that have already been conserved or protected.

### **5.11.2 Optimal Conservation Planning Boundary**

The second tier is known as the OCPB. The OCPB combines the regional natural resources identified in the ORB, as well as regional and local area conservation planning, including habitat conservation and restoration, habitat linkages, management challenges, land use and zoning issues, infrastructure including roads and developments, improving access, eliminating inholdings, providing prescribed burn buffers, resolving boundary irregularities, water resource protection, and conserving other important natural and historical resources.

The OCPB provides the basis for development of a broader CAS for SOFWEA. Although the OCPB provides the basis for potential future voluntary, willing-seller conservation acquisitions, it is designed to function primarily as a conservation planning boundary. The OCPB identifies surrounding lands and natural resources that may be important to the continued viability of fish and wildlife populations in the region. As they are currently managed, these lands appear to contribute to regional conservation and may support conservation landscape linkages.

### **5.11.3 Conservation Action Strategy**

The CAS is the third tier, and implements the results of the ORB and OCPB tiers. This element of the process incorporates the conservation planning recommendations into an action strategy that prioritizes conservation needs. The CAS is integral to the development of conservation stewardship partnerships and also implements the current approved process for establishing the FWC Florida Forever Inholdings and Additions acquisition list.

Primary components of the CAS may include:

- FWC Landowner Assistance Program
- FWC conservation planning
- FWC Additions and Inholdings Program Land Conservation Work Plan
- Forest Stewardship Program proposals
- Florida Forever project proposals and boundary modifications
- Conservation easements

Florida Fish and Wildlife Conservation Commission | Split Oak Forest WEA Management Plan

- Federal or State grant conservation proposals
- Regional or local conservation proposals
- Local, state, and federal planning proposals
- Non-governmental organization conservation proposals
- Roadway mitigation proposals

Continued conservation of these lands may be aided by available voluntary landowner stewardship programs, conservation easements, and in some cases, potential voluntary conservation acquisitions. Participation in any FWC conservation effort is entirely voluntary and at the sole choice of willing landowners.

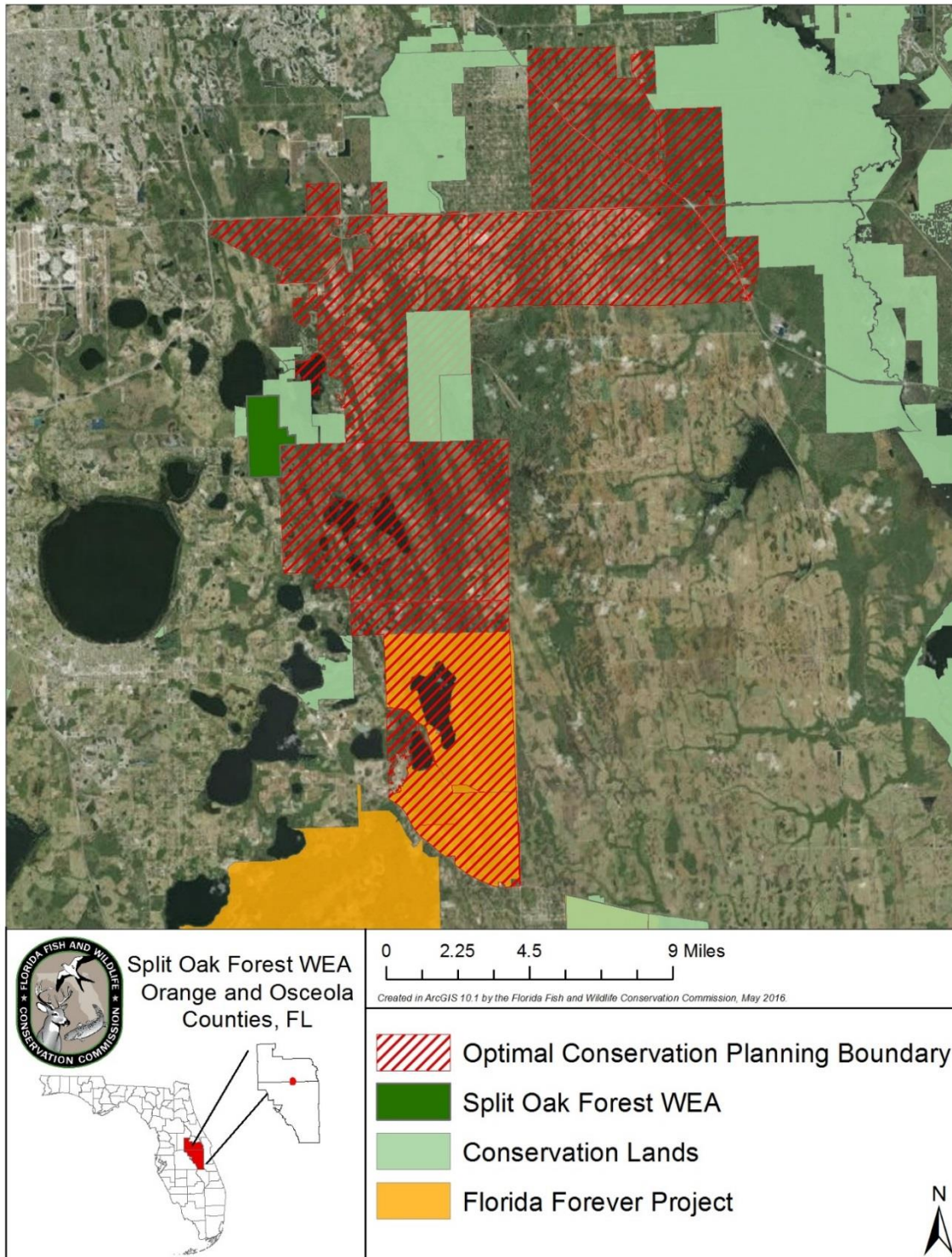
Private landowners seeking assistance with habitat management will likely find it offered within FWC's Landowner Assistance Program (LAP). The FWC employs biologists who are available to provide wildlife-related assistance with land-use planning and habitat management. There are many forms of assistance that include technical, financial, educational, and various forms of recognition that seek to award landowners who manage their wildlife habitat responsibly. More information on FWC's LAP program and online habitat management tools are available online at: <http://myfwc.com/conservation/special-initiatives/lap/> .

#### **5.11.4 FWC Florida Forever Additions and Inholdings Acquisition List**

Currently, FWC has identified no potential additions or privately held inholdings for SOFWEA. Upon completion of the CAS, additions to the FWC Florida Forever Additions and Inholdings acquisition list may be recommended.

### **5.12 Research Opportunities**

The FWC intends to cooperate with researchers, universities, and others as feasible and appropriate. For SOFWEA, the FWC will continue to assess and identify research needs, and pursue research and environmental education partnership opportunities as appropriate. Research proposals involving the use of the area are evaluated on an individual basis. All research activities on SOFWEA must have prior approval by FWC.



**Figure 11. SOFWEA - Optimal Conservation Planning Boundary**

## **5.13 Cooperative Management and Special Uses**

### **5.13.1 Cooperative Management**

The FWC is responsible for the overall management and operation of the SOFWEA. The FFS assists the FWC by providing technical assistance on forest resource management. In addition, the FWC cooperates and consults with the DEP and the SFWMD for the monitoring and management of both ground and surface water resources of the SOFWEA.

### **5.13.2 First Responder and Military Training**

First-responder (public governmental police department or agency, fire and emergency medical service personnel) training and military training are conditionally allowed on SOFWEA. Such activities are considered allowable uses only when undertaken intermittently for short periods of time, and in a manner that does not impede the management and public use of SOFWEA, and causes no measurable long-term impact to the natural resources of the area. Additionally, FWC staff must be notified and approve the training through issuance of a permit prior to any such training taking place on SOFWEA. Any first-responder or military training that is not low-impact, intermittent and occasional would require an amendment to this management plan, and therefore will be submitted by FWC to DSL and ARC for approval consideration prior to authorization.

### **5.13.3 Apiaries**

Currently, there are no apiaries operating on SOFWEA. However, use of apiaries is conditionally approved for SOFWEA, and is deemed to be consistent with purposes for acquisition, is in compliance with the Conceptual State Lands Management Plan, and is consistent with the FWC agency mission, goals, and objectives as expressed in the agency Strategic Plan and priorities document (Appendix 13.9). The location, management, and administration of apiaries on SOFWEA will be guided by the FWC Apiary Policy (Appendix 13.10).

## **5.14 Climate Change**

Because of Florida's unique ecology and topography, any potential impacts as a result of climate change may be particularly acute and affect multiple economic, agricultural, environmental, and health sectors across the state. The impact of climate change on wildlife and habitat may already be occurring, from eroding shorelines and coral bleaching to increases in forest fires and saltwater intrusion into inland freshwater wetlands.

The Intergovernmental Panel on Climate Change (IPCC), a multi-national scientific body, reports that climate change is likely proceeding at a rate where there will be unavoidable impacts to humans, wildlife, and habitat. Given current levels of heat-trapping greenhouse gas emissions, shifts in local, regional, and national climate patterns including changes in



precipitation, temperature, increased frequency and intensity of extreme weather events, rising sea levels, tidal fluctuations, and ocean acidification are projected . The current trend of global temperature increase has appeared to accelerate in recent decades, and continued greenhouse gas emissions may result in projected global average increases of 2 – 11.5° F by the end of the century.<sup>5</sup>

This apparent change in global climate has the potential to disrupt natural processes; in some areas, climate change may cause significant degradation of ecosystems that provide services such as clean and abundant water, sustainable natural resources, protection from flooding, as well as hunting, fishing and other recreational opportunities. Consequently, climate change is a challenge not only because of its likely direct effects, but also because of its potential to amplify the stress on ecosystems, habitats, and species from existing threats such as exponential increases in surface and ground water use, habitat loss due to increased urbanization, introduction of invasive species, and fire suppression.

Potential impacts that may be occurring as a result of climate change include: change in the timing of biological processes, such as flowering, breeding, hibernation, and migration;<sup>6, 7, 8</sup> more frequent invasions and outbreaks of exotic invasive species;<sup>9</sup> and loss of habitat in coastal areas due to sea level rise.<sup>10</sup> Some species are projected to adjust to these conditions through ecological or evolutionary adaptation, whereas others are projected to exhibit range shifts as their distributions track changing climatic conditions. Those species that are unable to respond to changing climatic conditions are projected to go extinct. Some estimates suggest that as many as 20% - 30% of the species currently assessed by the IPCC are at risk of extinction within this century if global mean temperatures exceed increases of 2.7 – 4.5° F.<sup>11</sup> A number of ecosystems are projected to be affected at temperature increases well below these levels.

At this time, the potential effects of climate change on Florida's conservation lands are just beginning to be studied and are not yet well understood. For example, FWC has begun a process for currently developing climate change adaptation strategies for monitoring, evaluating, and determining what specific actions, if any, may be recommended to ameliorate the projected impacts of climate change on fish and wildlife resources, native vegetation, and the possible spread of exotic and invasive species. Currently, FWC is continuing its work on the development of these potential adaptation strategies. However, as noted above, the effects of climate change may become more frequent and severe within the time period covered by this Management Plan.

For these reasons, there is a continuing need for increased information and research to enable adaptive management to cope with potential long-term climate change impacts. The most immediate actions that FWC can take are to work with partners to gather the best

scientific data possible for understanding natural processes in their current state, model possible impacts and subsequent changes from climate change, develop adaptive management strategies to enhance the resiliency of natural communities to adapt to climate change, and formulate criteria and monitoring for potential impacts when direct intervention may be necessary to protect a species. To this end, when appropriate, FWC will participate in organizations such as the Peninsular Florida Land Conservation Cooperative or similar organizations so that FWC continues to gain understanding and share knowledge of key issues related to potential climate change. In addition, FWC will consider the need for conducting vulnerability assessments to model the potential effects of climate change, especially sea level rise and storm events, on imperiled species and their habitats on FWC managed land.

Elements of climate change that may potentially affect the SOFWEA include more frequent and more potent storm events, alteration of vegetation reproductive cycles, the spread of exotic species, and changes in the fire regime. To address the potential impacts of climate change on the SOFWEA, goals and objectives have been developed as a component of this Management Plan. Depending on the recommendations of the adaptive management strategies described above, additional specific goals and objectives to mitigate potential climate change impacts may be developed for the SOFWEA Management Plan in the future.

To address the potential impacts of climate change on the SOFWEA, Goals and Objectives have been developed as a component of this Management Plan (Section 6.12). Depending on the recommendations of the adaptive management strategies described above, additional specific goals and objectives to mitigate potential climate change impacts may be developed for the SOFWEA Management Plan in the future.

### **5.15 Soil and Water Conservation**

Soil disturbing activities will be confined to areas that have the least likelihood of experiencing erosion challenges. On areas that have been disturbed prior to acquisition, 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.

## **6 Resource Management Goals and Objectives**

The management goals described in this section are considered broad, enduring statements designed to guide the general direction of management actions to be conducted in order to

achieve an overall desired future outcome for SOFWEA. The objectives listed within each management goal offer more specific management guidance and measures, and are considered the necessary steps to be completed to accomplish the management goals. Many of the objectives listed have specific end-of-the-calendar-year target dates for completion and all of them are classified as having either short-term (less than two years) or long-term (up to ten years) timelines for completion.

## **6.1 Habitat Restoration and Improvement**

**Goal: Improve extant habitat and restore disturbed areas.**

### **Short-term (TWO YEARS)**

- 6.1.1** Conduct prescribed burning on 400 acres of fire adapted communities per year.
- 6.1.2** Maintain 800 acres of fire adapted communities (50%) within 4-8 year target fire return interval.
- 6.1.3** Develop and implement a prescribed burn plan.
- 6.1.4** Conduct habitat/natural community improvement on 135 acres per year including roller chopping and mowing, on pasture, scrubby flatwoods, mesic flatwoods, and scrub communities, as appropriate (Figure 12).
- 6.1.5** Conduct habitat/natural community restoration activities on 5 acres to restore to historic sandhill habitat (Figure 12).
- 6.1.6** Continue to implement OBVM.

### **Long Term (UP TO 10 YEARS)**

- 6.1.7** Conduct prescribed burning on 400 acres of fire adapted communities per year.
- 6.1.8** Continue to maintain 1,683 acres of fire adapted communities (95%) per year within target fire return interval.
- 6.1.9** Continue to implement OBVM.
- 6.1.10** Continue to implement the prescribed burn plan.

- 6.1.11 Conduct habitat/natural community improvement on 135 acres per year including roller chopping and mowing, on pasture, scrubby flatwoods, mesic flatwoods, and scrub communities, as appropriate (Figure 12).
- 6.1.12 Continue to conduct habitat/natural community restoration activities on 10 acres to restore to historic sandhill habitat (Figure 12).
- 6.1.13 Conduct thinning on northern wet flatwoods, if prescribed burning does not restore the basal area to established thresholds (Figure 12).

## **6.2 Imperiled and Focal Species Habitat Maintenance, Enhancement, Restoration, or Population Restoration**

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

### **Short-term**

- 6.2.1 Continue to implement the WCPR strategy.
- 6.2.2 Monitor 5 imperiled and focal species, including gopher tortoise, brown headed nuthatch, Bachman sparrow, Florida scrub jay, and Florida mouse.
- 6.2.3 As described in the WCPR Strategy, conduct a baseline survey for the Bachman's sparrow and the brown-headed nuthatches on the area.
- 6.2.4 As described in the WCPR Strategy, continue annual monitoring of Florida scrub-jays.
- 6.2.5 Continue to collect opportunistic wildlife species occurrence data.  
(Gopher frog, Florida pine snake, burrowing owl, Cooper's hawk, crested caracara, Florida black bear, Florida sandhill crane, Florida mottled duck, limpkin, red-cockaded woodpecker, short-tailed hawk, snail kite, Southeastern American kestrel Southern bald eagle, swallow-tailed kite, Sherman's fox squirrel, and wading birds)
- 6.2.6 Conduct a rare plant survey.

### **Long-term**

- 6.2.7 Continue to implement WCPR strategy by managing identified habitats and monitoring identified species.
- 6.2.8 Continue to monitor 5 imperiled and focal species, including gopher tortoise, brown headed nuthatch, Bachman sparrow, Florida scrub jay, and Florida mouse.

- 6.2.9** As described in the WCPR Strategy, conduct a gopher tortoise survey every 5 years on the area.
- 6.2.10** As described in the WCPR Strategy, continue to conduct surveys for the Bachman's sparrow and brown-headed nuthatches every 2-3 years on the area.
- 6.2.11** As described in the WCPR Strategy, continue annual monitoring of Florida scrub-jays.
- 6.2.12** As described in the WCPR Strategy, conduct a Florida mouse survey by 2025.
- 6.2.13** Continue to collect opportunistic wildlife species occurrence data.  
(Gopher frog, Florida pine snake, burrowing owl, Cooper's hawk, crested caracara, Florida black bear, Florida sandhill crane, Florida mottled duck, limpkin, red-cockaded woodpecker, short-tailed hawk, snail kite, Southeastern American kestrel Southern bald eagle, swallow-tailed kite, Sherman's fox squirrel, and wading birds)

### **6.3 Other Wildlife (Game and Nongame) habitat maintenance, enhancement, restoration, or population restoration**

#### **Short Term**

- 6.3.1** Continue to collect opportunistic wildlife occurrence data.
- 6.3.2** Continue to monitor 1 kestrel nest box.

#### **Long Term**

- 6.3.3** Install and monitor one bat box.
- 6.3.4** Install and monitor 10-20 Eastern bluebird nest boxes.
- 6.3.5** Install and monitor 4-6 wood duck boxes.
- 6.3.6** Continue to monitor 1 kestrel nest box.
- 6.3.7** Continue to collect opportunistic wildlife occurrence data.

### **6.4 Exotic and Invasive Species Maintenance and Control**

**Goal: Remove exotic and invasive plants and animals and conduct needed maintenance-control.**

#### **Short-term**

- 6.4.1** Annually treat at least 100 acres of EPPC Category I and Category II invasive exotic plant species. (Caesar weed, cogon grass, heart-of-flame, lantana, skunk-vine, Chinese tallow, tall grass, Old World climbing fern, and other less occurring species that have been identified on the area as listed in Table 6)
- 6.4.2** Implement control measures on one exotic and nuisance animal species (feral hog)
- 6.4.3** Opportunistically monitor other exotic animal species that may occur on the area such as, cattle egret, Cuban tree frog, and green house frog.

#### **Long-term**

- 6.4.4** Annually treat at least 100 acres of EPPC Category I and Category II invasive exotic plant species. (Caesar weed, cogon grass, heart-of-flame, lantana, skunk-vine, Chinese tallow, tall grass, Old World climbing fern, and other less occurring species that have been identified on the area as listed in Table 6)
- 6.4.5** Implement control measures on one exotic and nuisance animal species (feral hog)
- 6.4.6** Continue to opportunistically monitor other exotic animal species that may occur on the area such as, cattle egret, Cuban tree frog, and green house frog.

### **6.5 Public Access and Recreational Opportunities**

**Goal: Provide public access and recreational opportunities.**

#### **Short-term**

- 6.5.1** Maintain public access and recreational opportunities to allow for a recreational carrying capacity of 162 visitors per day.
- 6.5.2** Maintain/design/develop 7.5 miles of designated trails and 10.7 undesignated trails, including the Florida National Scenic Trail.
- 6.5.3** Cooperate with other agencies, Orange and Osceola Counties, stakeholders, and regional landowners to investigate regional recreational opportunities including linking hiking, and multi-use trail systems between adjacent public areas (i.e. Florida National Scenic Trail).
- 6.5.4** Maintain a website, three kiosks, trail map, and interpretive panels for interpretation and education

- 6.5.5** Develop the Recreational Master Plan.
- 6.5.6** Monitor trails annually for visitor impacts.
- 6.5.7** Continue to cooperate with the U.S. Forest Service and the Florida Trail Association regarding the potential of relocation of the FNST across SOFWEA.
- 6.5.8** Relocate the south public access in Osceola County to a more seasonally dry location on the south boundary of the SOFWEA

#### **Long-term**

- 6.5.9** Maintain public access and recreational opportunities to allow for a recreational carrying capacity of 162 visitors per day.
- 6.5.10** Continue to maintain/design/develop 7.5 miles of designated trails and 10.7 undesignated trails.
- 6.5.11** Continue to provide a website, three kiosks, trail map, and interpretive panels for interpretation and education.
- 6.5.12** Monitor trails annually for visitor impacts.
- 6.5.13** Reassess recreational opportunities every three years.
- 6.5.14** Continue to provide fishing opportunities on appropriate water bodies.
- 6.5.15** Cooperate with other agencies, County, stakeholders, and regional landowners to investigate regional recreational opportunities including linking hiking, and multi-use trail systems between adjacent public areas.
- 6.5.16** Continue to identify partnerships that could provide for environmental educational programs and outreach.

## **6.6 Hydrological Preservation and Restoration**

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

#### **Short-term**

- 6.6.1** Conduct or obtain a site hydrological assessment to identify potential hydrology restoration needs.



- 6.6.2** To maintain and enhance natural hydrological functions, install and maintain low-water crossings and culverts as appropriate.
- 6.6.3** Continue to cooperate with the SFWMD and DEP for the monitoring of surface and ground water quality and quantity.

#### **Long-term**

- 6.6.4** To enhance natural hydrological functions, continue to install and maintain low-water crossings and culverts as appropriate.
- 6.6.5** Implement hydrological restoration plan, as appropriate.
- 6.6.6** Continue to cooperate with the SFWMD and DEP for the monitoring of surface and ground water quality and quantity

### **6.7 Forest Resource Management**

**Goal: Manage timber resources to improve or restore natural communities for the benefit of wildlife.**

#### **Short-term**

- 6.7.1** Cooperate with the FFS to complete a Timber Assessment.
- 6.7.2** Consult with the FFS or a professional forestry consultant regarding forest management activities as appropriate.

#### **Long-term**

- 6.7.3** Continue to consult with the FFS or a professional forestry consultant regarding forest management activities as appropriate.

### **6.8 Cultural and Historical Resources**

**Goal: Protect, preserve and maintain historical resources.**

#### **Short-term**

- 6.8.1** Ensure all known sites are recorded in the Florida Division of Historical Resources Master Site file.
- 6.8.2** Coordinate with DHR to assess the need for conducting a historical resource survey.

### **Long-term**

- 6.8.3 Cooperate with DHR in designing site plans for development of infrastructure.
- 6.8.4 Cooperate with DHR to manage and maintain known existing cultural resources.
- 6.8.5 Coordinate with DHR for historical resource management guideline staff training.

## **6.9 Capital Facilities and Infrastructure**

**Goal: Develop the capital facilities and infrastructure necessary to meet the goals and objectives of this Management Plan.**

### **Short-term**

- 6.9.1 Continue to maintain five facilities (three designated entrances and two observation platforms).
- 6.9.2 Monitor trails and infrastructure annually for visitor impacts.
- 6.9.3 Maintain 7.5 miles of designated trails existing on site and 10.7 of undesignated trails (as applicable) (Figure 12).
- 6.9.4 To improve or repair five facilities, and 7.5 miles of trails and 10.7 of undesignated trails existing on site (as applicable) Figure 12.
- 6.9.5 Improve or repair one facility (one entrance kiosk) (Figure 12).
- 6.9.6 Obtain an updated boundary survey of the area.

### **Long-term**

- 6.9.7 Monitor trails and infrastructure annually for visitor impacts.
- 6.9.8 Continue to maintain five facilities (three designated entrances and two observation platforms).
- 6.9.9 Maintain 7.5 miles of designated trails existing on site and 10.7 of undesignated trails (as applicable) Figure 12
- 6.9.10 To improve or repair five facilities, and 7.5 miles of trails and 10.7 of undesignated trails existing on site (as applicable) Figure 12.
- 6.9.11 Improve or repair four facilities. (2 entrances and 2 observation platforms)

## **6.10 Land Conservation and Stewardship Partnerships**

**Goal: Enhance fish and wildlife conservation, resource, and operational management through development of an optimal boundary.**

### **Short-term**

- 6.10.1** Identify potential important wildlife habitat, landscape-scale linkages, wildlife corridors, and operational/resource management needs.
- 6.10.2** Identify and develop conservation stewardship partnerships.
- 6.10.3** Identify and pursue conservation acquisition needs.
- 6.10.4** Develop and maintain a GIS shapefile and other necessary data to facilitate nominations from the FWC OCPB and for FWC's LAP and Land Acquisition Programs.
- 6.10.5** Develop a Conservation Action Strategy.
- 6.10.6** Contact and inform adjoining landowners about the FWC Landowners Assistance Program to pursue non-acquisition conservation stewardship, partnerships, and potential conservation easements.
- 6.10.7** Determine which parcels should be added to the FWC acquisition list.
- 6.10.8** Identify potential non-governmental organization partnerships and grant program opportunities.
- 6.10.9** Determine efficacy of conducting an adjacent landowner's assistance/conservation stewardship partnership workshop.
- 6.10.10** Identify potential conservation easements donations.
- 6.10.11** Evaluate and determine if any portions of SOFWEA are no longer needed for conservation purposes, and therefore may be designated as surplus lands.

### **Long-term**

- 6.10.12** To minimize fragmentation of the area, continue to identify strategic parcels to revise the completed OCPB for SOFWEA as appropriate and necessary.
- 6.10.13** Continue to identify and develop conservation stewardship partnerships.
- 6.10.14** Continue to identify and pursue conservation acquisition needs.

- 6.10.15** Continue to maintain a GIS shapefile and other necessary data to facilitate nominations from the FWC OCPB and for the FWC LAP and Land Acquisition Program.
- 6.10.16** Continue to propose nominations of selected properties as additions to the FWC acquisition list.
- 6.10.17** Continue to pursue acquisition of parcels added to the FWC acquisition list as acquisition work plan priorities and funding allow.
- 6.10.18** As feasible, continue to periodically contact and meet with adjacent landowners for willingness to participate in the Conservation Action Strategy, and coordinate landowner assistance/conservation stewardship partnership workshops as deemed appropriate.
- 6.10.19** Coordinate and conduct landowner assistance/conservation stewardship partnership workshop(s) as necessary and appropriate.
- 6.10.20** Continue to identify potential conservation easements donations.
- 6.10.21** Continue to evaluate and determine if any portions of SOFWEA are no longer needed for conservation purposes, and therefore may be designated as surplus lands.

## **6.11 Cooperative Management and Special Uses**

### **Short Term**

- 6.11.1** Continue to cooperate with Orange and Osceola Counties with ongoing management in accordance with the SOFWEA Interagency Partnership Agreement (Appendix 13.1).
- 6.11.2** Continue to cooperate with FDOT, DEP and Orange and Osceola Counties on appropriate mitigation for the proposed extension of Osceola Parkway if it is approved to be routed on the area.
- 6.11.3** Continue to cooperate with Orange and Osceola counties and other law enforcement as appropriate regarding conducting first responder training on the area.
- 6.11.4** Continue to cooperate with DEP regarding compliance with FCT covenants and agreements covering the area.
- 6.11.5** Continue to cooperate with FFS regarding conducting prescribed burning and prescribed burning training.

- 6.11.6** Cooperate with Orange and Osceola counties regarding the development and implementation of the Arthropod Control Plan.
- 6.11.7** Continue to cooperate with North American Butterfly Association on conducting the annual butterfly count on the area.
- 6.11.8** Continue to cooperate and communicate with adjacent landowners regarding ongoing management activities, such as prescribed burning and exotic treatments.
- 6.11.9** Consider applying for available and appropriate grant funding opportunities to enhance conservation and management on the area.

### **Long Term**

- 6.11.10** Continue to cooperate with Orange and Osceola Counties with ongoing management in accordance with the SOFWEA Interagency Partnership Agreement.
- 6.11.11** Continue to cooperate with FDOT, DEP and Orange and Osceola Counties on the potential consideration and appropriate mitigation for the proposed extension of Osceola Parkway if it is approved to be located on the area.
- 6.11.12** Continue to cooperate with Orange and Osceola counties and other law enforcement as appropriate regarding conducting first responder training on the area.
- 6.11.13** Continue to cooperate with DEP regarding compliance with FCT covenants and agreements.
- 6.11.14** Continue to cooperate with FFS regarding conducting prescribed burning and prescribed burning training.
- 6.11.15** Cooperate with Orange and Osceola counties regarding the development and implementation of the Arthropod Control Plan.
- 6.11.16** Continue to cooperate with North American Butterfly Association on conducting the annual butterfly count on the area.
- 6.11.17** Continue to cooperate and communicate with adjacent landowners regarding ongoing management activities, such as prescribed burning and exotic treatments.
- 6.11.18** Consider applying available and appropriate grant funding opportunities to enhance conservation and management on the area.

## **6.12 Climate Change**

**Goal: Develop appropriate adaptation strategies in response to projected climate change effects and their potential impacts on natural resources, including fish and wildlife, and the operational management of the SOFWEA.**

### **Long-term**

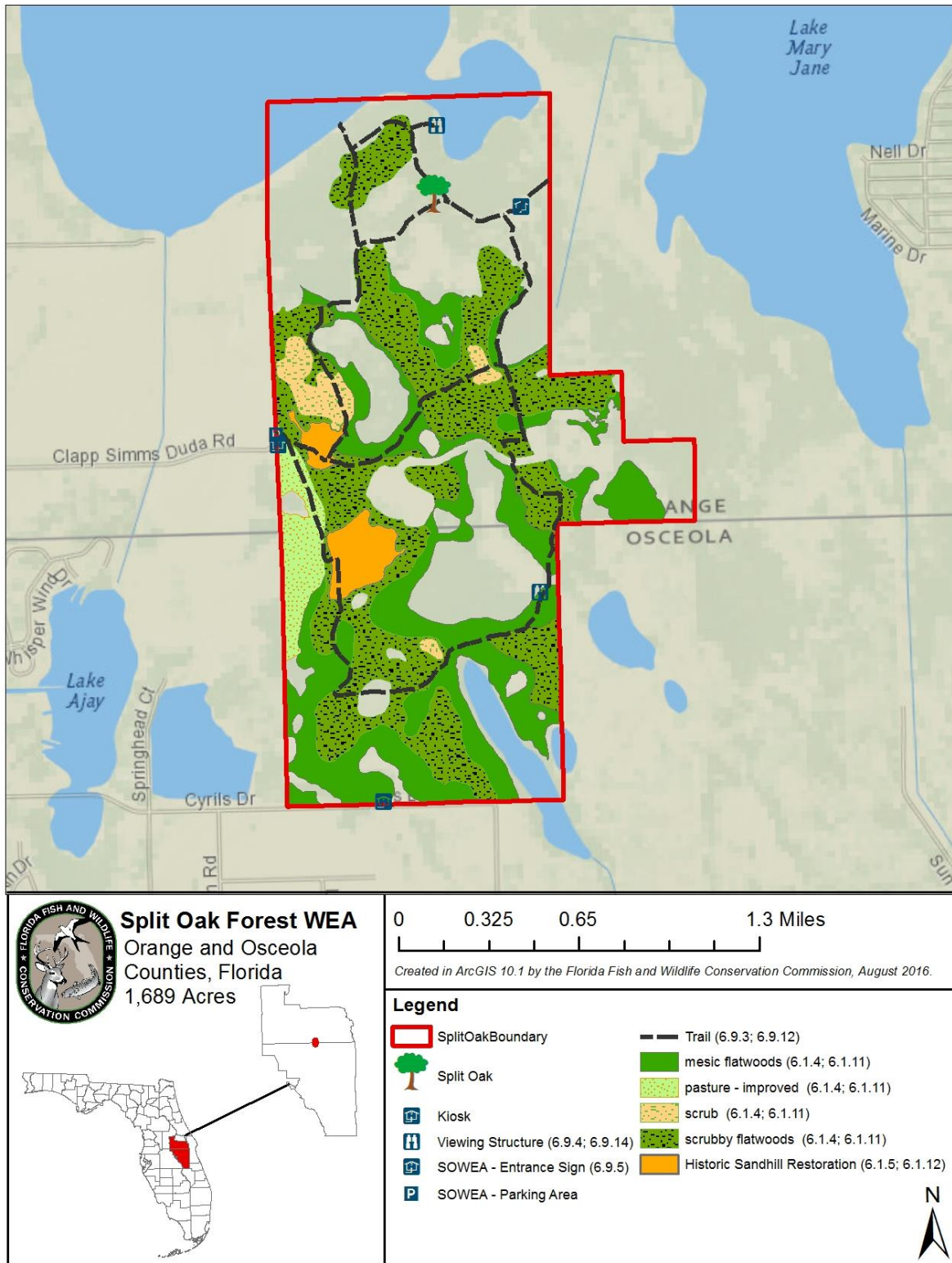
- 6.12.1** Coordinate with FWC-FWRI Climate Change Adaptation Initiative to identify potential impacts of projected climate change on fish and wildlife resources and operational management of the SOFWEA.
- 6.12.2** Incorporate appropriate climate change adaptation strategies into the WCPR for the SOFWEA.
- 6.12.3** As appropriate, update the SOFWEA Prescribed Fire Plan to incorporate new scientific information regarding projected climate change, such as increased frequency of drought, on the fire regime of SOFWEA's fire-adapted habitats.
- 6.12.4** As science, technology, and climate policy evolve, educate natural resource management partners and the public about the agency's policies, programs and efforts to study, document and address potential climate change; assess the need to incorporate public education about climate change into the update of the SOFWEA Recreation Master Plan.

## **6.13 Research Opportunities**

**Goal: Explore and pursue cooperative research opportunities.**

### **Long-term**

- 6.13.1** Explore and pursue cooperative research opportunities through universities, Fish and Wildlife Research Institute, etc.
- 6.13.2** Continue to cooperate with researchers, universities, and others as appropriate.
- 6.13.3** Continue to assess the need for and pursue research and environmental education partnership opportunities as appropriate.

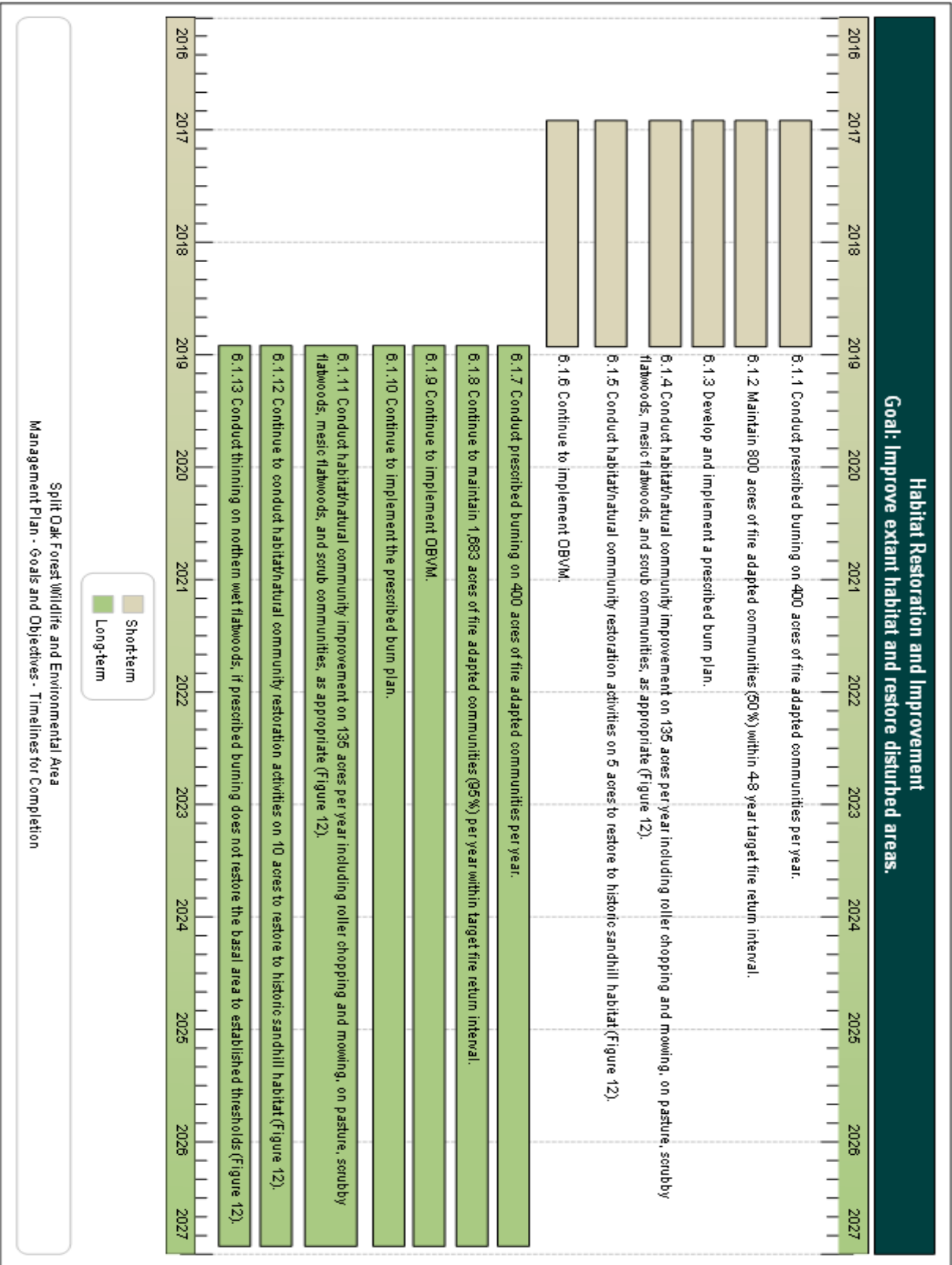


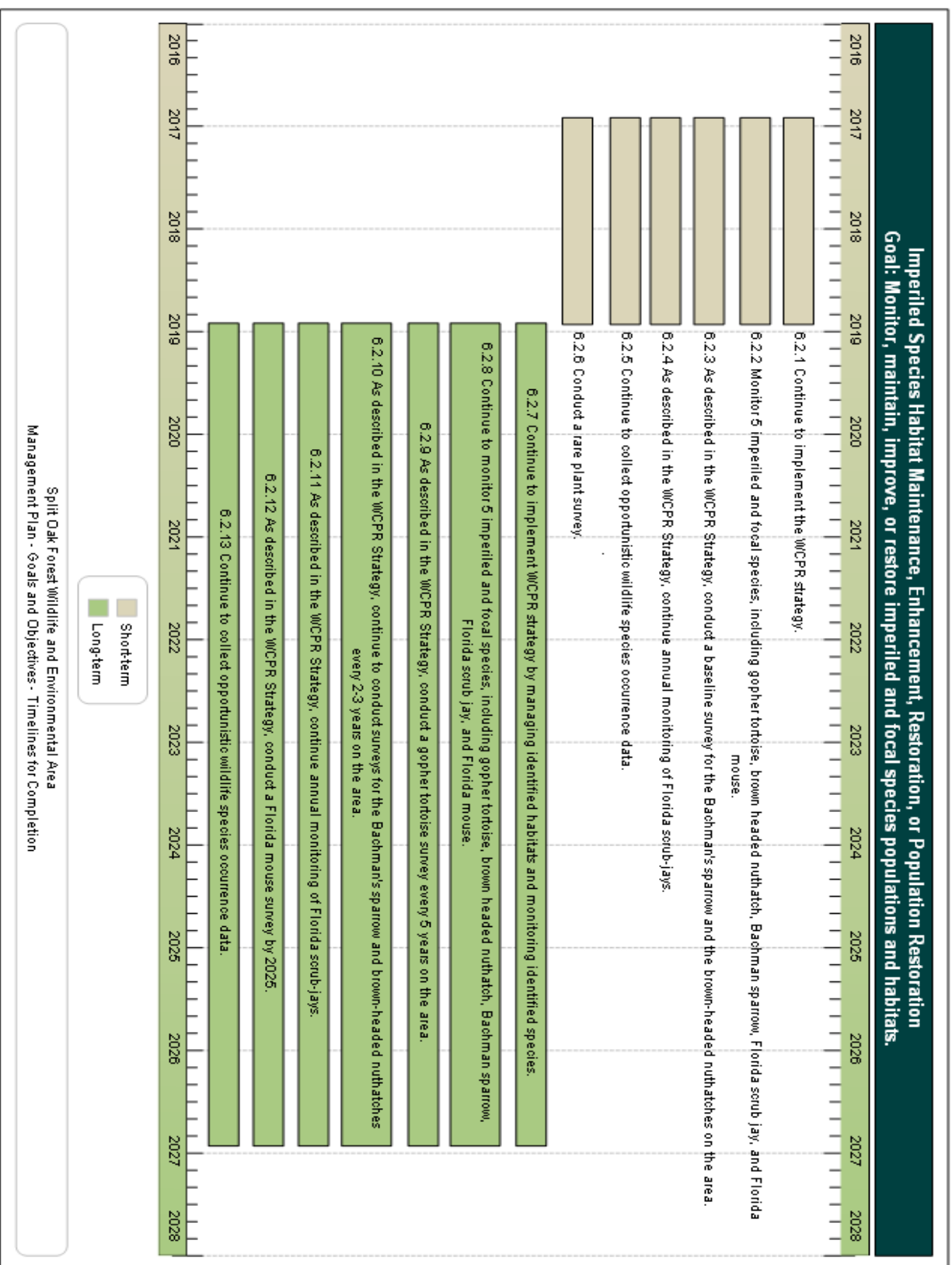
**Figure 12. SOFWEA Project Locations**

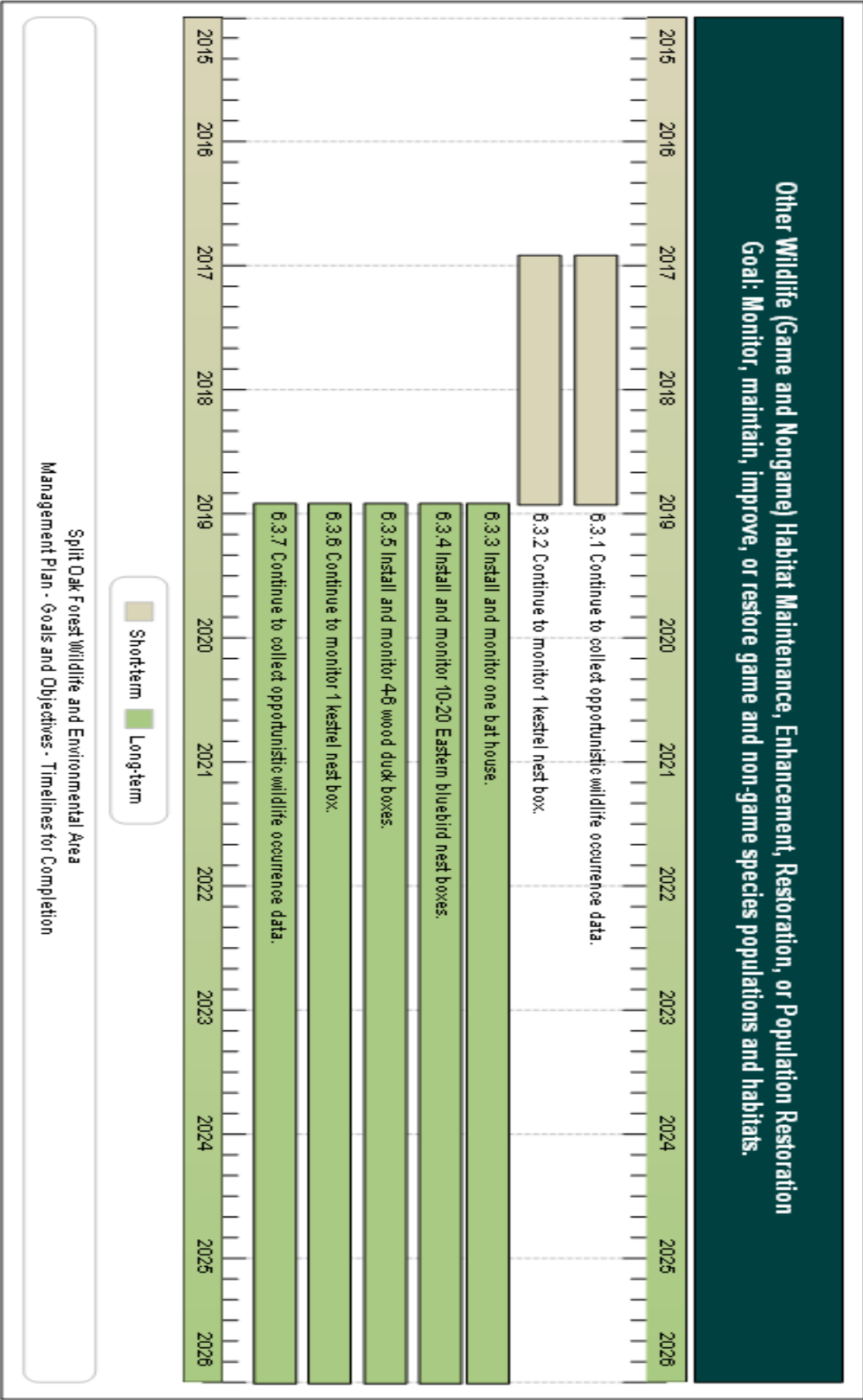


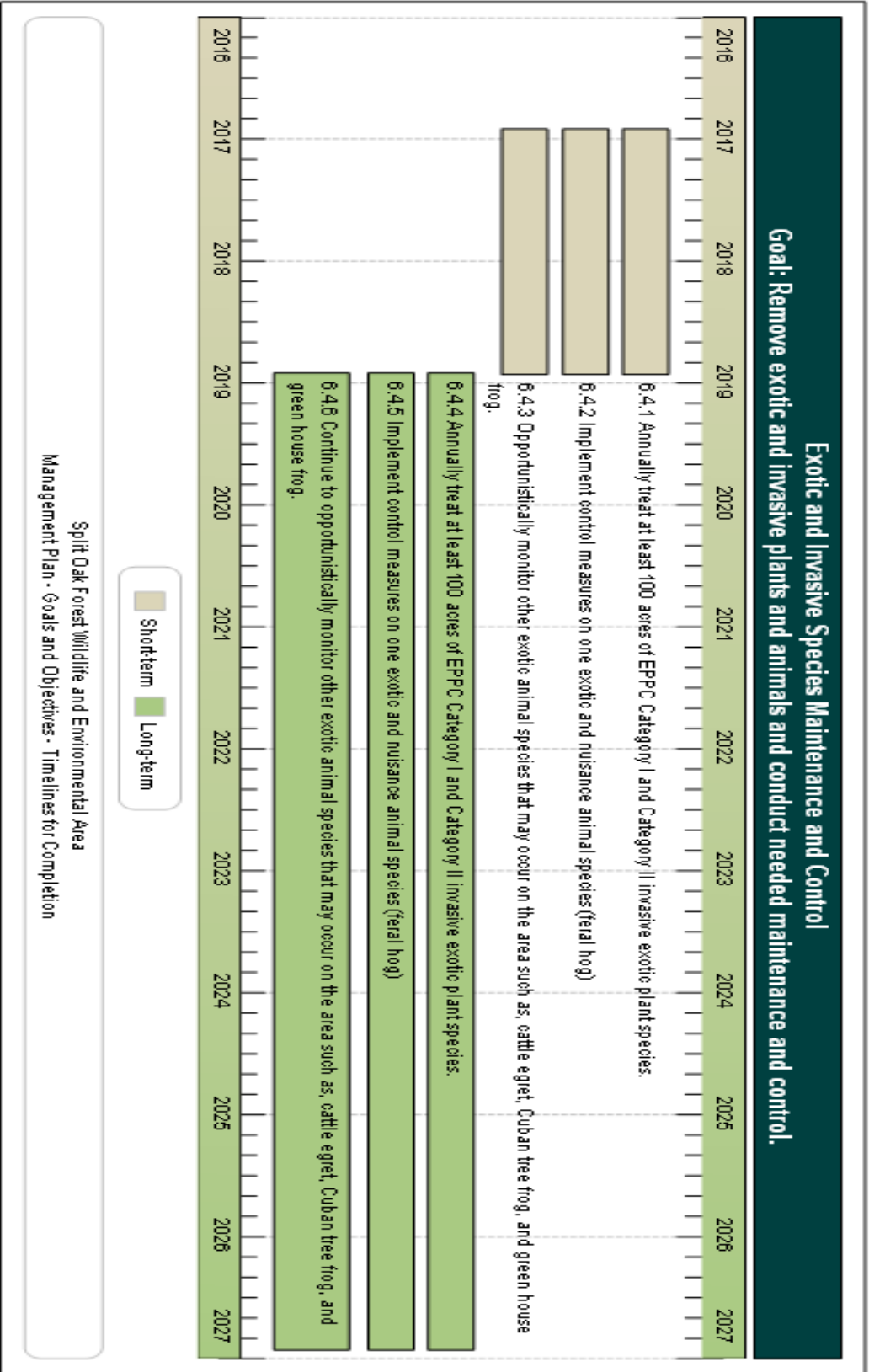
## 7 Schedule: Timelines for Completion of Resource Management Goals and Objectives

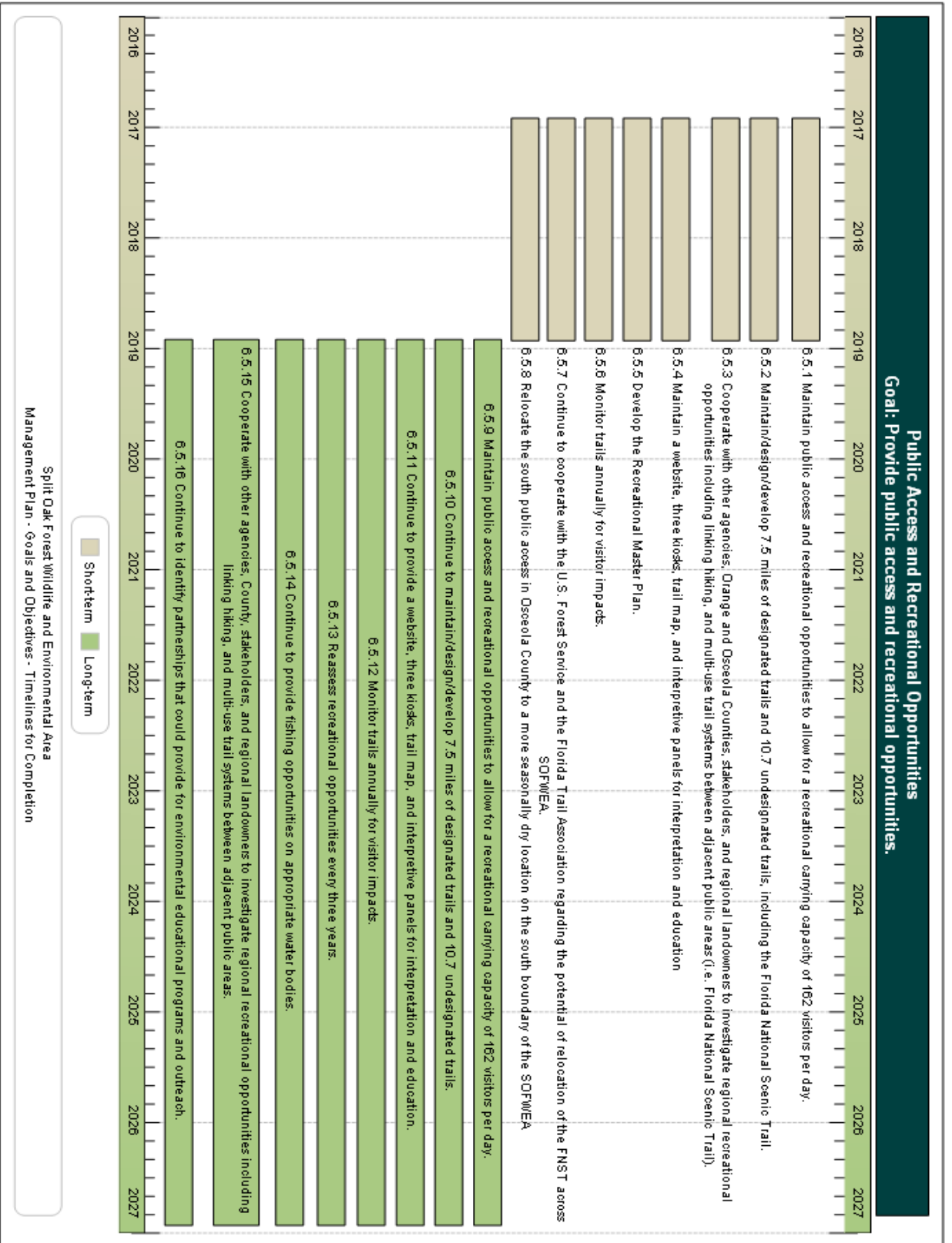
The following section presents the short- and long-term goals and objectives for the management of SOFWEA graphically in a timeline format. These timelines directly reflect the short- and long-term goals and objectives presented above in Section 6.

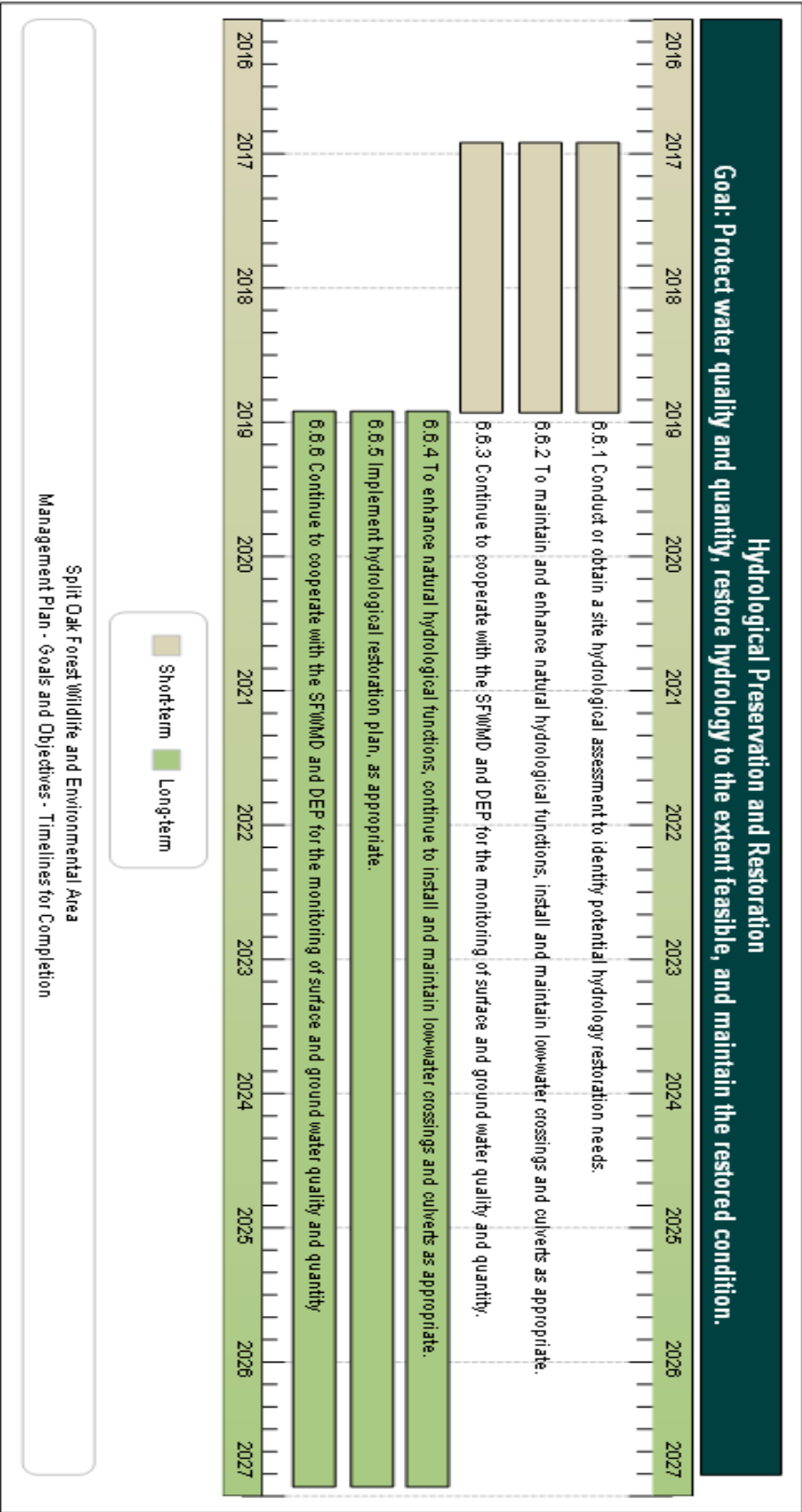




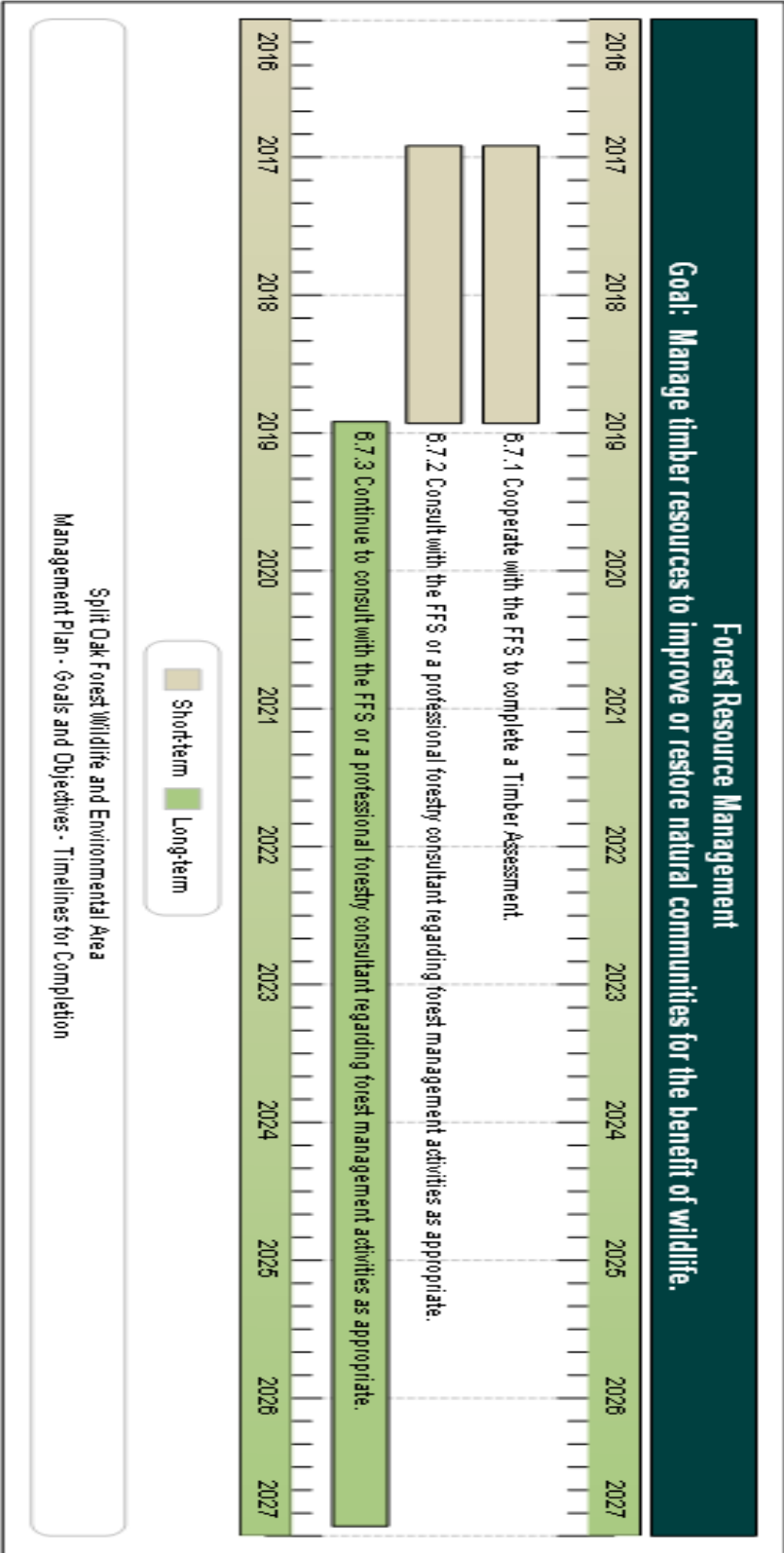


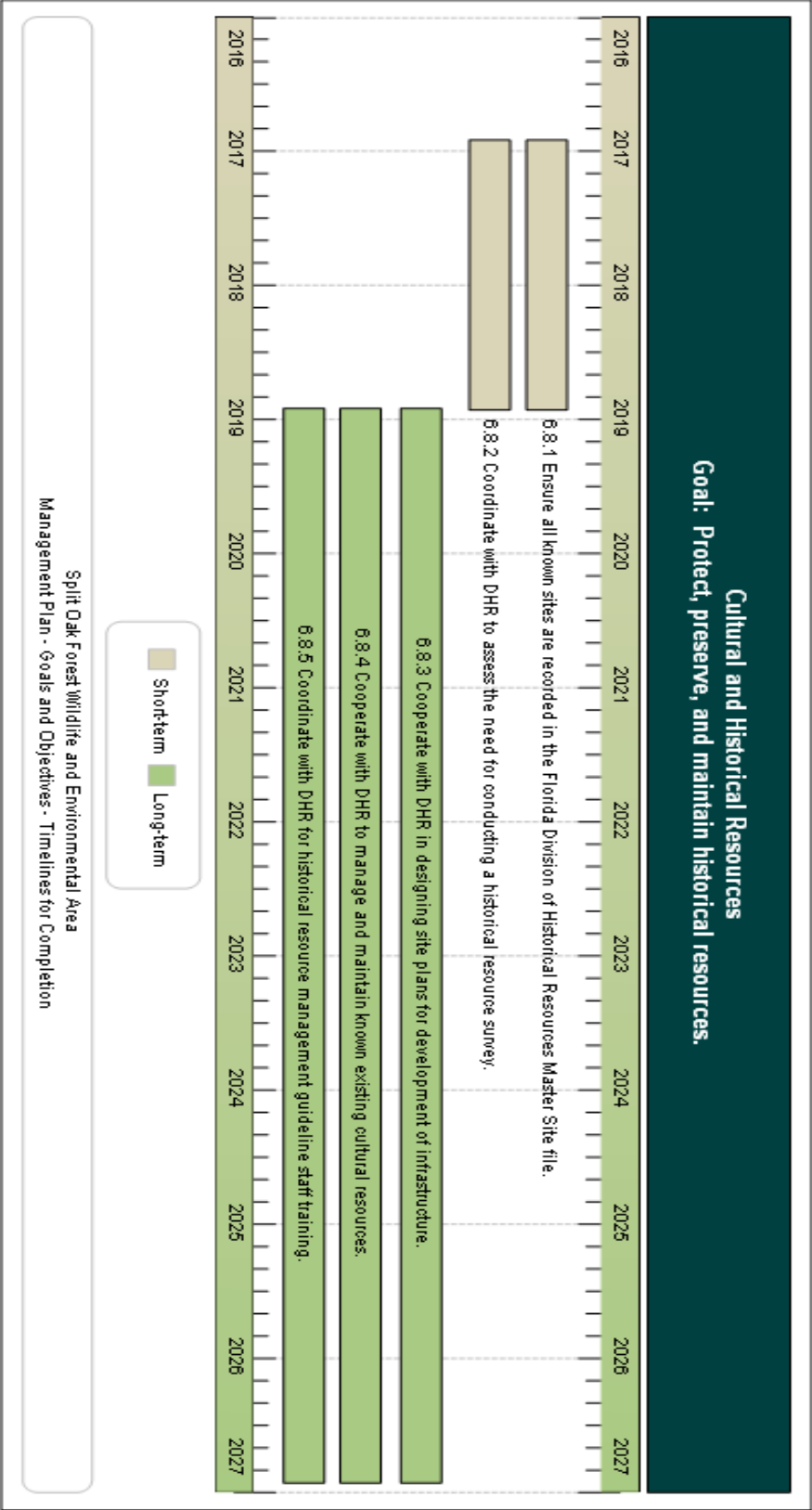


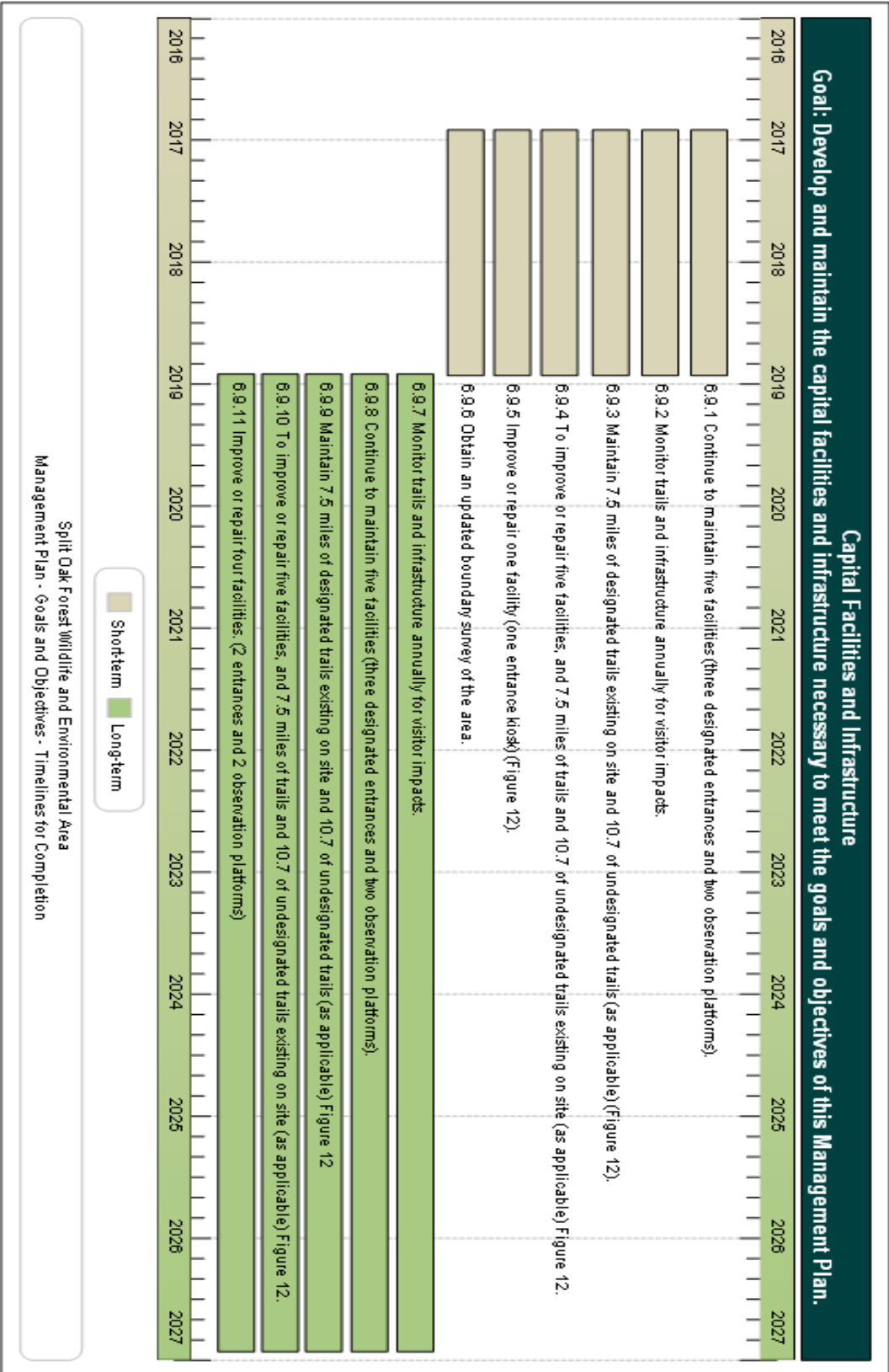






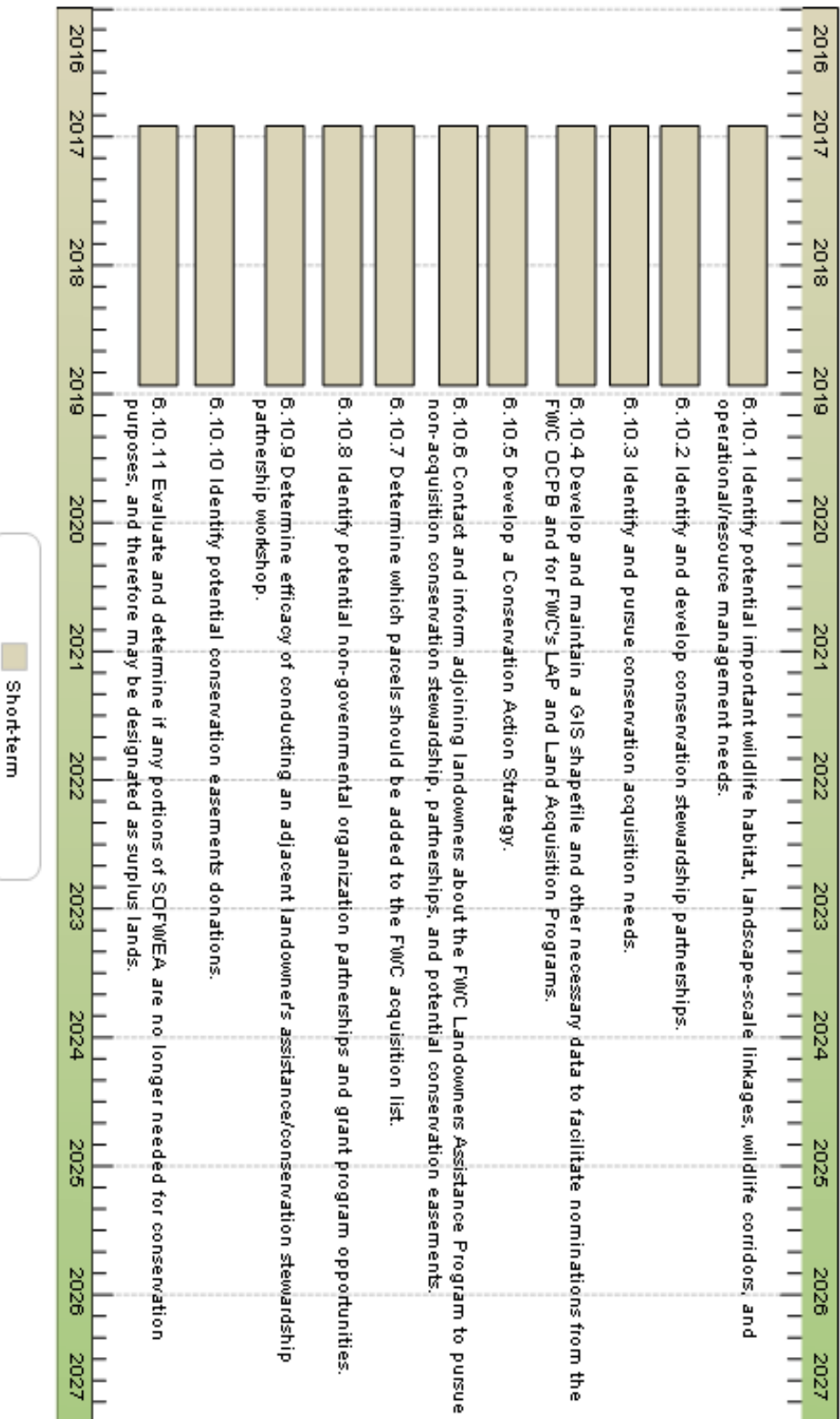






## Land Conservation and Stewardship Partnerships

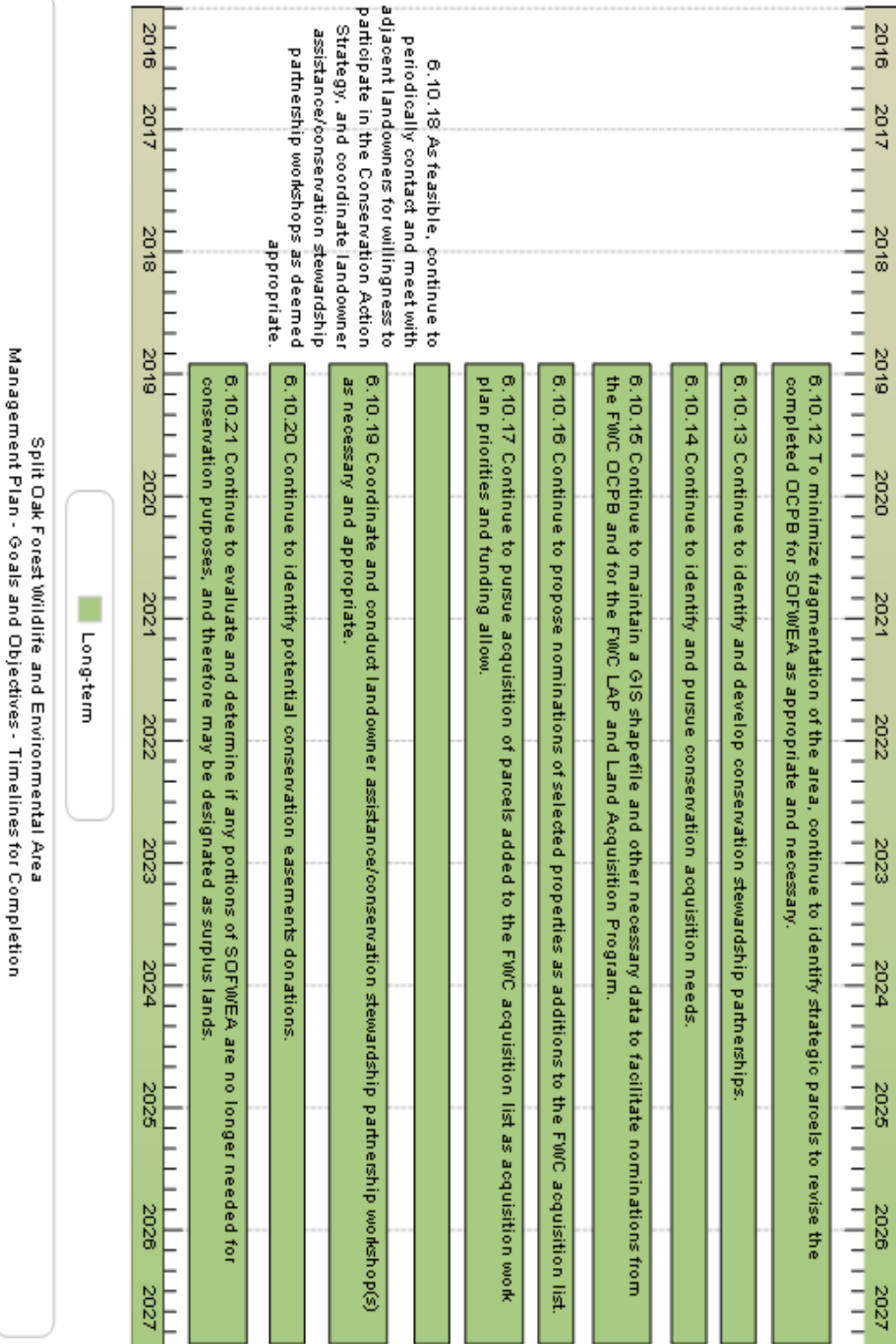
### Goal: Enhance fish and wildlife conservation, resource, and operational management through development of an optimal boundary.

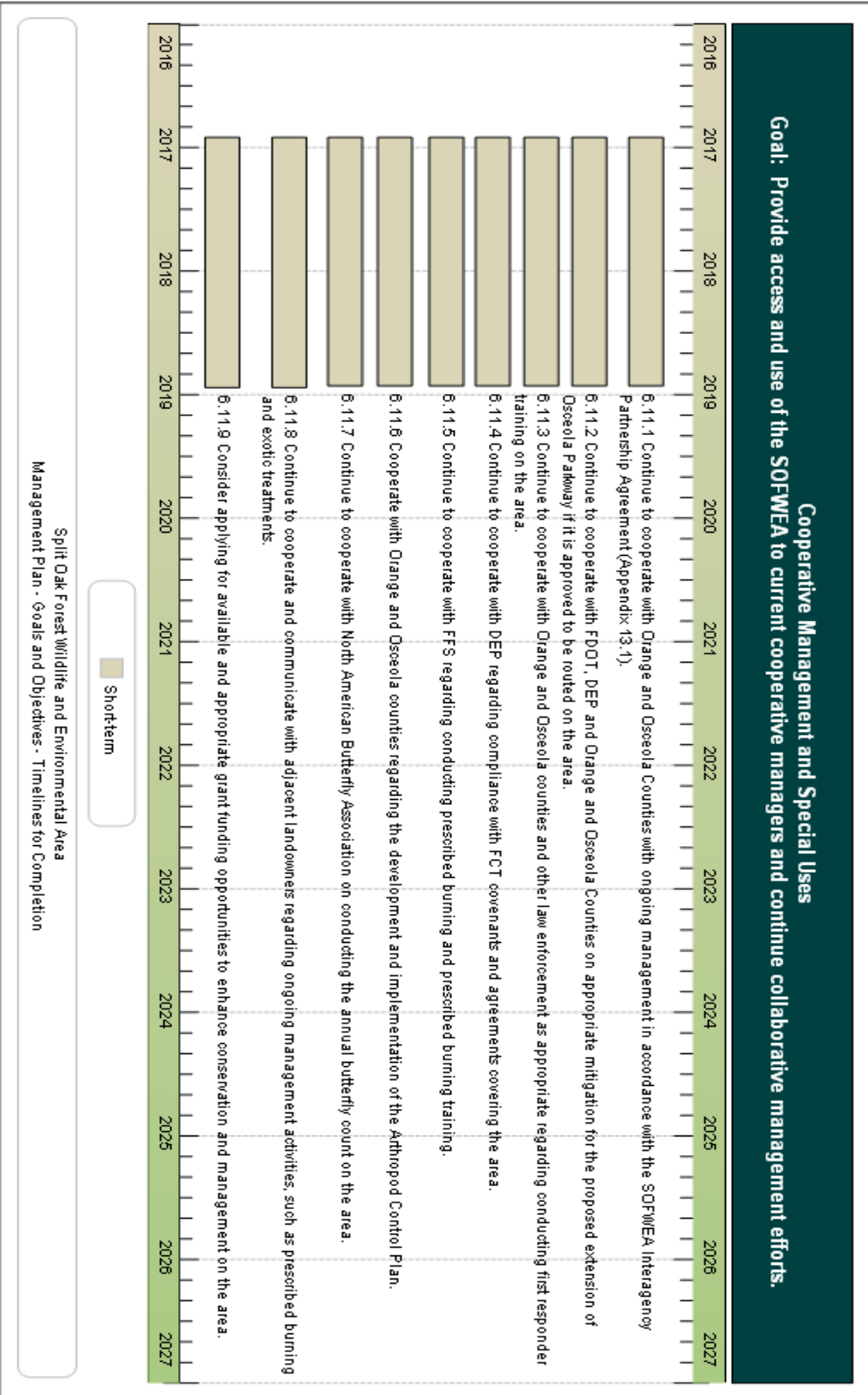


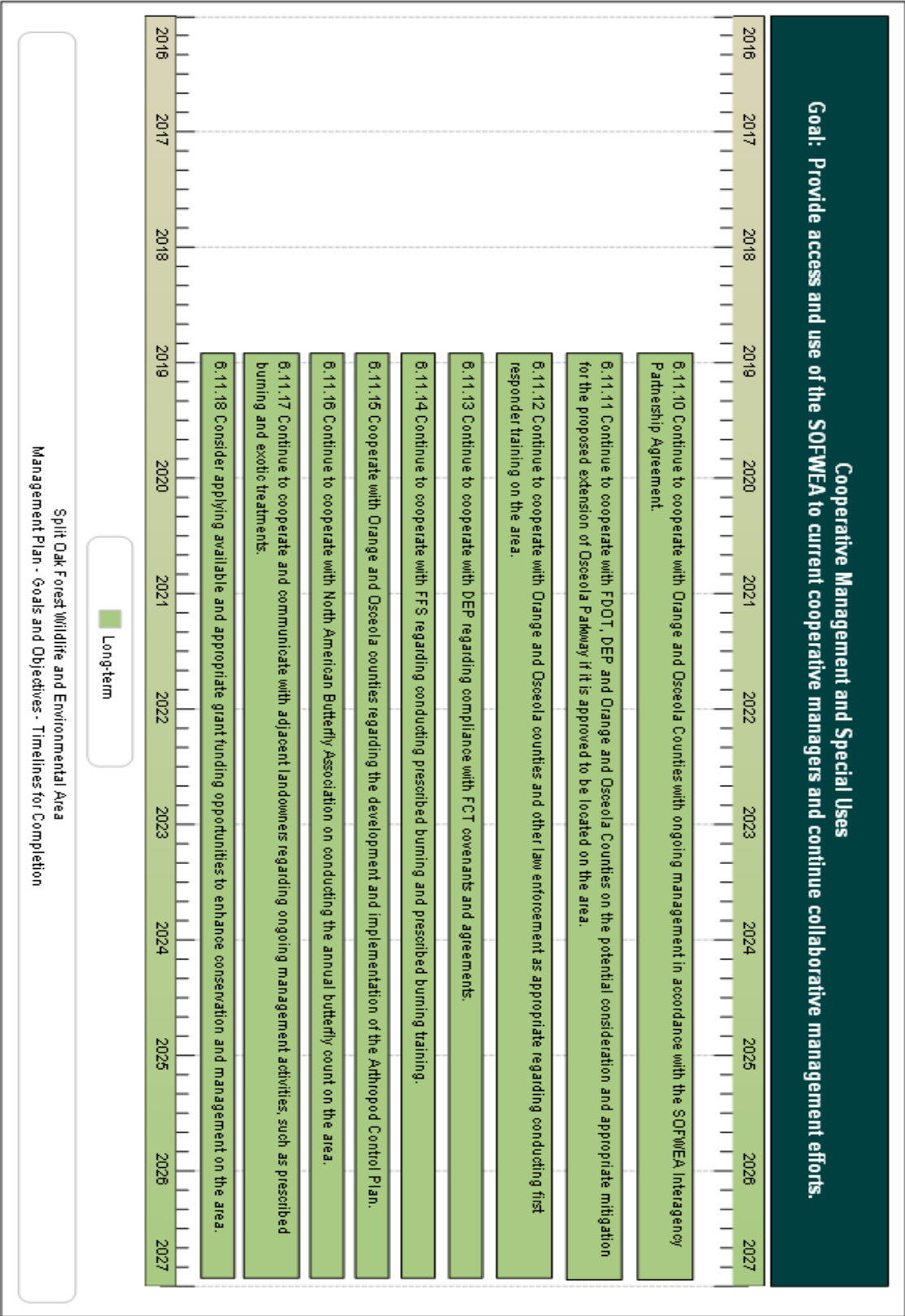
Split Oak Forest Wildlife and Environmental Area  
Management Plan - Goals and Objectives - Timelines for Completion

## Land Conservation and Stewardship Partnerships

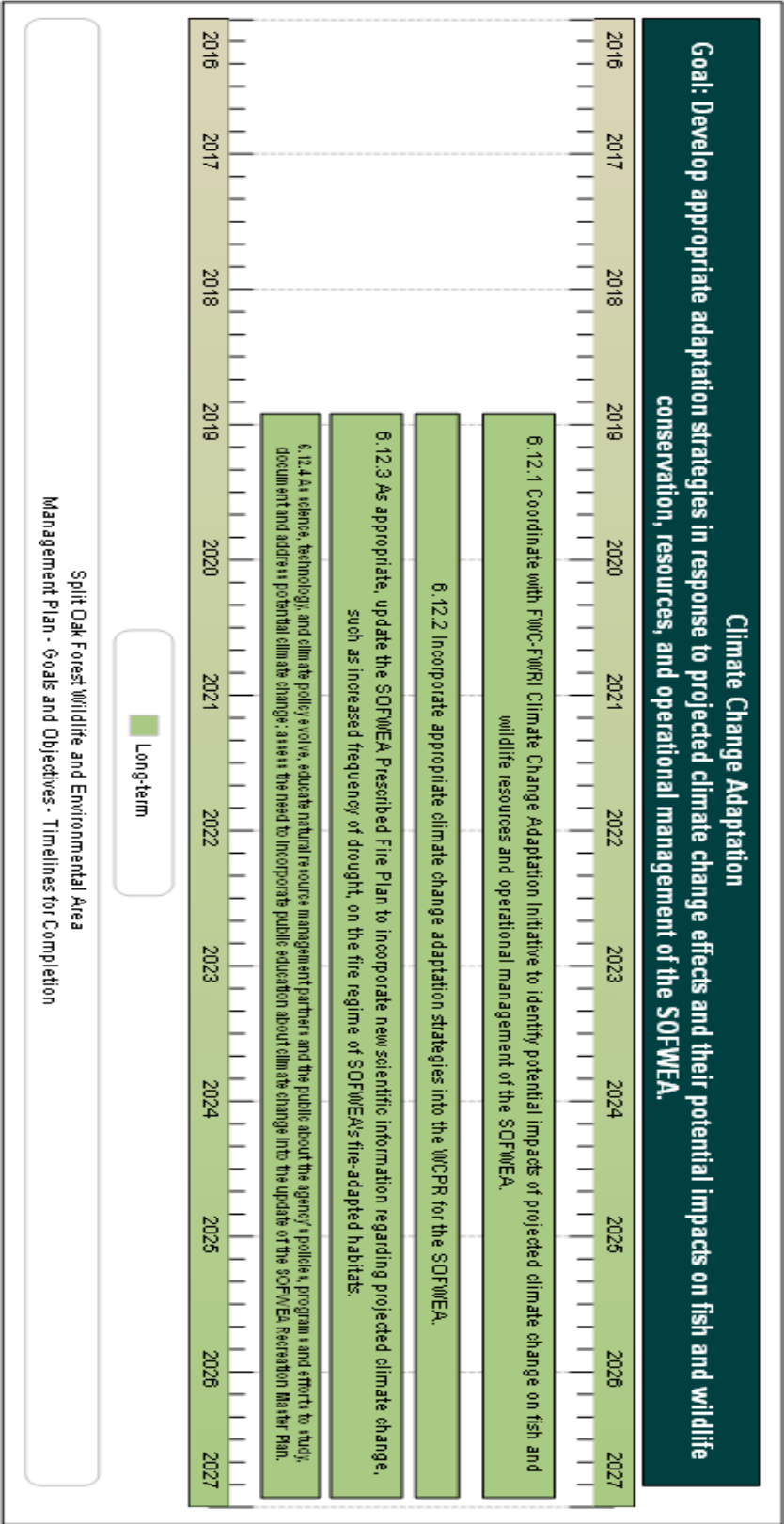
### Goal: Enhance fish and wildlife conservation, resource, and operational management through development of an optimal boundary.

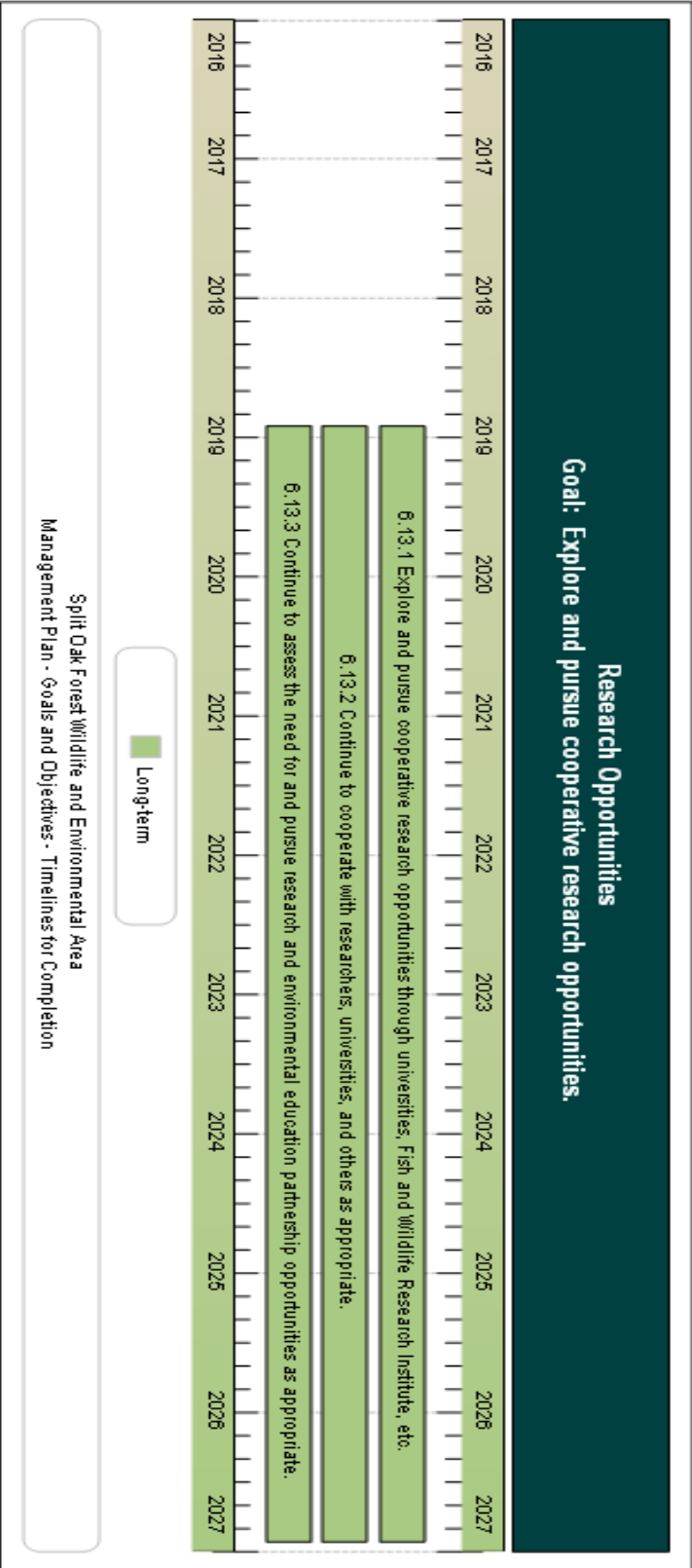












## **8 Resource Management Challenges and Strategies**

The following section identifies and describes further management needs and challenges associated with SOFWEA and provides solution strategies that will address these challenges. These specific challenges may not be fully addressed in the broader goals and objectives section above, and are thereby provided here.

### **8.1 Challenge: Currently SOFWEA has insufficient habitat to sustain certain imperiled species and preclude biological isolation, such as the Florida Scrub Jay, Red-cockaded Woodpecker, and Indigo Snake.**

**8.1.1 Strategy:** Pursue conservation efforts to increase potential viable habitat on surrounding lands for these species.

**8.1.2 Strategy:** Cooperate and coordinate with surrounding landowners to assist with the resource management activities.

### **8.2 Challenge: SOFWEA is not a widely known recreation destination.**

**8.2.1 Strategy:** Work with Orange and Osceola counties' parks and recreation and tourism development groups to promote SOFWEA.

**8.2.2 Strategy:** Cross promote SOFWEA with other regional conservation lands.

### **8.3 Challenge: Potential future development on adjacent lands can result in incompatible land uses increasing management challenges for the area for continuing to conduct management activities such as prescribed burning and exotic species treatments.**

**8.3.1 Strategy:** Cooperate and work with Orange and Osceola Counties to ensure land use and zoning designations adjacent to SOFWEA will continue to be compatible with the management of the area.

**8.3.2 Strategy:** Incorporate a notification process to adjacent neighbors for management practices, and certain activities that have to occur.

**8.4 Challenge: The proposed extension of Osceola Parkway through SOFWEA will result in incompatible land uses, wildlife resource impacts, resource and operational impacts, and recreational management impacts and challenges for the area if the Parkway is approved to be routed through the area.**

**8.4.1 Strategy:** Continue to cooperate and work with FDOT and Orange and Osceola Counties to ensure any unavoidable impacts are minimized and sufficiently mitigated to maintain existing habitats and replace habitats eliminated by any potential development of the parkway on the area.

**8.4.2 Strategy:** Continue to cooperate with FDOT, DEP and Orange and Osceola counties to ensure Drainage Retention Area's are not developed on the area from the proposed road development.

**8.4.3 Strategy:** Continue to cooperate with adjacent landowners for completing management activities on the area, such as prescribed burning

**8.4.4 Strategy:** Ensure all FWC staff is directly involved with the road design, construction and development plans.

**8.4.5 Strategy:** Explore various funding opportunities through roadway mitigation funds to assist in long term management of the area if the Parkway is approved to be located on the area.

**8.5 Challenge: Currently there is insufficient staffing for SOFWEA to maintain optimal resource and operational management of the area.**

**8.5.1 Strategy:** Cooperate with other nearby FWC staff to assist when needed.

**8.5.2 Strategy:** Request additional funding for an additional position.

**8.5.3 Strategy:** Use contractual services for appropriate activities.

**8.5.4 Strategy:** Continue to work with Orange and Osceola staff to assist in management activities.

**8.6 Challenge: Currently there are high densities of exotic species on adjacent lands including but not limited to old world climbing fern and aquatic soda apple providing an extensive source of seed that disperses onto the SOFWEA.**

- 8.6.1** Strategy: Coordinate with the local Cooperative Invasive Species Management Area (CISMA), FWC's Uplands Invasive Plant Species Section, and FWC's Landowner Assistance Program to work with adjacent landowners to control and manage exotic invasive plants on adjacent properties.
- 8.6.2** Strategy: Work with neighboring land owners through FWC Private Landowners Assistance Program personnel to treat old world climbing fern.
- 8.6.3** Strategy: Coordinate with other governmental and private organizations to obtain resources to control and manage exotic invasive species on adjacent properties.
- 8.7 Challenge: Currently there is documented illegal use and activity ongoing on the area.**
- 8.7.1** Strategy: Continue to work with FWC LE and Orange and Osceola Counties' law enforcement to patrol illegal uses on the area.
- 8.8 Challenge: Currently SOFWEA regulations prohibit bicycling and only allow equestrian uses by special permit. SOFWEA Stakeholders and recreational users are requesting these restrictions be removed, and reclassify these uses as approved ongoing recreational uses on the area.**
- 8.8.1** Strategy: FWC will meet with FCT/DEP and Orange and Osceola Counties to determine the feasibility of removing these use restrictions.
- 8.8.2** Strategy: Explore feasibility of allowing these uses and the impacts it may have on the area
- 8.9 Challenge: Currently, law enforcement staffing is at insufficient levels for optimal management of SOFWEA.**
- 8.9.1** Strategy: Pursue funding for increased law enforcement and management staffing and additional private sector contract services.
- 8.9.2** Strategy: Explore potential volunteer resources for assisting with management.

## 9 Cost Estimates and Funding Sources

The following represents the actual and unmet budgetary needs for managing the lands and resources of SOFWEA. This cost estimate was developed using data developed by FWC and other cooperating entities, and is based on actual costs for land management activities, equipment purchase and maintenance, and for development of fixed capital facilities. Funds needed to protect and manage the property and to fully implement the recommended program are derived primarily from the Land Acquisition Trust Fund and from State Legislative appropriations. However, private conservation organizations may be cooperators with the agency for funding of specific projects. Alternative funding sources, such as monies available through mitigation, may be sought to supplement existing funding.

The cost estimate below, although exceeding what FWC typically receives through the appropriations process, is estimated to be what is necessary for optimal management, and is consistent with the current and planned resource management and operation of SOFWEA. Cost estimate categories are those currently recognized by FWC and the Land Management Uniform Accounting Council. More information on these categories, as well as the Fiscal Year 2015 operational plan showing detailed cost estimates by activity and categories of expenditures, may be found in Appendix 13.12.

**Split Oak Forest WEA Management Plan Cost Estimate**  
***Maximum expected one year expenditure***

<b><u>Resource Management</u></b>	<b><u>Expenditure</u></b>	<b><u>Priority</u></b>	<b>Priority schedule:</b>
Exotic Species Control	\$12,537	(1)	(1) Immediate (annual)
Prescribed Burning	\$77,129	(1)	(2) Intermediate (3-4 years)
Cultural Resource Management	\$1,906	(1)	(3) Other (5+ years)
Timber Management	\$601	(1)	
Hydrological Management	\$8,430	(1)	
Other (Restoration, Enhancement, Surveys, Monitoring, etc.)	\$44,062	(1)	
<b>Subtotal</b>	<b>\$144,666</b>		
<b><u>Administration</u></b>			
General administration	<b>\$5,015</b>	(1)	
<b><u>Support</u></b>			
Land Management Planning	\$16,338	(1)	
Land Management Reviews	\$5,343	(3)	
Training/Staff Development	\$1,503	(1)	
Vehicle Purchase	\$166,103	(2)	
Vehicle Operation and Maintenance	\$13,445	(1)	
Other (Technical Reports, Data Management, etc.)	\$3,306	(1)	
<b>Subtotal</b>	<b>\$206,039</b>		
<b><u>Capital Improvements</u></b>			
New Facility Construction	\$6,146	(2)	
Facility Maintenance	\$17,493	(1)	
<b>Subtotal</b>	<b>\$23,639</b>		
<b><u>Visitor Services/Recreation</u></b>			
Info./Education/Operations	<b>\$6,479</b>	(1)	
<b><u>Law Enforcement</u></b>			
Resource protection	<b>\$0</b>	(1)	
<b><u>Total</u></b>	<b>\$385,838</b>	*	

\* Based on the characteristics and requirements of this area, 1.4 FTE positions would be optimal to fully manage this area. All land management funding is dependent upon annual legislative appropriations.

**Split Oak Forest WEA Management Plan Cost Estimate**  
***Ten-year projection***

<b><u>Resource Management</u></b>	<b><u>Expenditure</u></b>	<b><u>Priority</u></b>	<b>Priority schedule:</b>
Exotic Species Control	\$110,154	(1)	(1) Immediate (annual)
Prescribed Burning	\$677,667	(1)	(2) Intermediate (3-4 years)
Cultural Resource Management	\$16,747	(1)	(3) Other (5+ years)
Timber Management	\$5,283	(1)	
Hydrological Management	\$74,067	(1)	
Other (Restoration, Enhancement, Surveys, Monitoring, etc.)	\$387,136	(1)	
<b>Subtotal</b>	<b>\$1,271,054</b>		
<b><u>Administration</u></b>			
General administration	\$44,062	(1)	
<b><u>Support</u></b>			
Land Management Planning	\$143,551	(1)	
Land Management Reviews	\$15,295	(3)	
Training/Staff Development	\$13,209	(1)	
Vehicle Purchase	\$584,525	(2)	
Vehicle Operation and Maintenance	\$118,128	(1)	
Other (Technical Reports, Data Management, etc.)	\$29,049	(1)	
<b>Subtotal</b>	<b>\$903,756</b>		
<b><u>Capital Improvements</u></b>			
New Facility Construction	\$17,753	(2)	
Facility Maintenance	\$153,692	(1)	
<b>Subtotal</b>	<b>\$171,445</b>		
<b><u>Visitor Services/Recreation</u></b>			
Info./Education/Operations	\$56,921	(1)	
<b><u>Law Enforcement</u></b>			
Resource protection	\$0	(1)	
<b><u>Total</u></b>	<b>\$2,447,238</b>	*	

\* Based on the characteristics and requirements of this area, 1.3 FTE positions would be optimal to fully manage this area. All land management funding is dependent upon annual legislative appropriations.



## 10 Analysis of Potential for Contracting Private Vendors for Restoration and Management Activities

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 FWC 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 “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. Items selected as “rejected” represent those for which FWC has in-house expertise and/or which the agency has found it can accomplish at less expense than through contracting with outside sources:

	Approved	Conditional	Rejected
• Dike and levee maintenance		✓	
• Exotic species control		✓	
• Mechanical vegetation treatment		✓	
• Public contact and educational facilities development		✓	
• Prescribed burning		✓	
• Timber harvest activities		✓	
• Vegetation inventories		✓	

## 11 Compliance with Federal, State, and Local Governmental Requirements

The operational functions of FWC personnel are governed by the agency’s Internal Management Policies and Procedures (IMPP) Manual. The IMPP Manual provides internal guidance regarding many subjects affecting the responsibilities of agency personnel including personnel management, safety issues, uniforms and personal appearance, training, as well as accounting, purchasing, and budgetary procedures.

When public facilities are developed on areas managed by FWC, every effort is made to comply with Public Law 101 - 336, the Americans with Disabilities Act. As new facilities are developed, the universal access requirements of this law are followed in all cases except where the law allows reasonable exceptions (e.g., where handicap access is structurally impractical or where providing such access would change the fundamental character of the facility being provided).

Uses planned for SOFWEA are in compliance with the Conceptual State Lands Management Plan and its requirement for “balanced public utilization,” and are in compliance with the mission of FWC as described in its Agency Strategic Plan (Appendix 13.9). Such uses also comply with the authorities of the FWC as derived from Article IV, Section 9, of the Florida Constitution as well as the guidance and directives of Chapters, 253, 259, 327, 370, 379, 403, 870, 373, 375, 378, 487, and 597 FS.

The FWC has developed and utilizes an Arthropod Control Plan for SOFWEA in compliance with Chapter 388.4111 F.S. (Appendix 13.14-13.15). This plan was developed in cooperation with the local Orange and Osceola County arthropod control agencies. This plan is also in conformance with the Local Government Comprehensive Plan as approved and adopted for Orange and Osceola Counties, Florida, (Appendix 13.16-13.17).

## 12 Endnotes

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- <sup>3</sup> Walters, C. J. and R. Hilborn. 1978. Ecological optimization and adaptive management. *Annual Review of Ecology and Systematics* 9:157–188.
- <sup>4</sup> Regulatory Negotiation Committee on Accessibility Guidelines for Outdoor Developed Areas, Final Report (1999).
- <sup>5</sup> Karl, T. R., J. M. Melillo, and T. C. Peterson (Eds.). 2009. *Global Climate Change Impacts in the United States*. Cambridge University Press. New York, NY.
- <sup>6</sup> McCarty, J. P. 2001. Ecological consequences of recent climate change. *Conservation Biology* 15:320-331.

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- <sup>8</sup> Parmesan, C. 2006. Ecological and evolutionary responses to recent climate change. *Annual Review of Ecology, Evolution, and Systematics* 37:637-669.
- <sup>9</sup> Logan, J. A., and J. A. Powell. 2009. Ecological consequences of climate change altered forest insect disturbance regimes. In *Climate Warming in Western North America: Evidence and Environmental Effects* (F. H. Wagner, Ed.). University of Utah Press, Salt Lake City, UT.
- <sup>10</sup> Stevenson, J. C., M. S. Kearney, and E. W. Koch. 2002. Impacts of sea level rise on tidal wetlands and shallow water habitats: A case study from Chesapeake Bay. *American Fisheries Society Symposium* 32:23-36.
- <sup>11</sup> IPCC. 2007b. *Climate Change 2007: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge University Press, Cambridge, UK.
- <sup>12</sup> Emanuel, K.A. 1987. The Dependence of Hurricane Intensity on Climate. *Nature* 326: 483-485.
- <sup>13</sup> Emanuel, K.A. 2005. Increasing Destructiveness of Tropical Cyclones Over the Past 30 Years.
- <sup>14</sup> Webster et al. 2005; Webster, P. J., et al. 2005. Changes in Tropical Cyclone Number, Duration, and Intensity, in a Warming Environment. *Science* 309: 1844–1846.
- <sup>15</sup> Mann, M.E. and K.A. Emanuel. 2006. Atlantic Hurricane Trends Linked to Climate Change. *Eos Trans. AGU* 87: 233-244.
- <sup>16</sup> Stanton, E.A. and F. Ackerman. 2007. *Florida and Climate Change: The Costs of Inaction*. Tufts University Global Development and Environment Institute and Stockholm Environment Institute–US Center, Tufts University, Medford, MA.
- <sup>17</sup> Clough, J.S. 2008. Application of the Sea-Level Affecting Marshes Model (SLAMM 5.0) to Crystal River NWR. Warren Pinnacle Consulting, Inc. for U.S. Fish and Wildlife Service. 46 pp.