

A Management Plan for  
Spirit-of-the-Wild  
Wildlife Management Area  
2016 - 2026



Hendry County, Florida

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



## Florida Department of Environmental Protection

Marjory Stoneman Douglas Building  
3900 Commonwealth Boulevard  
Tallahassee, Florida 32399-3000

Rick Scott  
Governor

Carlos Lopez-Cantera  
Lt. Governor

Jonathan P. Steverson  
Secretary

October 24, 2016

Mr. Thomas Houston  
Florida Fish and Wildlife Conservation Commission  
620 South Meridian Street  
Tallahassee, FL 32399-1600

**RE: Spirit of the Wild Wildlife Management Area - Lease #4419**

Dear Mr. Houston:

On **October 21, 2016**, the Acquisition and Restoration Council recommended approval of the **Spirit of the Wild Wildlife Management Area** management plan. Therefore, the Division of State Lands, Office of Environmental Services, acting as agent for the Board of Trustees of the Internal Improvement Trust Fund, hereby approves the **Spirit of the Wild Wildlife Management Area** management plan. The next management plan update is due October 21, 2026.

Approval of this land management plan does not waive the authority or jurisdiction of any governmental entity that may have an interest in this project. Implementation of any upland activities proposed by this management plan may require a permit or other authorization from federal and state agencies having regulatory jurisdiction over those particular activities. Pursuant to the conditions of your lease, please forward copies of all permits to this office upon issuance.

Sincerely,

A handwritten signature in black ink that reads "Paula L. Allen". The signature is written in a cursive style with a large, sweeping initial "P".

Paula L. Allen  
Office of Environmental Services  
Division of State Lands  
Department of Environmental Protection

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**A Management Plan  
for  
Spirit-of-the-Wild Wildlife Management Area**

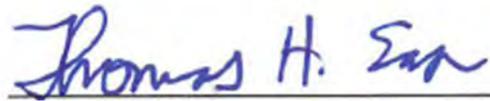
Hendry County, Florida

Owned by the Board of Trustees of the Internal Improvement Trust Fund  
Managed by the Florida Fish and Wildlife Conservation Commission



April 2016

Approved



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: Spirit-of-the-Wild Wildlife Management Area  
 Location: Hendry County, Florida  
 Acreage Total: 7,647 acres  
 Acreage Breakdown:

<u>Land Cover Classification</u>	<u>Acres</u>	<u>Percent of Total Area</u>
Basin marsh	253.58	3.39%
Depression marsh	495.36	6.62%
Dome swamp	3.08	0.04%
Mesic flatwoods	992.31	13.25%
Mesic hammock	15.69	0.21%
Pasture - improved	4,287.63	57.27%
Pasture - semi-improved	838.83	11.20%
Ruderal	147.11	1.96%
Wet flatwoods	434.62	5.81%
Wet prairie	18.34	0.24%

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

Lease/Management Agreement No.: 7,647 (Appendix 13.1)

Use: Single \_\_\_\_\_ Management Responsibilities:  
 Multiple X Agency FWC Responsibilities  
LEAD, SUBLESSEE (Wildlife Management Area, resource protection, law enforcement)

Designated Land Use: Wildlife Management Area

Sublease (s): None

Encumbrances: Utility anchor, water control structure, oil/gas/mineral reservations

Type Acquisition: Florida Forever Program

Unique Features: Natural: Mesic flatwoods, wet flatwoods, basin marsh. Scenic: Expansive views

Archaeological/Historical: Roberts Canal.

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: No acres FWC Additions and Inholdings list; 8,128 acres remaining in the Twelve Mile Slough Florida Forever Project (Figure 3).

Surplus Lands/Acreage: None

Public Involvement: Management Advisory Group consensus building meeting and Public Hearing (Appendix 13.2)

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

ARC Approval Date \_\_\_\_\_ BTITF Approval Date: \_\_\_\_\_

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

\_\_\_\_\_  
 \_\_\_\_\_

## Land Management Plan Compliance Checklist

Required for State-owned conservation lands over 160 acres

### Section A: Acquisition Information Items

Item #	Requirement	Statute/Rule	Page Numbers and/or
1	The common name of the property.	18-2.018 & 18-2.021	1
2	The land acquisition program, if any, under which the property was	18-2.018 & 18-2.021	3
3	Degree of title interest held by the Board, including reservations and	18-2.021	7
4	The legal description and acreage of the property.	18-2.018 & 18-2.021	1-3, Appendix
5	A map showing the approximate location and boundaries of the property.	18-2.018 & 18-2.021	5-6, 82
6	An <b>assessment</b> as to whether the property, or any portion, should be <b>analysis in the plan, and provide corresponding map.</b>	18-2.021	55
7	Identification of other parcels of land within or immediately adjacent to management of the property. <i>Please clearly indicate parcels on a</i>	18-2.021	79-81, 83
8	Identification of adjacent land uses that conflict with the planned use	18-2.021	9-10
9	A statement of the purpose for which the lands were acquired, the authority for such use or uses.	259.032(10)	3-4
10	Proximity of property to other significant State, local or federal land	18-2.021	7-9, 11

### Section B: Use Items

Item #	Requirement	Statute/Rule	Page Numbers and/or
11	The designated single use or multiple use management for the	18-2.018 & 18-2.021	53-54
12	A description of past and existing uses, including any unauthorized	18-2.018 & 18-2.021	51
13	A description of alternative or multiple uses of the property were not adopted.	18-2.018	53-55
14	A description of the management responsibilities of each entity will be coordinated.	18-2.018	7, 84
15	Include a provision that requires that the managing agency consult taking actions that may adversely affect archeological or historical	18-2.021	50, 79, 84, 94

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	79-84
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)	54
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	119
19	Letter of compliance from the local government stating that the LMP is in compliance with the Local Government Comprehensive Plan.	BOT requirement	Appendix 13.4
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	13-16, 47, 49-55, 66-72, 77-88
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	52-55
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 13.4
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	13, Appendix 13.2
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 13.2
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)	13, Appendix 13.2
27	Summary of comments and concerns expressed by the advisory group for parcels over 160 acres	18-2.021	Appendix 13.2
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)	13, Appendix 13.7
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	64, Appendix 13.7
30	Summary of comments and concerns expressed by the management review team, if required by Section 259.036, F.S.	18-2.021	Appendix 13.7
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	Appendix 13.7

### 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	14-16, Appendix 13.3
33	Insert FNAI based natural community maps when available.	ARC consensus	29
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	29-37

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	29-37, 47-50
36	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding beaches and dunes.	18-2.021	47
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	38-46
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	44-47
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	46-48, Appendix 13.5
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)	64-119
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.	↓	64-119
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.		89-112
42-C.	The associated measurable objectives to achieve the goals.		89-112
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>		64-119, Appendix 13.8
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.		116-118, 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)	14-38
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).		64-119

44-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		89-112
44-C.	Measurable objectives (see requirement for #42-C).		89-112
44-D.	Related activities (see requirement for #42-D).		64-119, Appendix 13.8
44-E.	Budgets (see requirement for #42-E).		136-138, 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).	↓	64-119
45-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		89-112
45-C.	Measurable objectives (see requirement for #42-C).		89-112
45-D.	Related activities (see requirement for #42-D).		64-119, Appendix 13.8
45-E.	Budgets (see requirement for #42-E).		136-138, 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)	28, 73-74
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 13.13
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).	↓	64-119
48-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		89-112
48-C.	Measurable objectives (see requirement for #42-C).		89-112
48-D.	Related activities (see requirement for #42-D).		64-119
48-E.	Budgets (see requirement for #42-E).		136-138, 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 appropriate managing agencies that have been notified of the proposed plan.</i>	18-2.018 & 18-2.021	47

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	47, 49
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	47, 49
52	***Quantitative description of the land regarding an inventory of hydrological features and associated acreage. <i>See footnote.</i>	253.034(5)	47, 49, 77
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).	↓	64-119
53-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		89-112
53-C.	Measurable objectives (see requirement for #42-C).		89-112
53-D.	Related activities (see requirement for #42-D).		64-119, Appendix 13.8
53-E.	Budgets (see requirement for #42-E).		136-138, 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, 94
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	94, 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).	↓	64-119
57-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		89-112
57-C.	Measurable objectives (see requirement for #42-C).		89-112
57-D.	Related activities (see requirement for #42-D).		64-119, Appendix 13.11
57-E.	Budgets (see requirement for #42-E).		136-138, 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)	79, 82
59	Capital Facilities and Infrastructure	259.032(10) & 253.034(5)	
59-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	64-119
59-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		89-112
59-C.	Measurable objectives (see requirement for #42-C).		89-112
59-D.	Related activities (see requirement for #42-D).		64-119
59-E.	Budgets (see requirement for #42-E).		136-138, Appendix 13.12
60	*** Quantitative data description of the land regarding an inventory of recreational facilities and associated acreage.		253.034(5)
61	Public Access and Recreational Opportunities	259.032(10) & 253.034(5)	
61-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	64-119
61-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		89-112
61-C.	Measurable objectives (see requirement for #42-C).		89-112
61-D.	Related activities (see requirement for #42-D).		64-119
61-E.	Budgets (see requirement for #42-E).		136-138, 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	iii-x
63	Place the Executive Summary at the front of the LMP. Include a physical description of the land.	ARC and 253.034(5)	ii
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	56-63
65	Key management activities necessary to achieve the desired outcomes regarding other appropriate resource management.	259.032(10)	64-119

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)	136-138, 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)	136-138, Appendix 13.12
68	A statement of gross income generated, net income and expenses.	18-2.018	136-138, 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
ARC	Acquisition and Restoration Council
BEBR	Bureau of Economic and Business Research
CAS	Conservation Action Strategy
DEP	Department of Environmental Protection
DHR	Division of Historical Resources
DOD	Department of Defense
DSL	Division of State Lands
FAC	Florida Administrative Code
FFS	Florida Forest Service
FLEPPC	Florida Exotic Pest Plant Council
FNAI	Florida Natural Areas Inventory
FS	Florida Statute(s)
FWC	Florida Fish and Wildlife Conservation Commission
FWRI	Fish and Wildlife Research Institute
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
LMR	Land Management Review
MAG	Management Advisory Group
MSL	Mean Sea Level
NRCS	Natural Resources Conservation Service
OBVM	Objective-Based Vegetation Management
OCPB	Optimal Conservation Planning Boundary
OFW	Outstanding Florida Waters
ORB	Optimal Resource Boundary
ORV	Off-Road Vehicle
OSSF	Okaloacoochee Slough State Forest
OSWMA	Okaloacoochee Slough Wildlife Management Area
SFWMD	South Florida Water Management District
SWWMA	Spirit-of-the-Wild Wildlife Management Area
TMSFFP	Twelve Mile Slough Florida Forever Project
TNC	The Nature Conservancy
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WCPR	Wildlife Conservation Prioritization and Recovery
WMA	Wildlife Management Area

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# 1 Introduction and General Information

Approximately 30 miles from the vast waters of Lake Okeechobee, Florida’s largest lake, the Spirit-of-the-Wild Wildlife Management Area (SWWMA) conserves 7,647 acres of land within a corridor of conservation lands and projects that stretch from the Caloosahatchee River to the Big Cypress Swamp Preserve. Set in the heart of Hendry County within a rural and remote landscape of conservation lands, ranches, and groves, the SWWMA and other proximate conservation lands protect vital habitat for the Florida panther and many other imperiled, rare, and more common wildlife species including the Everglades snail kite, wood stork, and crested caracara. The SWWMA also preserves the hydrological connection with other conservation lands to the south including the Big Cypress Swamp Preserve.

The SWWMA’s freshwater marshes, flatwoods, and hammocks are set within what was once a part of the historic Kissimmee River/Everglades Watershed, with slow-moving water flowing from Lake Okeechobee’s southern end, south and southwest, down the peninsula and eventually into Florida

Bay. However, the landscape and plant communities of the SWWMA, along with the area’s hydrology, have been significantly altered by past human activities, including ditching, canal construction, cattle ranching, and more intensive agriculture.



The landscape of the Spirit-of-the-Wild WMA

Although previous alteration of the landscape impacted the area, the natural communities are home to a unique variety of imperiled and common wildlife of the SWWMA and retain much of their original plant composition that is being improved and restored through ongoing resource management actions. The rare and imperiled species that thrive on the grassy flatlands of the SWWMA include a large number of bird species, including the Florida sandhill crane and crested caracara. Many wading birds can be found on the wetter portions of the SWWMA, including the wood stork, tricolored heron, roseate spoonbill, and white ibis.

A wide array of conservation lands surround the SWWMA, with the closest area being the Okaloacoochee Slough State Forest (OSSF) and Okaloacoochee Slough Wildlife

Management Area (OSWMA) which share the SWWMA's eastern boundary. Other conservation lands in the vicinity include the Dinner Island Ranch Wildlife Management Area (DIRWMA), conservation easements that were acquired for the restoration and protection of Florida panther habitat under the U.S. Fish and Wildlife Service's (USFWS) Wildlife Restoration Grant Program and conservation easements that were acquired by the South Florida Water Management District (SFWMD) for the restoration and conservation of wetlands.

The SWWMA is managed by the Florida Fish and Wildlife Conservation Commission (FWC) for the conservation of imperiled and common wildlife, and for fish and wildlife-based public outdoor recreation. The area is managed to conserve and restore natural wildlife habitat, while providing high-quality opportunities for wildlife viewing, hunting, fishing, horseback-riding, bicycling, and hiking.

## **1.1 Management Plan Purpose**

This Management Plan serves as the basic statement of policy and direction for the management of SWWMA. It provides information including the past usage, conservation acquisition history, and descriptions of the natural and historical resources found on SWWMA. 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 SWWMA's management for the next ten years.

This Management Plan is submitted for review to the Acquisition and Restoration Council (ARC) acting on behalf of the Board of Trustees of the Internal Improvement Trust Fund (Board of Trustees) of the State of Florida through the Florida Department of Environmental Protection's Division of State Lands (DSL), in compliance with paragraph seven of Lease No. 4419 (Appendix 13.1) and pursuant 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 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 13.2). 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 SWWMA Management Plan (Sections 5 – 8).

Further management planning input is received through Land Management Reviews (LMR) conducted every five years, which includes a review of the previous Management Plan, as well as a field review of SWWMA. The LMR report (Section 5.1, Appendix 13.7) provides FWC staff with important information and guidance provided by a diverse team of land management auditors, and communicates the recommendations of the LMR team to FWC so they may be adequately addressed in this Management Plan, and thus guide the implementation of the LMR team recommendations on SWWMA.

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**

The SWWMA is located about nine miles south of LaBelle in Hendry County (Figures 1 and 2). The town of Immokalee is approximately 13 miles to the south, and Fort Myers is approximately 25 miles to the west. The SWWMA is bounded by State Road 29 on the west, Sears Road on the north, and County Road 832 (Keri Road) on the south. The area is bisected by Roberts Canal. The SWWMA is located in Sections 10, 21-23, 25-28, and 33-36, in Township 44 South, Range 29 East (Figure 3). There are two designated entrances to the SWWMA, and both are located along Keri Road.

## **1.3 Acquisition**

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

All the lands acquired within the SWWMA are part of the Twelve Mile Slough Florida Forever Land Acquisition Project (TMSFFP). The principal purposes of the TMSFFP are to protect significant natural habitat important to numerous imperiled species, as well as to preserve the hydrological connection with protected conservation lands to the east and south. More specifically for SWWMA, important purposes of acquisition include protecting and restoring naturally functioning plant communities and to promote a diversity of



An American alligator in Twelve Mile Slough

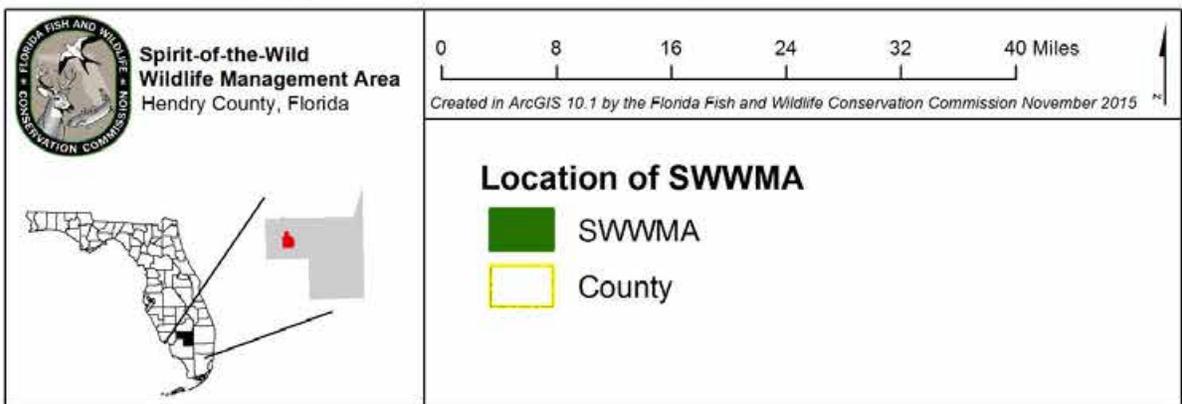
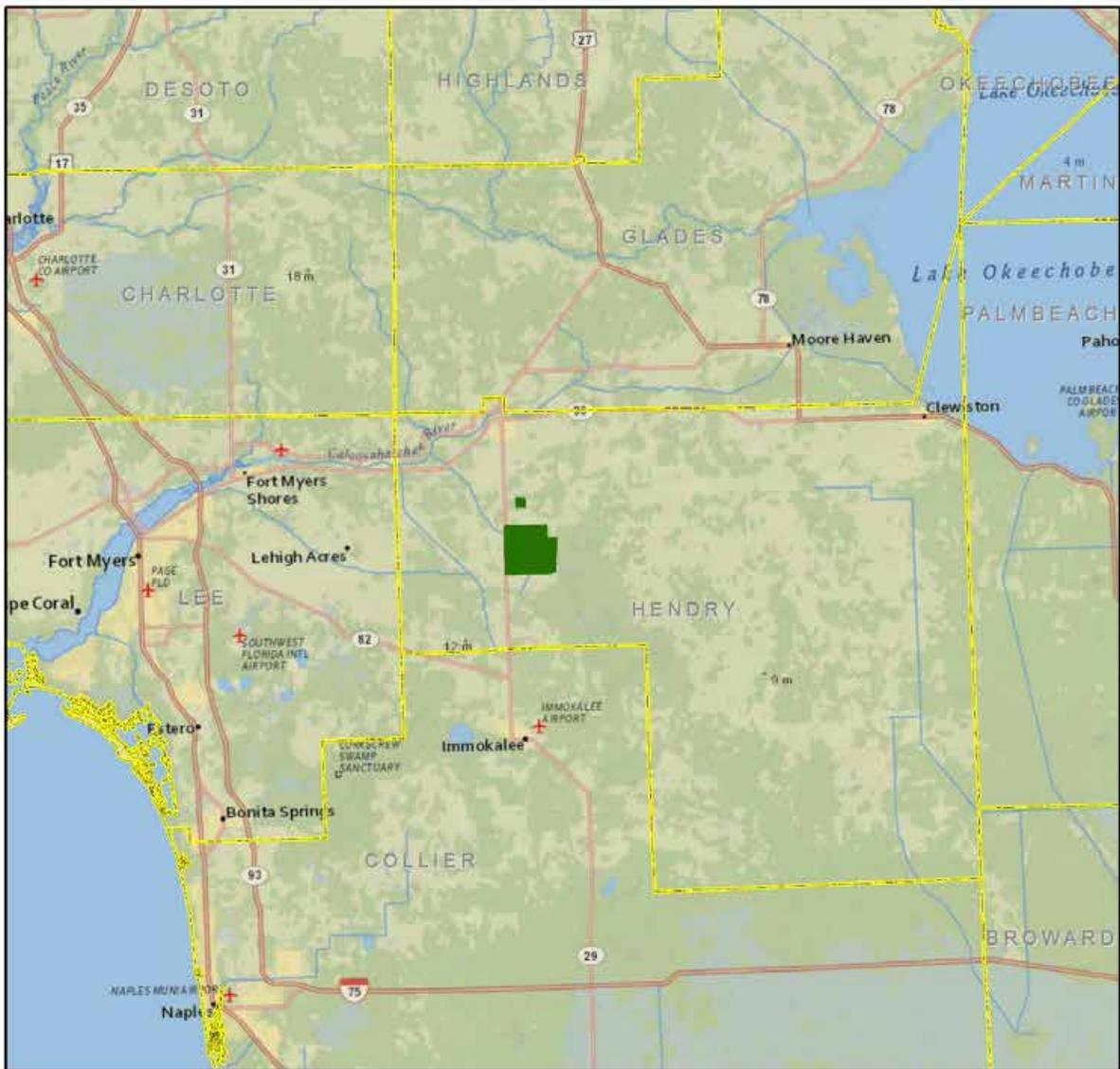
wildlife habitats. The SWWMA is considered a Strategic Habitat Conservation Area for the Florida panther, swallow-tailed kite, Florida sandhill crane, limpkin, and Everglades snail kite. Another purpose for acquisition of SWWMA is to provide quality public outdoor natural resource-based recreational opportunities for the public to enjoy.

The most prominent feature of the TMSFFP is the Twelve Mile Slough. A swale, or “river of grass” natural community, forms the broad band of emergent sedges, grasses, and herbs that runs east through the southern part of the TMSFFP. The SWWMA and the entire TMSFFP are important to many wildlife species, particularly those that require extensive areas of habitat to maintain viable populations. The TMSFFP expands the contiguous area of diverse ecosystems that provide

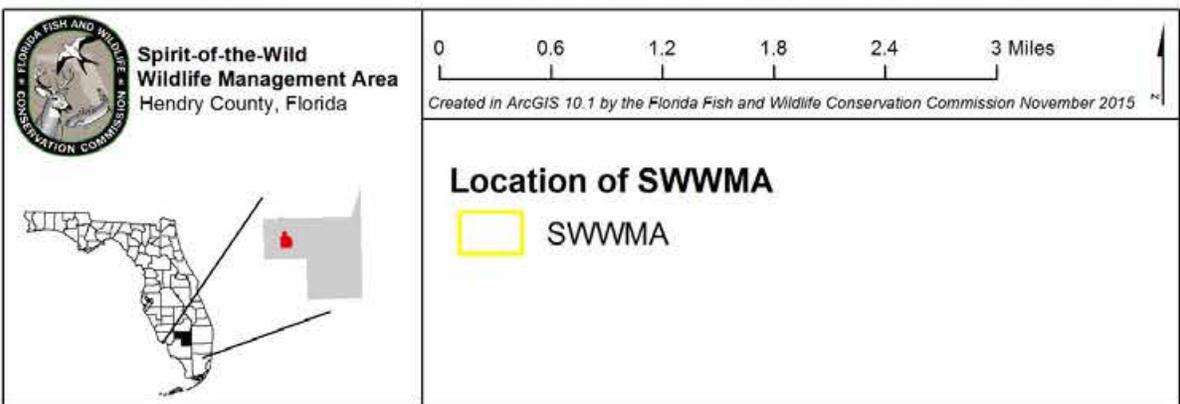
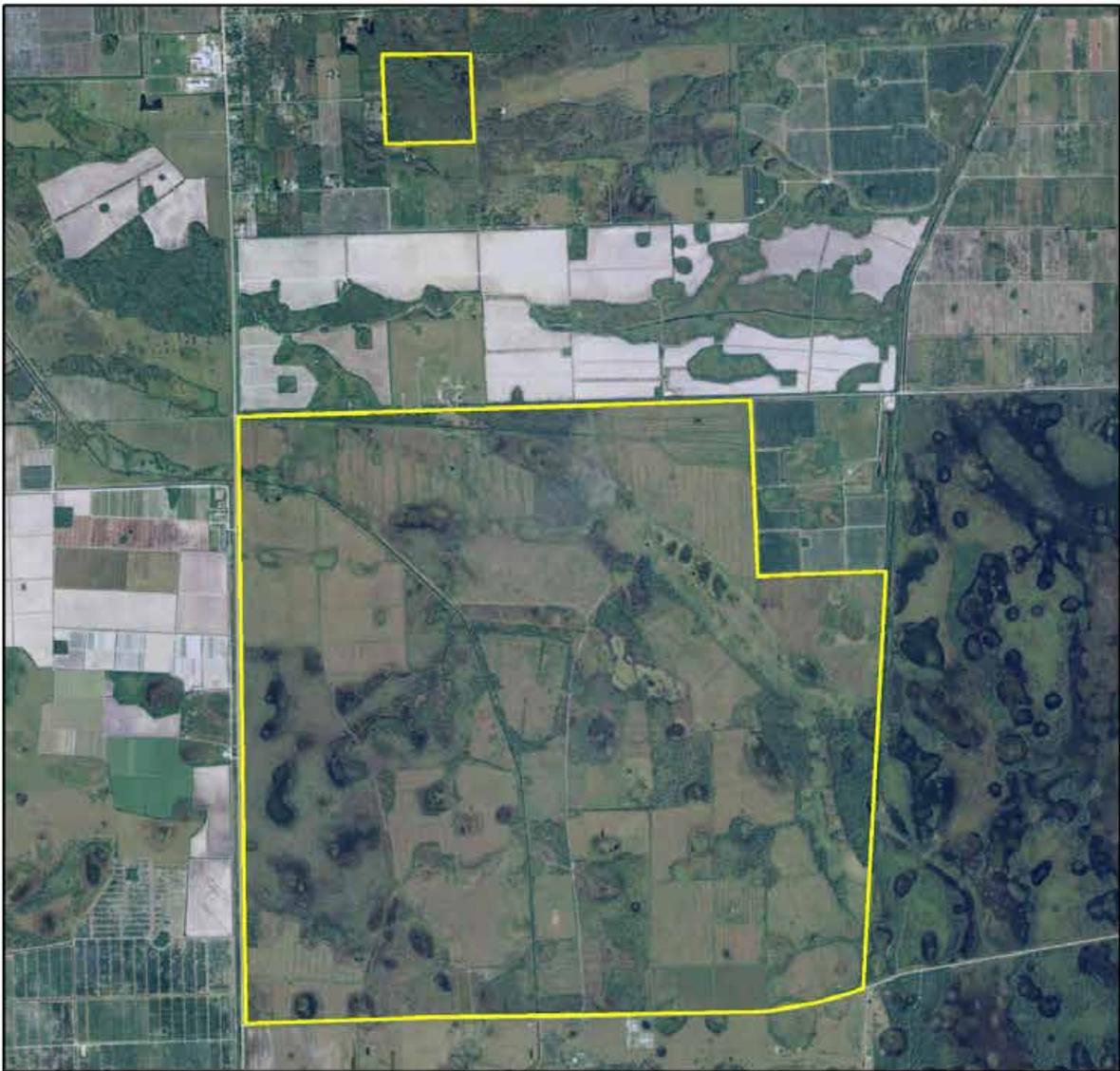
critical habitat for wide-ranging species such as the Florida panther. The ecosystem encompassed by the SWWMA and the larger TMSFFP is a large landscape of agricultural, public and private conservation lands and the associated watershed in south-central Hendry County.

### **1.3.2 Acquisition History**

The State of Florida acquired 7,486 acres of the SWWMA with funds from the State’s Florida Forever Land Acquisition Program from John Albritton in June, 2002. FWC received a lease from the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida (Board of Trustees) through the DEP’s Division of State Lands (DSL) in May, 2003. Additionally, the Board of Trustees acquired the 160 acre northern tract in December 2003. The northern tract was incorporated into the established boundary of SWWMA in May 2008.



**Figure 1: General Location of the SWWMA**



**Figure 2: Boundary of the SWWMA - Aerial Imagery**

## **1.4 Management Authority**

The FWC is the designated lead managing agency for SWWMA under the authority granted by Lease Number 4419 from the Board of Trustees agent, DSL. 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 50-year Board of Trustees' Lease Agreement Number 4419 with FWC directs FWC to "manage the leased premises only for the conservation and protection of natural and historical resources and resource-based, public outdoor recreation which is compatible with the conservation and protection of these public lands, as set forth in subsection 253.023(11), FS..." The lease agreement further directs FWC to "implement applicable Best Management Practices for all activities under this lease in compliance with paragraph 18-2.018(2)(h), FAC, which have been selected, developed, or approved by lessor, lessee, or other land managing agencies for the protection and enhancement of the leased premises."

## **1.6 Title Interest and Encumbrances**

As State-owned lands, title to SWWMA is vested in the Board of Trustees (Governor and Cabinet). In May 2003, DSL, as staff to the Board of Trustees, entered into Lease Agreement Number 4419, a 50 year lease agreement, granting FWC management authority for SWWMA. Encumbrances include a utility anchor along State Road 29 held by the Florida Power and Light Company and outstanding oil, gas, and mineral reservations on the area. Currently, these encumbrances do not create impediments to the overall management of SWWMA.

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

The extensive network of conservation lands in the vicinity of the SWWMA are shown on Table 1, and in Figure 3. Located within 15 miles of the SWWMA are conservation areas managed by the USFWS, the Florida Department of Environmental Protection (DEP), the Florida Forest Service (FFS), the FWC, the SFWMD, Collier and Lee counties, and private conservation organizations, such as The Nature Conservancy (TNC). The OSSF is directly adjacent to the SWWMA's eastern border. Nearby Florida Forever projects include Twelve Mile Slough to the north and south, and Devil's Garden to the east (Table 2).

Most of the conservation lands listed in Table 1 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 managed by a private landowner, while a public agency or not-for-profit organization holds a conservation easement on the land.

**Table 1: Conservation Lands in the Vicinity (15 Miles) of SWWMA**

<b>Federal Government</b>	<b>Managing Agency</b>
Florida Panther Conservation Bank II Conservation Easement	DOI - USFWS
Wetlands Reserve Program Easement #169	DOA – NRCS
Wetlands Reserve Program Easement #177	DOA – NRCS
Wetlands Reserve Program Easement #193	DOA – NRCS
Wetlands Reserve Program Easement #199	DOA – NRCS
<b>State of Florida</b>	<b>Managing Agency</b>
Dinner Island Ranch Wildlife Management Area	FWC
Hickey Creek Wildlife and Environmental Area	FWC
LaBelle Ranch, Inc. Conservation Easement	DEP – DSL
Okaloacoochee Slough State Forest	FFS
Okaloacoochee Slough Wildlife Management Area	FWC
Panther Passage Conservation Bank Conservation Easement	FWC
Spirit-of-the-Wild Wildlife Management Area	FWC
<b>County/City</b>	<b>Managing Agency</b>
Airport Mitigation Park	Lee County
Alva Scrub Preserve	Lee County
Caloosahatchee Regional Park	Lee County
Caracara Prairie Preserve	Collier County
Daniels Preserve at Spanish Creek	Lee County
Hickey's Creek Mitigation Park	Lee County
Hickey's Creek/Greenbriar Connector	Lee County
Imperial Marsh Preserve	Lee County
Pepper Ranch Preserve	Collier County
Persimmon Ridge Preserve	Lee County
Sam Galloway Tract at Imperial Marsh Preserve	Lee County
<b>Water Management District</b>	<b>Managing Agency</b>
C-43 Basin Storage Reservoir - Part 1	SFWMD
Caloosahatchee Basin Water Storage Reservoir	SFWMD
Caloosahatchee River Basin Water Quality Treatment and Testing Facility	SFWMD
Corkscrew Regional Ecosystem Watershed	SFWMD
Corkscrew Regional Mitigation Bank	SFWMD
Lake Trafford Impoundment	SFWMD
<b>Other Conservation Lands</b>	<b>Managing Agency</b>
Babcock Ranch Preserve	Babcock Ranch Management, LLC
Black Boar Ranch Conservation Easement	TNC
Corkscrew Swamp Sanctuary	National Audubon Society, Inc.

**Table 1: Conservation Lands in the Vicinity (15 Miles) of SWWMA**

Floraglates Preserve	Floraglates Foundation
Greenbriar Swamp Preserve	Lee County East County Water Control District
Lone Ranger Ranch TNC Conservation Easements	TNC
Meadowbrook Park	Lee County East County Water Control District
Moya Preserve	Floraglates Foundation
Savannah Lakes	Lee County East County Water Control District

Acronym Key	Agency Name
DEP	Florida Department of Environmental Protection
DOI	United State Department of the Interior
DSL	Division of State Lands
FFS	Florida Forest Service
FWC	Florida Fish and Wildlife Conservation Commission
NRCS	Natural Resources Conservation Service
SFWMD	South Florida Water Management District
TNC	The Nature Conservancy
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service

**Table 2: Florida Forever Projects in the Vicinity (15 Miles) of SWWMA**

Project Name	Acres
Caloosahatchee Ecoscape Florida Forever BOT Project	18,497.00
Corkscrew Regional Ecosystem Watershed Florida Forever BOT Project	67,936.47
Devil's Garden Florida Forever BOT Project	82,994.75
Fisheating Creek Ecosystem Florida Forever BOT Project	184,179.04
Half Circle L Ranch Florida Forever BOT Project	11,203.00
Panther Glades Florida Forever BOT Project	64,809.40
Twelve Mile Slough Florida Forever BOT Project	15,967.48

## 1.8 Adjacent Land Uses

As listed in the Hendry County Comprehensive Land Use Plan, the lands within the SWWMA are currently designated as public lands. The parcels within and around the SWWMA are zoned as A-2, which allows agricultural use of the semi-improved pasture on the area.

The lands within the SWWMA primarily have the future land use designation of Agricultural lands, as do the lands to the north and south. The land on the west side of

State Road 29 are part of the Rodina Sector Plan. According to the Hendry County Comprehensive Land Use Plan, Rodina is intended to be a mixed-use development that blends agriculture and conservation with pedestrian friendly, compact, and mixed-use communities.

According to the Hendry County Rural and Agricultural Lands Study map, much of the SWWMA is considered a primary panther zone with the rest of the area considered a secondary zone. The SWWMA is also considered a Potential Regional Park, which is a designation for sizable areas used primarily for outdoor recreation including picnicking, boating, fishing, horseback riding, hiking, biking, trails, swimming, camping, and more. The Board of County Commissioners and the Hendry-LaBelle Recreation Board encourages public access to such regional parks.

The U.S. Census Bureau estimates that there were 37,895 people living in Hendry County in 2013. The Bureau of Economic and Business Research's (BEBR) medium-range population projection indicates that in the year 2025, there will be 39,700 people living in the County. According to BEBR population projections for the counties surrounding Hendry County for the year 2025 are as follows: Broward County - 1,902,200; Collier County - 411,400; Glades County - 14,000; Lee County - 837,800; Palm Beach County - 1,536,600.

Since Hendry County's population is expected to grow very slowly, significant development of the lands adjacent to the SWWMA appears unlikely in the immediate future. Additionally, the surrounding lands are expected to remain zoned for agriculture or agriculture conservation. While the Rodina Sector Plan calls for development west of SR 29, currently, development of those lands has not been initiated. FWC will continue monitor, evaluate and communicate any potential concerns about future development of adjacent lands, if specific proposals for development are submitted.

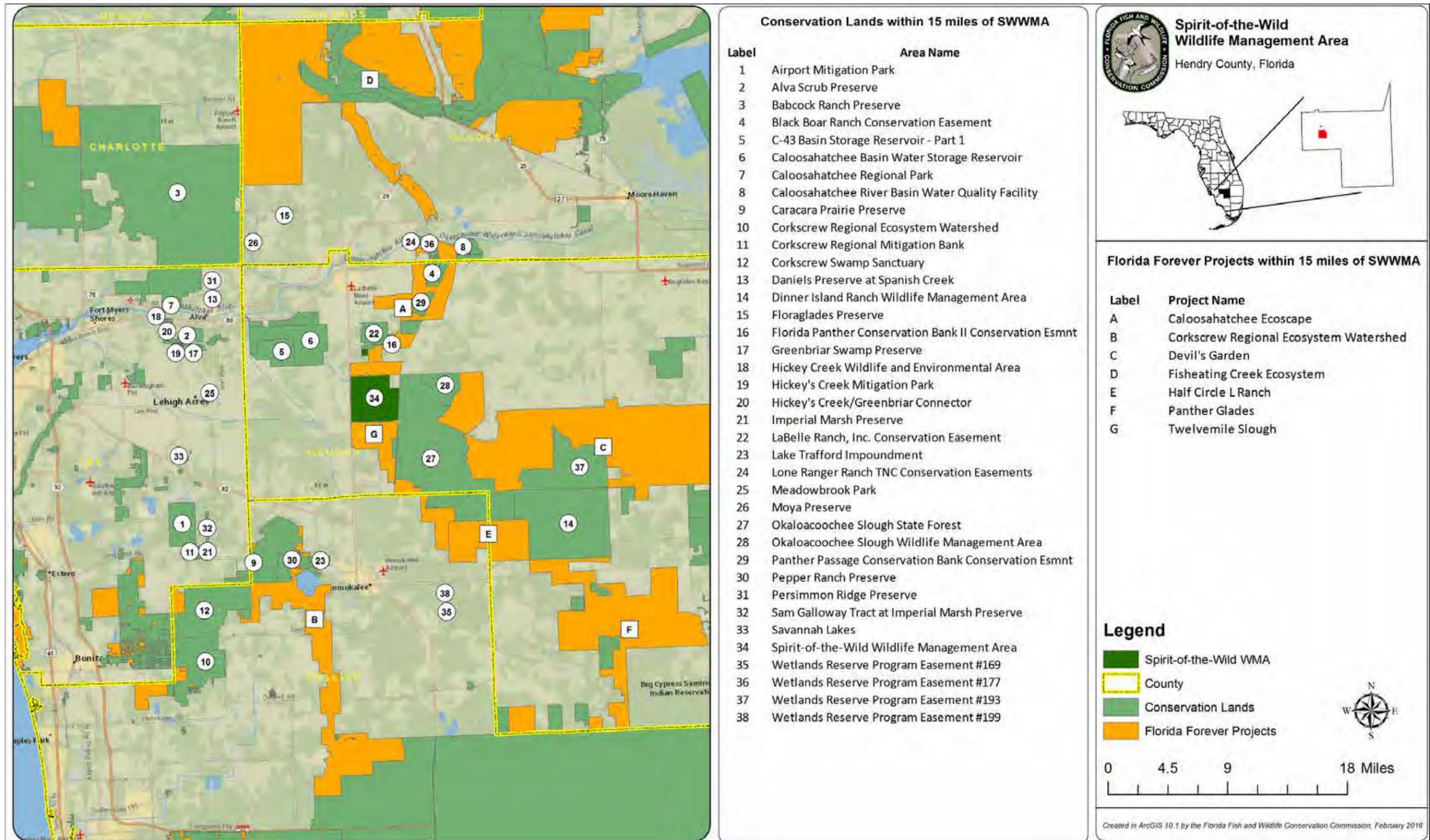


Figure 3: Nearby Conservation Lands and Florida Forever Projects

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## **1.9 Public Involvement**

The FWC conducted a Management Advisory Group (MAG) meeting in Clewiston, Florida on December 2, 2015 to obtain input from both public and private stakeholders regarding management of SWWMA. 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 MAG, as well as a listing of participants, is included as Appendix B. Additionally, a public hearing, as required by Chapter 259.032(10), FS, was held in Clewiston on January 7, 2016. The report of that hearing is also contained in Appendix B. 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 received at a public hearing held by ARC when the SWWMA 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**

#### **2.1.1 Climate**

Hendry County is located in the warm subtropical portion of the state. The temperature of the City of La Belle, approximately 8 miles from SWWMA, during the period 1929 to 2012 ranged from an average minimum 61.5 degrees Fahrenheit (F) to an average maximum of 85 degrees F. January had the lowest average temperature per year at 49.9 degrees F. The highest average temperatures occur in July and August, which had an average temperature of 92 degrees F over the period of record. The average annual temperature for the period of record was 73.25 degrees F.

Average total annual precipitation during the period 1929 to 2012 was 51.25 inches, during which the period rainfall was highest during the month of June (8.67 inches) and lowest in December (1.53 inches). The driest months were November (1.62 inches), December (1.53 inches), and January (1.78 inches). The wet season normally extends from June through September (7.04 inches), while spring and fall are normally considered drier seasons.

#### **2.1.2 Topography**

SWWMA is located in the Immokalee Rise physiographic province. The topography may be characterized as gently sloping prairies and pastures with very little elevation change. The elevation ranges from 25 feet above mean sea level (MSL) at the north end of the area to 28 feet above MSL in the southeastern portion of the area.

### **2.1.3 Soils**

NRCS data were used to identify the SWWMA's soil series and soil depth to water table. Seventeen soil map units described in the soil survey of the SWWMA are distributed as shown in Figure 4. The primary soil types found on the SWWMA include Oldsmar sand muck (37% of the area), Wabasso sand (12%), Malabar fine sand (10%), Malabar sand (6%), and Winder fine sand (6%). Analyses of depth to water table for map units occurring within the SWWMA are also provided in Figure 5. 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. Soil series descriptions may be found in Appendix 13.3.

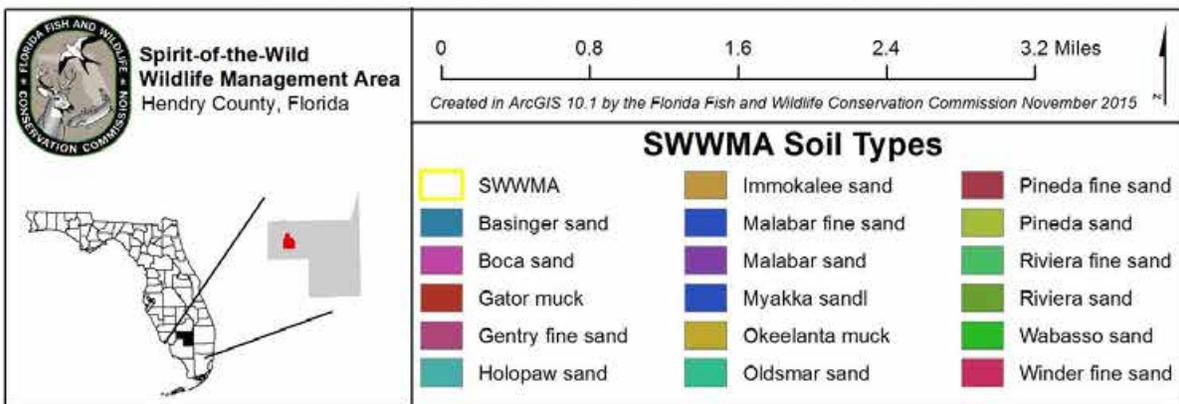
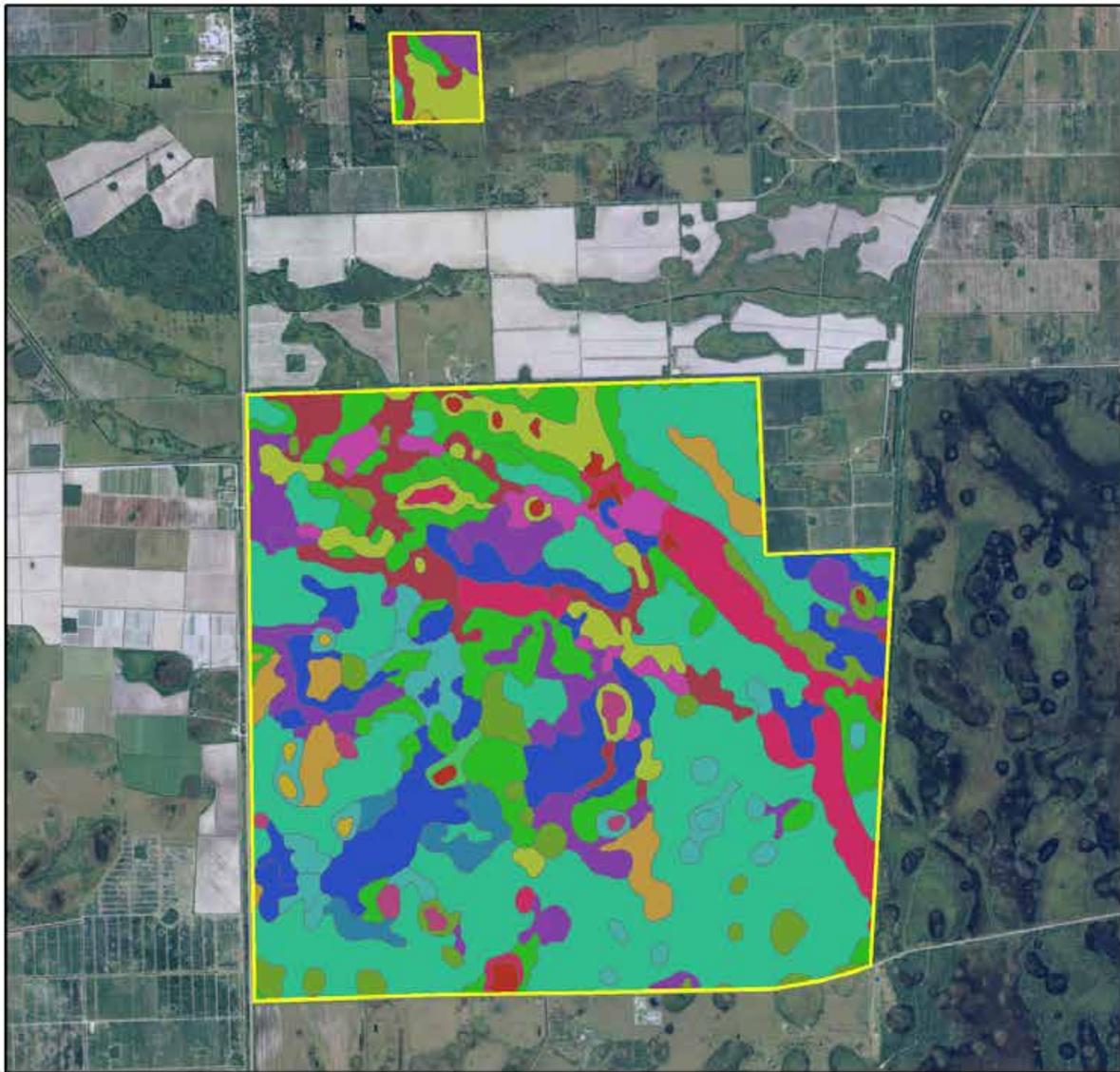
### **2.1.4 Geologic Conditions**

The geology of the SWWMA consists of one major formation at the surface according to the geologic map of the State of Florida. This formation is known as Shelly sediments of Plio-Pleistocene age. This formation covers 100% of SWWMA. Mollusk bearing sediments of southern Florida contain some of the most abundant and diverse fossil faunas in the world. Lithologically these sediments are complex, varying from unconsolidated, variably calcareous, and fossiliferous quartz sands to well indurated, sandy, fossiliferous limestones (both marine and freshwater). This section consists of fossiliferous sands and carbonates. The lithology of this formation consists of limestone, sand, clay, or mud.

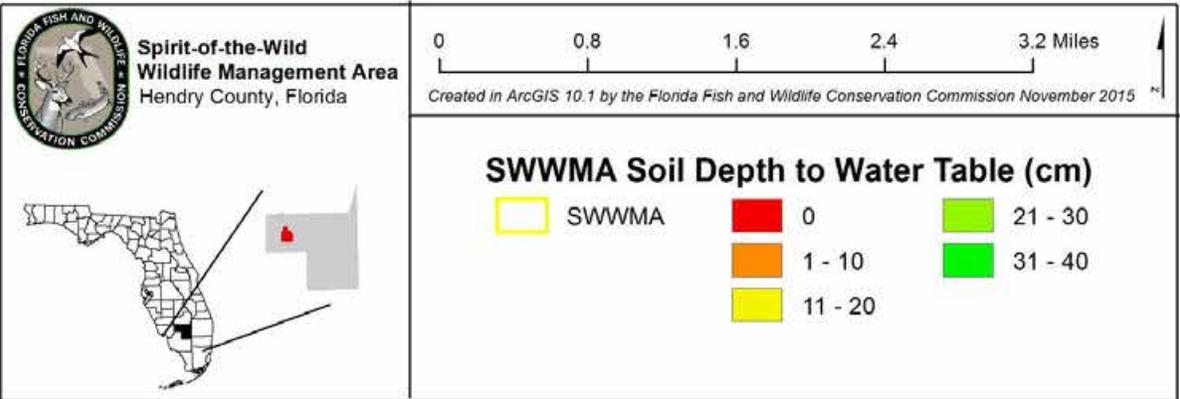
## **2.2 Vegetation**

The SWWMA is situated in a region that is was historically characterized by a vast landscape of pine flatwoods forests, oak hammocks, cypress swamps, wet prairies and marshes that have been altered by conversion to cattle ranches, crop farms and citrus groves. Though much of the historic plant composition remains or is being restored through ongoing resource management actions described in Section 5.1 of this Management Plan. The FWC has completed natural and anthropogenic community mapping of SWWMA through the work of the Florida Natural Areas Inventory (FNAI). Through this work, FNAI has identified and mapped a total of ten plant communities, ten rare plants and 29 exotic invasive plants within the SWWMA.

Natural, rare, and exotic invasive plant species known to occur on SWWMA are listed in Tables 3, 4, and 5, respectively. The plant communities located on SWWMA are listed in Table 6 and shown in Figure 6. These communities are described in Section 2.2.1.



**Figure 4: Soil Types Found on the SWWMA**



**Figure 5: SWWMA Soil Depth to Water Table**

**Table 3: Native Plants found on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Alabama supplejack	<i>Berchemia scandens</i>
Alligator-flag	<i>Thalia geniculata</i>
Alligatorlily	<i>Hymenocallis palmeri</i>
American black nightshade	<i>Solanum americanum</i>
American bluehearts	<i>Buchnera americana</i>
American cupscale	<i>Sacciolepis striata</i>
Annual saltmarsh aster	<i>Symphotrichum subulatum</i>
Arrowfeather threeawn	<i>Aristida purpurascens</i> var. <i>tenuispica</i>
Arrowhead	<i>Sagittaria lancifolia</i>
Axilflower	<i>Mecardonia acuminata peninsularis</i>
Baldsedge	<i>Rhynchospora nitens</i>
Baldwin's coyote-thistle	<i>Eryngium baldwinii</i>
Baldwin's flatsedge	<i>Cyperus croceus</i>
Baldwin's milkwort	<i>Polygala balduinii</i>
Baldwin's nutrush	<i>Scleria baldwinii</i>
Baldwin's spikerush	<i>Eleocharis baldwinii</i>
Ballmoss	<i>Tillandsia recurvata</i>
Bantam-buttons	<i>Syngonanthus flavidulus</i>
Basketgrass	<i>Oplismenus hirtellus</i>
Bunched beaksedge	<i>Rhynchospora microcephala</i>
Beach false foxglove	<i>Agalinis fasciculata</i>
Beaked panicgrass	<i>Coleataenia anceps</i>
Beautyberry	<i>Callicarpa americana</i>
Beggar-ticks	<i>Bidens pilosa</i>
Big carpetgrass	<i>Axonopus furcatus</i>
Bighead rush	<i>Juncus megacephalus</i>
Blackeyed Susan	<i>Rudbeckia hirta</i>
Blackroot	<i>Pterocaulon pycnostachyum</i>
Bladderwort	<i>Utricularia subulata</i>
Blanket crabgrass	<i>Digitaria serotina</i>
Bloodleaf	<i>Iresine diffusa</i>
Bloodroot	<i>Lachnanthes caroliana</i>
Blue-joint panicgrass	<i>Coleataenia tenera</i>
Bogbuttons	<i>Lachnocaulon anceps</i>
Bottlebrush threeawn	<i>Aristida spiciformis</i>
Bracken fern	<i>Pteridium aquilinum</i> var. <i>pseudocaudatum</i>
Branched hedgehyssop	<i>Gratiola ramosa</i>
Bretonica peluda	<i>Melochia spicata</i>
Bristly greenbrier	<i>Smilax tamnoides</i>
Broadleaf arrowhead	<i>Sagittaria latifolia</i>

**Table 3: Native Plants found on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Broomsedge bluestem	<i>Andropogon virginicus</i>
Bushy bluestem	<i>Andropogon glomeratus</i> var. <i>hirsutior</i>
Butterflyweed	<i>Asclepias tuberosa</i>
Butterweed	<i>Packera glabella</i>
Button rattlesnakemaster	<i>Eryngium yuccifolium</i>
Buttonweed	<i>Diodia virginiana</i>
Cabbage palm	<i>Sabal palmetto</i>
Callose grape	<i>Vitis shuttleworthii</i>
Canada spikerush	<i>Eleocharis geniculata</i>
Canadian horseweed	<i>Conyza canadensis</i> var. <i>pusilla</i>
Candyroot	<i>Polygala nana</i>
Cardinal airplant	<i>Tillandsia fasciculata</i>
Caribbean purple	<i>Gamochaeta antillana</i>
Carolina fimbry	<i>Fimbristylis caroliniana</i>
Carolina yelloweyed grass	<i>Xyris caroliniana</i>
Carpeweed	<i>Phyla nodiflora</i>
Chalky broomsedge bluestem	<i>Andropogon virginicus</i> var. <i>glaucus</i>
Chapman's skeletongrass	<i>Gymnopogon chapmanianus</i>
Chestnutleaf falsecroton	<i>Caperonia castaneifolia</i>
Cinnamon fern	<i>Osmundastrum cinnamomea</i>
Climbing aster	<i>Ampelaster carolinianus</i>
Climbing hempvine	<i>Mikania scandens</i>
Clustered bushmint	<i>Hyptis alata</i>
Clustered mille graines	<i>Oldenlandia uniflora</i>
Coast cockspur	<i>Echinochloa walteri</i>
Coastal sandbur	<i>Cenchrus spinifex</i>
Coastalplain chaffhead	<i>Carphephorus corymbosus</i>
Coastalplain hawkweed	<i>Hieracium megacephalon</i>
Coastalplain milkwort	<i>Polygala setacea</i>
Coastalplain St. John's-wort	<i>Hypericum brachyphyllum</i>
Coastalplain willow	<i>Salix caroliniana</i>
Coastalplain yelloweyed grass	<i>Xyris ambigua</i>
Combleaf mermaidweed	<i>Proserpinaca pectinata</i>
Common buttonbush	<i>Cephalanthus occidentalis</i>
Common carpetgrass	<i>Axonopus fissifolius</i>
Common cattail	<i>Typha latifolia</i>
Common duckweed	<i>Spirodela polyrhiza</i>
Common ragweed	<i>Ambrosia artemisiifolia</i>
Common reed	<i>Phragmites australis</i>
Common wireweed	<i>Sida ulmifolia</i>

**Table 3: Native Plants found on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Coral bean	<i>Erythrina herbacea</i>
Corkwood	<i>Stillingia aquatica</i>
Corky-stem passion flower	<i>Passiflora suberosa</i>
Creeping bluestem	<i>Schizachyrium scoparium</i> var. <i>scoparium</i>
Creeping cucumber	<i>Melothria pendula</i>
Creeping primrosewillow	<i>Ludwigia repens</i>
Creeping woodsorrel	<i>Oxalis corniculata</i>
Cuban jute	<i>Sida rhombifolia</i>
Curtiss' primrosewillow	<i>Ludwigia curtissii</i>
Cutleaf groundcherry	<i>Physalis angulata</i>
Cutthroatgrass	<i>Panicum abscissum</i>
Cypress panicgrass	<i>Dichantherium dichotomum</i>
Cypress witchgrass	<i>Dichantherium ensifolium</i>
Dahoon holly	<i>Ilex cassine</i>
Danglepod	<i>Sesbania herbacea</i>
Darrow's blueberry	<i>Vaccinium darrowii</i>
Deer-tongue	<i>Carphephorus paniculatus</i>
Dense gayfeather	<i>Liatris spicata</i>
Dog fennel	<i>Eupatorium capillifolium</i>
Dotted smartweed	<i>Polygonum punctatum</i>
Dwarf huckleberry	<i>Gaylussacia dumosa</i>
Dwarf live oak	<i>Quercus minima</i>
Dwarf St. John's-wort	<i>Hypericum mutilum</i>
Dwarf sundew	<i>Drosera brevifolia</i>
Earleaf greenbriar	<i>Smilax auriculata</i>
Early paspalum	<i>Paspalum praecox</i>
Early whitetop fleabane	<i>Erigeron vernus</i>
Eastern false dragon-head	<i>Physostegia purpurea</i>
Eastern gamagrass	<i>Tripsacum dactyloides</i>
Eastern milkpea	<i>Galactia regularis</i>
Eastern purple bladderwort	<i>Utricularia purpurea</i>
Egyptian paspalidium	<i>Paspalidium geminatum</i>
Elliott's lovegrass	<i>Eragrostis elliottii</i>
Elliott's bluestem	<i>Andropogon gyrans</i> var. <i>stenophyllus</i>
Elliott's yelloweyed grass	<i>Xyris elliottii</i>
Erect-leaf witchgrass	<i>Dichantherium erectifolium</i>
Fall panicgrass	<i>Panicum dichotomiflorum</i>
False fennel	<i>Eupatorium leptophyllum</i>
False pimpernel	<i>Lindernia grandiflora</i>
Fasicked beakrush	<i>Rhynchospora fascicularis</i>

**Table 3: Native Plants found on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Fernald's beakrush	<i>Rhynchospora fernaldii</i>
Fetterbush	<i>Lyonia lucida</i>
Fewflower beaksedge	<i>Rhynchospora rariflora</i>
Field paspalum	<i>Paspalum laeve</i>
Fine-stem lovevine	<i>Cassytha filiformis</i>
Fingergrass	<i>Eustachys petraea</i>
Fireweed	<i>Erechtites hieraciifolius</i>
Flat-joint carpetgrass	<i>Axonopus compressus</i>
Flattened pipewort	<i>Eriocaulon compressum</i>
Flat-topped goldenrod	<i>Euthamia graminifolia</i>
Floatingheart	<i>Nymphoides aquatica</i>
Florida alicia	<i>Chapmannia floridana</i>
Florida bully	<i>Sideroxylon reclinatum</i>
Florida butterfly orchid	<i>Encyclia tampensis</i>
Florida false beardgrass	<i>Chrysopogon pauciflorus</i>
Florida grape	<i>Vitis cinerea</i> var. <i>floridana</i>
Florida jointail grass	<i>Coelorachis tuberculosa</i>
Florida keys hempvine	<i>Mikania cordifolia</i>
Florida paspalum	<i>Paspalum floridanum</i>
Florida tickseed	<i>Coreopsis gladiata</i>
Florida yelloweyed grass	<i>Xyris floridana</i>
Florida yellow flax	<i>Linum floridanum</i>
Forked blue curls	<i>Trichostema dichotomum</i>
Forked fimbry	<i>Fimbristylis dichotoma</i>
Fourleaf vetch	<i>Vicia acutifolia</i>
Fourpetal St. John's-wort	<i>Hypericum tetrapetalum</i>
Foxtail	<i>Setaria parviflora</i>
Fragrant beaksedge	<i>Rhynchospora odorata</i>
Fringed nutrush	<i>Scleria ciliata</i>
Gallberry	<i>Ilex glabra</i>
Gaping panicum	<i>Panicum hians</i>
Giant bristlegrass	<i>Setaria magna</i>
Giant ladies' tresses	<i>Spiranthes praecox</i>
Giant orchid	<i>Pteroglossaspis ecristata</i>
Giant wild pine	<i>Tillandsia utriculata</i>
Glade lobelia	<i>Lobelia glandulosa</i>
Glades morning glory	<i>Ipomoea sagittata</i>
Glaucous knotweed	<i>Polygonum glaucum</i>
Globe beakrush	<i>Rhynchospora globularis</i>
Golden aster	<i>Pityopsis graminifolia</i>

**Table 3: Native Plants found on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Golden polypody	<i>Phlebodium aureum</i>
Graceful sandmat	<i>Euphorbia hypericifolia</i>
Grassleaf barbara's buttons	<i>Marshallia graminifolia</i>
Grass-leaved ladies' tresses	<i>Spiranthes vernalis</i>
Grassy arrowhead	<i>Sagittaria graminea</i>
Graytwig	<i>Schoepfia schreberi</i>
Gulf coast spikerush	<i>Eleocharis cellulosa</i>
Gulfdune paspalum	<i>Paspalum monostachyum</i>
Hackberry	<i>Celtis laevigata</i>
Hairawn muhly	<i>Muhlenbergia capillaris</i>
Hairy bluestem	<i>Andropogon longiberbis</i>
Hairy fimbry	<i>Fimbristylis puberula</i>
Hammock prairie-clover	<i>Dalea carnea</i> var. <i>carnea</i>
Haspan flatsedge	<i>Cyperus haspan</i>
Hemlock witchgrass	<i>Dichantherium portoricense</i>
Herb-of-grace	<i>Bacopa monnieri</i>
Hoarypea	<i>Tephrosia</i> sp.
Horned bladderwort	<i>Utricularia cornuta</i>
Humped bladderwort	<i>Utricularia gibba</i>
Hurricanegrass	<i>Fimbristylis cymosa</i>
Husk tomato	<i>Physalis pubescens</i>
Innocence	<i>Houstonia procumbens</i>
Inundated beaksedge	<i>Rhynchospora inundata</i>
Knotgrass	<i>Paspalum distichum</i>
Kunth's maiden fern	<i>Thelypteris kunthii</i>
Lanceleaf greenbrier	<i>Smilax smallii</i>
Largeflowered rose gentian	<i>Sabatia grandiflora</i>
Laurel greenbriar	<i>Smilax laurifolia</i>
Leafless beaked ladies' tresses	<i>Sacoila lanceolata</i> var. <i>lanceolata</i>
Leafless swallowwort	<i>Orthosia scoparia</i>
Leafy bladderwort	<i>Utricularia foliosa</i>
Leavenworth's tickseed	<i>Coreopsis leavenworthii</i>
Leconte's flatsedge	<i>Cyperus lecontei</i>
Lemon bacopa	<i>Bacopa caroliniana</i>
Limestone sandmat	<i>Euphorbia blodgettii</i>
Little blue maidencane	<i>Amphicarpum muhlenbergianum</i>
Live oak	<i>Quercus virginiana</i>
Long strap fern	<i>Campyloneurum phyllitidis</i>
Longleaf milkweed	<i>Asclepias longifolia</i>
Longleaf panicum	<i>Panicum longifolium</i>

**Table 3: Native Plants found on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Longleaf threeawn	<i>Aristida palustris</i>
Long-leaf violet	<i>Viola lanceolata</i>
Long's sedge	<i>Carex longii</i>
Lopsided indiagrass	<i>Sorghastrum secundum</i>
Low nutrush	<i>Scleria verticillata</i>
Low pinebarren milkwort	<i>Polygala ramosa</i>
Lowland rotala	<i>Rotala ramosior</i>
Maidencane	<i>Panicum hemitomom</i>
Manyflower marshpennywort	<i>Hydrocotyle umbellata</i>
Manyspike flatsedge	<i>Cyperus polystachyos</i>
Marsh fimbry	<i>Fimbristylis spadicea</i>
Marsh mermaidweed	<i>Proserpinaca palustris</i>
Marsh seedbox	<i>Ludwigia palustris</i>
Mexican primrosewillow	<i>Ludwigia octovalvis</i>
Milk pea	<i>Galactia elliottii</i>
Mistflower	<i>Conoclinium coelestinum</i>
Mock bishop's weed	<i>Ptilimnium capillaceum</i>
Mohr's thoroughwort	<i>Eupatorium mohrii</i>
Moistbank pimpernel	<i>Lindernia dubia</i>
Muscadine grape	<i>Vitis rotundifolia</i>
Myrsine	<i>Myrsine floridana</i>
Narrow-leaf milkweed	<i>Asclepias lanceolata</i>
Needleleaf witchgrass	<i>Dichanthelium aciculare</i>
Needlepod rush	<i>Juncus scirpoides</i>
Netted nutrush	<i>Scleria reticularis</i>
Netted pawpaw	<i>Asimina reticulata</i>
Nuttall's meadowbeauty	<i>Rhexia nuttallii</i>
Nuttall's thistle	<i>Cirsium nuttallii</i>
Openflower witchgrass	<i>Dichanthelium laxiflorum</i>
Oppositeleaf spotflower	<i>Acmella oppositifolia</i> var. <i>repens</i>
Orange milkwort	<i>Polygala lutea</i>
Pale meadowbeauty	<i>Rhexia mariana</i>
Pan-American balsmscale	<i>Elionurus tripsacoides</i>
Papaya	<i>Carica papaya</i>
Partridge pea	<i>Chamaecrista fasciculata</i>
Pepper vine	<i>Ampelopsis arborea</i>
Persimmon	<i>Diospyros virginiana</i>
Pickerelweed	<i>Pontederia cordata</i>
Piedmont primrosewillow	<i>Ludwigia arcuata</i>
Piedmont sumpweed	<i>Iva microcephala</i>

**Table 3: Native Plants found on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Pillpod sandmat	<i>Euphorbia hirta</i>
Pine lily	<i>Lilium catesbaei</i>
Pinebarren flatsedge	<i>Cyperus ovatus</i>
Pinebarron goldenrod	<i>Solidago fistulosa</i>
Pineland heliotrope	<i>Heliotropium polyphyllum</i>
Pineland purple	<i>Carphephorus odoratissimus subtropicanus</i>
Pineland rayless goldenrod	<i>Bigelovia nudata australis</i>
Pineland twinflower	<i>Dyschoriste angusta</i>
Pink sundew	<i>Drosera capillaris</i>
Pipewort	<i>Eriocaulon decangulare</i>
Pitted stripeseed	<i>Piriqueta cistoides caroliniana</i>
Pointed blue-eyed grass	<i>Sisyrinchium angustifolium</i>
Poison ivy	<i>Toxicodendron radicans</i>
Pokeweed	<i>Phytolacca americana</i>
Pond cypress	<i>Taxodium distichum</i> var. <i>imbricarium</i>
Poorland flatsedge	<i>Cyperus compressus</i>
Possum grape	<i>Cissus verticillata</i>
Potbelly airplant	<i>Tillandsia paucifolia</i>
Procession flower	<i>Polygala incarnata</i>
Prostrate rattle-box	<i>Crotalaria rotundifolia</i>
Purple bluestem	<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>
Purple false foxglove	<i>Agalinis purpurea</i>
Purple lovegrass	<i>Eragrostis spectabilis</i>
Purple thistle	<i>Cirsium horridulum</i>
Queen's-delight	<i>Stillingia sylvatica</i>
Ravenel's pipewort	<i>Eriocaulon ravenelii</i>
Rayless sunflower	<i>Helianthus radula</i>
Red maple	<i>Acer rubrum</i>
Red mulberry	<i>Morus rubra</i>
Reddish wild pine	<i>Tillandsia smalliana</i>
Redmargin zephyrlily	<i>Zephyranthes simpsonii</i>
Redtop panicum	<i>Panicum rigidulum</i>
Resurrection fern	<i>Pleopeltis polypodioides</i> var. <i>michauxiana</i>
Rice button aster	<i>Symphyotrichum dumosum</i>
Richard's yelloweyed grass	<i>Xyris jupicai</i>
Rock Carolina leafflower	<i>Phyllanthus caroliniensis saxicola</i>
Rose-of-plymouth	<i>Sabatia stellaris</i>
Rosy camphorweed	<i>Pluchea baccharis</i>
Rouge plant	<i>Rivina humilis</i>
Roughhair witchgrass	<i>Dichantherium strigosum</i> var. <i>glabrescens</i>

**Table 3: Native Plants found on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Roundleaf thoroughwort	<i>Eupatorium rotundifolium</i>
Roundpod St. John's-wort	<i>Hypericum cistifolium</i>
Rustweed	<i>Polypremum procumbens</i>
Saltbush	<i>Baccharis halimifolia</i>
Saltmarsh fingergrass	<i>Eustachys glauca</i>
Saltmarsh umbrellasedge	<i>Fuirena breviseta</i>
Sand blackberry	<i>Rubus cuneifolius</i>
Sand cordgrass	<i>Spartina bakeri</i>
Sandweed	<i>Hypericum fasciculatum</i>
Satinleaf	<i>Chrysophyllum oliviforme</i>
Savanna milkweed	<i>Asclepias pedicellata</i>
Savannah yelloweyed grass	<i>Xyris flabelliformis</i>
Saw greenbriar	<i>Smilax bona-nox</i>
Saw palmetto	<i>Serenoa repens</i>
Sawgrass	<i>Cladium jamaicense</i>
Scaleleaf aster	<i>Symphotrichum adnatum adadnatum</i>
Seaside goldenrod	<i>Solidago sempervirens</i>
Seaside primrose willow	<i>Ludwigia maritima</i>
Semaphore thorough-wort	<i>Eupatorium mikanioides</i>
Sensitive pea	<i>Chamaecrista nictitans var. aspera</i>
Shaggy hedgehyssop	<i>Gratiola pilosa</i>
Shiny blueberry	<i>Vaccinium myrsinites</i>
Shiny leafed wild coffee	<i>Psychotria nervosa</i>
Shiny woodoats	<i>Chasmanthium nitidum</i>
Shoestring fern	<i>Vittaria lineata</i>
Shore rush	<i>Juncus marginatus</i>
Shortleaf rosegiant	<i>Sabatia brevifolia</i>
Shortleaf wild coffee	<i>Psychotria tenuifolia</i>
Shortleaf yelloweyed grass	<i>Xyris brevifolia</i>
Shortleafed gayfeather	<i>Liatris tenuifolia var. quadriflora</i>
Shortspike bluestem	<i>Andropogon brachystachyus</i>
Showy milkwort	<i>Asemeia grandiflora</i>
Shrubby primrose willow	<i>Ludwigia suffruticosa</i>
Shyleaf	<i>Aeschynomene americana</i>
Silverling	<i>Baccharis glomeruliflora</i>
Simpson's stopper	<i>Myrcianthes fragrans</i>
Skyflower	<i>Hydrolea corymbosa</i>
Slash pine	<i>Pinus elliottii var. densa</i>
Slender adder's-tongue fern	<i>Ophioglossum nudicaule</i>
Slender fimbry	<i>Fimbristylis autumnalis</i>

**Table 3: Native Plants found on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Slender gayfeather	<i>Liatris gracilis</i>
Slenderfruit nutrush	<i>Scleria georgiana</i>
Small butterwort	<i>Pinguicula pumila</i>
Smallfruit primrose willow	<i>Ludwigia microcarpa</i>
Smallfruit spikerush	<i>Eleocharis microcarpa</i>
Smallhead doll's daisy	<i>Boltonia diffusa</i>
Small's yelloweyed grass	<i>Xyris smalliana</i>
Sour paspalum	<i>Paspalum conjugatum</i>
South Florida bluestem	<i>Schizachyrium rhizomatum</i>
Southeast sneezeweed	<i>Helenium pinnatifidum</i>
Southeast sunflower	<i>Helianthus agrestis</i>
Southeastern primrosewillow	<i>Ludwigia linifolia</i>
Southern bayberry	<i>Myrica pusilla</i>
Southern beaksedge	<i>Rhynchospora microcarpa</i>
Southern cattail	<i>Typha domingensis</i>
Southern crabgrass	<i>Digitaria ciliaris</i>
Southern cutgrass	<i>Leersia hexandra</i>
Southern dewberry	<i>Rubus trivialis</i>
Southern fleabane	<i>Erigeron quercifolius</i>
Southern gaura	<i>Gaura angustifolia</i>
Southern needleleaf	<i>Tillandsia setacea</i>
Southern sandbur	<i>Cenchrus echinatus</i>
Southern umbrellasedge	<i>Fuirena scirpoidea</i>
Southern watergrass	<i>Luziola fluitans</i>
Spadeleaf	<i>Centella asiatica</i>
Spanish moss	<i>Tillandsia usneoides</i>
Spanish stopper	<i>Eugenia foetida</i>
Spatterdock	<i>Nuphar advena</i>
Spider-orchid	<i>Habenaria floribunda</i>
Spikerush	<i>Eleocharis elongata</i>
Splitbeard bluestem	<i>Andropogon ternarius</i>
Spreading beaksedge	<i>Rhynchospora divergens</i>
Spreading cinchweed	<i>Pectis prostrata</i>
St. Andrew's-cross	<i>Hypericum hypericoides</i>
St. Augustinegrass	<i>Stenotaphrum secundatum</i>
St. Peter's-wort	<i>Hypericum crux-andreae</i>
Staggerbush	<i>Lyonia fruticosa</i>
Stiff yellow flax	<i>Linum medium var. texanum</i>
Stinking camphorweed	<i>Pluchea foetida</i>
Strangler fig	<i>Ficus aurea</i>

**Table 3: Native Plants found on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
String-lily	<i>Crinum americanum</i>
Sugarcane plumegrass	<i>Saccharum villosum villosum</i>
Swamp bay	<i>Persea palustris</i>
Swamp fern	<i>Blechnum serrulatum</i>
Swamp flatsedge	<i>Cyperus ligularis</i>
Swamp hibiscus	<i>Hibiscus grandiflorus</i>
Swamp hornpod	<i>Mitreola sessilifolia</i>
Swamp laurel oak	<i>Quercus laurifolia</i>
Swamp smartweed	<i>persicaria hydropiperoides</i>
Swamp sunflower	<i>Helianthus angustifolius</i>
Sweet broom	<i>Scoparia dulcis</i>
Sweet everlasting	<i>Pseudognaphalium obtusifolium</i>
Sweetscent camphorweed	<i>Pluchea carolinensis</i>
Sweet shaggytuft	<i>Stenandrium dulce</i>
Switchgrass	<i>Panicum virgatum</i>
Sword fern	<i>Nephrolepis exaltata</i>
Tall elephantsfoot	<i>Elephantopus elatus</i>
Tall jointweed	<i>Polygonella gracilis</i>
Tall nutgrass	<i>Scleria triglomerata</i>
Tall threeawn	<i>Aristida patula</i>
Tall yelloweyed grass	<i>Xyris platylepis</i>
Tallow wood	<i>Ximenia americana</i>
Thin paspalum	<i>Paspalum setaceum</i>
Threesquare bulrush	<i>Schoenoplectus pungens</i>
Toadflax	<i>Linaria canadensis</i>
Tracy's beaksedge	<i>Rhynchospora tracyi</i>
Tropical flatsedge	<i>Cyperus surinamensis</i>
Tropical royalblue waterlily	<i>Nymphaea elegans</i>
Tropical water hyssop	<i>Bacopa innominata</i>
Twistedleaf goldenrod	<i>Solidago tortifolia</i>
Valley redstem	<i>Ammannia coccinea</i>
Variable witchgrass	<i>Dichanthelium commutatum</i>
Virginia chain fern	<i>Woodwardia virginica</i>
Virginia creeper	<i>Parthenocissus quinquefolia</i>
Viviparous spikerush	<i>Eleocharis vivipara</i>
Walter's groundcherry	<i>Physalis walteri</i>
Wand goldenrod	<i>Solidago stricta</i>
Warty panicgrass	<i>Panicum verrucosum</i>
Water cowbane	<i>Tiedemannia filiformis</i>
Water horn fern	<i>Ceratopteris sp.</i>

**Table 3: Native Plants found on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Water-willow	<i>Justicia angusta</i>
Wax-myrtle	<i>Morella cerifera</i>
White crownbeard	<i>Verbesina virginica</i>
White stopper	<i>Eugenia axillaris</i>
White sunnybell	<i>Schoenolirion albiflorum</i>
White vine	<i>Funastrum clausum</i>
White waterlily	<i>Nymphaea odorata</i>
Whitemouth day-flower	<i>Commelina erecta</i>
Whitetop aster	<i>Oclemena reticulata</i>
White-top sedge	<i>Rhynchospora colorata</i>
Whorled marshpennywort	<i>Hydrocotyle verticillata</i>
Wild coco orchid	<i>Eulophia alta</i>
Wild pennyroyal	<i>Piloblephis rigida</i>
Winged loosestrife	<i>Lythrum alatum</i>
Winged primrosewillow	<i>Ludwigia alata</i>
Winged sumac	<i>Rhus copallinum</i>
Wiregrass	<i>Aristida stricta</i>
Witchgrass	<i>Panicum chamaelonche</i>
Wood sage	<i>Teucrium canadense</i>
Woodland false buttonweed	<i>Spermacoce remota</i>
Wooly sunbonnets	<i>Chaptalia tomentosa</i>
Wright's beaksedge	<i>Rhynchospora wrightiana</i>
Wrinkled jointgrass	<i>Mnesithea rugosa</i>
Yellow batchelor's button	<i>Polygala rugelii</i>
Yellow flatsedge	<i>Cyperus flavescens</i>
Yellow spikerush	<i>Eleocharis flavescens</i>
Yellow-top flaveria	<i>Flaveria linearis</i>
Yerba de Tajo	<i>Eclipta prostrata</i>

**Table 4: Rare Plant Species Observed on the SWWMA**

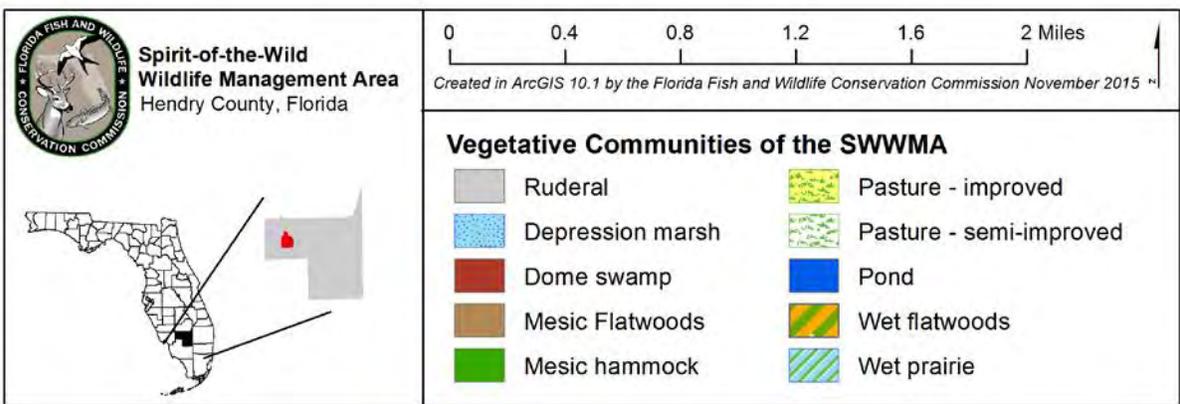
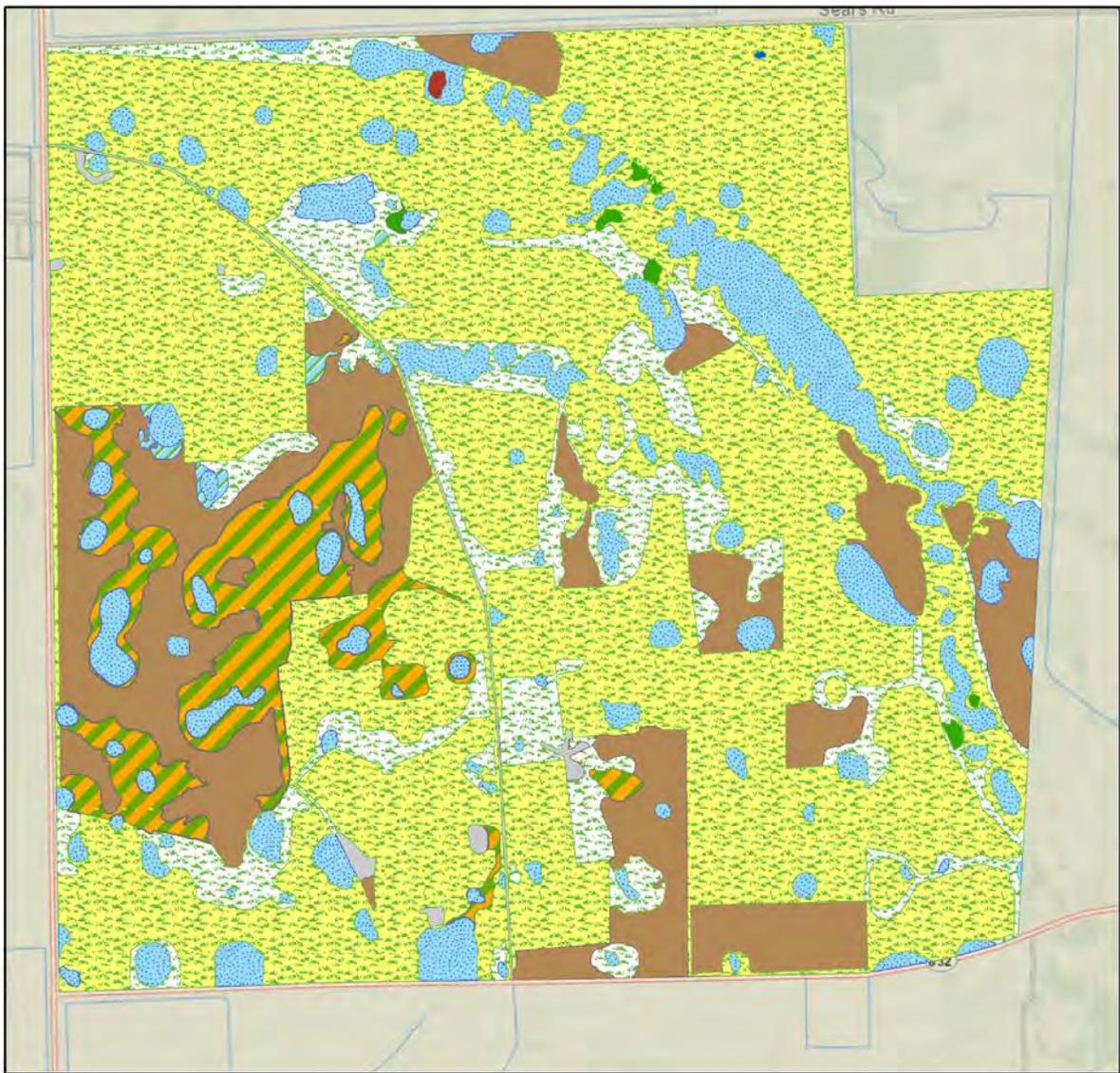
<b>Common Name</b>	<b>Scientific Name</b>	<b>Status</b>
Cardinal airplant	<i>Tillandsia fasciculata</i>	SE
Cutthroatgrass	<i>Panicum abscissum</i>	SE
Florida jointtailgrass	<i>Mnesithea tuberculosa</i>	ST
Giant orchid	<i>Pteroglossaspis ecristata</i>	ST
Giant wild pine	<i>Tillandsia utriculata</i>	SE
Leafless beaked ladiestresses	<i>Sacoila lanceolata lanceolata</i>	ST
Pine lily	<i>Lilium catesbaei</i>	ST
Redmargin zephyrlily	<i>Zephyranthes simpsonii</i>	ST

Satinleaf	<i>Chrysophyllum oliviforme</i>	ST
Simpson's stopper	<i>Myrcianthes fragrans</i>	ST

Acronym	Status
SE	State Endangered
ST	State Threatened

**Table 5: Exotic and Invasive Plant Species Observed on the SWWMA**

Common Name	Scientific Name
Alligatorweed	<i>Alternanthera philoxeroides</i>
Bahiagrass	<i>Paspalum notatum</i>
Brazilian pepper	<i>Schinus terebinthifolia</i>
Caesarweed	<i>Urena lobata</i>
Centepedegrass	<i>Eremochloa ophiuroides</i>
Cogongrass	<i>Imperata cylindrica</i>
Crowfootgrass	<i>Dactyloctenium aegyptium</i>
Guava	<i>Psidium guajava</i>
Guineagrass	<i>Megathyrsus maximum</i>
Indian laurel	<i>Ficus microcarpa</i>
Japanese climbing fern	<i>Lygodium japonicum</i>
Jaraguagrass	<i>Hyparrhenia rufa</i>
Limpograss	<i>Hemarthria altissima</i>
Melaleuca	<i>Melaleuca quinquenervia</i>
Old World climbing fern	<i>Lygodium microphyllum</i>
Paragrass	<i>Urochloa mutica</i>
Peruvian primrosewillow	<i>Ludwigia peruviana</i>
Rosary pea	<i>Abrus precatorius</i>
Rose natalgrass	<i>Melinis repens</i>
Torpedograss	<i>Panicum repens</i>
Tropical soda apple	<i>Solanum viarum</i>
Water hyacinth	<i>Eichhornia crassipes</i>
Water lettuce	<i>Pistia stratiotes</i>
Water spangles	<i>Salvinia minima</i>
West Indian lantana	<i>Lantana camara</i>
West Indian marsh grass	<i>Hymenachne amplexicaulis</i>
Wild balsamapple	<i>Momordica charantia</i>
Wild bushbean	<i>Macroptilium lathyroides</i>
Wright's nut-rush	<i>Scleria lacustris</i>



**Figure 6: FNAI Natural Communities found at the SWWMA**

**Table 6: FNAI Mapped Natural Community Types on the SWWMA**

<b>Community Type</b>	<b>GIS Acres</b>	<b>Percentage</b>
Basin marsh	253.58	3.39%
Depression marsh	495.36	6.62%
Dome swamp	3.08	0.04%
Mesic flatwoods	992.31	13.25%
Mesic hammock	15.69	0.21%
Pasture - improved	4,287.63	57.27%
Pasture - semi-improved	838.83	11.20%
Ruderal	147.11	1.96%
Wet flatwoods	434.62	5.81%
Wet prairie	18.34	0.24%

## 2.2.1 FNAI Natural Community Descriptions for SWWMA

### 2.2.1.1 Basin Marsh (~ 254 acres)

Basin marsh is a wetland herbaceous community occupying large, irregularly shaped depressions within mesic flatwoods, wet flatwoods or hydric hammocks. 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.

At SWWMA, basin marshes are typically over ten acres and can reach 150 acres. The hydroperiod of these basin marshes has been shortened so that only the deepest areas retain marsh characteristics, with surrounding shallow marsh encroached by pasture grasses or woody vegetation. Basin marshes generally grade into wet prairies or wet flatwoods, but may have sharp transitions to mesic flatwoods. Basin marshes contain certain assemblages of species, or zones, based on the depth of the marsh or the amount of peat buildup. The deepest zones are usually found in the center, but may be found in pockets throughout the marsh. Basin marshes at SWWMA are generally shallow with few deep zones. These areas generally supported sawgrass. Surrounding the deepest zone, and occurring in the deepest sand bottom areas, is pickerelweed, bulltongue arrowhead, spikerushes, and maidencane. The next shallower zone is typically the largest zone and consists of water toothleaf, peelbark, St. John's wort, Tracy's beaksedge, broomsedge bluestem, slimspike threeawn, bluejoint panicum, rose-of-Plymouth, and yellow-eyed grasses. The shallowest zone, occurring near the edges of marshes, consists of pink sundew, flattened pipewort, tenangle pipewort, combleaf mermaidweed, and Florida yellow bladderwort. The upper edges of the basin marshes are encroached by pasture grasses

including centipedegrass and bahiagrass. Disturbances to basin marshes on SWWMA include ditches and cattle grazing. Cattle affect the basin marshes by grazing on the native vegetation, disturbing the soil, as well as spreading seeds of weedy grasses through their dung.

Acreage of basin marsh on the historic map of SWWMA is considerably greater than that of the present. Substantial portions have been drained and converted to improved or semi-improved pasture.

#### **2.2.1.2 Depression Marsh (~ 495 acres)**

Depression marsh is a wetland herbaceous community similar to basin marsh, but occupying smaller, typically circular or elliptic depressions in mesic flatwoods, wet flatwoods, and hydric hammocks 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 abundant on SWWMA, and are found in association with wet prairie, wet flatwoods, and mesic flatwoods. Depression marshes may have a deeper center of pickerelweed, bull tongue arrowhead, and maidencane, rarely Carolina willow, fireflag and southern cattail. Species surrounding these deeper areas include peelbark, St. John's wort, Peruvian primrosewillow, wax myrtle, water toothleaf, broomsedge bluestem, common water hyacinth, spikerushes, pipeworts, rosy camphorweed, combleaf mermaidweed, longleaf threeawn, big carpetgrass, lemon bacopa, spadeleaf, pink sundew, southern umbrellasedge, branched hedgehyssop, pennyworts, Carolina redroot, bluejoint panicum, bahiagrass, smartweeds, narrowfruit horned beaksedge, Tracy's beaksedge, rose-of-Plymouth, sand cordgrass, zigzag bladderwort, and yellow-eyed grasses. Disturbances to depression marshes on SWWMA include invasion by exotic species including melaleuca, common water hyacinth, and water lettuce, ditches, and prior cattle grazing.

#### **2.2.1.3 Dome Swamp (~ 3 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. Dome swamps 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 soils, 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.

On SWWMA, the only occurrence of a dome swamp is near the northern boundary and has a closed canopy of pond cypress. Scattered wax myrtle dominates the shrub layer. Brazilian pepper, an EPPC Category I invasive exotic, is also abundant. Herbs make up the bulk of the understory and are dominated by weedy species such as big carpetgrass, and spadeleaf. Vines are absent. Epiphytes are common and include ballmoss and Spanish moss. Disturbance to the dome swamp on SWWMA is moderate and includes invasion by weedy and exotic species, mainly Brazilian pepper. Although a few pond cypresses are visible in the northwestern marshes on the historical aerial photography, there is significant presence of dome swamps on SWWMA in the historical imagery.

#### **2.2.1.4 Mesic Flatwoods (~ 992 acres)**

Mesic flatwoods, once the most widespread natural community in Florida, are open pinelands covering the flat sandy terraces left behind by former high sea levels. Mesic flatwoods are characterized by an open canopy of tall pines with a dense, low ground layer of varying mixtures of shrubs, grasses, and forbs. These open pinelands occur on low sandy soils. In areas that have been well burned, shrubs are low in stature, and grasses predominate; in less frequently burned areas, shrubs dominate. Longleaf pine is the principal canopy tree in northern and Central Florida, transitioning to predominately slash pine in south Florida. 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 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.

At SWWMA, mesic flatwoods occurs intermingled with wet flatwoods and occasionally wet prairie. Mesic flatwoods are distinguished from wet flatwoods by their abundance of shrubs, particularly saw palmetto, and herbaceous species composition, which is less hydrophytic. The mesic flatwoods at SWWMA have an open canopy of south Florida slash pine. In areas bordering wetlands the canopy may become denser. When a sub-canopy is present, species include laurel oak, live oak, and cabbage palm. Shrubs and herbs are typically co-dominant in the understory except in areas bordering wetlands and islands where shrubs become dominant. Shrub species are usually three to six feet tall but can exceed nine to fifteen feet in some places that have not burned in many years. Shrub species include saw palmetto, wax myrtle, gallberry, fetterbush, tarflower, coastalplain staggerbush, dwarf live oak, netted pawpaw, fourpetal St. John's wort, wild pennyroyal, and shiny blueberry. Herb species include wiregrass, bottlebrush threeawn, lopsided indiagrass, needleleaf witchgrass, broomsedge bluestem, big carpetgrass, purple thistle,

elephantsfoot, slender flattop goldenrod, bahiagrass, queensdelight, narrowleaf silkgrass, gayfeathers, chaffheads, milkworts, and yellow-eyed grasses. Epiphytes and vines are rare. Epiphytes include ball moss and golden polypody. Vines include ear leaf greenbrier, saw greenbrier and muscadine. Disturbance to mesic flatwoods on SWWMA includes invasion by exotics, including caesarweed and bahiagrass, hog digging and cattle grazing. Cattle affect the mesic flatwoods by grazing on the native vegetation, disturbing the soil, as well as spreading seeds of big carpetgrass and bahiagrass through dung. At least two active gopher tortoise burrows were present in mesic flatwoods along the western boundary of SWWMA.

Most of the historic mesic flatwoods on SWWMA have been converted to pasture or other agricultural uses including sod farming. The signature on the historic photos is slightly lighter than the wet prairie/wet flatwoods. Shrubs are more evident as well, in the mesic flatwoods.

#### **2.2.1.5 Mesic Hammock (~ 16 acres)**

Mesic hammock is a well-developed evergreen hardwood and/or palm forest, typically with a closed canopy of live oak. Dominated by evergreen oak forests, mesic hammocks occur in naturally fire-protected areas. 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.

On SWWMA, Mesic hammocks are small and few. They are found in association with basin marshes, depression marshes where infrequent fire has allowed their development. The canopy is dense and usually dominated by live oak and cabbage palm. Shrubs and herbs are a sparse component of the understory. Shrubs include saw palmetto, wax myrtle, myrsine, and common persimmon. Herbs include witchgrasses, big carpetgrass, tall elephantsfoot, yankeeweed, bahiagrass, frog-fruit, and mock bishopsweed. Epiphytes are common and include cardinal airplant, ballmoss, southern needleleaf, and Spanish moss. Vines occur infrequently and include muscadine, poison ivy, Virginia creeper, and pepper vine. Disturbances to mesic hammocks on SWWMA include invasion by exotics and hog digging. The invasive exotics Brazilian pepper and caesarweed can frequently be found in

the mesic hammocks. Although mesic hammocks may have been present historically as small patches associated with the wetlands, there is no clear evidence of mesic hammocks on the historic aerial photography for SWWMA.

#### **2.2.1.6 Pasture – Improved (~ 4,288 acres)**

Improved pasture is an unnatural community that has been prepared for cattle grazing, and no longer resembles the former natural community. Dominated by planted non-native or domesticated native forage species, improved pasture contains evidence of current or recent pasture activity or cultural treatments. Improved pastures have been cleared of their native vegetation. Most improved pastures in Florida are planted with bahiagrass and to a lesser extent with Bermudagrass or pangolagrass. Weedy native species are often common in improved pastures in Florida and include dogfennel, many species of flatsedge, carpetgrasses, crabgrasses, and rustweed among many others.



Pasture at Spirit-of-the-Wild WMA

On SWWMA, the majority of improved pasture is historically mesic flatwoods and native species are scattered throughout. Shrubs include netted pawpaw, gallberry, coastalplain staggerbush, wax myrtle, cabbage palm, coastalplain willow, and saw palmetto. Weedy herbs make up the predominant component of improved pasture and include broomsedge bluestem, American bluehearts, spadeleaf, common water hyacinth, Gulf Coast spikerush, dogfennel, slender flattop goldenrod, manyflower marshpennywort, Canadian toadflax, savannah false pimpernel, maidencane, dotted smartweed, pickerelweed, southern dewberry, bulltongue arrowhead and grass-leaved ladies' tresses. No epiphytes are found. Vines include earleaf greenbrier and muscadine. The invasive exotic water hyacinth is found in several of the improved pastures that historically were depression marshes.

#### **2.2.1.7 Pasture – Semi Improved (~ 839 acres)**

Semi-improved pastures have been cleared of a significant percentage of their native vegetation and planted in non-native or domesticated native forage species, but still retain scattered patches of native vegetation with natural species composition and structure (most often small areas of mesic flatwoods) among the pastured areas. The planted areas are usually dominated by bahiagrass and can resemble improved pastures. Seeding of bahiagrass can also occur within areas of native groundcover.

On SWWMA, most of the semi-improved pasture occurs in areas that were historically mesic flatwoods, and share some attributes with mesic flatwoods. Semi-improved pasture also occurs on former wet prairie/flatwoods and drained marshes. Canopy and subcanopy, if present, consist of south Florida slash pine. In former mesic flatwoods, the shrubs are dense to sparse and consist of red maple, netted pawpaw, silverling, flowering dogwood, *Hypericum* sp., fourpetal St. John's wort, gallberry, wax myrtle, south Florida slash pine, laurel oak, dwarf live oak, myrtle oak, live oak, cabbage palm, coastalplain willow, Brazilian pepper, saw palmetto and shiny blueberry. Herbs make up the bulk of the understory and are dominated by weedy species such as broomsedge bluestem, purple thistle, dogfennel, slender flattop goldenrod, spadeleaf, bahiagrass and the exotic smutgrass. Other species include bushy bluestem, swamp fern, sawgrass, cypress witchgrass, tall elephantsfoot, southern fleabane, early whitetop fleabane, southern umbrellasedge, manyflower marshpennywort, candyroot, glaucous knotweed, pickerelweed, blackroot, spreading beaksedge, sand blackberry, southern dewberry, nutrush, American black nightshade, sand cordgrass, bantam buttons, long-leaf violet, and yelloweyed grass. Wiregrass is generally absent. Epiphytes include ballmoss, Spanish moss, and cardinal airplant. Vines include pepper vine, Eastern milkpea, glades morning glory, and greenbrier. Exotics found in semi-improved pasture include Brazilian pepper, tropical soda apple, and caesarweed.

#### **2.2.1.8 Ruderal (~ 147 acres)**

Ruderal communities are areas where the natural community has been overwhelmingly altered as a result of human activity. Several ruderal types occur on SWWMA, including abandoned fields, agricultural fields, exotic monocultures, borrow pits, canals, clearings, ditches, spoil areas, roads, and utility corridors. The largest ruderal communities found on SWWMA include ditches and canals as well as impoundments. Most ruderal communities are dominated by weedy herbaceous species such as broomsedge bluestem, yankeeweed, slender flattop goldenrod, and the exotics, Bermudagrass, Peruvian primrose willow, smutgrass, and bahiagrass. Shrubs often present in ruderal communities include wax myrtle, cabbage palm, saw palmetto, and groundsel tree. Canals, ditches, and borrow pits are often dominated by pickerelweed, and invasive exotics, common-water hyacinth and water lettuce, or are simply open water. Some impoundments and abandoned fields were historically wet flatwoods or depression marshes. Remnant species found include southern umbrellasedge, maidencane, swamp smartweed, and narrowfruit horned beaksedge. Invasive exotics often found in ruderal communities include Brazilian pepper, water lettuce, and common water hyacinth.

#### **2.2.1.9 Wet Flatwoods (~ 435 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.

On SWWMA, wet flatwoods are often intermingled with mesic flatwoods, wet prairie, basin marsh, and depression marsh. Wet flatwoods are distinguished from mesic flatwoods by their abundance of hydrophytic herb species, and scarcity or absence of shrubs, particularly saw palmetto. Wet flatwoods differ from wet prairie based on canopy cover. The canopy and subcanopy is open and consists of south Florida slash pine. Shrubs are typically sparse and generally occur in areas where mesic flatwoods are intermingled. However, fire suppression also leads to encroachment by shrubs in wet flatwoods. Shrubs include dahoon, gallberry, wax myrtle, cabbage palm, saw palmetto, Brazilian pepper, and shiny blueberry. A few areas, which are delineated as wet flatwoods support an unusually high amount of south Florida slash pine. Some of these areas may have been depression marshes or wet prairies that were drained and then invaded by pines. Herbs, specifically grasses, are typically the dominant component of the understory with the most common being wiregrass. Other herbaceous species include blue maidencane, broomsedge bluestem, pineland rayless goldenrod, coastalplain chaffhead, spadeleaf, pineland daisy, purple thistle, Florida tickseed, tickseed, needleleaf witchgrass, cypress witchgrass, pink sundew, dwarf sundew, tall elephantsfoot, lovegrass, southern fleabane, flattened pipewort, button rattlesnakemaster, semaphore thoroughwort, slender flattop goldenrod, southern umbrellasedge, southeastern sneezeweed, bogbutton, stiff yellow flax, axilflower, hairawn muhly, beaked panic grass, golden aster, rosy camphorweed, candyroot, tall jointweed, pale meadowbeauty, beaksedge, whitetop sedge, goldenrod, grass-leaved ladiestresses, sweet shaggytuft, yellow hatpins, long-leaf violet, and yelloweyed grass. Epiphytes were not observed in wet flatwoods on SWWMA. Vines are infrequent and include Glades morning glory, greenbrier, and muscadine. Species composition of some of the small wet flatwoods ecotones found along depression or basin marsh edges indicate limestone is near the surface. These areas contain an abundance of Florida yellow flax. Invasive exotic species found in wet flatwoods include Brazilian pepper and caesarweed. Disturbances in wet flatwoods on SWWMA include hydrologic changes due to ditching and invasion by pasture grasses. Wet flatwoods may have replaced wet prairie as a result of decreased hydroperiod and infrequent fire. Although trees undoubtedly were removed from some areas of SWWMA prior to the 1957 photographs used to develop the historic map, extensive areas of wet prairie were evident, including the areas documented as wet flatwoods in the current natural community map.

#### **2.2.1.10 Wet Prairie (~ 18 acres)**

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 SWWMA, wet prairies can be found intermingled with mesic flatwoods, wet flatwoods, basin marsh, and depression marsh. Wet prairies are distinguished from dry prairie by their abundance of hydrophytic herbs, and scarcity or absence of shrubs, particularly saw palmetto. Wet prairies differ from wet flatwoods based on canopy cover, and from shallow depression marsh based on presence of wiregrass. Small wet prairie ecotones can be found along the edges of most depression and basin marshes, but many of these were not delineated due to their small size. A canopy and subcanopy is absent, though a few scattered south Florida slash pines may be present. Shrubs are sparse and include fourpetal St. John's wort, gallberry, wax myrtle, dwarf live oak, and cabbage palm. Saw palmetto is typically infrequent. In wet prairies that intermingle with mesic flatwoods, shrubs such as saw palmetto and wax myrtle can become more abundant. Herbs are the dominant component of the understory. Although wiregrass is generally present in the wet prairie at SWWMA, it is not always dominant. Other herbs found in wet prairies include blue maidencane, broomsedge bluestem, spadeleaf, pineland daisy, purple thistle, Florida tickseed, needleleaf witchgrass, cypress witchgrass, southern fleabane, flattened pipewort, slender flattop goldenrod, pineland heliotrope, St. John's wort, bog-button, moistbank pimpernel, hairawn muhly, Baldwin's milkwort, low pinebarren milkwort, showy milkwort, blackroot, spreading beaksedge, inundated beaksedge, bantam buttons, and yelloweyed grass. Species composition of some of the small wet prairies found along depression or basin marsh edges indicate limestone is near the surface. These areas contain an abundance of Florida yellow flax. Epiphytes and vines are not found in wet prairie on SWWMA. Disturbances to wet prairies on SWWMA include hydrologic changes due to ditching and clearing of adjacent pasture lands.

#### **2.2.2 Forest Resources**

The SWWMA is characterized by scattered islands of trees separated by extensive, open fields. As a result, there are only limited forest resources present on the SWWMA. The FFS conducted a timber assessment of the SWWMA in 2005 to evaluate the area's timber resources and to provide recommendations regarding the management of the area's timber resources and the feasibility of utilizing silvicultural techniques as a management activity on the area (Appendix 13.4). The FWC has requested an update of that assessment, which will be incorporated into the Appendix of this Management Plan once it is completed by the FFS.

The only species with commercial potential present on the area is south Florida slash pine, though the 2005 timber assessment notes that only one mature stand of south Florida slash pine was observed on the area.

### 2.3 Fish and Wildlife Resources

The SWWMA supports a diverse list of wildlife species. Active wildlife management practices and a diversity of natural communities make the SWWMA an excellent place to view a wide array of plant and animal species. These species include mammals (Table 7), birds (Table 8), reptiles and amphibians (Table 9), fish (Table 10), and butterflies (Table 11). Additionally, six exotic animal species have been observed at SWWMA (Table 12).

**Table 7: Mammal Species Observed on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Bobcat	<i>Lynx rufus</i>
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>
Cotton mouse	<i>Peromyscus gossypinus</i>
Eastern cottontail	<i>Sylvilagus floridanus</i>
Coyote	<i>Canis latrans</i>
Eastern gray squirrel	<i>Sciurus carolinensis</i>
Eastern pipistrelle	<i>Perimyotis subflavus</i>
Eastern spotted skunk	<i>Spilogale putorius</i>
Evening bat	<i>Nycticeius humeralis</i>
Florida black bear	<i>Ursus americanus floridanus</i>
Florida panther	<i>Puma concolor coryi</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
Hispid cotton rat	<i>Sigmodon hispidus</i>
House mouse	<i>Mus musculus</i>
Marsh rabbit	<i>Sylvilagus palustris</i>
Nine-banded armadillo	<i>Dasypus novemcinctus</i>
Northern river otter	<i>Lontra canadensis</i>
Northern yellow bat	<i>Lasiurus intermedius</i>
Raccoon	<i>Procyon lotor</i>
Round-tailed muskrat	<i>Neofiber alleni</i>
Seminole bat	<i>Lasiurus seminolus</i>
Striped skunk	<i>Mephitis mephitis</i>
Virginia opossum	<i>Didelphis virginiana</i>
White-tailed deer	<i>Odocoileus virginianus</i>

**Table 8: Bird Species Observed on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
American bittern	<i>Botaurus lentiginosus</i>
American coot	<i>Fulica americana</i>
American crow	<i>Corvus brachyrhynchos</i>
American goldfinch	<i>Spinus tristis</i>
American kestrel	<i>Falco sparverius sparverius</i>
American redstart	<i>Setophaga ruticilla</i>
American robin	<i>Turdus migratorius</i>
American white pelican	<i>Pelecanus erythrorhynchos</i>
Anhinga	<i>Anhinga anhinga</i>
Bachman's sparrow	<i>Peucaea aestivalis</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Barn owl	<i>Tyto alba</i>
Barn swallow	<i>Hirundo rustica</i>
Barred owl	<i>Strix varia</i>
Belted kingfisher	<i>Megaceryle alcyon</i>
Black and white warbler	<i>Mniotilta varia</i>
Black vulture	<i>Coragyps atratus</i>
Blackbellied whistling-duck	<i>Dendrocygna autumnalis</i>
Black-crowned night-heron	<i>Nycticorax nycticorax</i>
Black-necked stilt	<i>Himantopus mexicanus</i>
Black-throated blue warbler	<i>Setophaga caerulescens</i>
Black-throated green warbler	<i>Setophaga virens</i>
Blue jay	<i>Cyanocitta cristata</i>
Blue-grey gnatcatcher	<i>Polioptila caerulea</i>
Blue-headed vireo	<i>Vireo solitarius</i>
Boat-tailed grackle	<i>Quiscalus major</i>
Bobolink	<i>Dolichonyx oryzivorus</i>
Brown thrasher	<i>Toxostoma rufum</i>
Brown-headed cowbird	<i>Molothrus ater</i>
Burrowing owl	<i>Athene cunicularia</i>
Carolina wren	<i>Thryothorus ludovicianus</i>
Cattle egret	<i>Bubulcus ibis</i>
Cedar waxwing	<i>Bombycilla cedrorum</i>
Chestnut-sided warbler	<i>Setophaga pensylvanica</i>
Chuck-will'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>

**Table 8: Bird Species Observed on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Coopers hawk	<i>Accipiter cooperii</i>
Crested caracara	<i>Caracara cheriway</i>
Double-crested cormorant	<i>Phalacrocorax auritus</i>
Downy woodpecker	<i>Picoides pubescens</i>
Eastern bluebird	<i>Sialia sialis</i>
Eastern kingbird	<i>Tyrannus tyrannus</i>
Eastern meadowlark	<i>Sturnella magna</i>
Eastern phoebe	<i>Sayornis phoebe</i>
Eastern towhee	<i>Pipilo erythrophthalmus</i>
European starling	<i>Sturnus vulgaris</i>
Everglades Snail kite	<i>Rostrhamus sociabilis plumbeus</i>
Florida sandhill crane	<i>Grus canadensis pratensis</i>
Florida wild turkey	<i>Meleagris gallopavo osceola</i>
Glossy ibis	<i>Plegadis falcinellus</i>
Grasshopper sparrow	<i>Ammodramus savannarum</i>
Gray catbird	<i>Dumetella carolinensis</i>
Great blue heron	<i>Ardea herodias</i>
Great crested flycatcher	<i>Myiarchus tyrannulus</i>
Great egret	<i>Ardea alba</i>
Great horned owl	<i>Bubo virginianus</i>
Greater yellowlegs	<i>Tringa melanoleuca</i>
Green heron	<i>Butorides virescens</i>
Hooded merganser	<i>Lophodytes cucullatus</i>
House wren	<i>Troglodytes aedon</i>
Killdeer	<i>Charadrius vociferus</i>
King rail	<i>Rallus elegans</i>
Least sandpiper	<i>Calidris bairdii</i>
Lesser yellowlegs	<i>Tringa flavipes</i>
Limpkin	<i>Aramus guarauna</i>
Little blue heron	<i>Egretta caerulea</i>
Loggerhead shrike	<i>Lanius ludovicianus</i>
Mottled duck	<i>Anas fulvigula</i>
Mourning dove	<i>Zenaida macroura</i>
Northern flicker	<i>Colaptes auratus</i>
Northern bobwhite	<i>Colinus virginianus</i>
Northern cardinal	<i>Cardinalis cardinalis</i>
Northern harrier	<i>Circus cyaneus</i>
Northern mockingbird	<i>Mimus polyglottos</i>
Northern parula	<i>Parula americana</i>
Northern waterthrush	<i>Parkesia noveboracensis noveboracensis</i>
Orange-crowned warbler	<i>Leiothlypis celata</i>

**Table 8: Bird Species Observed on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Osprey	<i>Pandion haliaetus</i>
Ovenbird	<i>Seiurus aurocapilla</i>
Painted bunting	<i>Passerina ciris</i>
Palm warbler	<i>Dendroica palmarum</i>
Peregrine falcon	<i>Falco peregrinus</i>
Pied-billed grebe	<i>Podilymbus podiceps</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Pine warbler	<i>Setophaga pinus</i>
Prairie warbler	<i>Dendroica discolor</i>
Purple martin	<i>Progne subis</i>
Red-bellied woodpecker	<i>Melanerpes carolinus</i>
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>
Red-shouldered hawk	<i>Buteo lineatus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Roseate spoonbill	<i>Platalea ajaja</i>
Ruby-crowned kinglet	<i>Regulus calendula</i>
Ruby-throated hummingbird	<i>Archilochus colubris</i>
Savannah sparrow	<i>Passerculus sandwichensis</i>
Sedge wren	<i>Cistothorus platensis</i>
Sharp-shinned hawk	<i>Accipiter striatus</i>
Short-tailed hawk	<i>Buteo brachyurus</i>
Snow goose	<i>Chen caerulescens</i>
Snowy egret	<i>Egretta thula</i>
Song sparrow	<i>Melospiza melodia</i>
Sora rail	<i>Porzana carolina</i>
Spotted sandpiper	<i>Actitis macularius</i>
Swallow-tailed kite	<i>Elanoides forficatus</i>
Tree swallow	<i>Tachycineta bicolor</i>
Tricolored heron	<i>Egretta tricolor</i>
Tufted titmouse	<i>Baeolophus bicolor</i>
Turkey vulture	<i>Cathartes aura</i>
Virginia rail	<i>Rallus limicola</i>
Whip-poor-will	<i>Antrostomus vociferus</i>
White ibis	<i>Eudocimus albus</i>
White-eyed vireo	<i>Vireo griseus</i>
White-winged dove	<i>Zenaida asiatica</i>
Wood duck	<i>Aix sponsa</i>
Wood stork	<i>Mycteria americana</i>
Yellow warbler	<i>Setophaga petechia</i>
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>

**Table 8: Bird Species Observed on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Yellow-crowned night-heron	<i>Nyctanassa violacea</i>
Yellow-rumped warbler	<i>Setophaga coronata</i>
Yellow-throated warbler	<i>Setophaga dominica</i>

**Table 9: Reptile and Amphibian Species Observed on SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
American alligator	<i>Alligator mississippiensis</i>
Barking tree frog	<i>Hyla gratiosa</i>
Cricket frog	<i>Acris gryllus</i>
Eastern diamondback rattlesnake	<i>Crotalus adamanteus</i>
Eastern rat snake	<i>Pantherophis alleghaniensis</i>
Eastern ribbon snake	<i>Thamnophis sauritus</i>
Eastern spadefoot toad	<i>Scaphiopus holbrooki</i>
Florida banded water snake	<i>Nerodia fasciata pictiventris</i>
Florida kingsnake	<i>Lampropeltis getula floridana</i>
Florida red-bellied turtle	<i>Pseudemys nelsoni</i>
Garter snake	<i>Thamnophis sirtalis</i>
Gopher tortoise	<i>Gopherus polyphemus</i>
Green anole	<i>Anolis carolinensis</i>
Green treefrog	<i>Hyla cinerea</i>
Little grass frog	<i>Pseudacris ocularis</i>
Narrowmouth toad	<i>Gastrophryne carolinensis</i>
Oak toad	<i>Anaxyrus quercicus</i>
Pig frog	<i>Lithobates grylio</i>
Pinewoods tree frog	<i>Hyla femoralis</i>
Pygmy rattlesnake	<i>Sistrurus miliarius barbouri</i>
Southern black Racer	<i>Coluber constrictor priapus</i>
Southern leopard frog	<i>Lithobates sphenoccephalus</i>
Southern Florida swamp snake	<i>Seminatrix pygaea cyclas</i>
Southern toad	<i>Anaxyrus terrestris</i>
Squirrel tree frog	<i>Hyla squirella</i>
Striped crayfish snake	<i>Regina alleni</i>
Water moccasin	<i>Agkistrodon piscivorus</i>

**Table 10: Fish Species Observed at SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Bluegill sunfish	<i>Lepomis macrochirus</i>
Florida flag fish	<i>Jordanella floridae</i>
Sailfin molly	<i>Poecilia latipinna</i>

**Table 11: Butterflies Observed at SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Banded sphinx moth	<i>Eumorphia fasciatus</i>
Brazilian skipper	<i>Calpododes ethlius</i>
Carolina satyr	<i>Hermeuptychia sosybius</i>
Cloudless sulfur	<i>Phoebis sennae</i>
Common buckeye	<i>Junonia coenia</i>
Fiery skipper	<i>Hylephila phyleus</i>
Georgia satyr	<i>Neonympha areolatus</i>
Giant swallowtail	<i>Papilio cresphontes</i>
Gulf fritillary	<i>Agraulis vanillae</i>
Little metalmark	<i>Calephelis virginiensis</i>
Little yellow	<i>Pyrisitia lisa</i>
Palamedes swallowtail	<i>Papilio palamedes</i>
Pearl crescent	<i>Phyciodes tharos</i>
Pearly wood-nymph (moth)	<i>Eudryas unio</i>
Phaon crescent	<i>Phyciodes phaon</i>
Queen	<i>Danaus gilippus</i>
Red admiral	<i>Vanessa atalanta</i>
Southern skipperling	<i>Copaeodes minima</i>
Spicebush swallowtail	<i>Papilio troilus</i>
Tropical checkered-skipper	<i>Pyrgus oileus</i>
Viceroy	<i>Limenitis archippus</i>
Whirlabout skipper	<i>Polites vibex</i>
White peacock	<i>Anartia jatrophae</i>
Zebra heliconian	<i>Heliconius charithonia</i>
Zebra swallowtail	<i>Eurytides marcellus</i>

**Table 12: Exotic Animal Species Found at SWWMA**

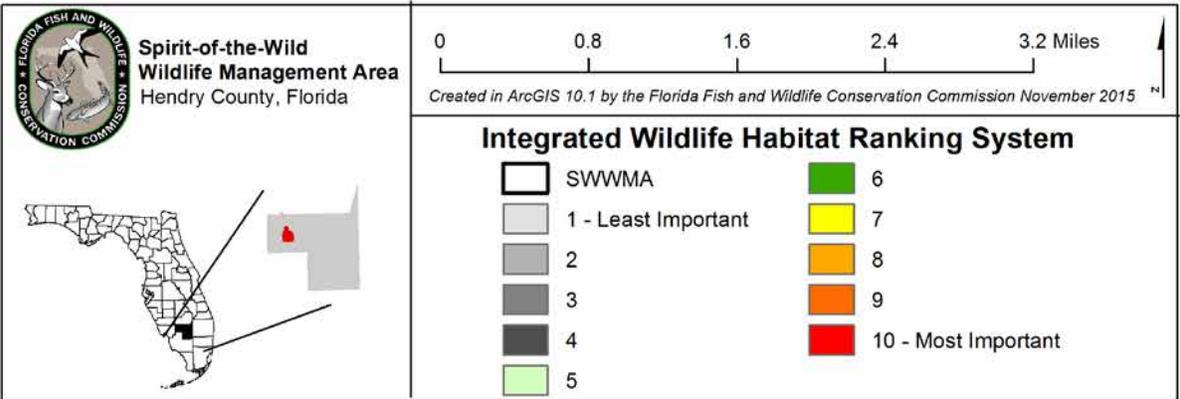
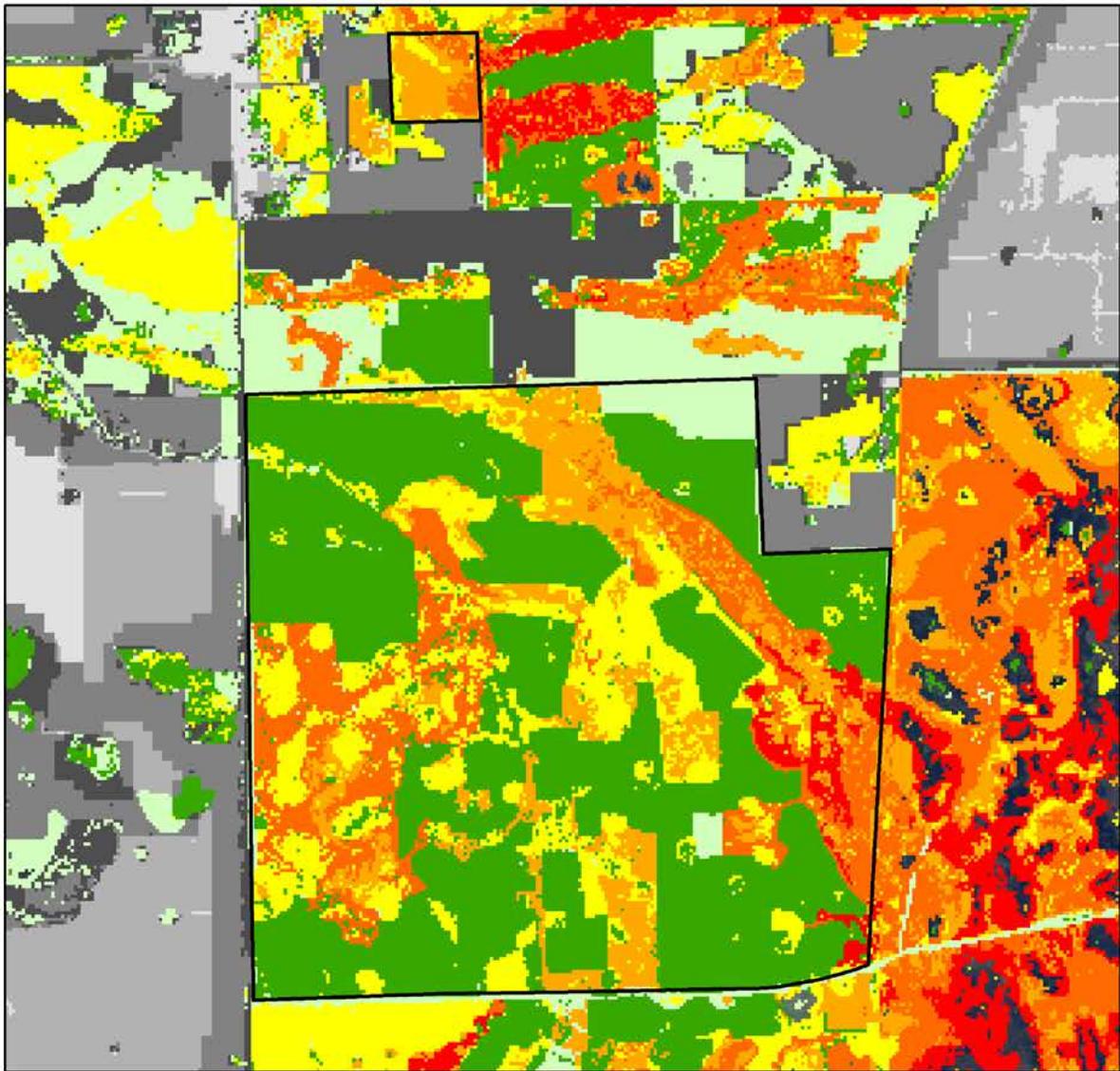
<b>Common Name</b>	<b>Scientific Name</b>
<b>Mammals</b>	
Feral hog	<i>Sus scrofa</i>
<b>Birds</b>	
European starling	<i>Sturnus vulgaris</i>
<b>Amphibians &amp; Reptiles</b>	
Brown anole	<i>Anolis sagrei</i>
Burmese python	<i>Python molurus bivittatus</i>
Greenhouse frog	<i>Eleutherodactylus planirostris</i>
Veiled chameleon	<i>Chaemeleo calyptratus</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 SWWMA has a high mean wildlife value of 7.3 (Figures 7).

### **2.3.2 Imperiled Species**

Twelve imperiled animal species have been documented at the SWWMA (Table 13). All abbreviations and status determinations were derived from Florida's Endangered and Threatened Species List published by FWC in May 2011. The FWC maintains the state list of animals designated as Federally-designated endangered or threatened, State-designated threatened, or State-designated species of special concern, in accordance with Rules 68A-27.003, and 68A-27.005, respectively, Florida Administrative Code (F.A.C.), <https://www.flrules.org/Default.asp>.



**Figure 7: Integrated Wildlife Habitat Ranking System**

**Table 13: Rare and Imperiled Wildlife Species Occurring On the SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>	<b>Status</b>
American alligator	<i>Alligator mississippiensis</i>	FT(SA)
Burrowing owl	<i>Athene cunicularia</i>	SSC
Crested caracara	<i>Caracara cheriway</i>	FT
Everglade snail kite	<i>Rostrhamus sociabilis plumbeus</i>	FE
Florida panther	<i>Puma concolor coryi</i>	FE
Florida sandhill crane	<i>Grus canadensis pratensis</i>	ST
Little blue heron	<i>Egretta caerulea</i>	SSC
Roseate spoonbill	<i>Platalea ajaja</i>	SSC
Snowy egret	<i>Egretta thula</i>	SSC
Tricolored heron	<i>Egretta tricolor</i>	SSC
White ibis	<i>Eudocimus albus</i>	SSC
Wood stork	<i>Mycteria americana</i>	FT

<b>Acronym</b>	<b>Status</b>
FE	Federal Endangered
FT	Federal Threatened (due to Similarity of Appearance)
SSC	Species of Special Concern
ST	State Threatened

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.”

On November 8, 2010, new threatened species rules approved by the FWC were implemented. All federally listed species that occur in Florida will now be included on Florida’s list as federally-designated Endangered or federally-designated Threatened species. In addition, the state has implemented a listing process to identify species that are not federally listed, but that may be at risk of extinction. These species will be called state-designated Threatened. All previous state-designated imperiled species were grandfathered on the list and are currently undergoing status reviews. The FWC will continue to maintain a separate Species of Special Concern category until all the former imperiled species have been reviewed and those species are either determined to be state-designated Threatened or removed from the list.

### **2.3.3 FWC Wildlife Observations and FNAI Element Occurrences**

FNAI assigns a rank to each “element” occurrence, which is an exemplary or rare component of the natural environment. As defined by FNAI, an “element” is any exemplary or rare component of the natural environment such as a species, natural community, bird

rookery, spring, sinkhole, cave, or other ecological feature. An element occurrence 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. This ranking system was developed by TNC 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 on SWWMA from the most recent GIS databases of the respective agencies are displayed in Figure 8. Appendix 13.5 contains a letter from FNAI authorizing the FWC to utilize their database for the purpose of displaying known plant and animal resources.

## **2.4 Native Landscapes**

As previously discussed, the SWWMA contains a substantial variety of native landscapes including mesic flatwoods, wet flatwoods, depression marsh, and basin marsh. All of the natural plant community types found in this diverse landscape are described in greater detail in section 2.2 of this management plan. The most prominent feature of the area's landscape is the "river of grass" natural community known as 12 mile slough or Canoe Slough that forms the broad band of emergent sedges, grasses, and herbs that runs east through the northern part of the area.

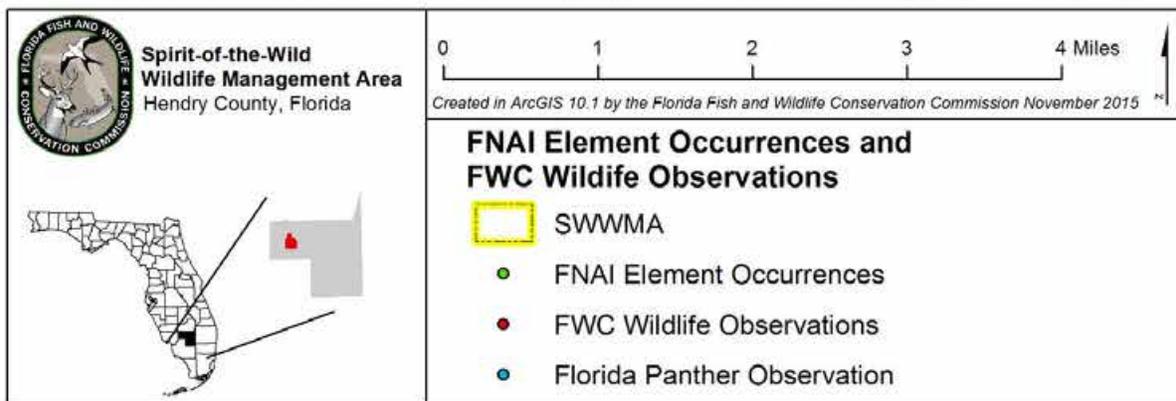
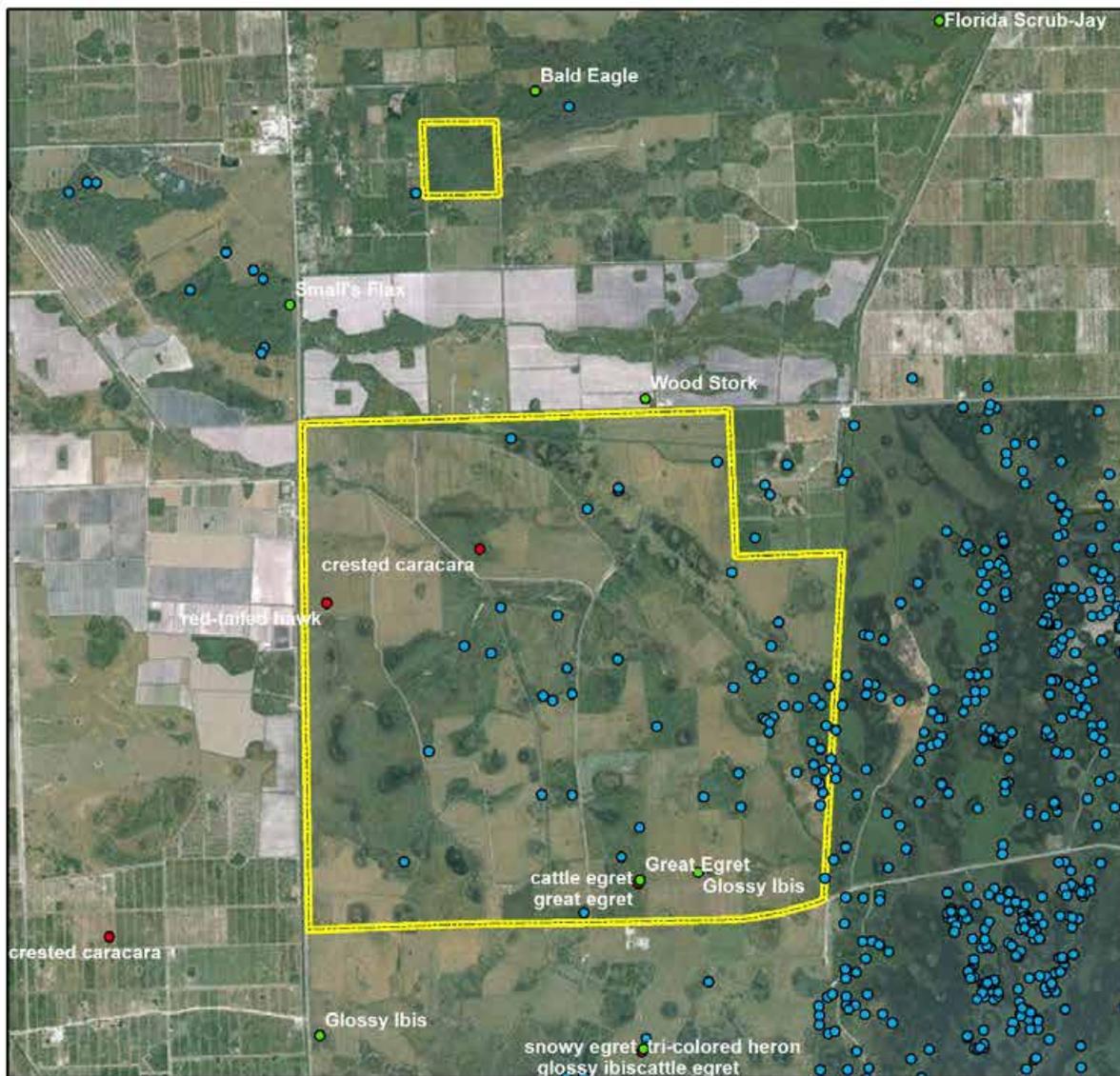
## **2.5 Water Resources**

SWWMA contains a portion of the Twelve Mile Slough, also known as Canoe Slough. Twelve Mile Slough is a slow-flowing, heavily vegetated waterway that stretches across the northeastern portion of SWWMA. Additionally, about four miles of Roberts Canal runs across the area from Keri Road to the northwest corner of SWWMA. The SWWMA is contained within the West Caloosahatchee drainage basin (Figure 9).

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 SWWMA 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. Additionally, it is the policy of DEP to afford the highest protection to Outstanding Florida Waters (OFW) and Outstanding National Resource Waters (Chapter 62-302.700 FAC). At this time, however, no portions of SWWMA are designated as OFW.

## **2.6 Beaches and Dunes**

There are no beach or dune resources on SWWMA.



**Figure 8: SWWMA Element Occurrences and Wildlife Observations**

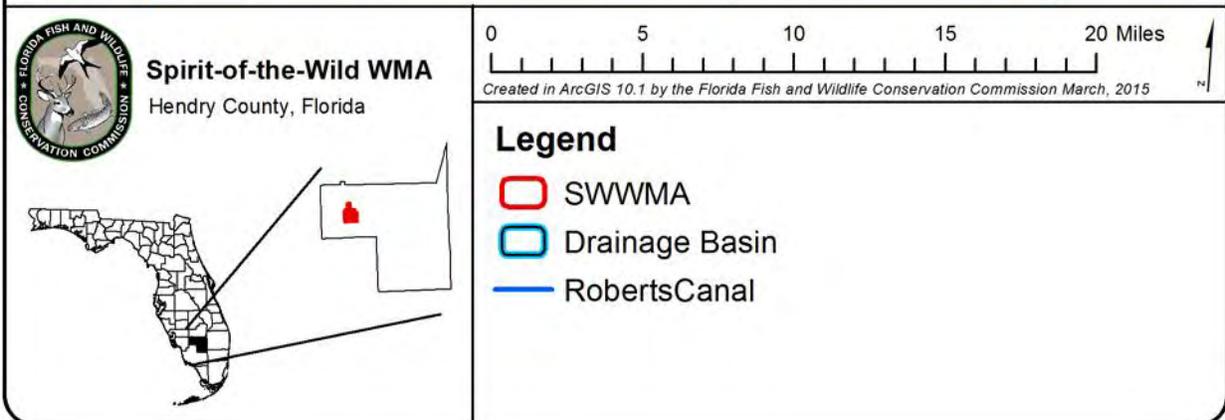
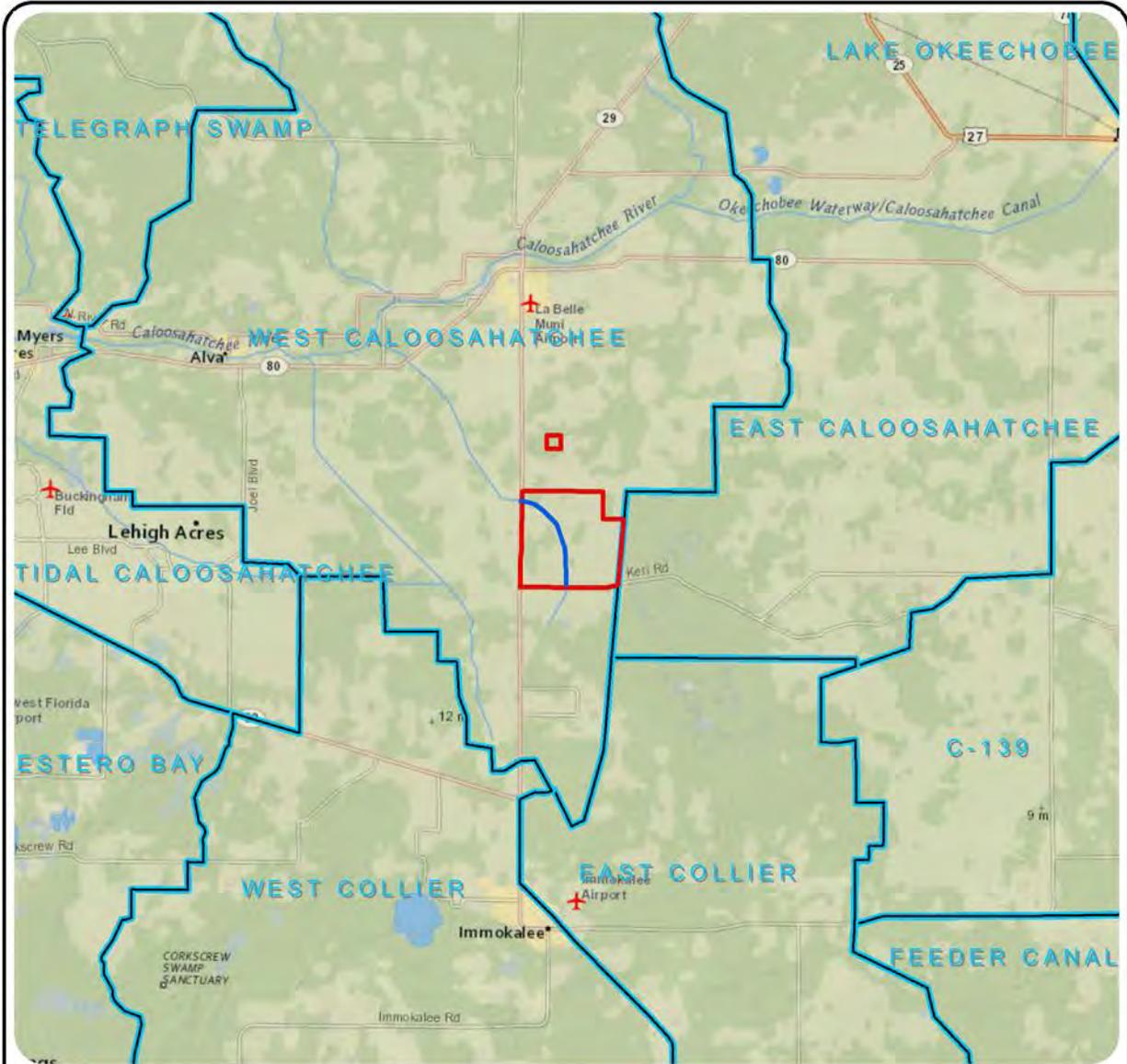


Figure 9: Water Resources of the SWWMA

## **2.7 Mineral Resources**

Hendry County has commercial sand, limestone, and oil production, and these resources are potentially present on the SWWMA. Sand is produced from formations near the surface and is used in a variety of construction and industrial applications. Potential sand producing units include Fort Thompson, Caloosahatchee, and Tamiami Formations. Limestone can also be mined from these formations. General uses for limestone include crushed stone, dimension stone, and soil conditioning. The active oil fields are the Sunoco-Felda field in Hendry and Collier Counties and the Mid-Felda and Townsend Canal fields in Hendry County. These fields produce oil from the Sunniland Formation of Cretaceous age.

In August 2013, TOCALA, LLC, submitted an application to the DEP for a permit to perform 3D geophysical seismic testing on approximately 161 square miles in Collier and Hendry counties. Although, the proposed project area includes 2,325 acres within the southwest portion of the nearby DIRWMA for which the subsurface mineral rights are owned by a private entity it did not include lands within SWWMA. The FWC reviewed this application and submitted comments and recommendations regarding the proposed activities to the DEP in December 2013. As part of this review, the FWC requested that the applicant coordinate with FWC staff when conducting activities within the DIRWMA in order to ensure that the area's resources, as well as public hunting, recreation, and access opportunities, would not be adversely affected. If any similar permits involving testing or extraction of mineral resources on SWWMA are submitted, FWC will review and provide comments and recommendations at that time.

## **2.8 Historical Resources**

There is only one historical feature recorded in the Florida Department of State's Division of Historical Resources (DHR) Master Site File within the boundary of the SWWMA (Roberts Canal, HN00139). State Road 29 (HN00518), which forms the western boundary of the SWWMA, is also considered to be a historical resource by the DHR. Three field surveys have been conducted to document historical resources on areas encompassing all or portions of the SWWMA. The DHR observations and recorded site files are divided into five categories: archaeological sites, resource groups, historic structures, historic bridges, and historic cemeteries. Roberts Canal and State Road 29 are categorized by the DHR as resource groups. The FWC will coordinate with the DHR if any additional sites are discovered on the SWWMA. All Master Site recordings, assessments, and preservation strategies will be coordinated with the DHR.

## **2.9 Scenic Resources**

The SWWMA offers sweeping vistas of the area's unique south Florida landscape, which includes wide open fields and pastures dotted with hammocks and islands of trees. Twelve Mile Slough, one of the most unique features of the SWWMA provides outstanding scenic

vistas and wildlife viewing opportunities. The natural communities found at SWWMA are described in section 2.2 of this management plan. The SWWMA is a part of the Great Florida Birding and Wildlife Trail and wildlife is abundant year-round throughout the area. Additionally, due to its remote location and lack of light pollution, the SWWMA is an excellent location for star gazing and amateur astronomy.

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

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

Thousands of years before Europeans arrived, Native Americans hunted, fished, and gathered wild plants throughout Florida. Evidence of Native American presence in the vicinity of SWWMA dates back to at least 800 A.D. The Calusa Indians were probably some of the first Native American tribes to occupy the Hendry County area, southwest of Lake Okeechobee. From 800 A.D. into the 17th century, these skilled hunters and fishermen inhabited the coastal regions of southwest Florida and traveled up the Caloosahatchee River in dugout canoes to reach interior wetlands associated with Lake Okeechobee and the Kissimmee River. Though some land alteration occurred during this period, 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.

Along with more advanced agricultural practices, the Spanish and other 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 16th through 20th 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 more intensive agriculture such as row cropping, citrus production, and associated development.

During the 1920s, the town of Clewiston blossomed, and sugar cane and citrus became important local industries. Southern Sugar, which became the U.S. Sugar Corporation in 1931, established a sugar mill in Clewiston which spurred more extensive agricultural development in the region. This region south of Lake Okeechobee was often impacted by severe flooding. After at least 2,400 residents around Lake Okeechobee died in floods from major hurricanes in 1926 and 1928, flood control in the area began in earnest. A dike was built around Lake Okeechobee in the years immediately after the major floods and the Caloosahatchee and St. Lucie rivers were dredged and channelized to create the Okeechobee Waterway, which connected the lake to the Atlantic Ocean and Gulf of Mexico.

Lock-and-dam structures controlled water flow. The construction of this man-made waterway and a sprawling network of canals diverted the historic water flow to agricultural and urban uses and away from the surrounding areas and sensitive ecosystems of the Florida Everglades and Florida Bay. As a result, the hydrology of the SWWMA and the surrounding area was significantly altered.

Today, agriculture is the base of Hendry County's economy. Sugar cane and citrus agriculture, followed by cattle and tomato farming, are among the County's most important economic activities. Previous landowners converted much of the historic prairie and flatwoods natural community types on the SWWMA to improved pasture. Prior to state acquisition, uses of the SWWMA included cattle ranching, farming, sod harvesting, and hunting.

### 3.2 Current Use of the Property

Currently, SWWMA 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 SWWMA 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.



White-tailed deer at Spirit-of-the-Wild WMA

Current and anticipated resource uses of the property are diverse. Hunting continues to be a popular recreational activity on SWWMA. The area also offers excellent opportunities for bird watching, especially for crested caracara 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, biking, sightseeing, and horseback riding.

Due to the proximity of population centers in adjacent Lee County, public use can be expected to increase as public awareness of recreational opportunities on the area increases. Annual use of SWWMA is estimated to be 250 user-days for all activities combined. The FWC administers hunts in the fall and spring for various game species

including small game, deer, turkey, and feral hogs, which account for a little more than half of the user-days.

### **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 SWWMA, and contribute to the overall economy for this region of Florida. In Fiscal Year 2014-15, an estimated 13,278 people visited the SWWMA. Primarily, as a result of this visitation and use of the area, FWC economic analysis estimates indicate that the SWWMA generated an estimated annual economic impact of \$2.6 million for the State and the South Florida region. This estimated annual economic impact has aided in the support or creation of an estimated 26 jobs.

These 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 SWWMA will depend upon future uses described in this Management Plan. Additional revenue from environmental lands such as the SWWMA might include sales of various permits and recreational user fees and ecotourism activities, if such projects could be feasibly developed. The annual area regulations can be consulted to clarify the necessary and required permits, fees, and regulations. Additionally, the long-term value of ecosystem services, including the protection of air and water quality functions, are considered to be significant to local and regional land and water resources, as well as to human health.

### **3.3 Single- or Multiple-use Management**

SWWMA will be managed under the multiple-use concept as a Wildlife Management Area. SWWMA 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 SWWMA 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 SWWMA. 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 13.6). 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 SWWMA are made in accordance with the requirements of Section 253.034(10) FS, Chapter 18-2, FAC 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 SWWMA.

### **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 SWWMA (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 SWWMA 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 good fish and wildlife resource based public outdoor recreational opportunities. Therefore, no portion of the SWWMA is recommended for potential surplus review.

## 4 Accomplished Objectives from the SWWMA Management Plan 2007 – 2017

This section is dedicated to reporting the extent to which the Objectives described in the SWWMA Management Plan 2007 – 2017 (pages 45 - 49) were successfully completed. Accomplishments for SWWMA 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 2007 – 2017 SWWMA Management Plan describe the planned activities for SWWMA 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 and described in italicized text below.

### Objectives Accomplished from the 2006 SWWMA Management Plan

Goals and Objectives	Percent Completed
<b>Goal 1: Control public use and access to the point necessary to protect the Florida Panther and its habitat.</b>	
Objective 1: In order to maintain control over human disturbance, limit access to two main entrances (ongoing). <i>Comment: Two entrances to the area have been established and both are located along Keri Road (C.R. 832). These entrances provide excellent public access while also aiding in the overall management and protection of the area's resources.</i>	100%
Objective 2: Provide adequate security and protection of natural resources by maintaining a law enforcement presence, especially during recreational events on adjacent private lands (ongoing). <i>Comment: This objective referred to recreational events on adjacent lands. At present, these private recreational events are not occurring on adjacent lands.</i>	100%
Objective 3: By 2007, complete an assessment of the most sensitive habitat areas for the Florida panther within SWWMA. <i>Comment: FWC has established its WCPR program strategy for SWWMA and has identified sensitive habitat areas for the Florida panther within the area.</i>	100%

<p>Objective 4: By 2007, develop and implement a public use plan that will address the panther habitat assessment; the plan should address hunting, camping, fishing, off-highway vehicle activities, wildlife viewing, equestrian activities and ecotourism.</p> <p><i>Comment: FWC has assessed recreation opportunities and has constructed a kiosk with interpretive panels and has created a website for the area. FWC will develop a RMP as part of the update to the SWWMA management plan that will address further recreation needs and issues for the area.</i></p>	0%
<p>Objective 5: Assess the need for on-site residence to enhance management and security by 2007.</p> <p><i>Comment: FWC will recommend funding for constructing an on-site residence in the updated management plan.</i></p>	100%
<p><b>Goal 2: Complete assessments and monitoring criteria for rare and listed species indigenous to SWWMA.</b></p>	
<p>Objective 1: Continue field observations for rare and listed species, including Florida panther, limpkin, Florida sandhill crane, American swallowtail kite, Everglades snail kite, wood stork, gopher tortoise, burrowing owl, and crested caracara (ongoing).</p> <p><i>Comment: FWC has developed a WCPR Strategy for the area. FWC staff also regularly records wildlife that is observed on the area.</i></p>	100%
<p>Objective 2: By 2010, complete an American alligator population assessment survey, and establish a schedule for annual nest surveys (ongoing).</p> <p><i>Comment: The FWC determined monitoring of American alligator is not recommended for this area.</i></p>	0%
<p>Objective 3: By 2011, complete a survey of crane and wading bird populations, and establish an ongoing monitoring protocol.</p> <p><i>Comment: FWC has completed three years of a four study on recruitment and monitoring of cranes in which SWWMA is included. FWC has completed 2 out of 3 annual aerial surveys for wading bird populations on the area. FWRI is conducting a multi-year sandhill crane survey on the area.</i></p>	100%

<p>Objective 4: By 2012, complete a crested caracara population assessment survey, and establish a monitoring protocol for periodic population assessment (ongoing).  <i>Comment: FWC has conducted a nesting survey and established a monitoring protocol for crested caracara on the area.</i></p>	<p>100%</p>
<p>Objective 5: Contract with FNAI to complete a survey of the rare and listed plant and animal species by 2007.  <i>Comment: A WCPR Strategy has been completed for the area. FWC plans to conduct a rare and listed plant survey through the services of FNAI during the upcoming planning cycle.</i></p>	<p>50%</p>
<p><b>Goal 3: Enhance and maintain upland and wetland communities to provide high quality habitats and conditions for fish and wildlife species indigenous to SWWMA and ensure the long-term viability of listed species.</b></p>	
<p>Objective 1: In accordance with the panther habitat assessment, implement a feral hog control program that balances habitat needs with recreational opportunities (ongoing).  <i>Comment: FWC has established hog hunting seasons during archery, muzzleloading gun, general gun, and small game seasons with a daily bag limit of one hog and no size limits.</i></p>	<p>100%</p>
<p>Objective 2: By 2007, work with the Barron Chapter 298 Water Control District and determine the impacts upon the planned hydrological restoration.  <i>Comment: FWC completed a hydrology assessment in coordination with NRCS, and has jointly implemented hydrological restoration projects with NRCS funding including filling 46 miles of ditches and installing staff gauges. FWC also coordinated with Barron Chapter 298 Water Control District on hydrological restoration work.</i></p>	<p>100%</p>
<p>Objective 3: By 2007, establish a protocol for removal of invasive exotic vegetation, including Brazilian pepper, tropical soda apple, cogongrass, torpedograss and smutgrass.  <i>Comment: FWC has documented the exotic vegetation on the area and treatment is ongoing.</i></p>	<p>100%</p>

<p>Objective 4: By 2007, begin to implement pasture restoration efforts on the improved pasture, at a rate of approximately 400 acres per year. <i>FWC began restoring 100 acres of improved pasture to its historic natural community. Due to the extensive costs and resources needed to restore pasture, FWC was not able to implement restoration efforts on 400 acres each year. FWC prioritizes natural community restoration based on a protocol of restoring and enhancing management units where the natural community composition remains relatively intact to ensure prioritization efforts are focused on maintaining, improving and protecting the least altered existing natural communities on each respective management area followed in successive order over time with the most altered units on an area, i.e., improved pasture, generally designated as the lowest priority for restoration until restoration of more intact natural communities is accomplished. However, FWC will continue pasture restoration efforts as restoration of other higher priority management units are completed and funding for restoration is allocated.</i></p>	<p>25%</p>
<p>Objective 5: Develop quantifiable vegetative management objectives by 2008. <i>Comment: FWC has established an OBVM program on the area which includes delineation of management units, development of management objectives and associated monitoring protocols.</i></p>	<p>100%</p>
<p>Objective 6: By 2009, begin implementation of a reforestation effort for restoration of improved pasture, based on historic vegetative analysis and vegetative management objectives developed for SWWMA. <i>Comment: Reforestation efforts have been established on four management units in the northeast portion of the area using FNAI's current and historic natural communities mapping designations on the area. FWC prioritizes natural community restoration based on a protocol of restoring and enhancing management units where the natural community composition remains relatively intact to ensure prioritization efforts are focused on maintaining, improving and protecting the least altered existing natural communities on each respective management area followed in successive order over time with the most altered units on an area, i.e., improved pasture, generally designated as the lowest priority for restoration until restoration of more intact natural communities is accomplished. However, FWC will continue pasture restoration efforts as restoration of other higher priority management units are completed and funding for restoration is allocated.</i></p>	<p>100%</p>
<p>Objective 7: Under the guidance of the OBVM program, ensure ample understory vegetation structure necessary for Florida panther daybed and den sites (ongoing). <i>Comment: FWC continues to manage fire adapted communities (mesic flatwoods) on the area with fire return intervals of 5 years to maintain ample understory vegetation structure for the Florida panther. Additionally, FWC has planted saw palmettos in improved pastures.</i></p>	<p>100%</p>

<b>Goal 4: Provide high quality ecotourism and recreational opportunities for SWWMA.</b>	
<p>Objective 1: Continue to maintain wild turkey management strategies consistent with producing a quality turkey hunting experience (ongoing).  <i>Comment: FWC coordinates with the agency's Wild Turkey program and the National Wild Turkey Federation to conduct habitat enhancement for wild turkeys including planting trees and shrubs for feeding and nesting cover.</i></p>	100%
<p>Objective 2: Continue to maintain deer management strategies consistent with producing a quality white-tailed deer hunting experience (ongoing).  <i>Comment: SWWMA has adopted rule changes that increases antler size restrictions and allows permit holder's guests to have their own bag limit, thus producing a better quality hunting experience.</i></p>	100%
<p>Objective 3: By 2007, investigate the feasibility of establishing a public waters alligator hunt.  <i>Comment: FWC has investigated the feasibility of establishing an alligator hunt and has determined that a hunt is not feasible on the area. Additionally, ample opportunities for alligator hunting are available in the surrounding region.</i></p>	100%
<p>Objective 4: By 2007, investigate participation in the Big O Birding Festival.  <i>Comment: The SWWMA participates in the Big O Birding Festival annually.</i></p>	100%
<p>Objective 5: By 2007, determine the feasibility of making SWWMA a stop on both the Big Water Heritage Trail and the Great Florida Birding Trail.  <i>Comment: The area became a stop on the Great Florida Birding Trail in 2013. The Big Water Heritage Trail is generally focused on sites in the areas immediately surrounding Lake Okeechobee. FWC will continue to determine the feasibility of making SWWMA a stop in the BWHT.</i></p>	100%
<p>Objective 6: By 2007, assess the feasibility of potential equestrian trail riding opportunities.  <i>Comment: Horseback riding is permitted on all named and numbered roads/trails on the area.</i></p>	100%

<p>Objective 7: By 2007, contact the Florida Trail Association for an assessment of potential hiking trail opportunities.  <i>Comment: FWC has assessed the hiking trail opportunities on the area and will implement hiking opportunities on the area as recommended upon completion of the area's Recreation Master Plan.</i></p>	100%
<p>Objective 8: By 2007, develop an assessment and management recommendations for improvement of fishing opportunities within the area.  <i>Comment: FWC has assessed the potential of improving fishing opportunities and has determined there are insufficient water resources on the area to warrant improvements for fishing opportunities. Also, many other fishing opportunities are available on Lake Okeechobee and other nearby areas.</i></p>	100%
<p>Objective 9: By 2010, develop a Recreation Master Plan for SWWMA, to include enhancements and signage for recreation/educational programs.  <i>Comment: A RMP will be developed in conjunction with the development of the SWWMA 2016-2026 Management Plan.</i></p>	0%
<p>Objective 10: By 2010, provide support to the Hendry County Economic Development Coordinator on their promotional plan for the recreational and educational opportunities offered at SWWMA.  <i>Comment: FWC cooperates with Hendry County to promote the area on the Hendry County website. In addition, FWC promotes the SWWMA and other areas statewide through the Office of Public Access and Wildlife Viewing Services.</i></p>	100%
<p><b>Goal 5: Assess existing facilities and infrastructure to determine their adequacy for ongoing management and recreational use of the area.</b></p>	
<p>Objective 1: Continue to maintain primary roads in all-weather condition for public access, and evaluate the secondary road and trail system to facilitate management and limited public access within the area (ongoing).  <i>Comment: FWC has completed extensive improvements to the main loop road including constructing a box culvert canal crossing, and installing culverts. FWC maintains the named, primary roads in all-weather access conditions annually and the trails as needed.</i></p>	100%
<p>Objective 2: By 2007, assess infrastructure needs, including equipment, storage, housing, roads, fencing and gates, wells, culverts, crossings, signage, etc.  <i>Comment: FWC has implemented its protocol for routine assessment of area facilities and infrastructure, ongoing maintenance and improvement, and will include recommendations for improving or developing new infrastructure on the area in the updated management plan.</i></p>	100%

<p>Objective 3: By 2007, complete necessary repairs on equipment storage buildings, pole barns, and office.  <i>Comment: FWC routinely monitors facility and infrastructure and conducts repairs as needed as funding is available.</i></p>	100%
<p>Objective 4: By 2007, assess retention of existing infrastructure, including fences, wells, corrals, etc.  <i>Comment: FWC has completed the assessment of infrastructure existing on the area prior to acquisition. The infrastructure necessary for ongoing management has been retained, while infrastructure that is no longer needed for ongoing management activities is being removed.</i></p>	100%
<p>Objective 5: Determine the feasibility of establishing two raised roads with culvert crossings at Robert’s Canal by 2009.  <i>FWC maintains three all-weather access roads on the area (Allbritton Loop, Thomas Road, and Canoe Road) including construction of a box culvert crossing over the Roberts Canal.</i></p>	100%
<p>Objective 6: In conjunction with the development of the Recreation Master Plan, investigate the feasibility of providing limited camping opportunities by 2010.  <i>Comment: FWC has determined camping is not feasible for the area. Also, many other camping opportunities are available on nearby areas.</i></p>	100%
<p><b>Goal 6: Assure an Optimum Planning Boundary and Optimum Resource Boundary for SWWMA by continuing to identify and designate appropriate lands for conservation and acquisition.</b></p>	
<p>Objective 1: To minimize fragmentation of the area, continue to identify strategic parcels necessary to complete an Optimum Planning Boundary for SWWMA (ongoing).  <i>Comment: FWC has developed an OCPB for the 2016-2026 SWWMA Management Plan</i></p>	100%
<p>Objective 2: Maintain a GIS shapefile, and other necessary data to facilitate nominations for the FWC Optimum Resource Boundary and Land Acquisition Program (ongoing).  <i>Comment: FWC has developed an OCPB for the 2016-2026 SWWMA Management Plan and actively maintains GIS shapefiles and associated data for the area.</i></p>	100%
<p><b>Goal 7: Identify and protect archaeological, historic, and other cultural resources.</b></p>	

<p>Objective 1: Continue to keep the location of undisturbed cultural sites as proprietary information, available only to agency personnel charged with protection (ongoing).  <i>Comment: Currently, no sites have been identified on the area.</i></p>	100%
<p>Objective 2: When conducting restoration or construction activities, request assistance from DHR to prevent destructive disturbance of cultural sites (ongoing).  <i>Comment: FWC continues to work with DHR when conducting ground penetrating activities. Staff continues to be vigilant of any cultural resources while conducting routine management activities on SWWMA.</i></p>	100%
<p>Objective 3: By 2007, send the area biologist to participate in the DHR cultural resource protection training, concerning the provisions of Chapter 267, FS.  <i>Comment: The SWWMA biologist is scheduled to complete Archaeological Resource Management Training in 2016.</i></p>	0%
<p>Objective 4: By 2007, request assistance from DHR to locate and map cultural sites within the area for reference by managers and other agency personnel.  <i>Comment: DHR conducted a Cultural Resource Assessment on SWWMA in 2005. No cultural resources were discovered on SWWMA, however, one resource group has been identified on the area (Roberts Canal).</i></p>	100%
<p><b>Goal 8: Develop education and outreach efforts to address public education needs, as well as interpretation of natural and cultural history.</b></p>	
<p>Objective 1: By 2007, through coordination with DOF, develop a SWWMA public education program addressing prescribed burning education and smoke management.  <i>Comment: FWC maintains a kiosk on the area that provides information on prescribed burning and continues to coordinate with FFS (formerly DOF) to enhance public education regarding the benefits of prescribed fire and smoke management.</i></p>	100%
<p>Objective 2: By 2010, develop a Recreation Master Plan for SWWMA, to include enhancements and signage for recreation/educational programs.  <i>Comment: FWC has assessed recreation opportunities, constructed a kiosk with interpretive panels and has created a website for the area. FWC will develop a RMP as part of the update to the SWWMA Management Plan that will address all the recreational needs and issues for the area.</i></p>	0%

<p>Objective 3: Using FNAI's vegetative community data delineate management units and develop quantifiable vegetation management objectives for desired future conditions by 2008.</p> <p><i>Comment: FWC has established an OBVM program for the area which includes delineation of management units, development of management objectives and associated monitoring protocols.</i></p>	<p>100%</p>
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## 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 SWWMA 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 SWWMA. 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

On-site reviews of conservation and recreation lands that exceed 1,000 acres and are titled in the name of the Board of Trustees are required every five years by section 259.036, F.S. These reviews determine whether the lands are being managed for the purposes for which they were acquired and whether they are being managed in accordance with their land management plan adopted pursuant to s. 259.032, F.S. According to statute, the review team "shall evaluate the extent to which the existing management plan provides sufficient protection to threatened or endangered species, unique or important natural or physical features, geological or hydrological functions or archaeological features. The review shall also evaluate the extent to which the land is being managed for the purposes for which it was acquired and the degree to which actual management practices, including public access, are in compliance with the adopted management plan."

A land management review of the SWWMA was conducted in January of 2011 and the results of that review and FWC responses to recommendations are included as Appendix 13.7. It was determined that the SWWMA is being managed in accordance with the purposes for acquisition and that management practices, including public access, are in compliance with the management plan.

## 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 SWWMA.

### 5.2.1 Monitoring

A well-developed monitoring protocol is also one of the principal, required criteria for the management of SWWMA. 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 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 SWWMA 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 SWWMA, 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 SWWMA, 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. SWWMA has high-quality native communities including mesic flatwoods, wet flatwoods, depression marsh, and basin marsh that FWC will continue to manage and protect. On improved pasture sites, FWC intends to initiate ground cover and natural community restoration.

The FNAI has conducted surveys and mapped the current vegetative communities and historic vegetation communities on SWWMA. 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, management units are delineated. Delineating management units takes into account the distribution and extent of the current and/or historic mapped natural communities, existing and proposed infrastructure, and other management considerations. The FWC land managers then identify the predominant current or historic natural community within each management unit that guides the type and frequency of management activities that should be applied. 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 of SWWMA and other areas 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 on SWWMA and other areas 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 SWWMA 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



Prescribed burning at SWWMA

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 build-up 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, 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 will be developed and implemented for SWWMA. 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.

### **5.3.3 Habitat Restoration**

FWC has completed multiple restoration projects on SWWMA since 2004. One of the primary management objectives for SWWMA is to restore native vegetation to the open pastures. A groundcover restoration project began in 2007. In an attempt to reclaim a 100-

acre improved pasture, FWC began herbicide treatments to eliminate the exotic and highly invasive bahiagrass, followed by reseeded with native grasses and forbs.

Another project involves the creation of wildlife corridors by planting clusters of trees in open pastures to connect isolated hammocks, wetlands, and pine flatwoods. Planted species include live oak, laurel oak, hackberry, red bay, swamp bay, sweet bay, red maple, dahoon holly, pop ash, common persimmon, and South Florida slash pine. These islands were spaced 100 - 200 yards apart and linked together by planting thin corridors of south Florida slash pines. These sheltered pathways will improve habitat for most native wildlife, especially the endangered Florida panther and its primary food source, the white-tailed deer.

Development of a habitat restoration strategy described in Section 6.1.1 will further aid in determining and developing feasible restoration projects, prioritizing implementation of those projects and establish the monitoring needed to successfully implement restoration work on the area.

## **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, a diversity of associated wildlife, including rare, imperiled, common game, and non-game species, can be found on SWWMA. In managing for wildlife species, an emphasis will be placed on conservation, protection and management of natural communities. As noted above, natural communities important to wildlife include depression marsh, basin marsh, mesic flatwoods, and wet flatwoods. Natural communities that are less represented on SWWMA include dome swamp, mesic hammock, and wet prairie.

The size and natural community diversity of SWWMA 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, SWWMA provides resources critical to many migratory birds including waterfowl, passerines, raptors, and others. Habitats important to migratory species will be protected, maintained or enhanced.

The FWC intends to manage game populations on a sustained-yield basis to assure healthy game populations and a high-quality recreational experience. In general, game wildlife populations will be managed to provide continued recreational sport hunting and wildlife viewing opportunities. However, due to the limited size of the area, some of the hunting opportunities may be regulated through a limited entry hunt program to ensure the persistence of viable game species populations, as well as hunter safety and satisfaction.

The potential for conflicts among recreational activities and user groups will also be considered and continually monitored.

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 on SWWMA. 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.

#### **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 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 wildlife species, 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 SWWMA. 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.

### 5.4.3 Focal Species Selection and Management

An FWC WCPR Species Management Strategy (WCPR Strategy) was completed for the SWWMA in December 2010 and revised in August 2014 (Appendix 13.8). Using statewide landcover-based habitat models, the SWWMA WCPR Strategy identifies 15 focal species and one group of species (wading birds) as having potential habitat on the SWWMA (Table 14). Of the focal species identified as having habitat on the area, the SWWMA WCPR Strategy provides measurable objectives and recommends some level of monitoring for Bachman’s sparrow, crested caracara, wading birds, and other species opportunistically.

**Table 14: Focal Species Occurring On the SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Bachman’s sparrow	<i>Peucaea aestivalis</i>
Big Cypress fox squirrel	<i>Sciurus niger avicennia</i>
Burrowing owl	<i>Athene cunicularia floridana</i>
Cooper’s hawk	<i>Accipiter cooperii</i>
Crested caracara	<i>Caracara cheriway</i>
Everglades Snail kite	<i>Rostrhamus sociabilis plumbeus</i>
Florida black bear	<i>Ursus americanus floridanus</i>
Florida mottled duck	<i>Anas fulvigula</i>
Florida panther	<i>Puma concolor coryi</i>
Florida sandhill crane	<i>Grus canadensis pratensis</i>
Gopher tortoise	<i>Gopherus polyphemus</i>
Limpkin	<i>Aramus guarauna</i>
Northern bobwhite	<i>Colinus virginianus</i>

**Table 14: Focal Species Occurring On the SWWMA**

<b>Common Name</b>	<b>Scientific Name</b>
Southern bald eagle	<i>Haliaeetus leucocephalus</i>
Swallow-tailed kite	<i>Elanoides forficatus</i>
Wading birds	Multiple species

## **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 SWWMA. 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 SWWMA and treated annually by FWC include Brazilian pepper, caesarweed, para grass, cogongrass, torpedograss, tropical soda apple, and water hyacinth, among others. Exotic and invasive plant species have been identified as occurring at varying densities on approximately 7,487 acres of the SWWMA. 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.

Additionally, the FWC will continue efforts to control the introduction of exotic and invasive species, as well as pests and pathogens, on the SWWMA 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.

As mentioned above, Brazillian pepper, tropical soda apple, cogongrass, and other exotic species are a major concern at SWWMA, and the FWC invests extensive resources in the treatment of these species. During the previous 10-year Management Plan period, the FWC has treated the entire area several times for Brazilian pepper, tropical soda apple, and cogon grass. FWC has also conducted more localized treatments of these species, plus

lygodium, West Indian marshgrass, primrose willow, melaleuca, and torpedograss. Generally, treatments consist of mowing heavily infested areas, then treating the areas chemically. Additionally, FWC conducted treatments of exotic species growing in Roberts Canal two to three times each year. While the treatment of exotic species on the area has been very successful, exotic species on adjacent lands easily spread to SWWMA, particularly along the boundary of the area.

An exotic animal species of concern on the SWWMA 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. Hog populations are controlled by hunts during the wild hog-dog hunt season, archery, small game, general gun, muzzleloading gun, and archery/muzzleloading gun seasons. 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**

### **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 for SWWMA. To accomplish this, FWC will work with recreational stakeholders and the general public to develop a Recreation Master Plan for SWWMA 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.

### **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, FWC has determined that SWWMA can currently support 263 visitors per day. However, an objective to improve public access facilities and amenities resulting in an increase of the public access carrying capacity to 284 visitors per day has been proposed in Section 6.4 of this Management Plan. It is important to note that 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 SWWMA 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 development and implementation process.

### **5.6.4 Wildlife Viewing**

The SWWMA is home to a variety of resident wildlife found within its basin swamps, mesic hammocks, depression marshes, other natural communities, and pastures. The SWWMA’s location within a mosaic of conservation lands and mix of wetlands and uplands produce outstanding wildlife viewing opportunities. As noted previously, the area is part of the Great Florida Birding and Wildlife Trail.

### **5.6.5 Hunting**

Hunting opportunities at the SWWMA include seasons for archery, small game, general gun, muzzleloading gun, spring turkey, youth turkey, and migratory bird. An evaluation of the hunting opportunities offered on the SWWMA is performed periodically by the FWC. Additional information about the current hunting opportunities and regulations on the area may be found at <http://myfwc.com/media/2530696/Spirit-of-the-Wild.pdf>.

### **5.6.6 Fishing**

Fishing is authorized year-round at the SWWMA. However, fishing opportunities on the SWWMA are relatively limited due to the small number of appropriate water bodies on the area.

#### **5.6.6.1 Hiking**

Hiking is a popular activity on the SWWMA, and the area's unimproved roads offer excellent opportunities to hike and view the scenery and abundant wildlife. Hiking on the area is best during the late fall and spring.

#### **5.6.6.2 Bicycling**

Bicycling is permitted on the roads throughout the SWWMA. Off-road bicycles are most appropriate as many of the area's roads are unimproved. As with hiking, bicycling on the area is best during the late fall and spring.

#### **5.6.6.3 Equestrian**

Horseback riding is permitted on the SWWMA, except during hunting seasons. Horses are allowed only on the area's named or numbered roads.

### **5.6.7 Camping**

Camping is prohibited at the SWWMA. However, camping opportunities are available on the adjacent OSSF.

### **5.6.8 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).

### **5.6.9 Environmental Education**

#### **5.6.9.1 Interpretation**

The SWWMA offers interpretive kiosks to educate visitors about the natural resources found on the area. A SWWMA bird list has been created for bird watching enthusiasts. Also, an area website is maintained to provide educational information, as well as information about recreational opportunities.

### 5.6.9.2 Programs

No regularly occurring educational or recreational programs are currently taking place at SWWMA, but area staff conduct various programs on occasion upon request as feasible.

## 5.7 Hydrological Preservation and Restoration

As described in Section 2.5 of this Management Plan, the surface water hydrology of the SWWMA is characterized by a generalized south to north drainage pattern and the area contains significant hydrological resources, including freshwater forested and shrub wetlands. However, the historic hydrology of the area has been altered over time by a variety of factors, including the construction of canals and the conversion of natural communities into altered landcover types. As a result, hydrological restoration is an important component of the overall management and restoration of the SWWMA.



Roberts Canal

The FWC has conducted several hydrological improvements on SWWMA since 2007 partly funded by a NRCS Wetlands Reserve Program Grant to restore wetlands on the area. These projects included filling ditches, installing culverts along the improved roads, and constructing a new box culvert structure over Roberts Canal. These practices have left the landscape much wetter than when it was acquired. Also, the FWC conducts mechanical vegetation control, native vegetation planting, ground cover restoration, and exotic plant species control.

The FWC will continue to work to restore natural water regimes on the area as appropriate and feasible. Further hydrologic restoration will be guided by a site-specific hydrological assessment, as discussed below.

### 5.7.1 Hydrological Assessment

The FWC will conduct or obtain an onsite hydrological and risk assessment to identify potential hydrology restoration needs on the SWWMA. To maintain and enhance natural hydrological functions, the FWC will maintain and install low-water crossings and culverts as appropriate.

### **5.7.2 Water Resource Monitoring**

Currently, the FWC monitors water levels at seven staff gauges on SWWMA. FWC cooperates with the DEP and the SFWMD for the monitoring of surface and ground water quality and quantity. In addition, the FWC will continue to cooperate with the SFWMD and the DEP to develop and implement any additional surface water quality and quantity monitoring protocols for the SWWMA. In this capacity, the FWC will primarily rely on the expertise of the SFWMD and the DEP to facilitate these monitoring activities. As necessary, the FWC may independently conduct or contract for water resource monitoring, as guided by the DEP and the SFWMD.

## **5.8 Forest Resource Management**

A Timber Assessment of the timber resources of the SWWMA was conducted by the FFS in 2006. The FWC has requested an updated Timber Assessment of the SWWMA, which will be appended to this Management Plan upon completion. The management of timber resources will be considered in the context of the Timber Assessment and the overall land management goals and activities.

Timber resources include some pine plantations in need of thinning for habitat improvement. Thinning of the forest over-story, hydrological restoration and reintroduction of prescribed burning are the most important factors in re-establishment of natural communities and the enhancement of wildlife habitats in these areas. Upland pine forest planted with off-site pines will be reforested with longleaf pine or other on-site species as appropriate. Degraded or disturbed bottomland hardwood sites will be encouraged to reforest naturally with native wetland oaks, hardwoods, and other appropriate native plant species.

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. The primary management technique for encouraging reforestation is protection of young trees and seedlings on these sites from damage. However, where natural regeneration is lacking, artificial reforestation may be implemented. Planting trees on these selected sites is used to increase the rate of reforestation and to ensure diversity. Forested wetlands are managed for stands with old growth characteristics. Snags will be protected to benefit cavity-nesting species.

### **5.8.1 Timber Management Plan**

As discussed above, the FFS conducted a Timber Assessment of the SWWMA in 2006 and an update to that Timber Assessment has been requested. The FWC will manage timber resources on the SWWMA in accordance with the recommendations of the Timber Assessment.

However, given the limited amount of timber resources currently present on the area, a formal timber management plan is not necessary for management of the timber resources

on the SWWMA due to the fact that the FWC only develops timber management plans on those areas where the extent and type of timber resources warrant development of such a plan.

## **5.9 Historical Resources**

Procedures outlined by DHR will be followed to preserve the cultural and historical sites of SWWMA. The FWC will consult with DHR in an attempt to locate any additional historical features on the area. In addition, FWC will ensure management staff has DHR Archaeological Resources Monitoring training. The FWC will refer to and follow DHR's Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Properties for management of these resources, and prior to any facility development or other ground disturbing activities. Furthermore, as appropriate and necessary, FWC will contact professionals from DHR for assistance prior to any ground-disturbing activity on SWWMA.

To date, the DHR Master Site File indicates one known historic site on SWWMA (Section 2.8). In addition the DHR conducted a historic resources survey of the area in 2005 and no other historic resources were identified on the area. The FWC will submit subsequently located historic sites on SWWMA to DHR for inclusion in their Master Site File. The FWC will continue to monitor the known site on a rotating, regular basis.

## **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 SWWMA include an office and shop compound, a hunter check station, and a kiosk (Figure 10). As described in Section 5.6.1 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 SWWMA (Figure 11). 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

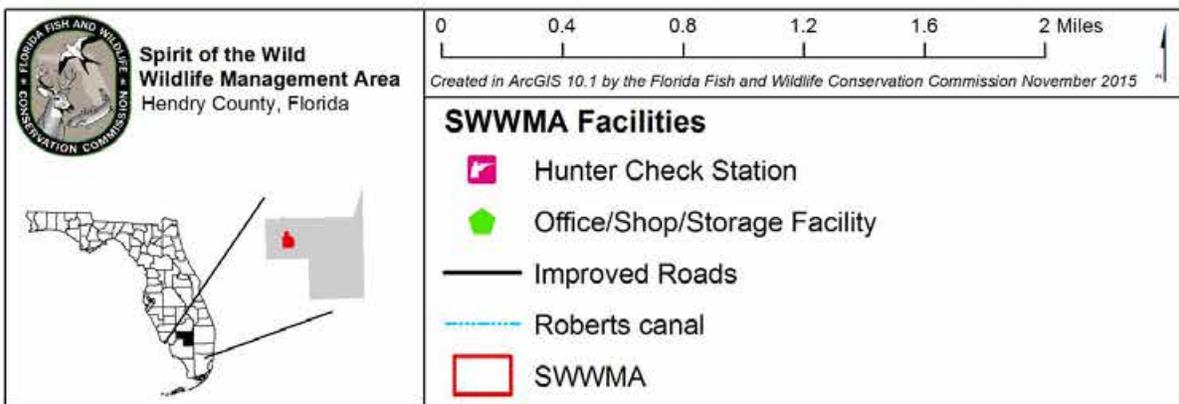
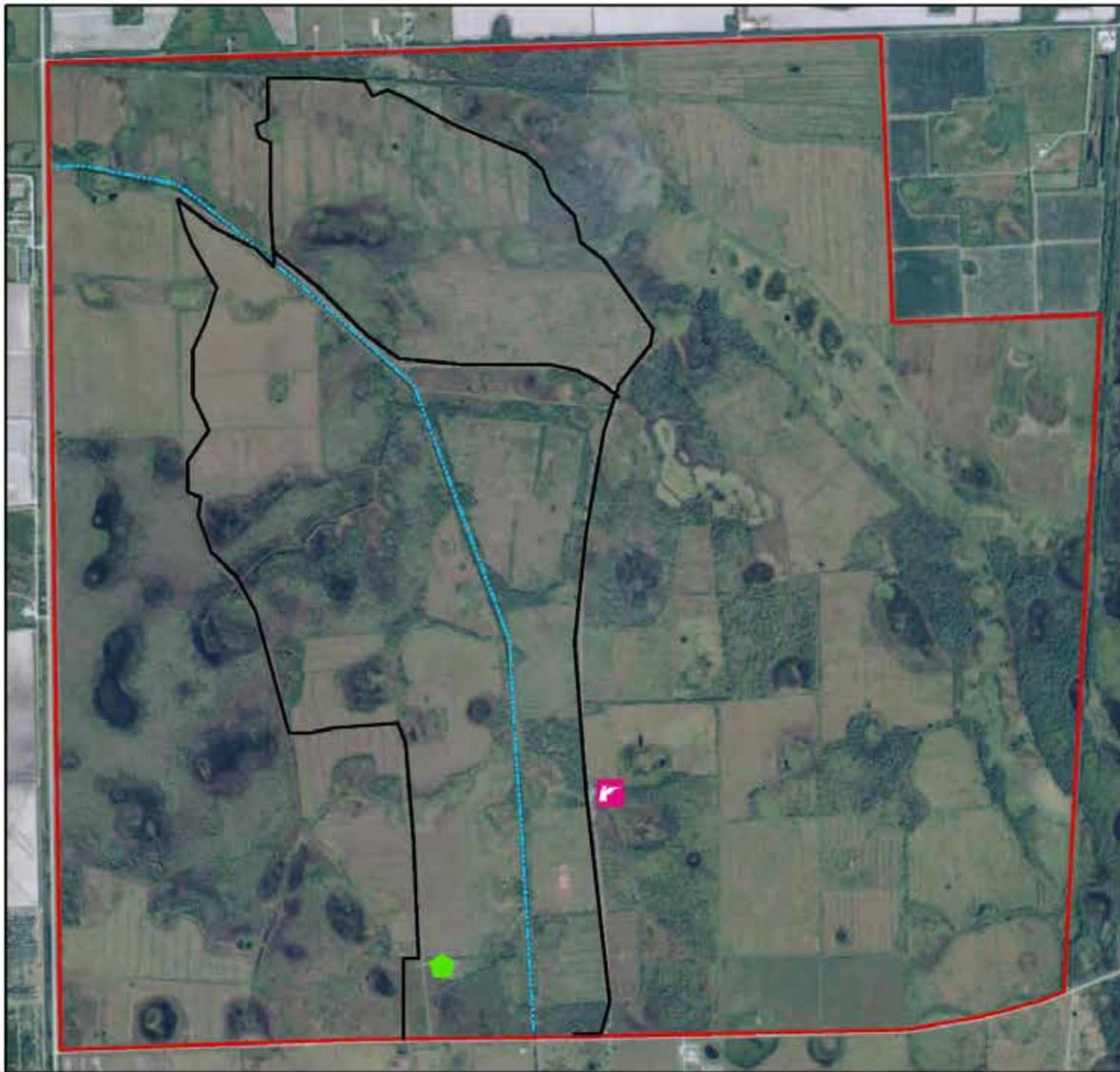
- Forest Stewardship Program proposals
- Florida Forever project proposals and boundary modifications
- Conservation easements
- Federal or State grant conservation proposals
- Regional or local conservation proposals
- Local, state, and federal planning proposals
- Non-governmental organization conservation 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 not identified any privately owned potential additions or inholdings for the SWWMA. However, acquisition of the remaining lands within the TMSFFP is considered essential to providing extensive habitat required by the Florida panther, and other imperiled and rare species. Also, acquiring these lands will enhance the operational and resource management feasibility of existing conservation lands as well as provide additional public access opportunities. Upon completion of the CAS, additions to the FWC Florida Forever Additions and Inholdings acquisition list may be recommended.



**Figure 10: SWWMA Facilities**

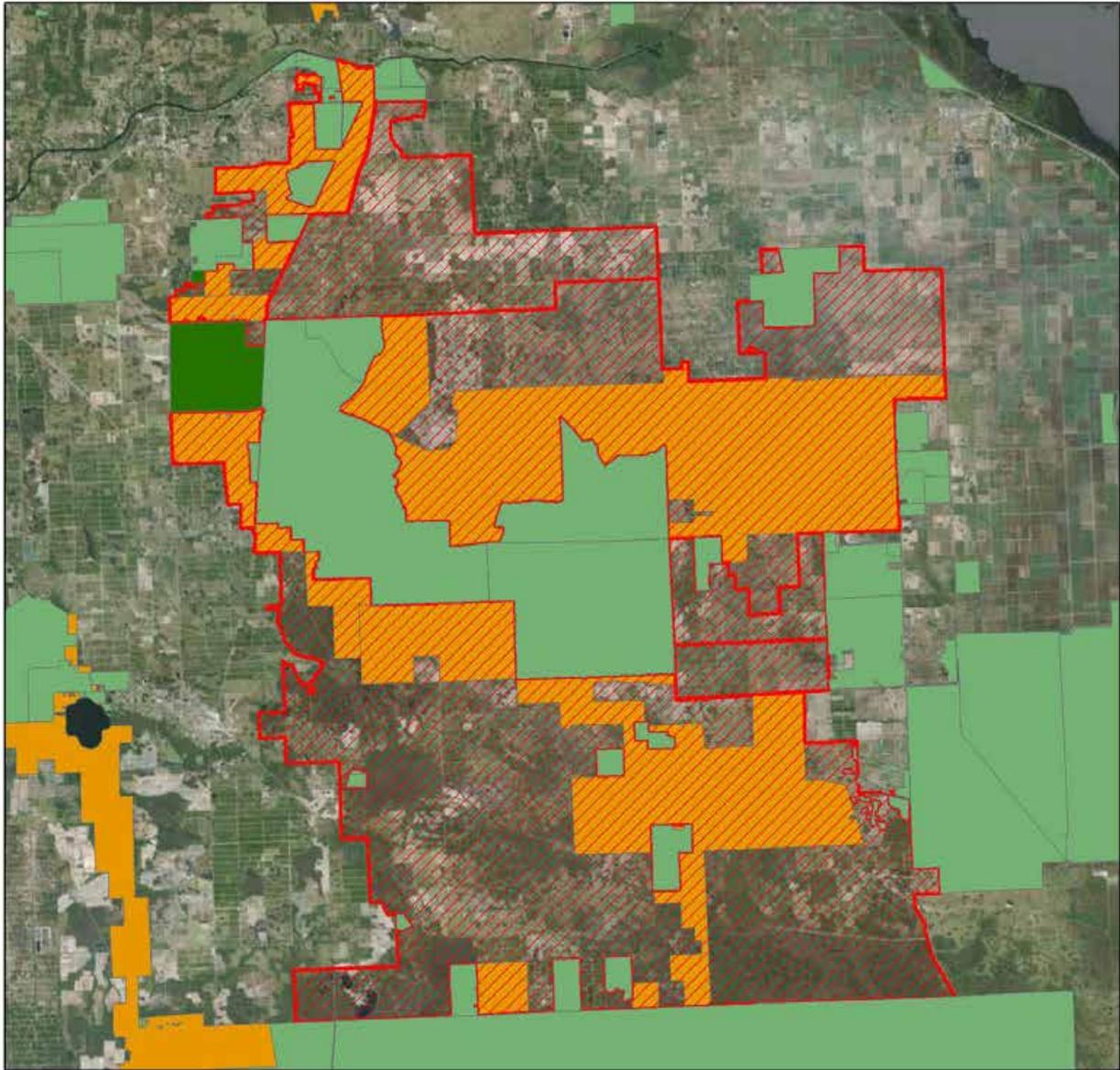


Figure 11: SWWMA Optimal Conservation Planning Boundary

## **5.12 Research Opportunities**

The FWC intends to cooperate with researchers, universities, and others as feasible and appropriate. For SWWMA, 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 SWWMA must have prior approval by FWC.

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

### **5.13.1 Cooperative Management**

The FWC is responsible for the overall management and operation of SWWMA as set forth in the lease agreement with the Board of Trustees. In keeping with the lease agreement, and in order to conduct its management operations in the most effective and efficient manner, the FWC cooperates with other agencies to achieve management goals and objectives described in this management plan. These include cooperating with DHR to ensure the requirements of the Management Procedures Guidelines - Management of Archaeological and Historical Resources document (Appendix 13.9) are followed with regard to any ground-disturbing activities. In addition, the FFS assists FWC by providing technical assistance on forest resource management. Also, FWC cooperates and consults with the SFWMD and DEP for the monitoring and management of both ground and surface water resources and the overall management of SWWMA.

### **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 SWWMA. 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 SWWMA, 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 SWWMA. 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 Cattle Grazing**

Cattle grazing has occurred previously on the SWWMA. However, there are currently no cattle grazing operations on the area. An objective has been developed in Section 6.1 to evaluate the potential for implementing organic, rotational, wildlife-friendly cattle grazing on improved and semi-improved pastures as a habitat management tool.

### **5.13.4 Apiaries**

Currently, there are no apiaries operating on SWWMA. However, use of apiaries is conditionally approved for SWWMA, 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 13.6). Location, management, and administration of apiaries on SWWMA will be guided by the FWC Apiary Policy (Appendix 12.5).

The FWC Apiary Policy (Appendix 13.10) will be followed with regards to site location, management, and administration of apiaries.

## 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.



Florida sandhill cranes on SWWMA

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.

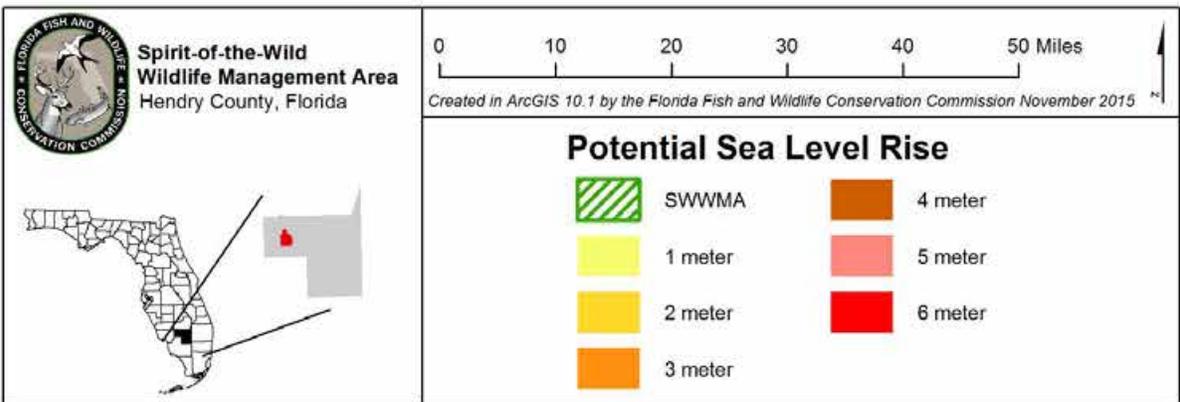
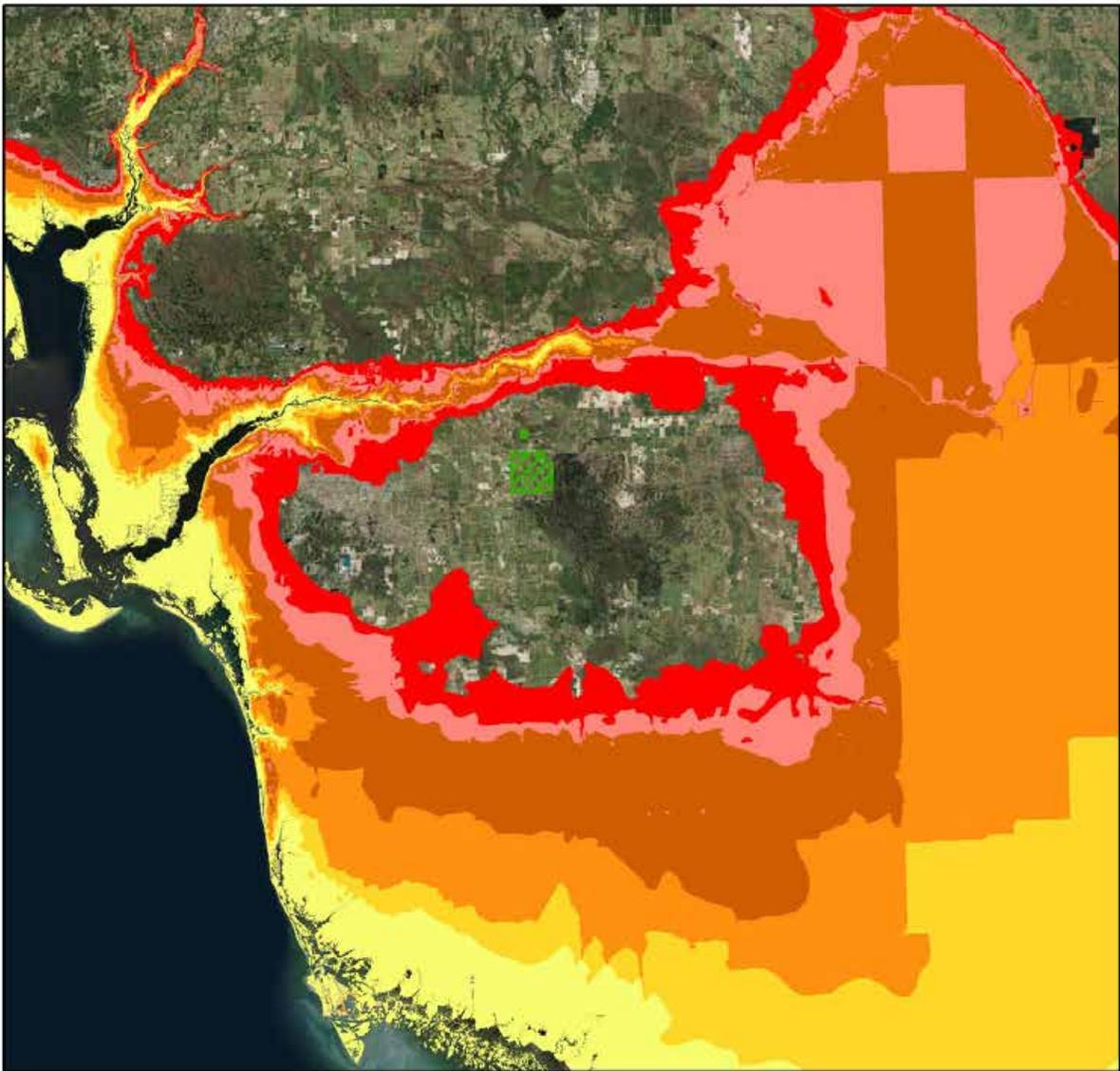
Elements of climate change that may potentially affect SWWMA include saltwater intrusion from sea level rise (Figure 12), more frequent and more potent storm events, alteration of vegetation reproductive cycles, and changes in the fire regime. The results of a

Sea Level Affecting Marsh Model for the SWWMA shows habitats that may potentially be impacted. The low-lying coastal habitats, such as salt marsh and hardwood swamp natural communities are projected to face the most direct and dramatic impacts of climate change, particularly from a projected rising sea level and from the projected increased frequency and intensity of coastal storms.<sup>12, 13, 14, 15</sup> The effects of sea level rise in the recent past have been observed on conservation lands along the Gulf and Atlantic coasts; cabbage palms have been dying on coastal islands due to salinity increases. The potential loss of habitat may result in the loss of species using that habitat, including migrating and nesting birds. Storm events also cause considerable physical damage to native vegetation along vulnerable shorelines, impacting nesting habitat for sea life and shorebirds. The projected rise in sea levels may decrease the availability and abundance of prey for wading birds that forage in shallow waters on the expansive tidal flats of the Gulf Coast. Climate change may amplify and hasten these effects, potentially at rates that exceed the normal resiliency of plant communities to recover, shift or adapt accordingly.<sup>16, 17</sup> Projected salt water intrusion into the subsurface freshwater lens from potential sea level rise and saltwater inundation of surface freshwaters from storm surges may alter coastal ecosystems and freshwater marshes, possibly resulting in more salt-tolerant aquatic plant communities.

To address the potential impacts of climate change on the SWWMA, Goals and Objectives have been developed as a component of this Management Plan (Section 6.10). 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 SWWMA 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.



**Figure 12: Potential Sea Level Rise**

## **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 SWWMA. 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**

- 6.1.1** Conduct prescribed burning on approximately 700 acres of fire adapted natural communities (mesic/wet flatwoods, wet prairie, depression marsh) per year.
- 6.1.2** Maintain approximately 1400 acres of fire adapted communities (65%) within 2 - 5 year target fire return interval.
- 6.1.3** Contract for mapping of historic and current natural communities on the 160 acre north tract addition.
- 6.1.4** Develop and implement a prescribed burn plan.
- 6.1.5** Conduct habitat/natural community improvement on 50 acres per year including mechanical treatments of native vegetation (Figure 13).
- 6.1.6** Conduct habitat/natural community improvement activities including planting native trees and shrubs on 100 acres.
- 6.1.7** Continue to maintain the existing 100 acre ground cover restoration site.
- 6.1.8** Continue to implement OBVM.

#### **Long-term**

- 6.1.9** Continue to conduct prescribed burning 500 acres of fire adapted communities (mesic/wet flatwoods, wet prairie, depression marsh) per year.
- 6.1.10** Continue to maintain 2,194 acres of fire adapted communities (100%) per year within target fire return interval of 2 – 5 years.
- 6.1.11** Continue to implement OBVM.

- 6.1.12 Continue to implement a prescribed burn plan.
- 6.1.13 Continue to conduct habitat/natural community improvement including mechanical treatments of native vegetation on 50 acres per year (Figure 13).
- 6.1.14 Continue to conduct habitat/natural community restoration activities including planting native trees and shrubs on 50 acres per year.
- 6.1.15 Continue to maintain the existing 100 acre ground cover restoration site.
- 6.1.16 Update the FNAI natural community map every five years.
- 6.1.17 Evaluate the potential for implementing organic, rotational, wildlife-friendly cattle grazing on improved and semi-improved pastures as a management tool.
- 6.1.18 Develop a habitat restoration strategy.

## **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 SWWMA WCPR strategy by managing identified habitats and monitoring identified species.
- 6.2.2 Monitor five imperiled and focal species: crested caracara, Florida black bear, Florida panther, Florida sandhill crane, and northern bobwhite quail as described in the WCPR Strategy.
- 6.2.3 Continue to collect opportunistic wildlife species occurrence data on wildlife including saw-toothed kite, Bachman's sparrow, Cooper's hawk, Everglades snail kite, southern bald eagle, Florida's mottled duck, limpkin, Big Cypress fox squirrel, and wading birds.

### **Long-term**

- 6.2.4 Edit and implement a revised SWWMA WCPR strategy by 2020.
- 6.2.5 Monitor five imperiled and focal species: crested caracara, Florida black bear, Florida panther, Florida sandhill crane, and northern bobwhite as described in the WCPR Strategy.

**6.2.6** Continue to collect opportunistic wildlife species occurrence data on wildlife including swallow tailed-kite, Bachman’s sparrow, Cooper’s hawk, Everglades snail kite, southern bald eagle, Florida’s mottled duck, limpkin, Big Cypress fox squirrel, and wading birds.

**6.2.7** Conduct a herpetological survey.

### **6.3 Other Wildlife (Game and Nongame) Habitat Maintenance, Enhancement, Restoration, or Population Restoration**

**Goal: Monitor, maintain, improve, or restore game and non-game species populations and habitats.**

#### **Short-term**

**6.3.1** Continue to conduct population and recruitment surveys for white-tailed deer.

**6.3.2** Continue to collect biological harvest data at check station.

**6.3.3** Continue to collect opportunistic wildlife occurrence data for common wildlife species.

**6.3.4** Continue to strip mow improved pastures for northern bobwhite.

#### **Long-term**

**6.3.5** Continue to conduct population and recruitment surveys for white-tailed deer.

**6.3.6** Continue to collect biological harvest data at the check station.

**6.3.7** Continue to collect opportunistic wildlife occurrence data for common wildlife species.

**6.3.8** Continue to strip mow improved pastures for northern bobwhite quail.

### **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** Conduct herbicide treatments on approximately 1,000 acres of EPPC Category I and II invasive exotic plant species per year including Brazilian pepper, Caesar weed, Japanese climbing fern, torpedograss, tropical soda apple, water hyacinth, and Wright’s nut-rush.

**6.4.2** Continue to implement control measures on one exotic and nuisance animal species (feral hog) through hunting.

**6.4.3** Continue opportunistic monitoring for exotic animal species, including Burmese pythons and Nile monitors.

#### **Long-term**

**6.4.4** Continue to annually treat at least 1,000 acres of EPPC Category I and Category II invasive exotic plant species including Brazilian pepper, Caesar weed, Japanese climbing fern, torpedograss, tropical soda apple, water hyacinth, and Wright's nut-rush.

**6.4.5** Continue to implement control measures on one exotic and nuisance animal species (feral hogs).

**6.4.6** Continue opportunistic monitoring for exotic animal species, including Burmese pythons and Nile monitors.

### **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 263 visitors per day.

**6.5.2** Develop additional public access and recreational opportunities to allow for a carrying capacity of 284 visitors per day.

**6.5.3** Continue to provide a website, three panel kiosk, bird list, and a regulation brochure for interpretation and education.

**6.5.4** Continue to provide hunting opportunities for deer, turkey, small game, youth spring turkey, and feral hogs.

**6.5.5** Develop a trail map.

**6.5.6** Maintain/design/develop one mile of trail.

**6.5.7** Develop a Recreation Master Plan.

**6.5.8** Monitor trails annually for visitor impacts.

#### **Long-term**

**6.5.9** Monitor trails annually for visitor impacts.

- 6.5.10 Implement the Recreation Master Plan.
- 6.5.11 Reassess recreational opportunities every three years.
- 6.5.12 Continue to provide hunting opportunities for deer, turkey, small game, youth spring turkey, and feral hogs.
- 6.5.13 Continue to provide fishing opportunities on appropriate water bodies.
- 6.5.14 Cooperate with other agencies, Hendry County, stakeholders, and regional landowners to investigate regional recreational opportunities including linking hiking, and multi-use trail systems between adjacent public areas.
- 6.5.15 Continue to identify partnerships that could provide for environmental educational programs and outreach.
- 6.5.16 Construct entrance package on the north tract consisting of a kiosk and parking area.

## **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 Continue to maintain hydrology improvements as recommended in the hydrological assessment.
- 6.6.2 To maintain natural hydrological functions, maintain low-water crossings and culverts as appropriate.
- 6.6.3 Continue to cooperate with the South Florida Water Management District for the monitoring of surface and ground water quality and quantity.
- 6.6.4 Continue to monitor and maintain seven staff gauges.
- 6.6.5 Continue to maintain Roberts Canal per SFWMD guidelines.

### **Long-term**

- 6.6.6 Continue to maintain hydrology improvements as recommended in the hydrological assessment.
- 6.6.7 To maintain natural hydrological functions, maintain low-water crossings and culverts as appropriate.

- 6.6.8 Continue to cooperate with the South Florida Water Management District for the monitoring of surface and ground water quality and quantity.
- 6.6.9 Continue to monitor and maintain seven staff gauges.
- 6.6.10 Continue to maintain Roberts Canal per SFWMD guidelines.
- 6.6.11 Explore the need and feasibility of water quality monitoring.

## **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 Florida Forest Service (FFS) to complete an updated 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 Historical Resources**

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

### **Short-term**

- 6.8.1 Monitor the known recorded site and submit updates of additional sites to DHR for inclusion in their Master Site file.
- 6.8.2 Ensure management staff has DHR Archaeological Resources Monitoring training.
- 6.8.3 Follow DHR's Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Properties for the management of historical resources.

### **Long-term**

- 6.8.4 Continue to monitor the one known recorded site and submit updates of additional sites to DHR for inclusion in their Master Site file.

- 6.8.5 Continue to follow DHR's Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Properties for the management of historical resources.
- 6.8.6 Cooperate with DHR in designing site plans for development of infrastructure.
- 6.8.7 Continue to ensure FWC staff has completed ARM 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 three facilities, including the office/shop compound, one kiosk, and the hunter check station.
- 6.9.2 Maintain 15 miles of roads.
- 6.9.3 Monitor roads, trails, and infrastructure biannually for visitor impacts.
- 6.9.4 Construct one mile of trail.
- 6.9.5 Evaluate potential for boardwalk sections and observation platform on the north tract.

### **Long-term**

- 6.9.6 Monitor roads, trails and infrastructure biannually for visitor impacts.
- 6.9.7 Continue to maintain three facilities.
- 6.9.8 Continue to maintain 15 miles of roads.
- 6.9.9 Continue to maintain one mile of trail existing on site.
- 6.9.10 Construct one new entrance package, one secondary entrance sign and one picnic shelter on the north tract, and one picnic shelter on the main area.
- 6.9.11 Improve or repair three facilities, 15 miles of roads, and one mile of trail existing on site (as applicable).
- 6.9.12 If determined feasible, construct boardwalk sections and observation platform on the north tract.
- 6.9.13 Explore the feasibility of improving the five miles of unimproved roads.

6.9.14 Assess the need for installing a vault toilet facility.

## **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 LAP to pursue non-acquisition conservation stewardship partnerships.

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 SWWMA are no longer needed for conservation purposes, and therefore may be designated as surplus lands.

6.10.12 Coordinate and cooperate with Department of Defense military branches to allow for training opportunities for military personnel as appropriate and compatible with the conservation of SWWMA.

### **Long-term**

6.10.13 To minimize fragmentation of the area, continue to identify strategic parcels to revise the completed OCPB for SWWMA as appropriate and necessary.

6.10.14 Continue to identify and develop conservation stewardship partnerships.

- 6.10.15 Continue to identify and pursue conservation acquisition needs.
- 6.10.16 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.
- 6.10.17 Continue to propose nominations of selected properties as additions to the FWC acquisition list.
- 6.10.18 Continue to pursue acquisition of parcels added to the FWC acquisition list as acquisition work plan priorities and funding allow.
- 6.10.19 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.
- 6.10.20 Coordinate and conduct landowner assistance/conservation stewardship partnership workshop(s) as necessary and appropriate.
- 6.10.21 Continue to identify potential conservation easements donations.
- 6.10.22 Continue to evaluate and determine if any portions of SWWMA are no longer needed for conservation purposes, and therefore may be designated as surplus lands.
- 6.10.23 Continue to coordinate and cooperate with Department of Defense military branches to allow for training opportunities for military personnel as appropriate and compatible with the conservation of SWWMA.

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

**Goal: Provide access and use of the SWWMA to current cooperative managers and continue collaborative management efforts.**

### **Short-term**

- 6.11.1 Continue to cooperate with adjacent private landowners with prescribed burning, exotic species control, and other management issues as needed.
- 6.11.2 Continue to cooperate with NRCS on the compliance of the WRP Easement terms.
- 6.11.3 Continue to cooperate with SFWMD, the Barron Chapter 298 Water Control District and the NRCS on hydrological restoration efforts for the area.

- 6.11.4 Continue to cooperate with FFS on prescribed burning and management of the boundary with OKSSF.
- 6.11.5 Continue to participate in the planning and review process for the widening of State Road 29.
- 6.11.6 Coordinate and cooperate with Department of Defense military branches to allow for training opportunities for military personnel and other initiatives as appropriate and compatible with the conservation of SWWMA.

#### **Long-term**

- 6.11.7 Continue to cooperate with adjacent private landowners with prescribed burning, exotic species control, and other management issues as needed.
- 6.11.8 Continue to cooperate with NRCS on the compliance of the WRP Easement terms.
- 6.11.9 Continue to cooperate with SFWMD, the Barron Chapter 298 Water Control District and the NRCS on hydrological restoration efforts for the area.
- 6.11.10 Continue to cooperate with FFS on prescribed burning and management of the boundary with OKSSF.
- 6.11.11 Continue to participate in the planning and review process for the widening of State Road 29.
- 6.11.12 Coordinate and cooperate with Department of Defense military branches to allow for training opportunities for military personnel and other initiatives as appropriate and compatible with the conservation of SWWMA.

### **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 SWWMA.**

#### **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 SWWMA.
- 6.12.2 Incorporate appropriate climate change monitoring protocols and management strategies into the OBVM program for the SWWMA.

- 6.12.3** Incorporate appropriate climate change adaptation strategies into the WCPR for SWWMA.
- 6.12.4** As appropriate, update the SWWMA Prescribed Fire Plan to incorporate new scientific information regarding projected climate change, such as increased frequency of drought, on the fire regime of SWWMA’s fire-adapted habitats.
- 6.12.5** 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 FWC’s public education curriculum.

### **6.13 Research Opportunities**

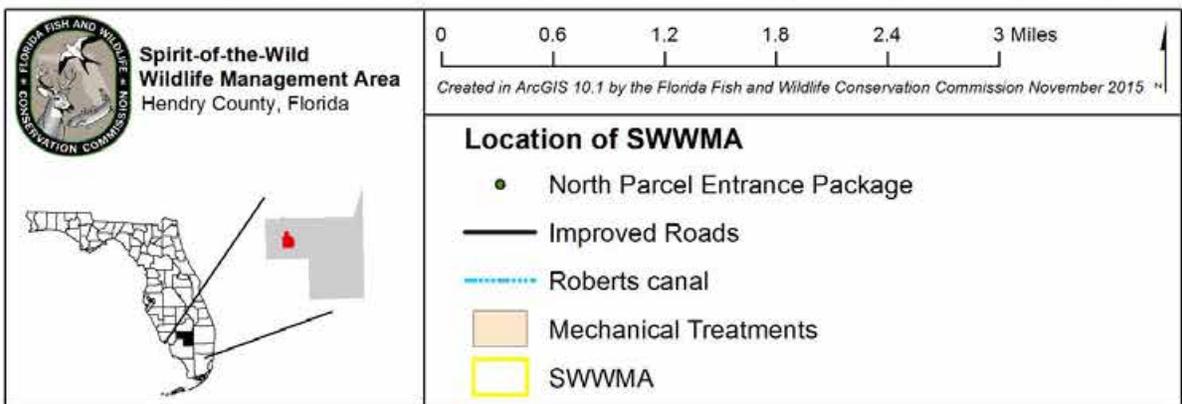
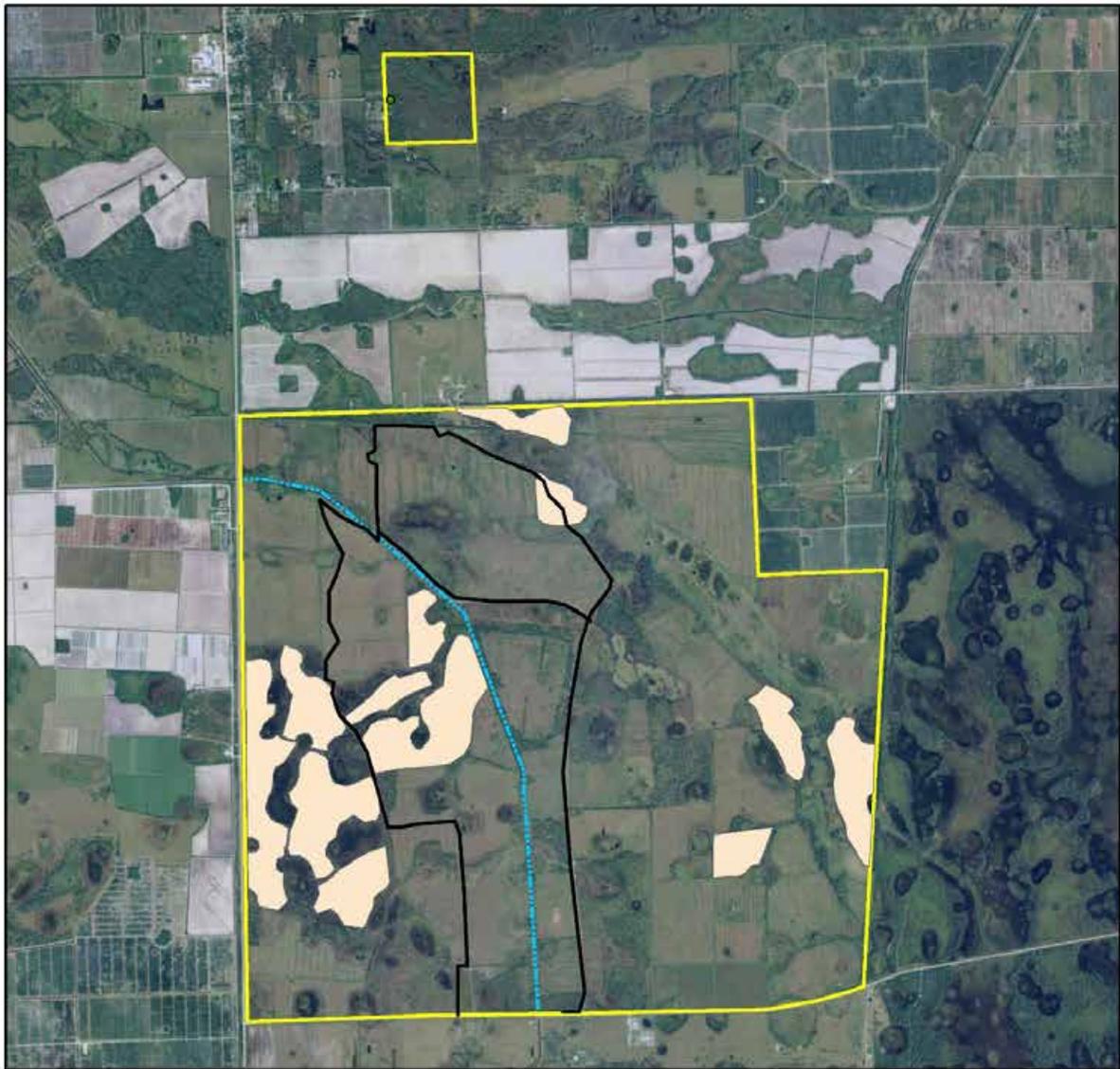
**Goal: Explore and pursue cooperative research opportunities.**

#### **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.

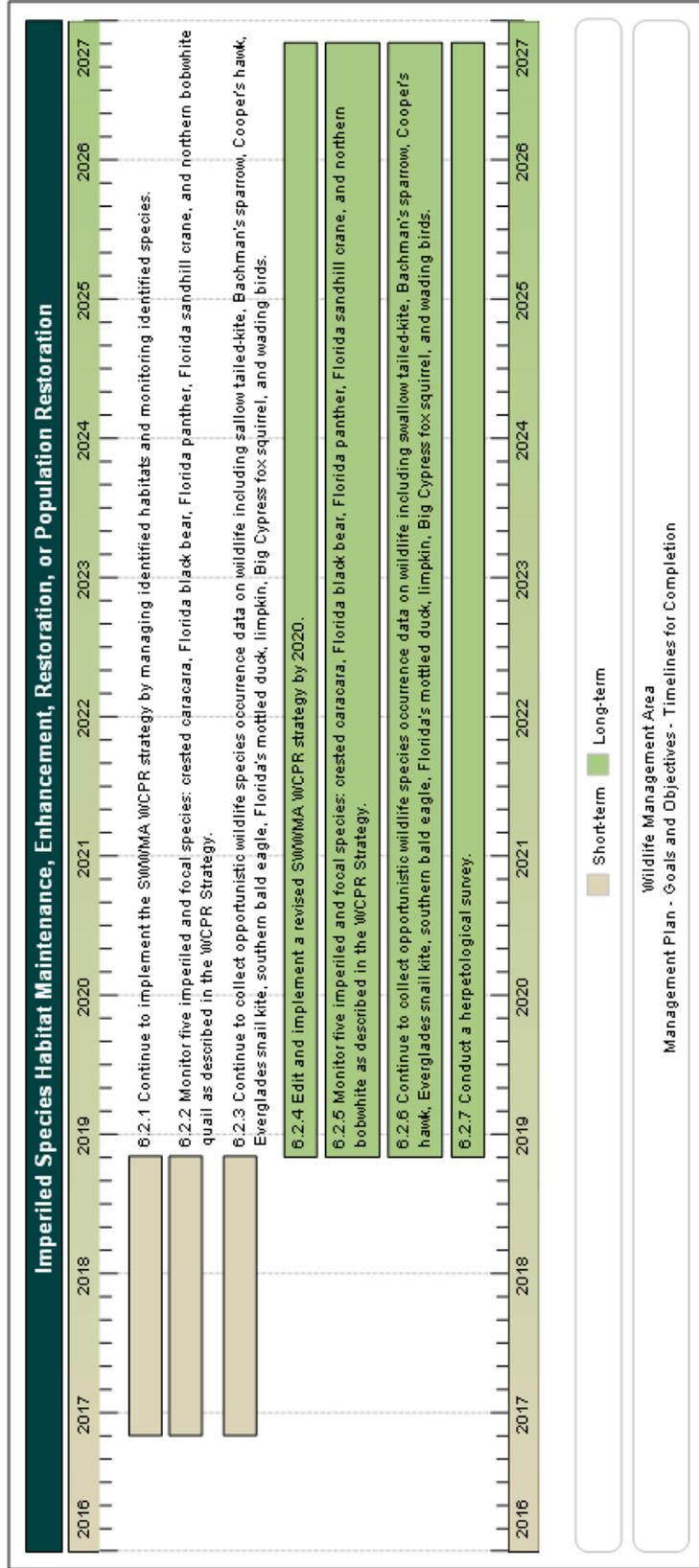
## **7 Schedule: Timelines for Completion of Resource Management Goals and Objectives**

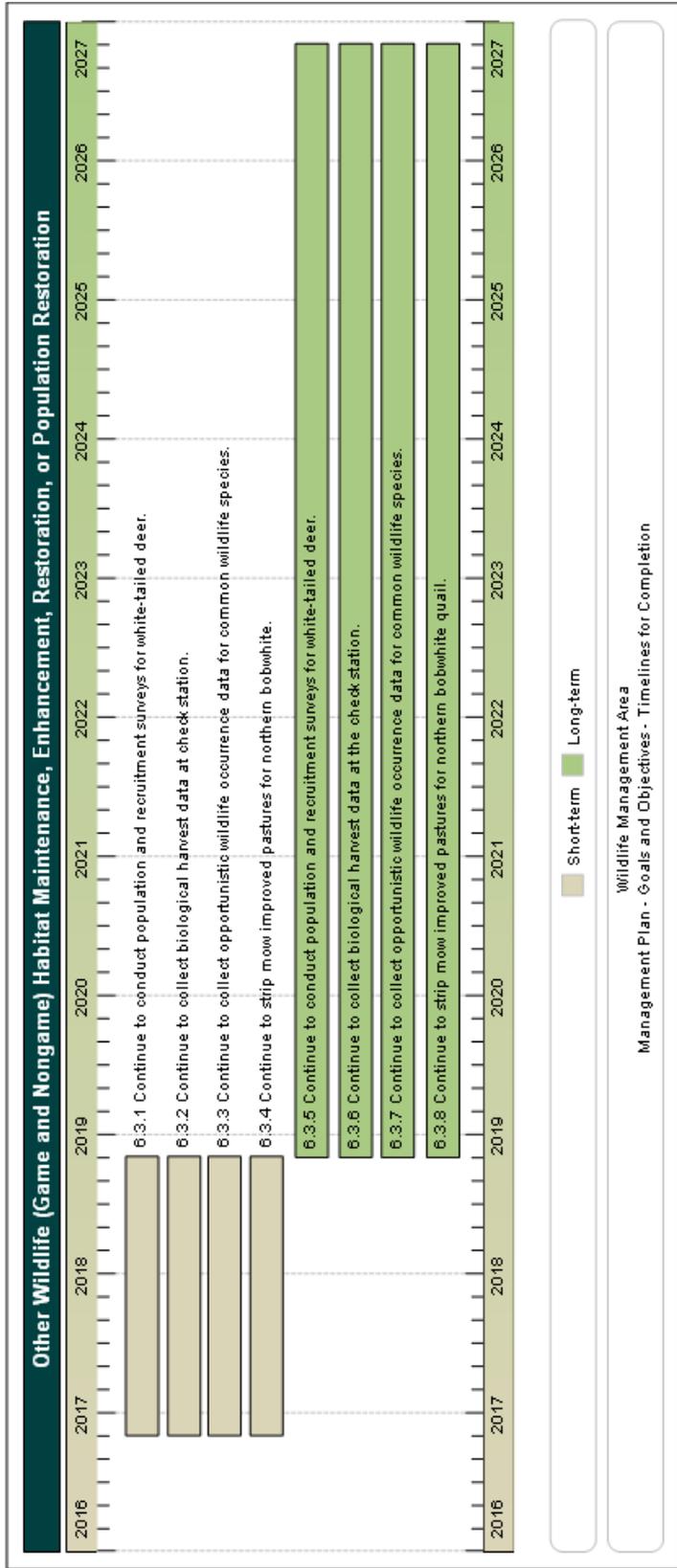
The following section presents the short- and long-term goals and objectives for the management of SWWMA graphically in a timeline format. These timelines directly reflect the short- and long-term goals and objectives presented above in Section 6.

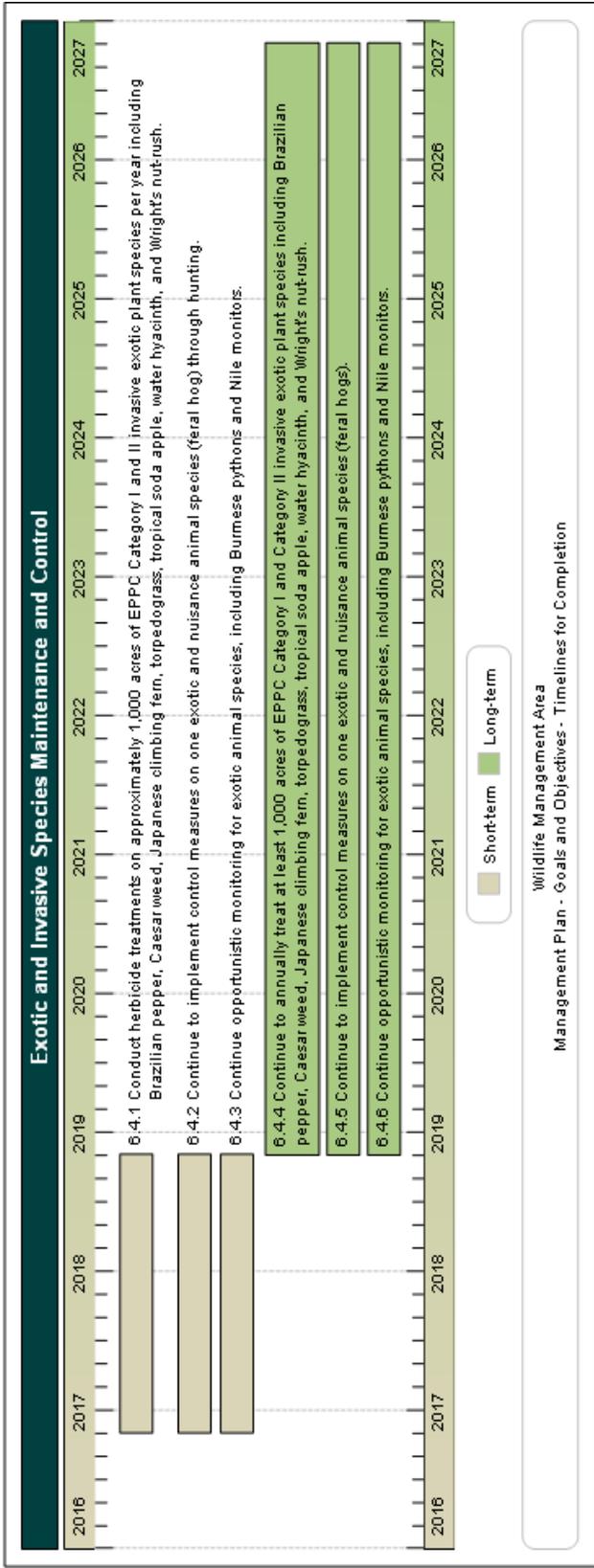


**Figure 13: Locations of Select Objectives**

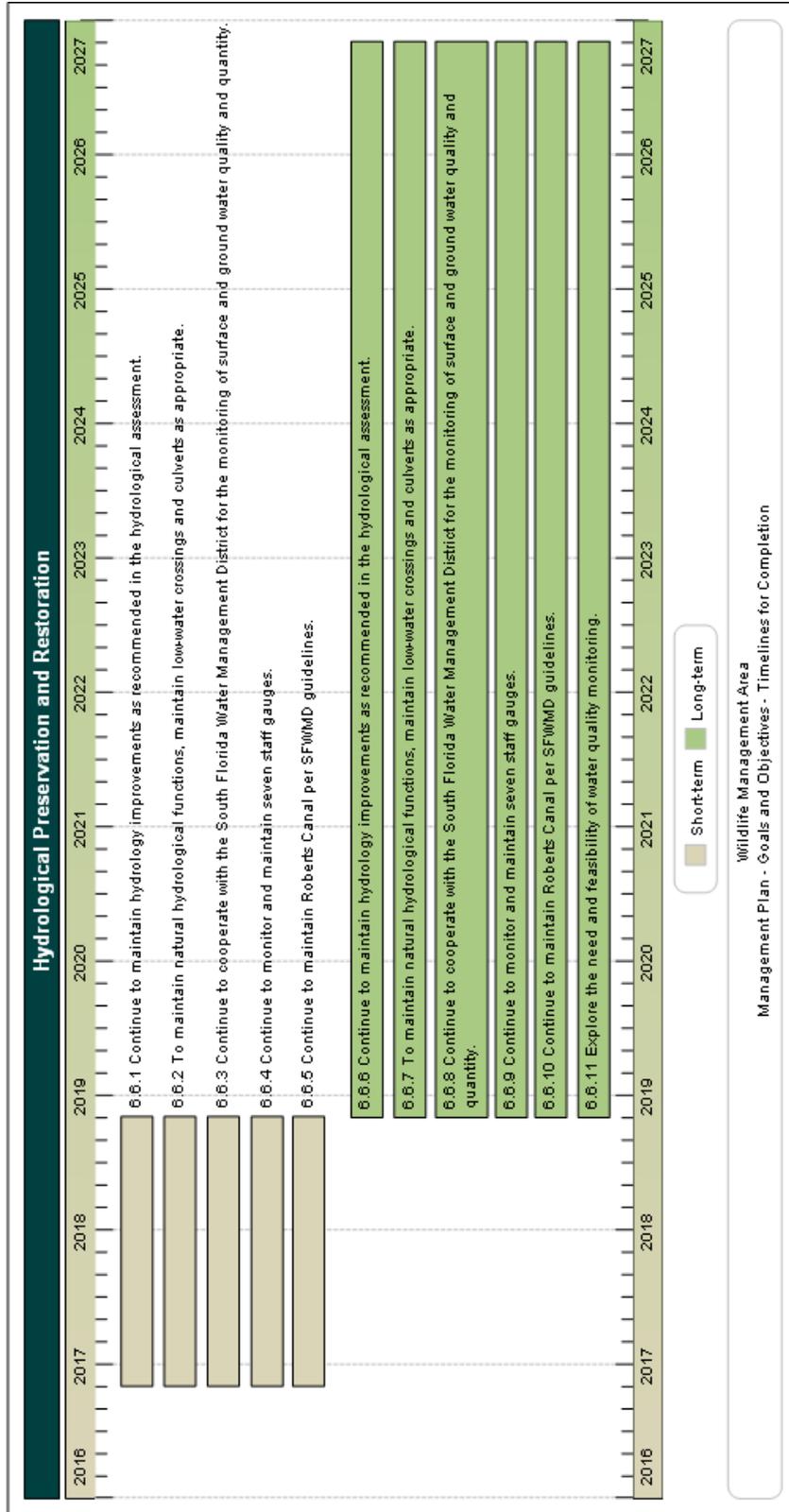


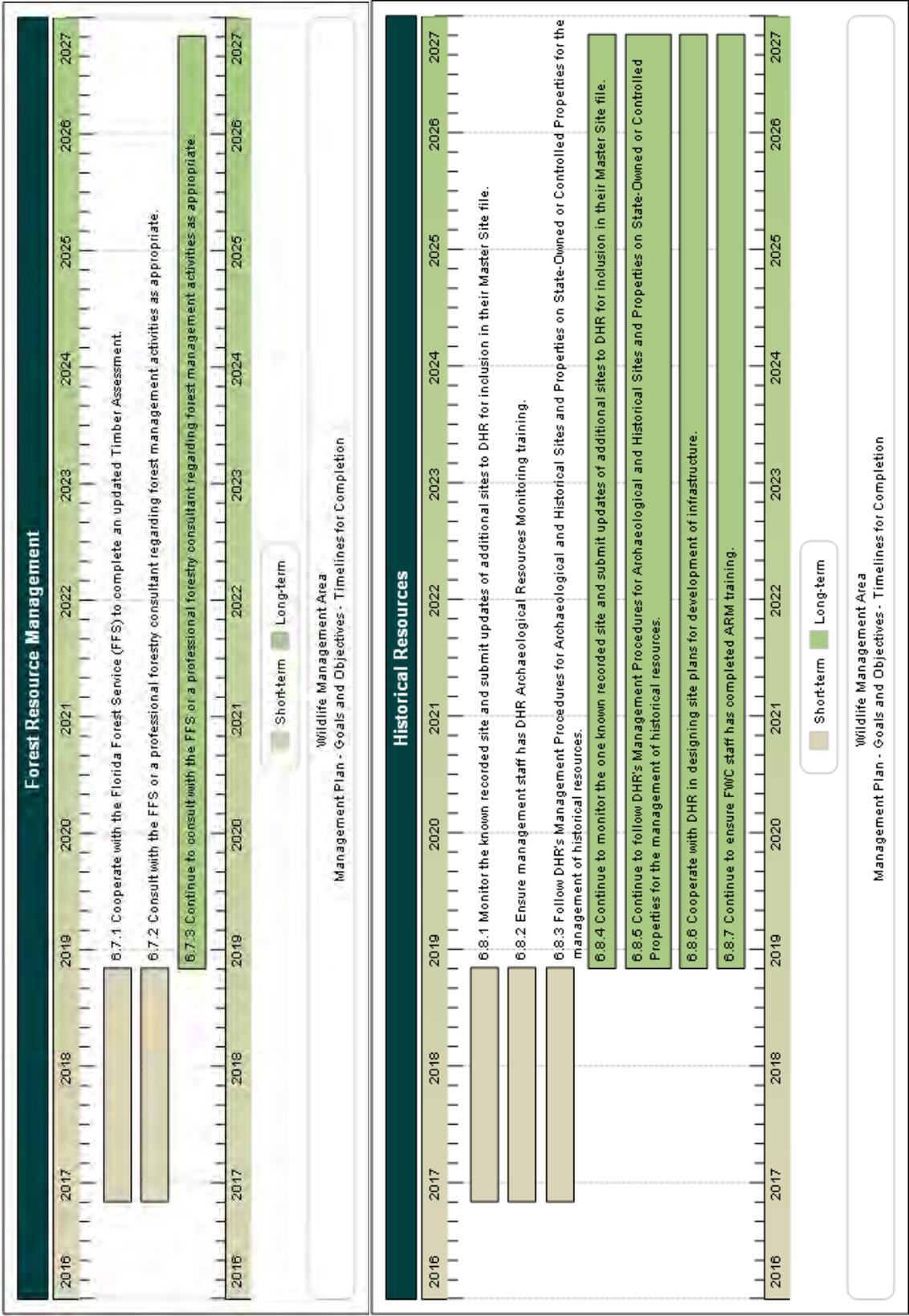




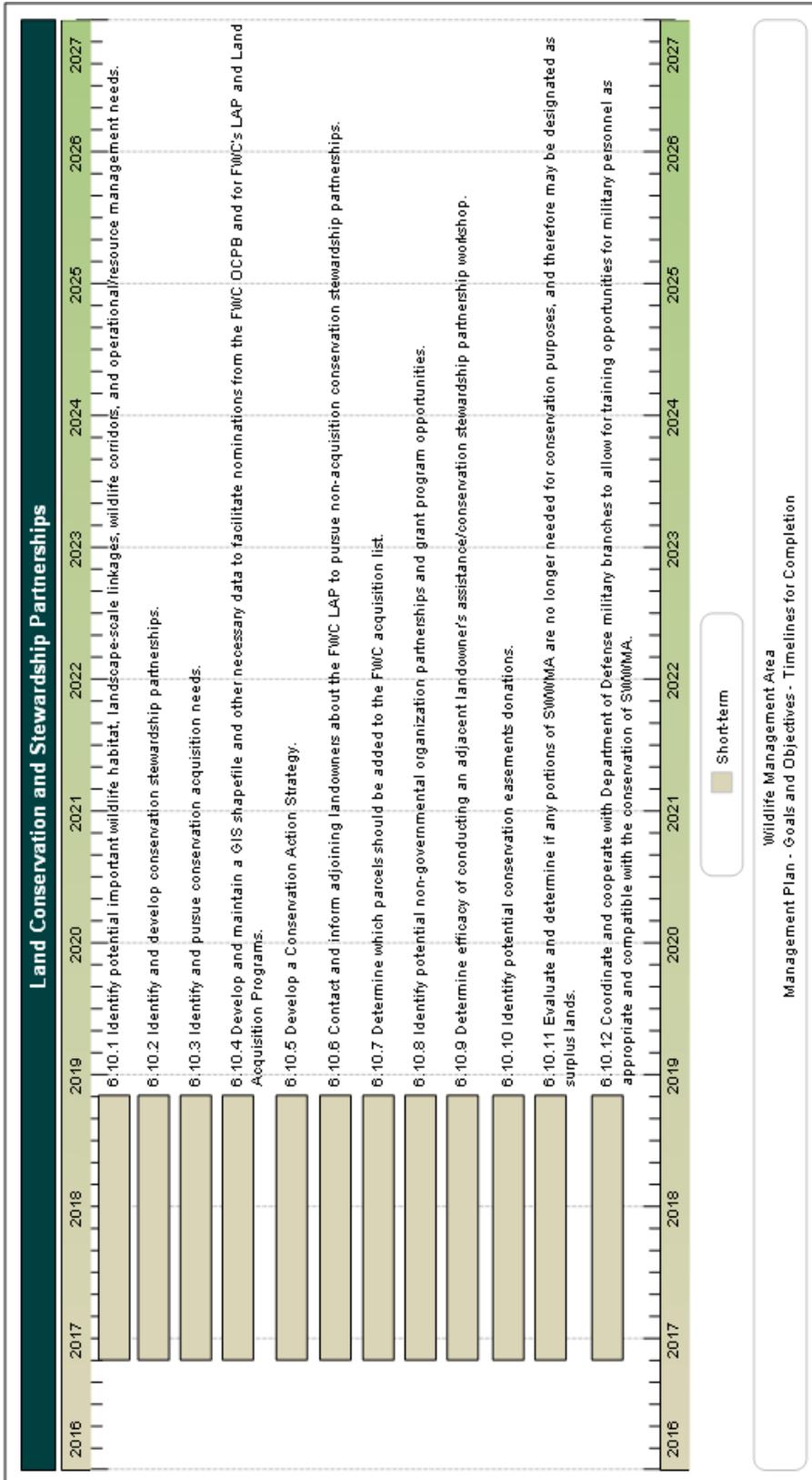


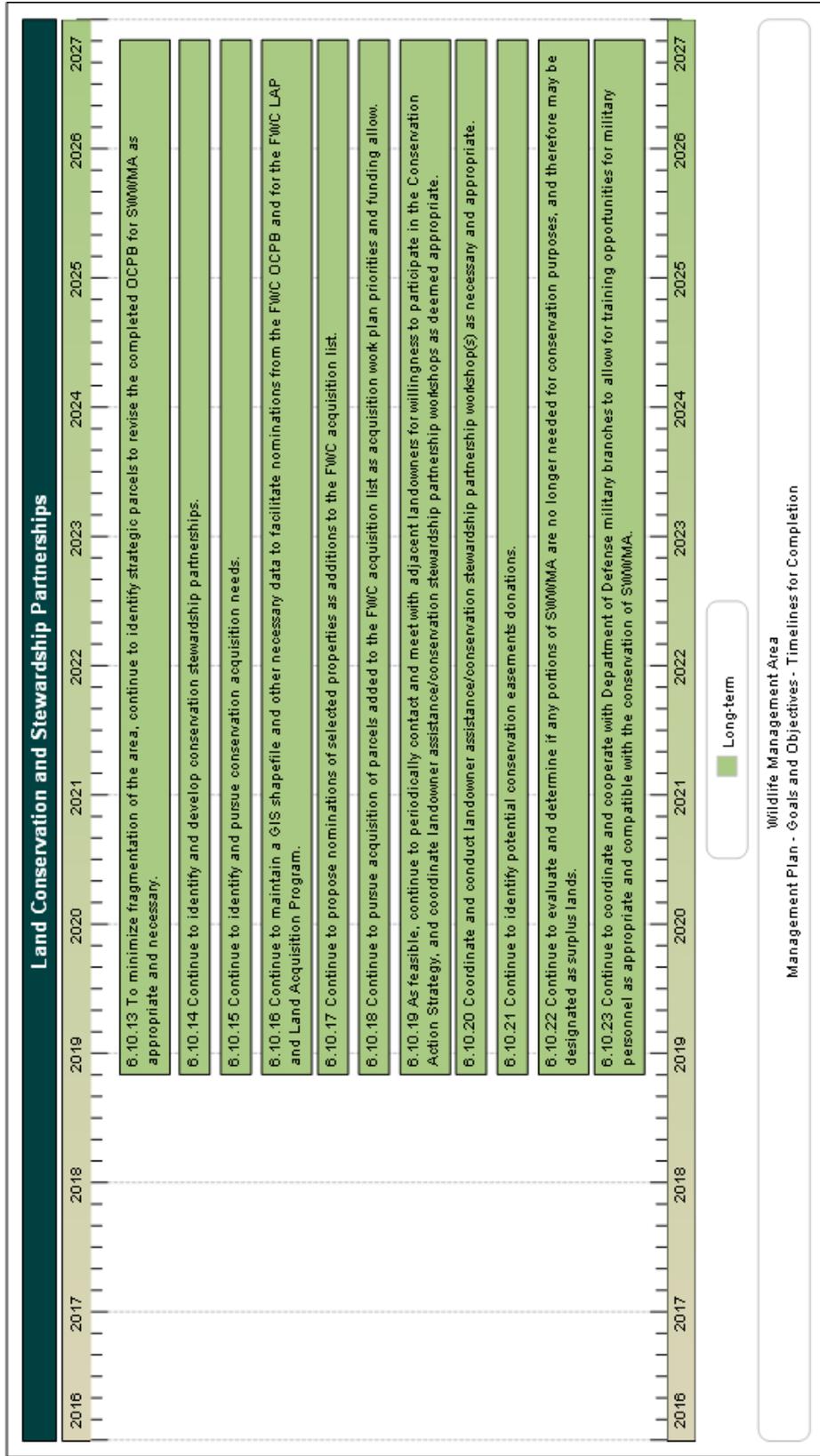


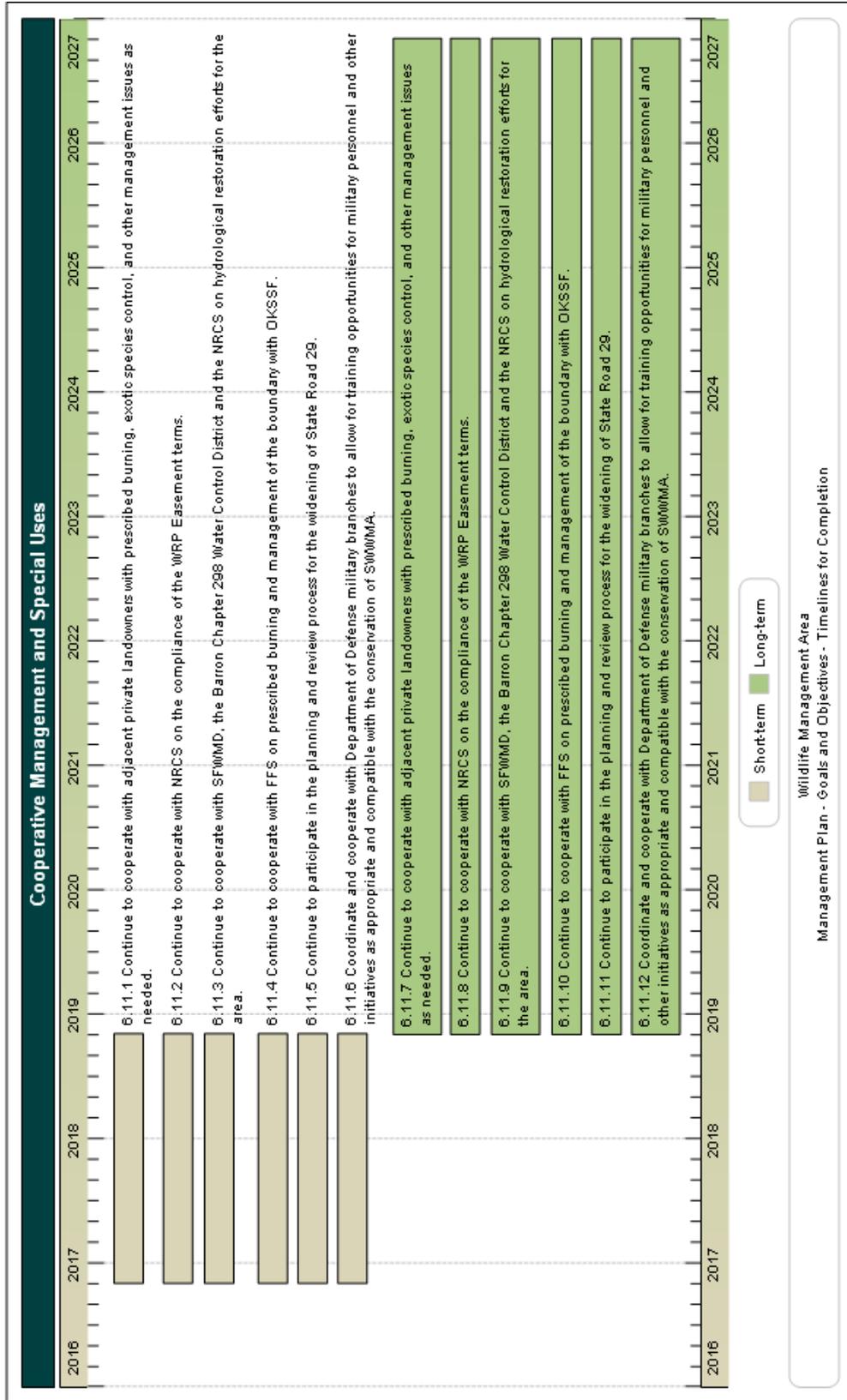


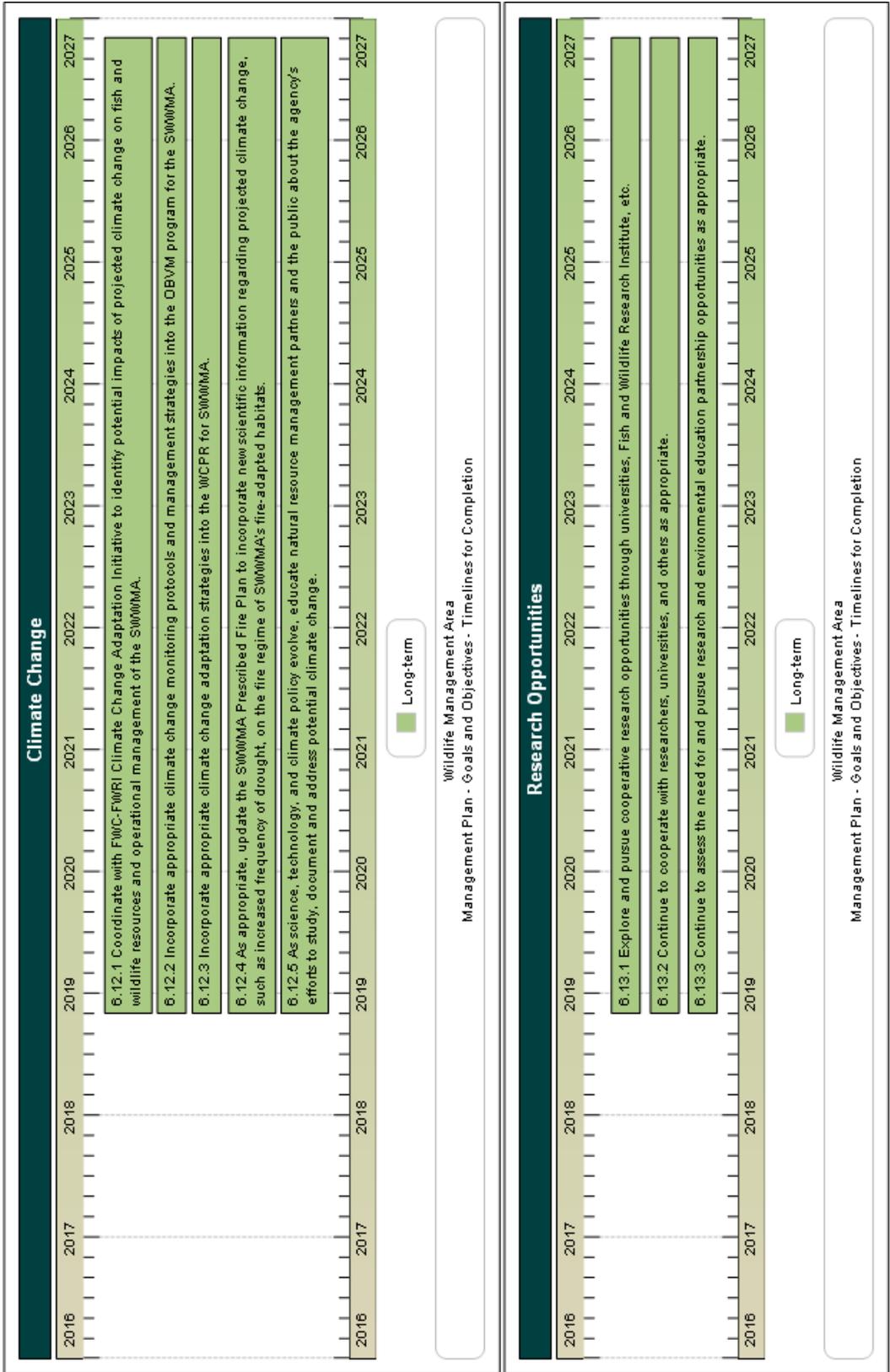












## **8 Resource Management Challenges and Strategies**

The following section identifies and describes further management needs and challenges associated with SWWMA 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: A complete boundary survey of SWWMA is lacking making management and protection of the area more challenging.**

8.1.1 Strategy: Determine perimeters needing a survey and contract for a boundary survey.

### **8.2 Challenge: While currently at minimal levels, unauthorized access, illegal dumping, vandalism, poaching, and unauthorized off-road vehicle (ORV) use may pose an increased threat in the future.**

8.2.1 Strategy: Coordinate with FWC law enforcement and Hendry County to assist with control of litter, natural resource use, theft, and vandalism on SWWMA.

8.2.2 Strategy: Continue to recommend funding for the installation of security fencing at the shop/office compound.

### **8.3 Challenge: Currently, the area experiences high levels of unauthorized access and poaching of palmetto fruit which coincides with the public hunts on the area.**

8.3.1 Strategy: Continue to provide area-wide security through FWC Law Enforcement patrols.

### **8.4 Challenge: The area continues to face challenges with prescribed burning and urban-interface with SR 29 and County Rd. 832 as its west and south boundaries, respectively.**

8.4.1 Strategy: Explore the feasibility for increasing the area's staffing in order to meet minimum staffing requirements to burn units when current weather conditions are appropriate for burning.

8.4.2 Strategy: Continue to recommend funding to contract the burning activities for the area.

**8.5 Challenge: Currently, Roberts Canal must be treated regularly due to invasive vegetation entering from adjacent lands.**

8.5.1 Strategy: Coordinate with the local Cooperative Invasive Species Management Area (CISMA) and FWC's Landowner Assistance Program to work with adjacent landowners to control and manage exotic invasive plants on adjacent properties.

**8.6 Challenge: Currently, law enforcement and management staffing is at insufficient levels for optimal management of SWWMA.**

8.6.1 Strategy: Pursue funding for increased law enforcement and management staffing and additional private sector contract services.

8.6.2 Strategy: Explore potential volunteer resources for assisting with management.

**8.7 Challenge: The SWWMA is not a well-known public outdoor recreation destination.**

8.7.1 Strategy: Improve public access points to increase visibility and accessibility.

8.7.2 Strategy: Work with local and Hendry County tourism boards to promote SWWMA.

8.7.3 Strategy: Cross-promote SWWMA with other regional public conservation lands.

**8.8 Challenge: Currently there are densities of exotic species on adjacent lands providing an extensive source of seed that disperses throughout and onto the SWWMA.**

8.8.1 Strategy: Coordinate with the local Cooperative Invasive Species Management Area (CISMA), FWC's Uplands Invasive Plant Species Section, FWC's Landowner Assistance Program, and private organizations to obtain resources to control and manage exotic invasive plants on adjacent properties and the area.

8.8.2 Strategy: Cooperate with adjacent landowners on exotic species control and on obtaining funding to aid in exotic species management on adjacent private lands.

**8.9 Challenge: Currently the mineral rights within much of the SWWMA are held by owners other than the Board of Trustees, which may potentially impact the public access, fish and wildlife resources, and management of the area if exploration and development of those mineral rights were to occur on the SWWMA.**

**8.9.1 Strategy:** Explore the potential of acquiring the mineral rights within the SWWMA.

**8.9.2 Strategy:** Continue to cooperate and consult with permitting agencies including the DEP on any possible development of those mineral rights to mitigate any potential adverse impacts on the resources of the SWWMA.

**8.10 Challenge: Currently there is insufficient habitat on the SWWMA to maintain wide-ranging species like the Florida panther.**

**8.10.1 Strategy:** Continue to recommend completion of adjacent and nearby Florida Forever acquisition projects such as the Twelve Mile Slough, Panther Glades, Devil's Garden, Half Circle L Ranch, Caloosahatchee Ecoscape, Corkscrew Ecosystem, and Everglades, Florida Forever projects.

**8.10.2 Strategy:** Continue to work with private landowners to enhance conservation stewardship efforts on surrounding private lands.

**8.11 Challenge: Given the history the area was named for fallen wildlife officers, a desire has been expressed to develop a memorial for fallen wildlife offices on the area.**

**8.11.1 Strategy:** Explore the feasibility of establishing a memorial with FWC Law Enforcement.

**8.12 Challenge: Cypress dome swamps are infested with invasive plant species such as torpedograss, and currently there is no acceptable treatment regimen that will eradicate the invasive species without harming the native species.**

**8.12.1 Strategy:** Explore new treatment methods for torpedograss in cypress dome swamps.

## **9 Cost Estimates and Funding Sources**

The following represents the actual and unmet budgetary needs for managing the lands and resources of SWWMA. 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 operational and resource management of the area and is consistent with the current and planned resource management and operation of SWWMA. 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 2014-2015 operational plan showing detailed cost estimates by activity and categories of expenditures, may be found in Appendix 13.11.

**Spirit of the Wild WMA Management Plan Cost Estimate**  
***Maximum expected one year expenditure***

<u>Resource Management</u>	<u>Expenditure</u>	<u>Priority schedule:</u>
Exotic Species Control	\$389,808	Immediate (annual)
Prescribed Burning	\$146,061	Intermediate (3-4 years)
Cultural Resource Management	\$0	Other (5+ years)
Timber Management	\$0	
Hydrological Management	\$13,029	
Other (Restoration, Enhancement, Surveys, Monitoring, etc.)	\$479,933	
<b>Subtotal</b>	<b>\$1,028,830</b>	
<u>Administration</u>		
General administration	\$7,121	
<u>Support</u>		
Land Management Planning	\$11,750	
Land Management Reviews	\$4,077	
Training/Staff Development	\$4,975	
Vehicle Purchase	\$133,536	
Vehicle Operation and Maintenance	\$31,474	
Other (Technical Reports, Data Management, etc.)	\$3,711	
<b>Subtotal</b>	<b>\$189,523</b>	
<u>Capital Improvements</u>		
New Facility Construction	\$219,169	
Facility Maintenance	\$58,769	
<b>Subtotal</b>	<b>\$277,939</b>	
<u>Visitor Services/Recreation</u>		
Info./Education/Operations	\$14,087	
<u>Law Enforcement</u>		
Resource protection	\$7,129	
<b><u>Total</u></b>	<b>\$1,524,629*</b>	

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

## Spirit of the Wild WMA Management Plan Cost Estimate

### *Ten-year projection*

<u>Resource Management</u>	<u>Expenditure</u>	<u>Priority schedule:</u>
Exotic Species Control	\$3,424,894	Immediate (annual)
Prescribed Burning	\$1,283,308	Intermediate (3-4 years)
Cultural Resource Management	\$0	Other (5+ years)
Timber Management	\$0	
Hydrological Management	\$114,472	
Other (Restoration, Enhancement, Surveys, Monitoring, etc.)	\$4,216,741	
<b>Subtotal</b>	<b>\$9,039,415</b>	
<u>Administration</u>		
General administration	\$62,566	
<u>Support</u>		
Land Management Planning	\$103,237	
Land Management Reviews	\$11,670	
Training/Staff Development	\$43,715	
Vehicle Purchase	\$469,920	
Vehicle Operation and Maintenance	\$276,532	
Other (Technical Reports, Data Management, etc.)	\$32,608	
<b>Subtotal</b>	<b>\$937,681</b>	
<u>Capital Improvements</u>		
New Facility Construction	\$633,067	
Facility Maintenance	\$516,355	
<b>Subtotal</b>	<b>\$1,149,422</b>	
<u>Visitor Services/Recreation</u>		
Info./Education/Operations	\$123,770	
<u>Law Enforcement</u>		
Resource protection	\$62,633	
<b>Total</b>	<b>\$11,375,487*</b>	

\*Based on the characteristics and requirements of this area, four 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 SWWMA 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 13.6). 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 Management Plan for SWWMA in compliance with Chapter 388.4111 F.S. (Appendix 13.12). The Arthropod Management Plan was developed in cooperation with the local Hendry County arthropod control agency. The 2017-2027 SWWMA Management Plan is also in conformance with the Local Government Comprehensive Plan as approved and adopted for Hendry County, Florida, (Appendix 13.13).

## 12 Endnotes

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- <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.
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- <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.