

A Management Plan for
Hilochee
Wildlife Management Area
2017 - 2027



Lake and Polk Counties, Florida

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

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Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

October 23, 2017

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

RE: Hilochee Wildlife Management Area - Lease #4066

Dear Mr. Houston:

On **October 20, 2017**, the Acquisition and Restoration Council recommended approval of the **Hilochee 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 **Hilochee Wildlife Management Area** management plan. The next management plan update is due October 20, 2027.

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,



Raymond V. Spaulding
Office of Environmental Services
Division of State Lands
Department of Environmental Protection

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**A Management Plan
for
Hilochee Wildlife Management Area**

Lake and Polk Counties, Florida

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



June 2017

Approved Thomas H. Eason

Dr. Thomas Eason
Director, Division of Habitat and Species Conservation

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LAND MANAGEMENT PLAN EXECUTIVE SUMMARY

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

Common Name of Property: Hilochee Wildlife Management Area

Location: Lake and Polk Counties, Florida

Acreage Total: 15,917 acres

Acreage Breakdown:

Land Cover Classification	Acres	Percent of Total Area
Basin swamp	8,217.0	51.8%
Basin marsh	1,367.6	8.6%
Pasture - improved	1,154.4	7.3%
Mesic flatwoods	883.3	5.6%
Wet flatwoods	718.4	4.5%
Pine plantation	619.2	3.9%
Pasture - semi-improved	601.8	3.8%
Baygall	458.6	2.9%
Abandoned field/abandoned pasture	428.8	2.7%
Agriculture	223.8	1.4%
Clearcut pine plantation	169.3	1.1%
Dome swamp	167.2	1.1%
Utility corridor	117.8	0.7%
Sandhill upland lake	101.6	0.6%
Restoration mesic flatwoods	89.7	0.6%
Spoil area	86.8	0.5%
Clearing/regeneration	85.0	0.5%
Artificial pond	82.4	0.5%
Scrubby flatwoods	61.3	0.4%
Depression marsh	50.0	0.3%
Mesic hammock	41.0	0.3%
Borrow area	35.0	0.2%
Xeric hammock	28.5	0.2%
Developed	22.9	0.1%
Sandhill	17.6	0.1%
Restoration wet flatwoods	11.9	0.1%
Wet prairie	10.2	0.1%
Restoration scrub	6.0	0.0%
Canal/ditch	2.9	0.0%

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

Lease/Management Agreement No.: 4066 (Appendix 12.1)

Use: Single <u> </u>	Management Responsibilities:	
Multiple <u> X </u>	Agency <u>FWC</u>	Responsibilities
		<u>LEAD, SUBLESSEE (Wildlife Management Area, resource protection, law enforcement)</u>

Designated Land Use: Wildlife Management Area

Sublease (s): Billboard advertising, citrus grove management, apiary management, water well monitoring.

Encumbrances: Natural gas pipeline, electric transmission line, adjacent landowner access easement

Type Acquisition: Fish and Wildlife Habitat Program

Unique Features: Natural: Natural communities

Archaeological/Historical: 33 known sites

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: 12,640 acres FWC Additions and Inholdings list; 162,454 acres remaining in the Green Swamp Florida Forever Project.

Surplus Lands/Acreage: None

Public Involvement: Management Advisory Group consensus building meeting and Public Hearing (Appendix 12.3)

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

ARC Approval Date _____ BTIITF Approval Date: _____

Comments: _____

Land Management Plan Compliance Checklist

Required for State-owned conservation lands over 160 acres

Section A: Acquisition Information Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
1	The common name of the property.	18-2.018 & 18-2.021	1
2	The land acquisition program, if any, under which the property was acquired.	18-2.018 & 18-2.021	12
3	Degree of title interest held by the Board, including reservations and encumbrances such as leases.	18-2.021	13
4	The legal description and acreage of the property.	18-2.018 & 18-2.021	1, 38
5	A map showing the approximate location and boundaries of the property, and the location of any structures or improvements to the property.	18-2.018 & 18-2.021	4, 111-112
6	An assessment as to whether the property, or any portion, should be declared surplus. <i>Provide information regarding assessment and analysis in the plan, and provide corresponding map.</i>	18-2.021	88
7	Identification of other parcels of land within or immediately adjacent to the property that should be purchased because they are essential to management of the property. <i>Please clearly indicate parcels on a map.</i>	18-2.021	113-114
8	Identification of adjacent land uses that conflict with the planned use of the property, if any.	18-2.021	18
9	A statement of the purpose for which the lands were acquired, the projected use or uses as defined in 253.034 and the statutory authority for such use or uses.	259.032(10)	3
10	Proximity of property to other significant State, local or federal land or water resources.	18-2.021	13

Section B: Use Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
11	The designated single use or multiple use management for the property, including use by other managing entities.	18-2.018 & 18-2.021	85-86
12	A description of past and existing uses, including any unauthorized uses of the property.	18-2.018 & 18-2.021	84-85
13	A description of alternative or multiple uses of the property considered by the lessee and a statement detailing why such uses were not adopted.	18-2.018	87
14	A description of the management responsibilities of each entity involved in the property's management and how such responsibilities will be coordinated.	18-2.018	116
15	Include a provision that requires that the managing agency consult with the Division of Historical Resources, Department of State before taking actions that may adversely affect archeological or historical resources.	18-2.021	110

Land Management Plan Compliance Checklist

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	116, 136
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)	87
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	431
19	Letter of compliance from the local government stating that the LMP is in compliance with the Local Government Comprehensive Plan.	BOT requirement	96-132
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	87
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	109
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	88
23	A statement regarding incompatible use in reference to Ch. 253.034(10).	253.034(10)	

*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

Land Management Plan Compliance Checklist

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	19, 254
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)	254
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)	19, 254
27	Summary of comments and concerns expressed by the advisory group for parcels over 160 acres	18-2.021	254
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)	19, 254
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	2, 97, 281
30	Summary of comments and concerns expressed by the management review team, if required by Section 259.036, F.S.	18-2.021	281
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	281

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	21-33, 299

Land Management Plan Compliance Checklist

33	Insert FNAI based natural community maps when available.	ARC consensus	21, 35-66
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	21, 35-66, 81
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	21, 35-66, 81
36	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding beaches and dunes.	18-2.021	81
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	84
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	21, 35-66, 81
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	78-81
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	78-81, 318
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)	96-132
42	Habitat Restoration and Improvement	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.	↓	104, 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.		119
42-C.	The associated measurable objectives to achieve the goals.		119
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>		96-132
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.		134-135, 467

Land Management Plan Compliance Checklist

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)	21, 35-46
44	Sustainable Forest Management, including implementation of prescribed fire management		
44-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).		109, 125
44-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).	18-2.021, 253.034(5) & 259.032(10) ↓	125
44-C.	Measurable objectives (see requirement for #42-C).		125
44-D.	Related activities (see requirement for #42-D).		96-132
44-E.	Budgets (see requirement for #42-E).		134-135, 467
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).	↓	104, 121
45-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		121
45-C.	Measurable objectives (see requirement for #42-C).		121
45-D.	Related activities (see requirement for #42-D).		96-132
45-E.	Budgets (see requirement for #42-E).		134-135, 467
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)	53, 105-106
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	469
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).	↓	105, 132
48-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		132
48-C.	Measurable objectives (see requirement for #42-C).		132
48-D.	Related activities (see requirement for #42-D).		96-132
48-E.	Budgets (see requirement for #42-E).		134-135, 467

Section E: Water Resources

Land Management Plan Compliance Checklist

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	81
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	84
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	84
52	***Quantitative description of the land regarding an inventory of hydrological features and associated acreage. <i>See footnote.</i>	253.034(5)	110
53	Hydrological Preservation and Restoration	259.032(10) & 253.034(5)	
53-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	109, 125
53-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		125
53-C.	Measurable objectives (see requirement for #42-C).		125
53-D.	Related activities (see requirement for #42-D).		96-132
53-E.	Budgets (see requirement for #42-E).		134-135, 467

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	84
55	***Quantitative data description of the land regarding an inventory of significant land, cultural or historical features and associated acreage.	253.034(5)	84
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	110
57	Cultural and Historical Resources	259.032(10) & 253.034(5)	
57-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).	↓	110, 126
57-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		126
57-C.	Measurable objectives (see requirement for #42-C).		126

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57-D.	Related activities (see requirement for #42-D).		96-132
57-E.	Budgets (see requirement for #42-E).		134-135, 467

**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)	110-112
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).	↓	110, 126
59-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		126
59-C.	Measurable objectives (see requirement for #42-C).		126
59-D.	Related activities (see requirement for #42-D).		96-132
59-E.	Budgets (see requirement for #42-E).		134-135, 467
60	*** Quantitative data description of the land regarding an inventory of recreational facilities and associated acreage.	253.034(5)	106-108, 111-112
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).	↓	106, 123
61-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		123
61-C.	Measurable objectives (see requirement for #42-C).		123
61-D.	Related activities (see requirement for #42-D).		96-132
61-E.	Budgets (see requirement for #42-E).		134-135, 467

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	v
63	Place the Executive Summary at the front of the LMP. Include a physical description of the land.	ARC and 253.034(5)	iii
64	If this LMP is a 10-year update, note the accomplishments since the drafting of the last LMP set forth in an organized (categories or bullets) format.	ARC consensus	89

Land Management Plan Compliance Checklist

65	Key management activities necessary to achieve the desired outcomes regarding other appropriate resource management.	259.032(10)	96-132
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)	134-135, 467
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)	134-135, 467
68	A statement of gross income generated, net income and expenses.	18-2.018	86, 134-135, 467

*** = 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
ARM	Archaeological Resources Management
BEBR	Bureau of Economic and Business Research
CARL	Conservation and Recreation Lands Program
CAS	Conservation Action Strategy
DEP	Department of Environmental Protection
DHR	Division of Historical Resources
DRP	Division of Recreation and Parks
DSL	Division of State Lands
F	Fahrenheit
FAC	Florida Administrative Code
FE	Federally Endangered
FFS	Florida Forest Service
FLEPPC	Florida Exotic Pest Plant Council
FNAI	Florida Natural Areas Inventory
FS	Florida Statute(s)
FT	Federally Threatened
FT (S/A)	Federally Threatened due to similarity of appearance
FWC	Florida Fish and Wildlife Conservation Commission

Management Plan Acronym Key

FWRI	Fish and Wildlife Research Institute
GFC	Florida Game and Freshwater Fish Commission
GIS	Geographic Information Systems
GPS	Geographic Positioning System
HWMA	Hilochee Wildlife Management Area
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
NRCS	Natural Resource Conservation Service
OBVM	Objective-Based Vegetation Management
OCPB	Optimal Conservation Planning Boundary
OFW	Outstanding Florida Waters
ORB	Optimal Resource Boundary
ORV	Off-Road Vehicle
PASO	Public Access Services Office
RMP	Recreational Management Plan
SE	State Endangered
SJRWMD	St. John's River Water Management District
SMA	Strategic Management Area
SSC	State Species of Special Concern
ST	State Threatened
SWFWMD	Southwest Florida Water Management District
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WCPR	Wildlife Conservation Prioritization and Recovery
WEA	Wildlife and Environmental Area
WMA	Wildlife Management Area

1 Introduction and General Information

Located within the Green Swamp system, Hilochee Wildlife Management Area (HWMA) conserves an important watershed and also provides important habitat for a wide variety of imperiled and rare wildlife species such as the Sherman's fox squirrel (*Sciurus niger shermani*), Audubon's crested caracara (*Polyborus plancus audubonii*), gopher tortoise (*Gopherus polyphemus*), eastern indigo snake (*Drymarchon corais couperi*), wood stork (*Mycteria americana*), and Florida black bear (*Ursus americanus floridanus*), among many others. It also provides an important area for people within the rapidly growing region between Tampa and Orlando to recreate and find respite from the urban landscape.

Set within a landscape mosaic of cypress swamps, pine forests and pastures, the Green Swamp is the headwaters of four major river systems, the Withlacoochee, Ocklawaha Hillsborough, and Peace Rivers. Because it has the highest groundwater elevation in the Florida peninsula, the Green Swamp is considered a critical recharge area for the Floridan aquifer, and thus protects a vital part of the water supply of central Florida. For these reasons, it has been designated An Area of Critical State Concern.

The following management plan has been developed for the Florida Fish and Wildlife Conservation Commission's (FWC) HWMA, and is proposed for submittal to the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida (Board of Trustees) and the Acquisition and Restoration Council (ARC) through the Florida Department of Environmental Protection's (DEP) Division of State Lands (DSL) 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 the DSL.

The HWMA 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 HWMA is managed to conserve and restore natural wildlife habitat, while providing high-quality opportunities for hunting, fishing, wildlife viewing, and other fish and wildlife-based public outdoor recreation opportunities including horseback-riding, paddling, bicycling and hiking.

The HWMA is owned by the Board of Trustees, with FWC having lead management authority for all resources within the established boundary. The Department of Agriculture and Consumer Services' Florida Forest Service (FFS) is a designated cooperating agency. The original HWMA (approximately 4,350 acres) was established by the Florida Game and Freshwater Fish Commission (GFC; now FWC) in 1995. Subsequent acquisitions, further described below (Section 1.3), increased the overall size of the area to its present day 15,917 acres.

The FWC is responsible for operation of HWMA as a wildlife management area as provided through the lease agreement with the Board of Trustees. Further management authority derives from Article IV, Section 9 of the Florida Constitution as well as the guidance and directives of Chapters 372, 253, 259, 327, 370, 403, 870, 373, 375, 378, 487, and 597 of the Florida Statutes. These laws provide the authority for FWC with regard to protection and management of the State's fish and wildlife resources.

1.1 Management Plan Purpose

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

This Management Plan is submitted for review to the ARC acting on behalf of the Board of Trustees through DSL, in compliance with paragraph seven of Lease No. 4066 (Appendix 13.1) and pursuant to Chapters 253 and 259, FS, and Chapters 18-2 and 18-4, FAC. Format and content were drafted in accordance with ARC requirements for management plans and the model plan outline provided by the staff of DSL. Terms (Appendix 13.2) 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 (MAG) and solicits additional input from user groups and the general public at a public hearing (Appendix 13.3). The FWC also engages area, district, and regional agency staff, as well as other FWC subject matter experts, 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 HWMA 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 HWMA. The LMR report (Section 5.1, Appendix 13.4) 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 HWMA.

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 HWMA is located nine miles south of Clermont in Lake and Polk counties, Florida (Figures 1 - 9). Currently, lands of HWMA managed by FWC include five separate tracts; Hilochee Unit (original 1995 acquisition and the subsequent Jahna Parcel), Osprey Unit, Wander, Polk Partners, and Ritter parcels (Figure 3). In aggregate, HWMA spans nearly 19 miles from north to south, and 14 miles from east to west, totaling approximately 15,917 acres. In Lake County, HWMA is within multiple Sections of Township 24 South, and Ranges 25 and 26 East (Figure 2). In Polk County, HWMA is within multiple Sections of Townships 25, 26, and 27 South, and Ranges 24 and 26 East.

1.3 Acquisition

1.3.1 Purpose for Acquisition of the Property

The original management prospectus prepared by GFC for HWMA, and included in the 1997 Conservation and Recreational Lands Acquisition Program (CARL) Annual Report, states that the purpose of acquisition for the Green Swamp is for the preservation “of the mosaic of land use in this region... [and protection of] the Floridan aquifer and the several rivers; [preservation of] a large area for wildlife; and [provision of] areas for public recreation in the rapidly growing region between Tampa and Orlando.” This is consistent with the Management Policy Statement included in the 2003 Florida Forever Five Year Plan for the Green Swamp project indicating HWMA was acquired “to conserve and protect significant habitat for native species or endangered and threatened species; to conserve, protect, manage, or restore important ecosystems, landscapes, and forests, in order to enhance or protect significant surface water, coastal, recreational, timber, fish and wildlife resources...; and to provide areas,..., for natural-resource-based recreation.” Similarly, the 2014 Florida Forever Five Year Plan for the Green Swamp Florida Forever Project indicates “The primary

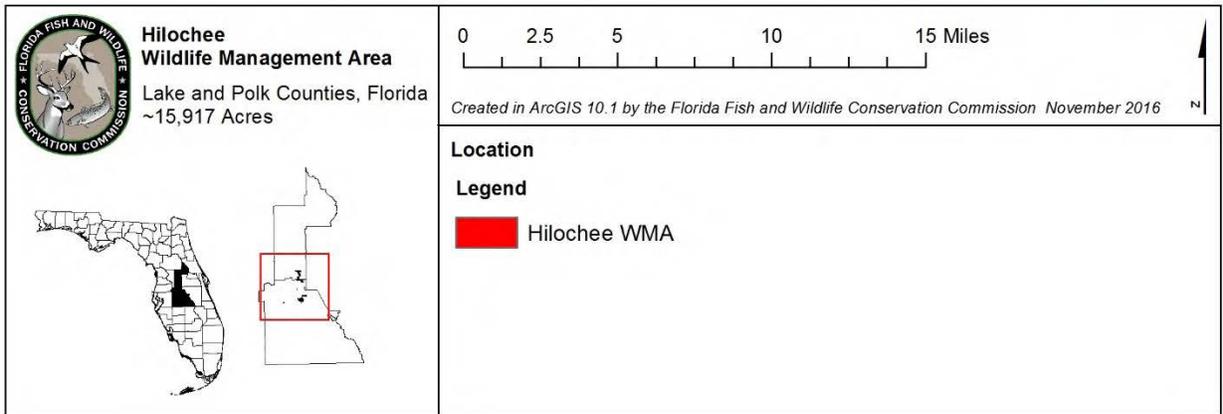
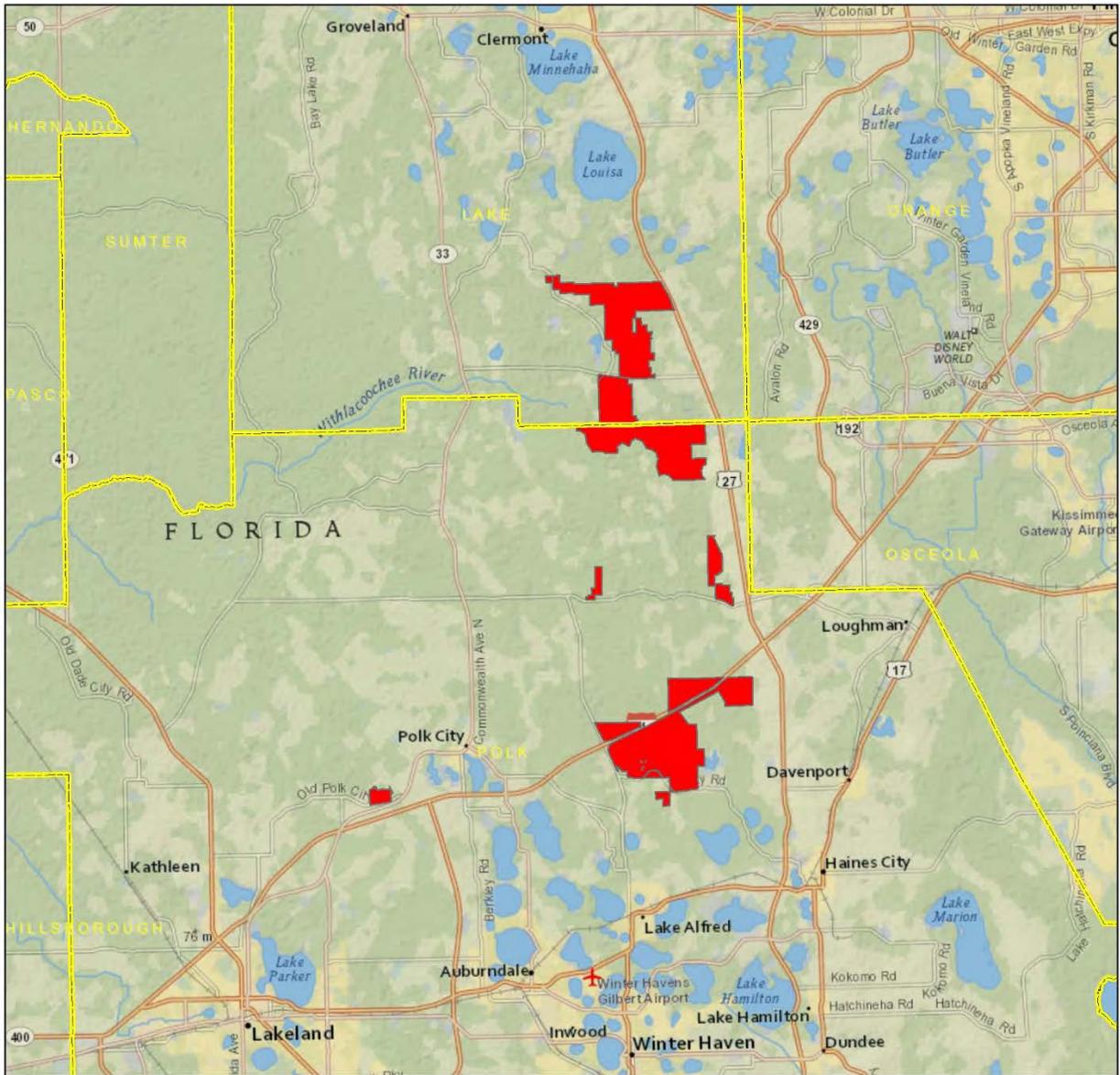


Figure 1. Location

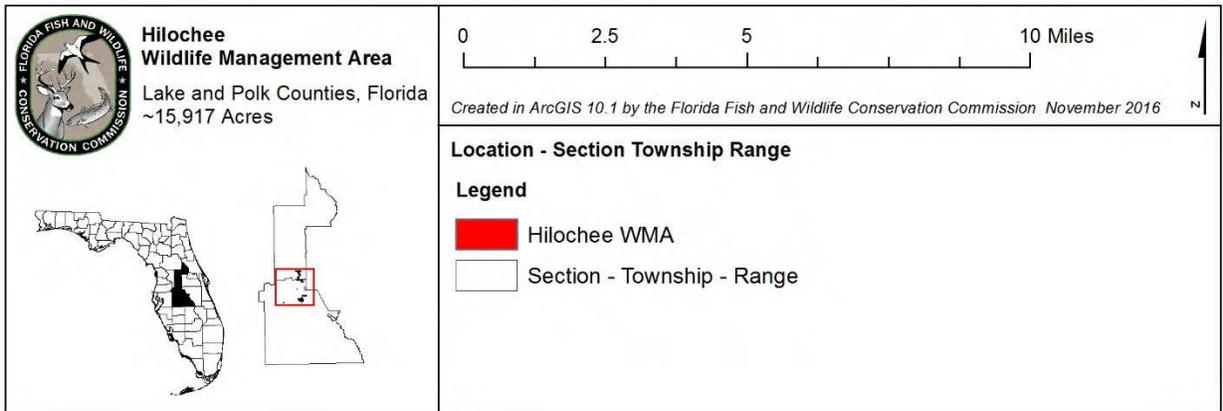
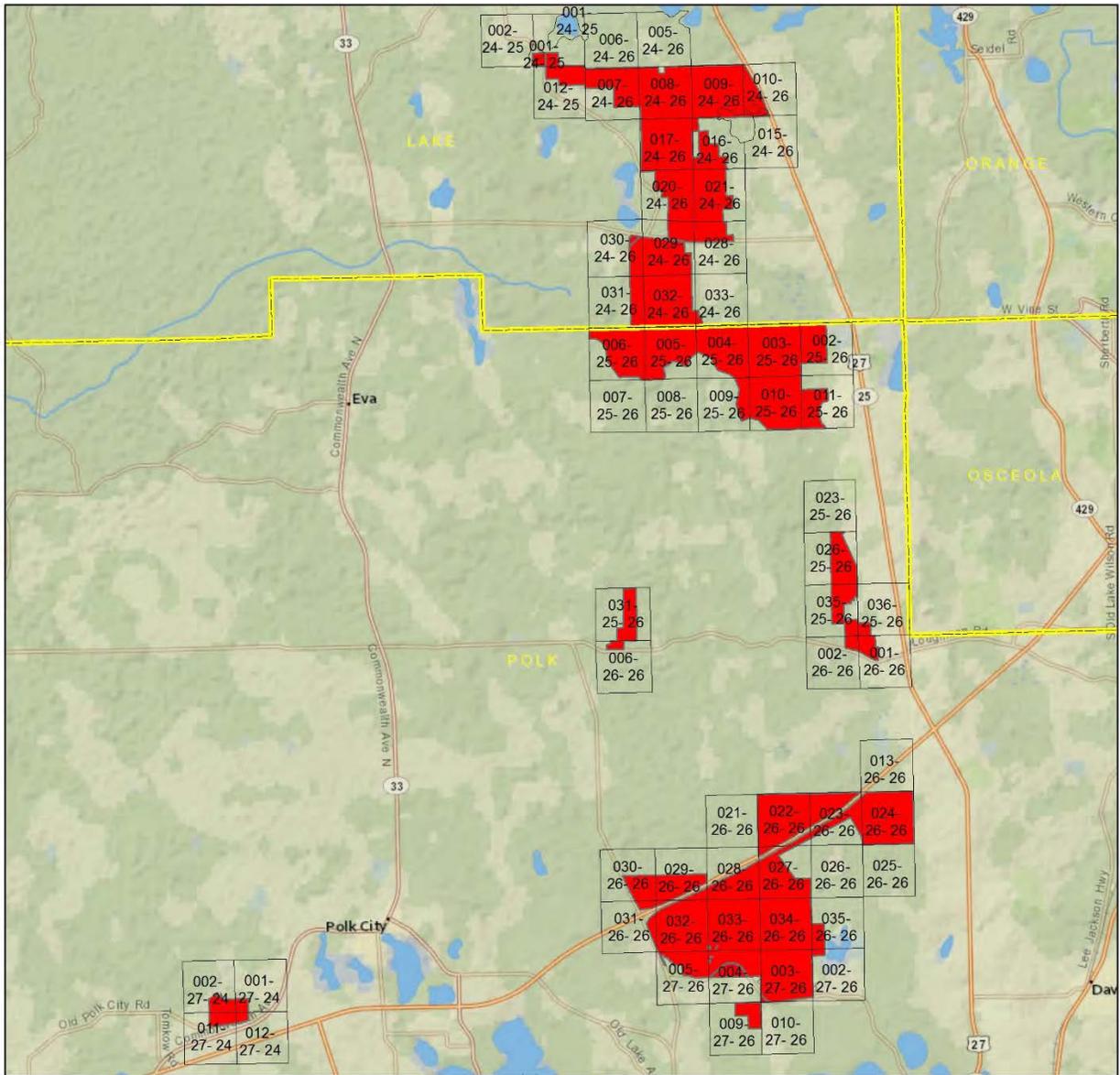


Figure 2. Location - Section Township Range

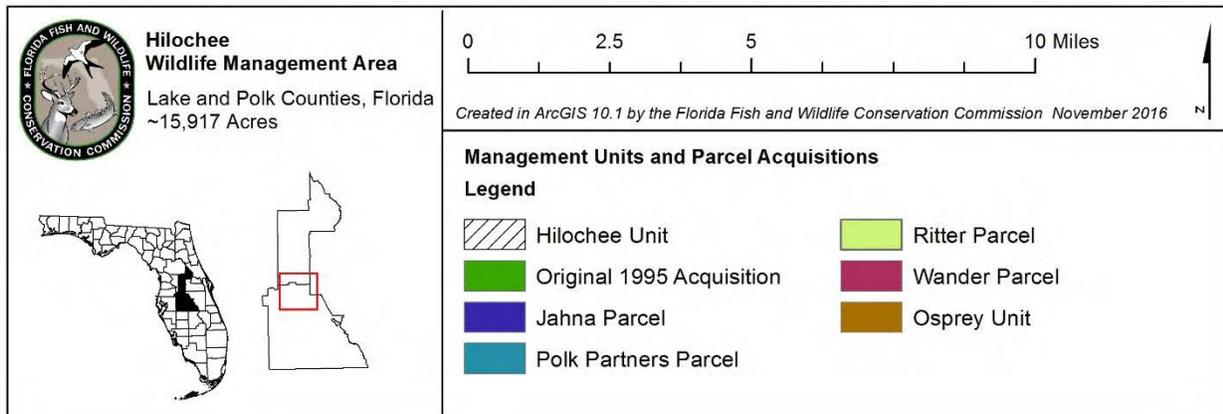
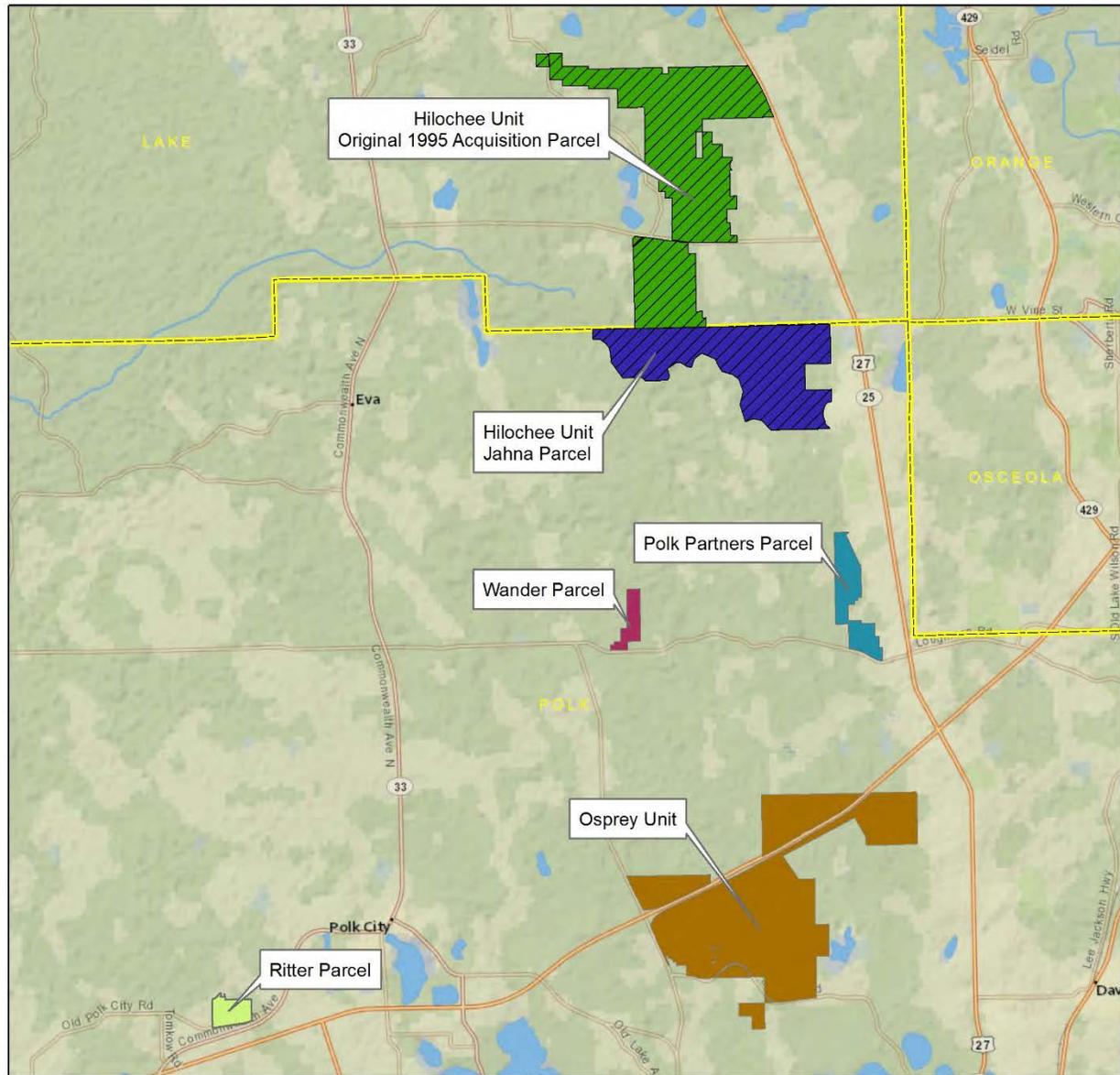


Figure 3. Management Units and Parcel Acquisitions

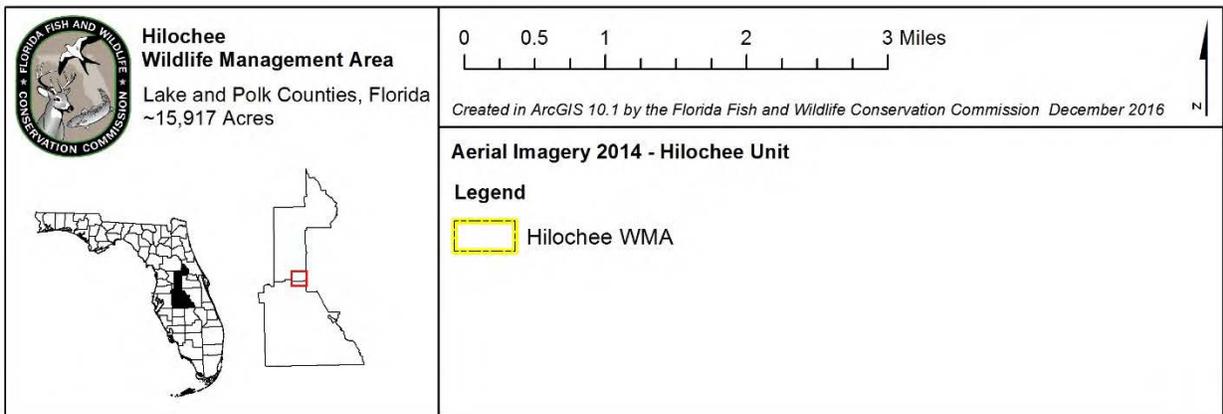
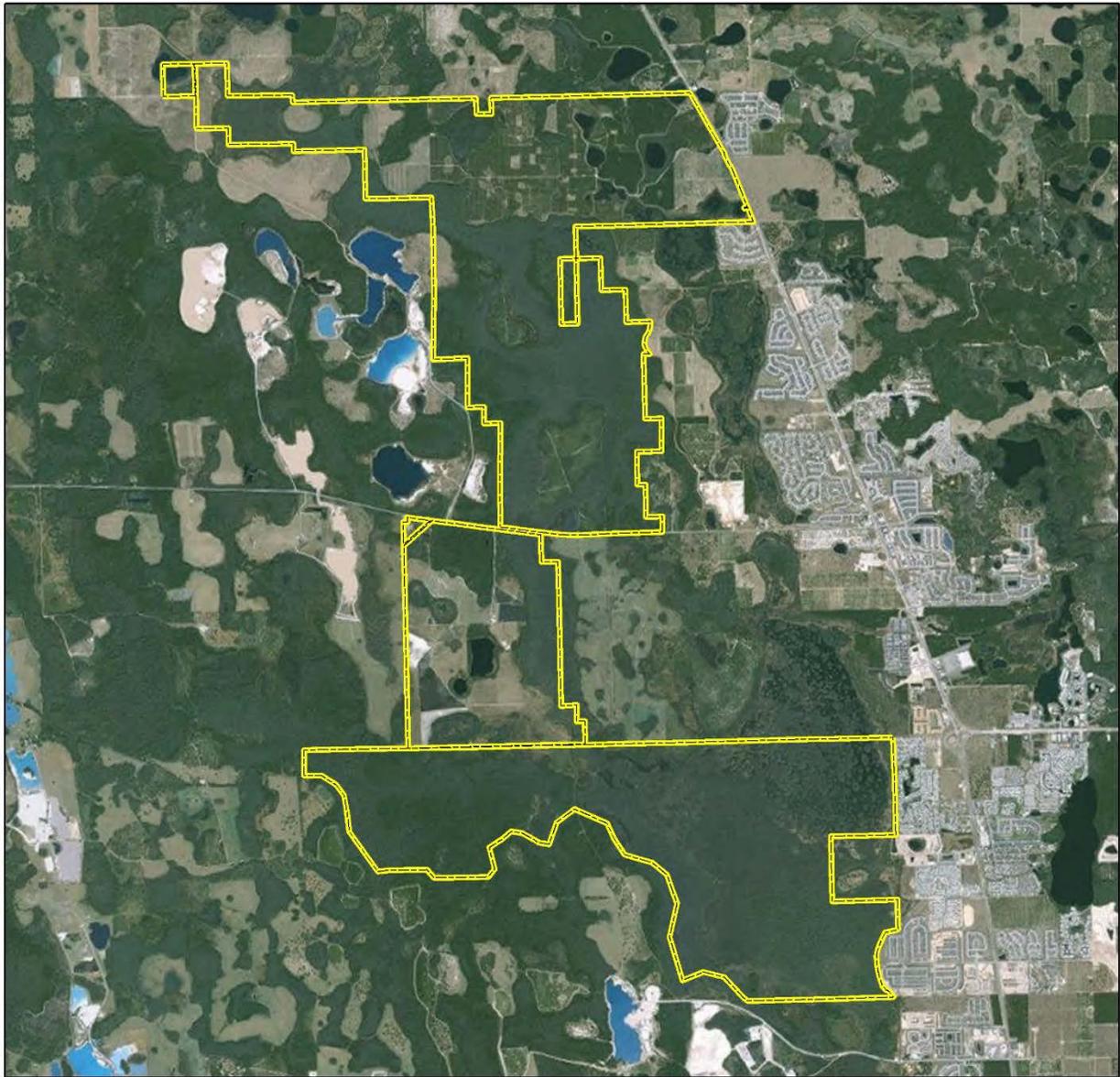


Figure 4. Aerial Imagery 2015 - Hilochee Unit

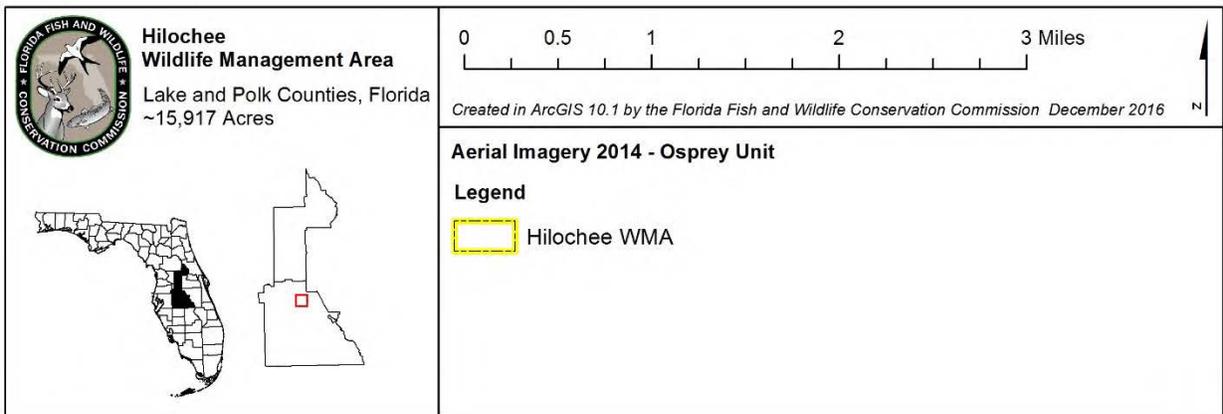
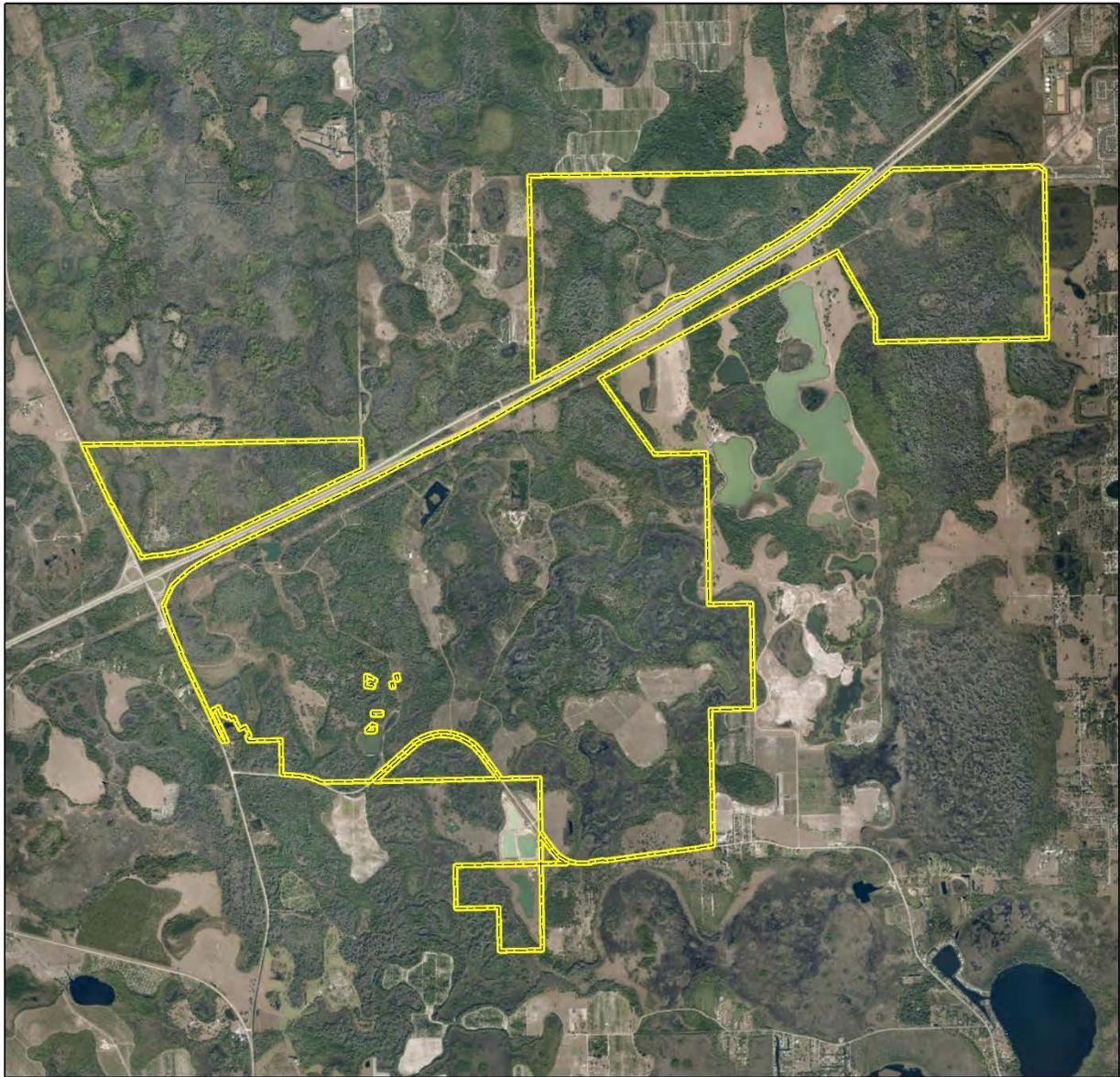


Figure 5. Aerial Imagery 2015 - Osprey Unit

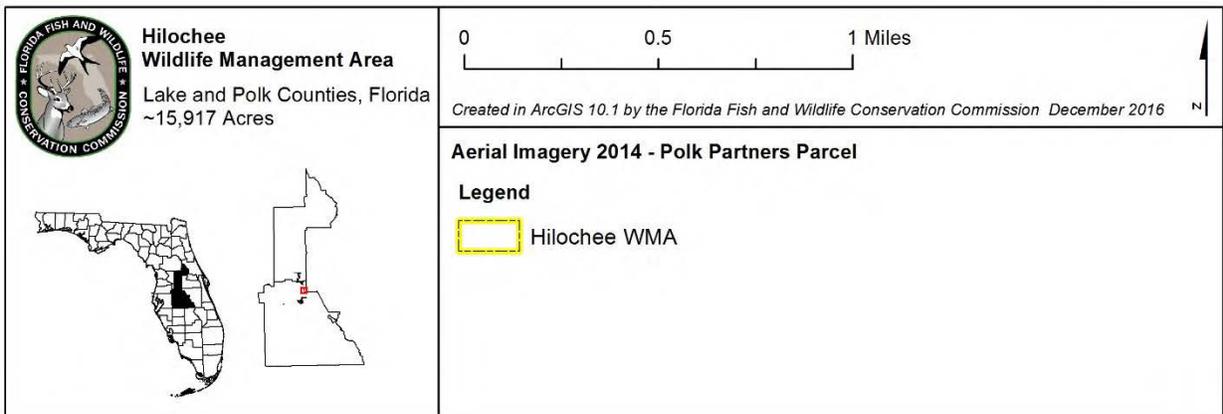


Figure 6. Aerial Imagery 2015 - Polk Partners Parcel

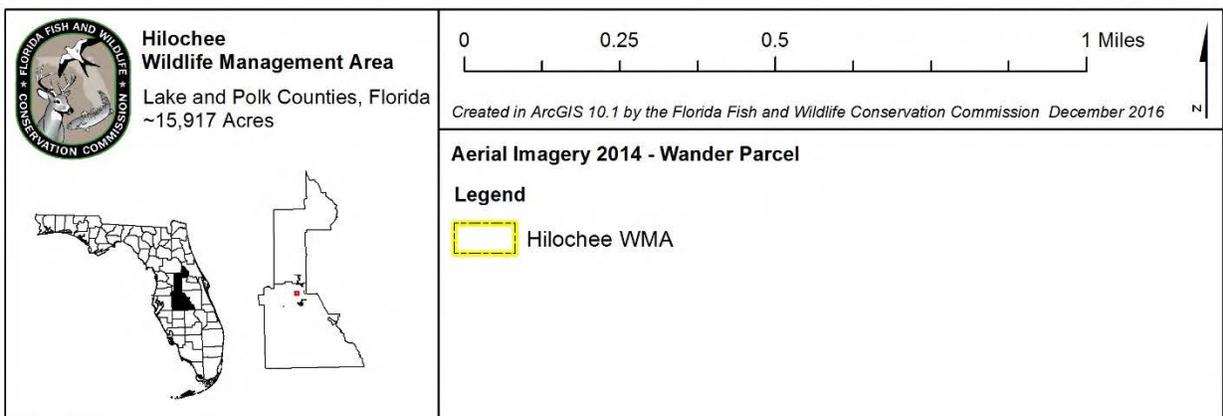


Figure 7. Aerial Imagery 2015 - Wander Parcel

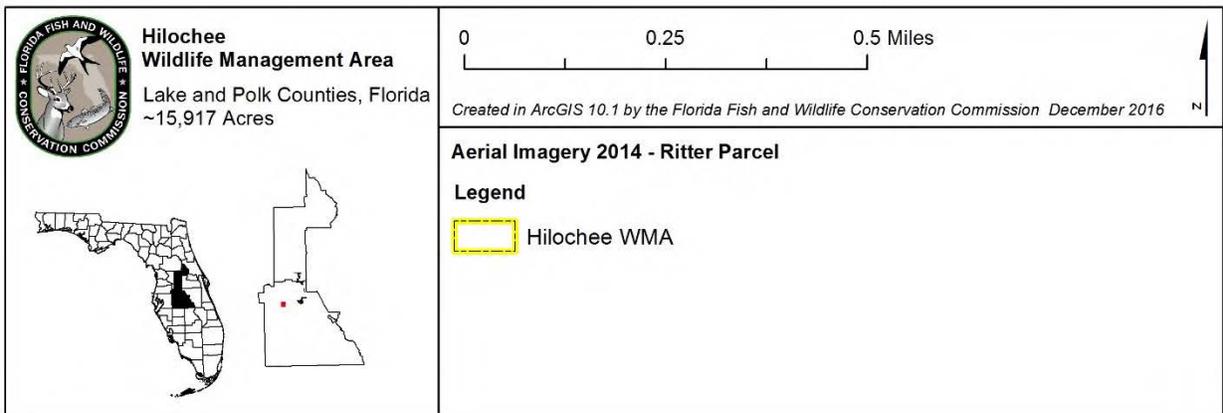


Figure 8. Aerial Imagery 2015 - Ritter Parcel

purposes for acquiring the Green Swamp Florida Forever project are protecting the water supply of central Florida, particularly recharge for the Floridan aquifer; protecting several rivers; preserving a large area for wildlife; and providing areas for public recreation.”

1.3.2 Acquisition History

Lands within HWMA were purchased through the CARL program under the Green Swamp CARL Project, Preservation 2000, and the Florida Forever conservation programs. Currently, the HWMA is part of the Green Swamp Florida Forever Project. The Green Swamp Florida Forever Project comprises 266,895 acres of cypress swamps, pine forests, citrus groves, mines and pasture lands, with 162,454 acres of the project remaining to be conserved. With the highest groundwater elevations in peninsular Florida and four major riverine systems, the project has among the highest levels of hydrological importance for state land acquisition projects, and has been designated as an Area of Critical State Concern. The FWC has been designated the lead managing agency for a large portion of the Green Swamp - Hilochee Florida Forever Project, while the DEP’s Division of Recreation and Parks (DRP) is designated lead management responsibility for acreage in the vicinity Lake Louisa State Park.

Additions to HWMA since the original 1995 acquisition include five tracts known as the Jahna parcel, the Polk Partners parcel, the Wander parcel, the Ritter parcel, and the Osprey Unit (Figure 3). These parcels are located south of the original HWMA. The Jahna addition was acquired in October 2001, and amended to FWC’s lease in December 2002, while the Polk Partners parcel was acquired in January 2001, and amended to the FWC lease in August 2001. The Wander parcel was acquired in December 2000, and amended to the FWC lease in August 2001, and the Ritter parcel was acquired in July 2001, and amended to the FWC lease in January 2003. The Osprey Unit was acquired in April 2001, and was amended to the FWC lease in January 2003.

1.4 Management Authority

The FWC is the designated lead managing agency for HWMA under the authority granted by Lease Number 4066 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 4066 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

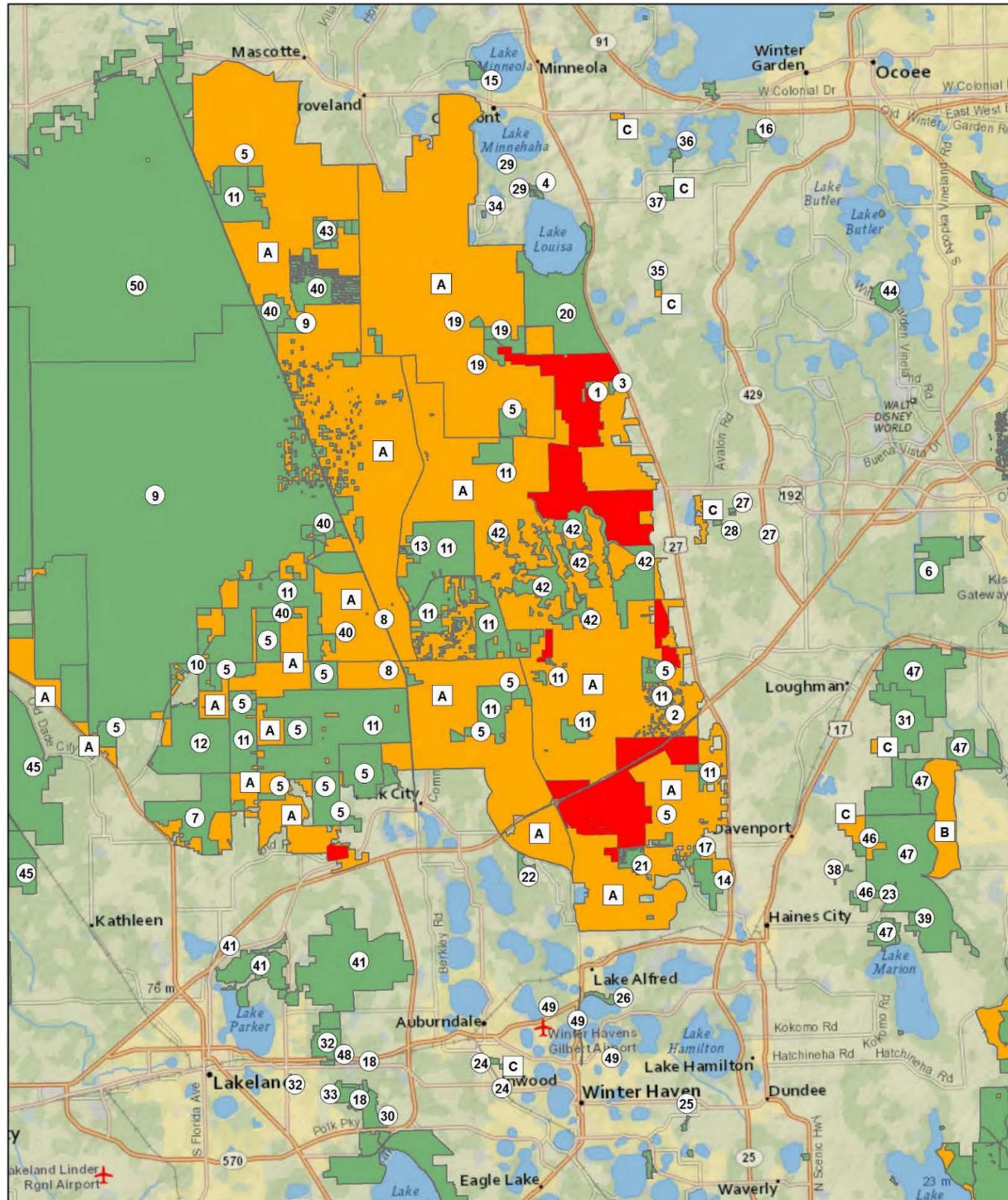
As State-owned lands, title to HWMA is vested in the Board of Trustees. Encumbrances on HWMA include an easement for the Gulfstream Pipeline (natural gas), a power transmission line easement within the Gulfstream Pipeline footprint, and an access easement for an adjacent landowner. Contracts, sub-leases, and other agreements include apiary and citrus grove management contracts, advertising billboard sub-leases, and water well monitoring license agreements with the St. Johns River Water Management District (SJRWMD).

1.7 Proximity to Other Public Conservation Lands

The HWMA is located in the vicinity of an extensive network of conservation lands (Figure 9, Table 1), including lands managed by the U.S. Fish and Wildlife Service (USFWS), South Florida Water Management District (SFWMD), Southwest Florida Water Management District (SWFWMD), SJRWMD, DEP, FFS, the Florida Audubon Society, Inc., Lake and Polk counties, and local municipalities. The Lake Louisa State Park is located adjacent to HWMA along the north boundary, and is managed by DRP.

Most of the conservation lands in the vicinity of HWMA are owned in full-fee by a public entity. However, some of these areas fall within a less-than-fee ownership classification whereas the land is owned and being managed by a private landowner while a public agency or not-for-profit organization holds a conservation easement and monitoring responsibility for the land. Potential future public conservation lands include several Florida Forever projects within the vicinity of HWMA (Figure 9, Table 2).

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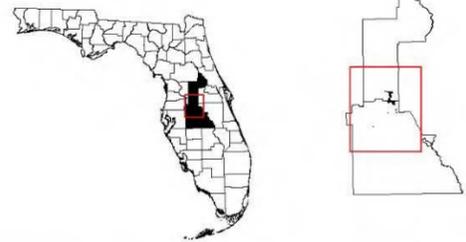
Map Symbol	Conservation Land
1	Alice Lockmiller Parcel
2	Appleton and Gurov Parcel
3	Boggy Marsh Sanctuary
4	Crooked River Preserve
5	FL DEP Green Swamp Conservation Easements
6	Florida Mitigation Bank
7	Gator Creek Reserve
8	General James A. Van Fleet State Trail
9	Green Swamp
10	Green Swamp East Conservation Easement
11	Green Swamp Land Authority Land Protection Agreements
12	Green Swamp/Bass Conservation Easement
13	Green Swamp/Chai Investments Company Conservation Easement
14	Hammock Lake Mitigation Bank
15	Inland Groves
16	Johns Lake Conservation Area
17	Lake Bonnet Marsh
18	Lake Hancock
19	Lake Louisa and Green Swamp Mitigation Bank
20	Lake Louisa State Park
21	Lake Lowery Marsh
22	Lake Mattie Marsh
23	Lake Wales Ridge National Wildlife Refuge
24	Lake Wales Ridge Wildlife and Environmental Area
25	Lewis Arboretum
26	Mackay Gardens and Lakeside Preserve
27	Oak Island Nature Preserve
28	Oak Island Preserve
29	Palatlakaha River Park
30	Polk County Conservation Easement
31	Reedy Creek Mitigation Bank
32	Saddle Creek County Park
33	Saddle Creek Sanctuary
34	Sawmill Lake
35	Schofield Tract
36	Scrub Point Preserve
37	Seminole State Forest
38	Serenoa Preserve
39	Sherwood L. Stokes Preserve/Lake Marion
40	SWFWMD Green Swamp Conservation Easements
41	Tenoroc Fish Management Area
42	The Jahna Ranch Conservation Easement
43	The Pasture
44	Tibet-Butler Preserve
45	Upper Hillsborough Conservation Easement
46	Upper Lake Marion Creek Watershed
47	Upper Lakes Basin Watershed
48	Upper Saddle Creek/Schaller Tract
49	Winter Haven to Lake Alfred Trail
50	Withlacoochee State Forest

Map Symbol	Florida Forever Project
A	Green Swamp
B	Lake Hatchineha Watershed
C	Lake Wales Ridge Ecosystem



Hilochee Wildlife Management Area

Lake and Polk Counties, Florida
~15,917 Acres

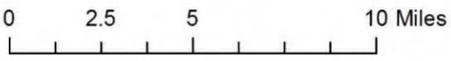


Conservation Lands and Florida Forever Projects within 10 Miles of HWMA

Legend

- Hilochee WMA
- Conservation Land
- Florida Forever Project





0 2.5 5 10 Miles

Created in ArcGIS 10.1 by the Florida Fish and Wildlife Conservation Commission September 2016

Figure 9. Conservation lands and Florida Forever Projects

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Table 1. Conservation lands within 10 miles of HWMA

<u>Map Symbol</u>	<u>Conservation Land</u>	<u>Manager</u>
1	Alice Lockmiller Parcel	SJRWMD
2	Appleton and Gurov Parcel	SWFWMD
3	Boggy Marsh Sanctuary	Florida Audubon Society, Inc.
4	Crooked River Preserve	Lake County Water Authority
5	Green Swamp Conservation Easements	DEP
6	Florida Mitigation Bank	Florida Mitigation Bank, LLC
7	Gator Creek Reserve	Polk County
8	General James A. Van Fleet State Trail	DEP
9	Green Swamp	SWFWMD
10	Green Swamp East Conservation Easement	SWFWMD
11	Green Swamp Land Authority	DEP
12	Green Swamp/Bass Conservation Easement	DEP
13	Green Swamp/Chai Conservation Easement	DEP
14	Hammock Lake Mitigation Bank	Mitigation Resources, LLC
15	Inland Groves	City of Clermont
16	Johns Lake Conservation Area	Orange County
17	Lake Bonnet Marsh	Polk County
18	Lake Hancock	SWFWMD
19	Lake Louisa & Green Swamp Mitigation Bank	Mitigation Resources, LLC
20	Lake Louisa State Park	DEP
21	Lake Lowery Marsh	Polk County
22	Lake Mattie Marsh	Green Horizon Land Trust
23	Lake Wales Ridge National Wildlife Refuge	FWS
24	Lake Wales Ridge WEA	FWC
25	Lewis Arboretum	Green Horizon Land Trust
26	Mackay Gardens and Lakeside Preserve	City of Lake Alfred
27	Oak Island Nature Preserve	Osceola County
28	Oak Island Preserve	Green Horizon Land Trust
29	Palatlahaha River Park	Lake County
30	Polk County Conservation Easement	SWFWMD
31	Reedy Creek Mitigation Bank	Mitigation Resources, LLC
32	Saddle Creek County Park	Polk County
33	Saddle Creek Sanctuary	Florida Audubon Society, Inc.
34	Sawmill Lake	Lake County Water Authority
35	Schofield Tract	Orange County

Table 1. Conservation lands within 10 miles of HWMA

<u>Map Symbol</u>	<u>Conservation Land</u>	<u>Manager</u>
36	Scrub Point Preserve	Lake County Water Authority
37	Seminole State Forest	FFS
38	Serenoa Preserve	Green Horizon Land Trust
39	Sherwood L. Stokes Preserve/Lake Marion	Polk County
40	SWFWMD Green Swamp Conservation Ease	SWFWMD
41	Tenoroc Fish Management Area	FWC
42	The Jahna Ranch Conservation Easement	DEP
43	The Pasture	Lake County
44	Tibet-Butler Preserve	Orange County
45	Upper Hillsborough Conservation Easement	SWFWMD
46	Upper Lake Marion Creek Watershed	SWFWMD
47	Upper Lakes Basin Watershed	SWFWMD
48	Upper Saddle Creek/Schaller Tract	Polk County
49	Winter Haven to Lake Alfred Trail	City of Winter Haven
50	Withlacoochee State Forest	FFS

Table 2. Florida Forever Projects within 10 Miles of HWMA

<u>Map Symbol</u>	<u>Florida Forever Project</u>
A	Green Swamp
B	Lake Hatchineha Watershed
C	Lake Wales Ridge Ecosystem

1.8 Adjacent Land Uses

The current land use designations for areas in the vicinity of the HWMA includes residential, conservation, and agriculture. Currently, low to medium residential density and farming is allowed.

Lake County's future land use map shows that the area surrounding the HWMA will be zoned as Conservation, Rural Conservation, and Ridge. Rural Conservation allows for one dwelling unit per 10 acres, and Ridge allows for a max four dwelling units per one net acre.

Polk County's future land use map shows that the area to the east of the HWMA will be zoned as varying types of residential, ranging from low to medium intensity. Within Polk County, the remainder of the area surrounding HWMA will be zoned as Agriculture and Preservation.

The 2013 U.S. Census data estimates that Lake County has an approximate population of 308,034, and Polk County has an approximate population of 623,009. The University of Florida's Bureau of Economic and Business Research (BEBR) medium range population projections for the year 2025 for these two counties are 392,000 and 744,600 people respectively. The 2025 medium-range population projections from BEBR of some of the surrounding counties are as follows: Pasco County, 595,700; Hillsborough County, 1,563,300; Hardee County, 28,000; Sumter County, 160,900; and Orange County, 1,525,100.

The HWMA may face some challenges with residential units currently being developed in close proximity to its boundary. Also, both Lake and Polk counties could decide in favor of expanded development due to increasing populations within this region of Florida, and thereby impact FWC's ability to manage HWMA lands by allowing development to approach the boundary of the area. Therefore, HWMA may face some significant challenges in the future due to the increase of people living in the area.

1.9 Public Involvement

To obtain input from both public and private stakeholders regarding management of HWMA, the FWC conducted a MAG meeting in Bartow, Florida, on November 12, 2014. Results of this meeting were used by FWC to develop management goals and objectives, and to identify opportunities, challenges and solution strategies for inclusion in this Management Plan. A summary of issues and opportunities raised by the MAG, as well as a listing of participants, has been produced by FWC (Appendix 13.3). Further, a public hearing, as required by Chapter 259.032(10), FS, was held in Tavares, Florida, on December 16, 2014. A summary report of the public hearing has also been produced by FWC (Appendix 13.3). A website is also maintained for receipt of public input at <http://myfwc.com/conservation/terrestrial/management-plans/develop-mps/>. Further testimony and input may be received at a public hearing held by ARC. 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

The climate of HWMA is classified as subtropical. Annual mean high and low temperatures are 83 and 63 degrees Fahrenheit (F) respectively. July and August are typically the warmest months with a mean high temperature of 92 degrees F, while January is typically the coolest month with a mean high temperature of 65 degrees F. Mean annual rainfall is 52 inches.

2.1.2 Topography and Geologic Condition

The HWMA is located in the Lake Upland and Polk Upland physiographic provinces, stretching north to south west of the Lake Wales Ridge. The geological condition of HWMA is defined by three stratigraphic units that occur on the area. Primarily, HWMA consists of the Pliocene/Pleistocene unit, with a small portions included within the Pleistocene and Miocene/Pliocene units.

Pliocene

In Lake and Polk counties, this unit is composed of siliciclastics, and occurs only in the Florida peninsula and eastern Georgia. The Pliocene unit is a shallow marine, near-shore deposit consisting of reddish brown to reddish orange, unconsolidated to poorly consolidated, fine to very coarse grained, clean to clayey sands. Cross bedded sands are common within the formation. Discoid quartzite pebbles and mica are often present. Clay beds are scattered and not areally extensive. Original fossil material is not present in the sediments, although poorly preserved molds and casts of mollusks and burrow structures are occasionally present. The permeable sands of the Pliocene unit form part of the surficial aquifer system. The lithology consists of sand, clay and mud.

Pliocene/Pleistocene

In Lake and Polk counties, this unit consists of reworked and undifferentiated Pliocene sediments, and is the result of post depositional reworking of Pliocene siliciclastics. The sediments are fine to coarse quartz sands with scattered quartz gravel and varying percentages of clay matrix. The lithology consists of sand, gravel, clay and mud.

Miocene/Pliocene

In Polk County, this unit is composed of interbedded sands, clays and carbonates. The sands are generally light gray to olive gray, poorly consolidated, clayey, variably dolomitic, very fine to medium grained, and phosphatic. The clays are yellowish gray to olive gray, poorly to moderately consolidated, sandy, silty, phosphatic and dolomitic. The carbonates are usually dolostone; light gray to yellowish gray, poorly to well indurated, variably sandy

and clayey, and phosphatic. Opaline chert is often found in these sediments. Fossil mollusks occur as reworked casts, molds, and limited original shell material. Silicified corals and wood, and vertebrate fossils are also present. This unit is part of the intermediate confining unit/aquifer system. The lithology consists of sandstone, mudstone, and dolostone.

2.1.3 Soils

Soil data provided by the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) indicates 51 map units (soil series) to be present on HWMA (Figures 10 - 14; map unit descriptions Appendix 13.5), with natural drainage classifications ranging from excessively drained to very poorly drained. These data further indicate soil depth to the water table ranging from 0 to 201 centimeters (Figures 15 - 19).

2.2 Vegetation

2.2.1 FNAI Natural and Altered Community Descriptions

Geographic Information System (GIS) mapping data of vegetation for HWMA, and their associated natural community descriptions, were originally developed by the Florida Natural Areas Inventory (FNAI) from their assessments and field reviews performed in 2004. Subsequently, FNAI revised these original GIS mapping data and descriptions in 2015. Also, FNAI mapped the probable historic natural community condition of HWMA in 2005 (Figures 20 - 24).

In the 2015 mapping of HWMA, 29 natural and altered communities (Figures 25 - 29, Table 3) were identified, and lists of the known native and exotic plant species for HWMA have subsequently been compiled (Tables 4 - 6). Natural communities represent approximately 76.4% of the total land cover of HWMA, and include basin swamp, basin marsh, mesic flatwoods, wet flatwoods, baygall, dome, swamp, scrubby flatwoods, depression marsh, mesic hammock, xeric hammock, sandhill, and wet prairie. The remainder of HWMA is comprised of altered areas (22.4%) and areas undergoing restoration (1.2%). The majority of the altered areas have a land cover classification of pasture (13.8%) and pine plantation (3.9%).

The following natural and altered community descriptions include generic natural community description excerpts from the FNAI Guide to the Natural Communities of Florida 2010 Edition, and have been modified by FWC for the purposes of this Management Plan. As noted above, natural community descriptions specific to HWMA were originally developed by FNAI in 2004 and updated in 2015. They too have been modified by FWC for the purposes of this Management Plan.

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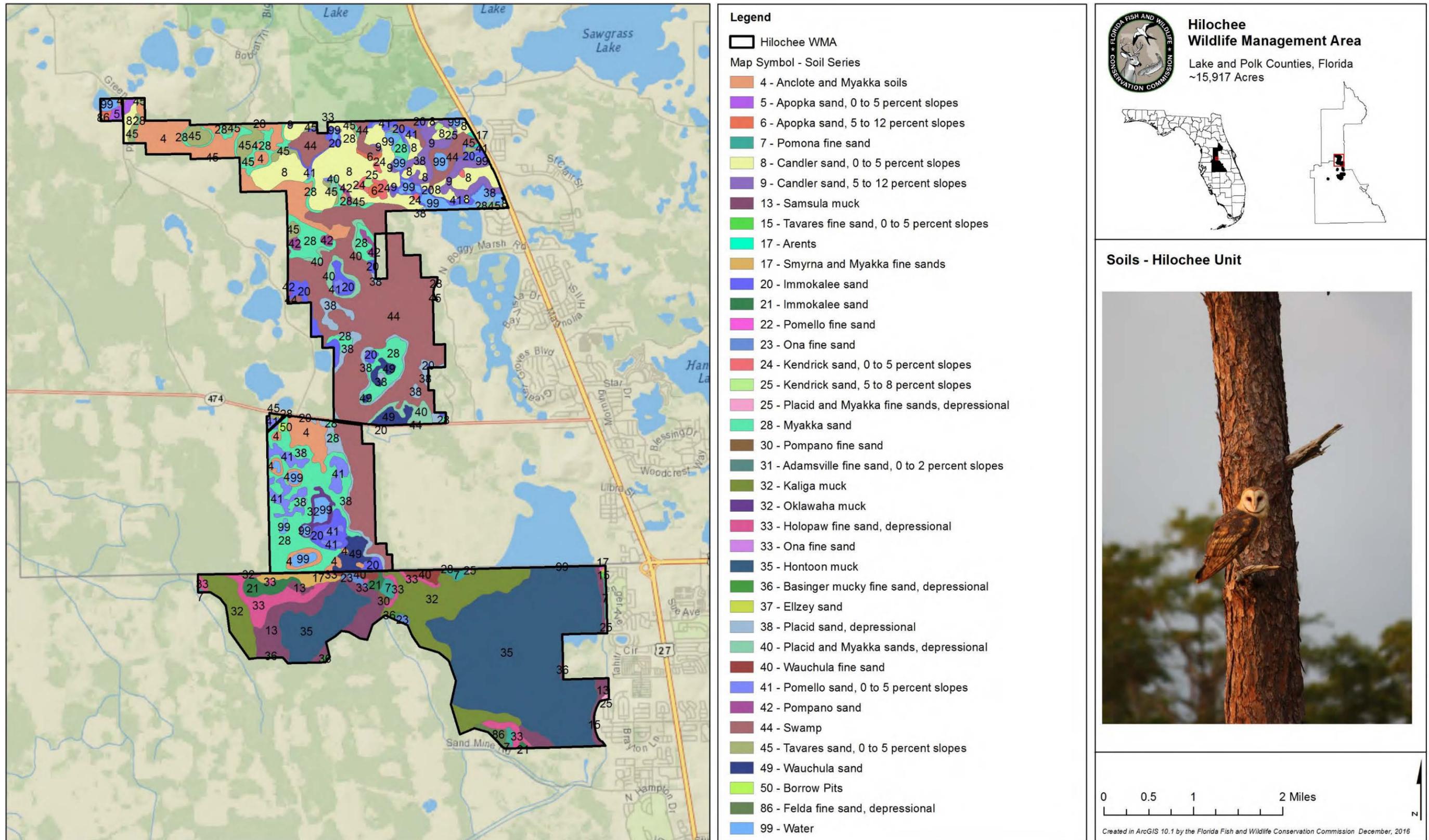
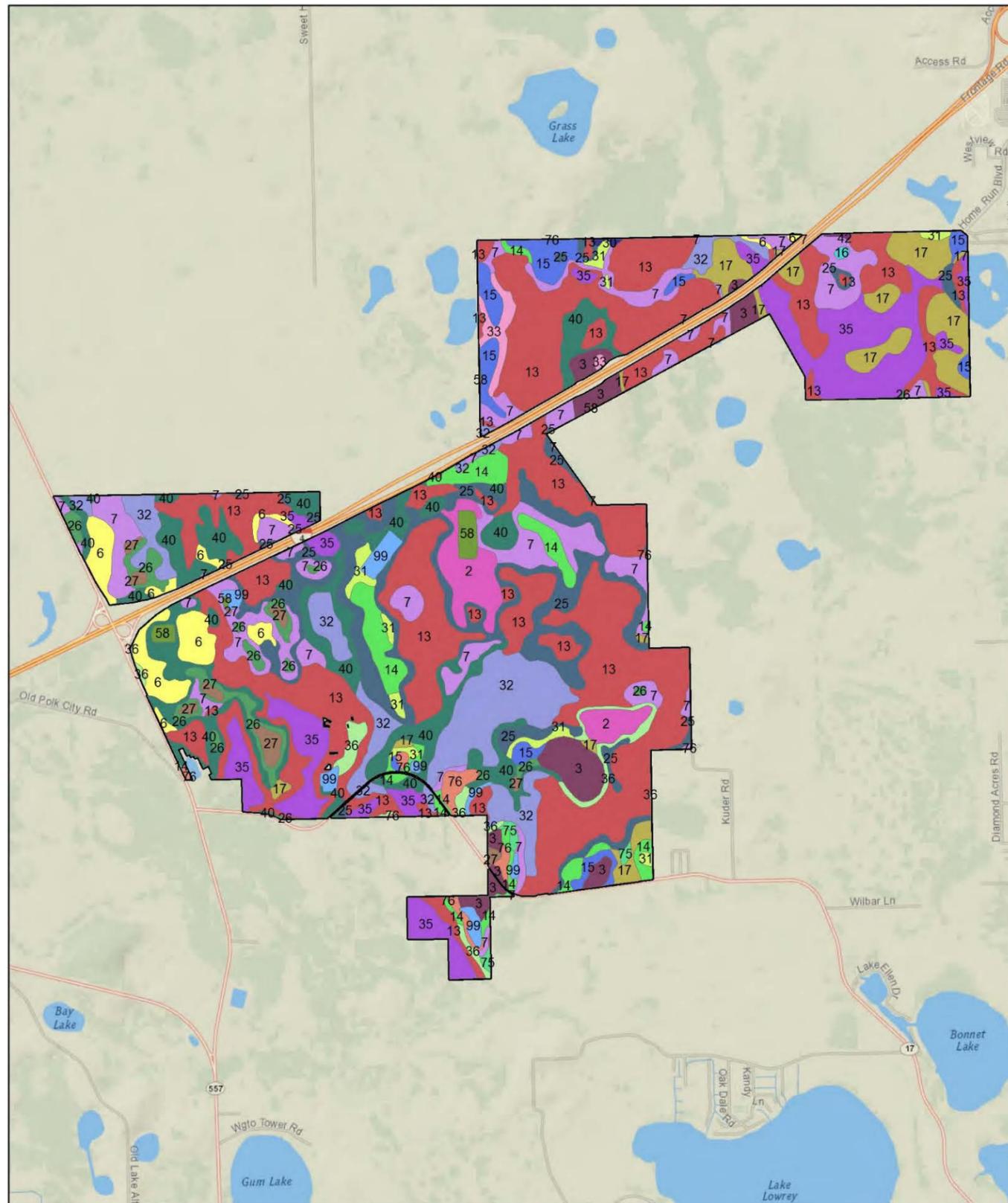


Figure 10. Soils - Hilochee Unit



Legend

□ Hilochee WMA

Osprey Unit

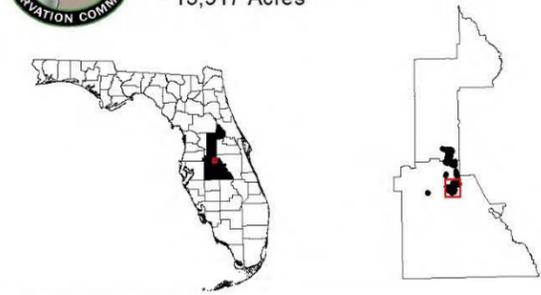
Map Symbol - Soil Series

- 2 - Apopka fine sand, 0 to 5 percent slopes
- 3 - Candler sand, 0 to 5 percent slopes
- 6 - Eaton mucky fine sand, depressional
- 7 - Pomona fine sand
- 13 - Samsula muck
- 14 - Sparr sand, 0 to 5 percent slopes
- 15 - Tavares fine sand, 0 to 5 percent slopes
- 16 - Urban land
- 17 - Smyrna and Myakka fine sands
- 25 - Placid and Myakka fine sands, depressional
- 26 - Lochloosa fine sand
- 27 - Kendrick fine sand, 0 to 5 percent slopes
- 30 - Pompano fine sand
- 31 - Adamsville fine sand, 0 to 2 percent slopes
- 32 - Kaliga muck
- 33 - Holopaw fine sand, depressional
- 35 - Hontoon muck
- 36 - Basinger mucky fine sand, depressional
- 40 - Wauchula fine sand
- 42 - Felda fine sand
- 58 - Udorthents, excavated
- 75 - Valkaria sand
- 76 - Millhopper fine sand, 0 to 5 percent slopes
- 99 - Water

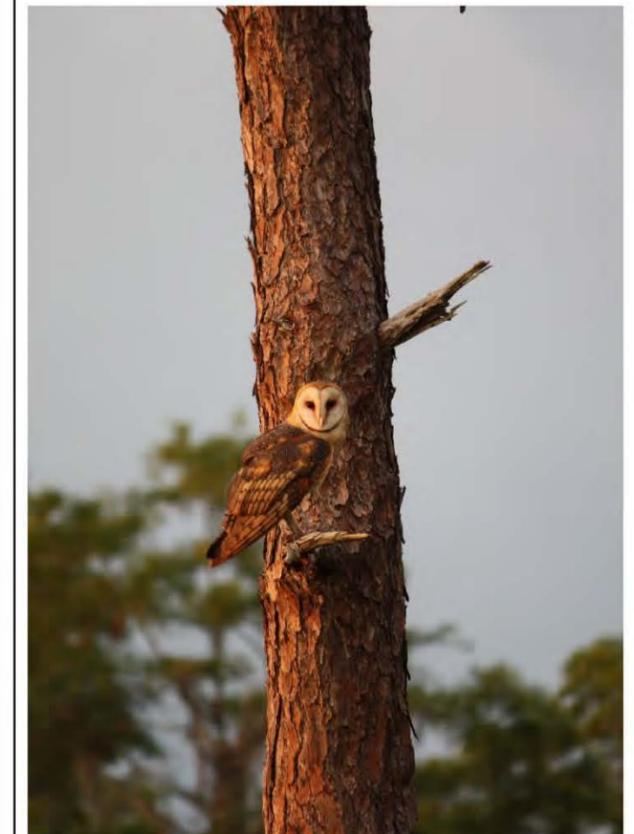


Hilochee Wildlife Management Area

Lake and Polk Counties, Florida
~15,917 Acres



Soils - Osprey Unit



0 0.5 1 2 Miles

Created in ArcGIS 10.1 by the Florida Fish and Wildlife Conservation Commission December, 2016

Figure 11. Soils - Osprey Unit

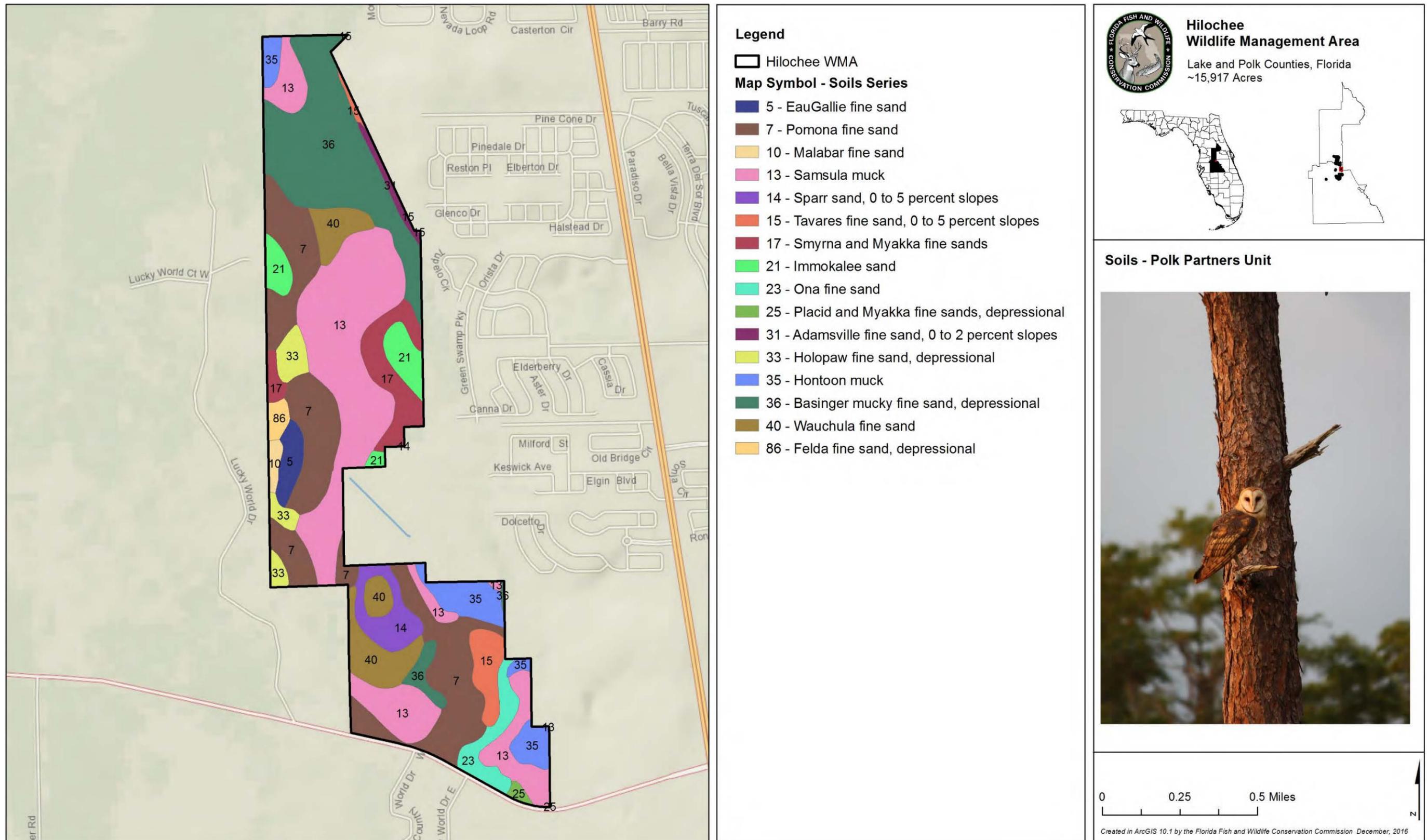


Figure 12. Soils - Polk Partners Parcel

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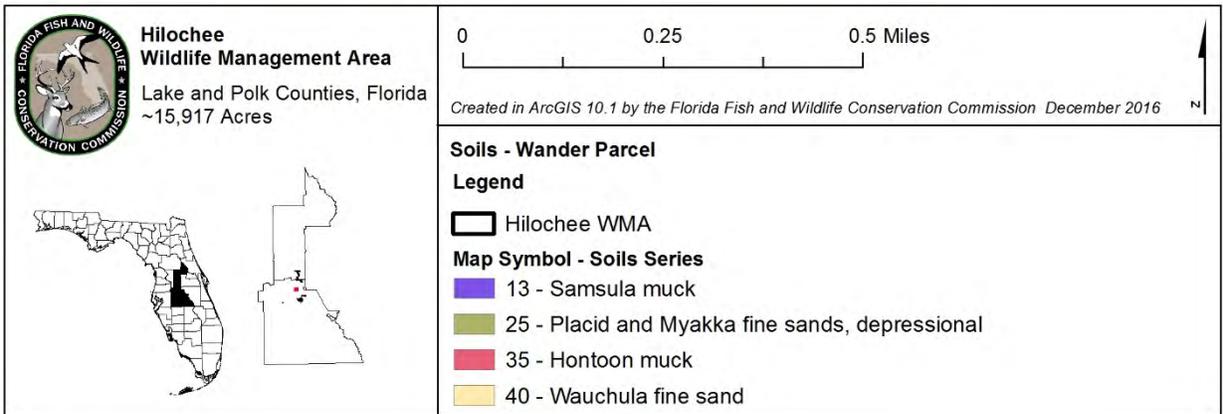
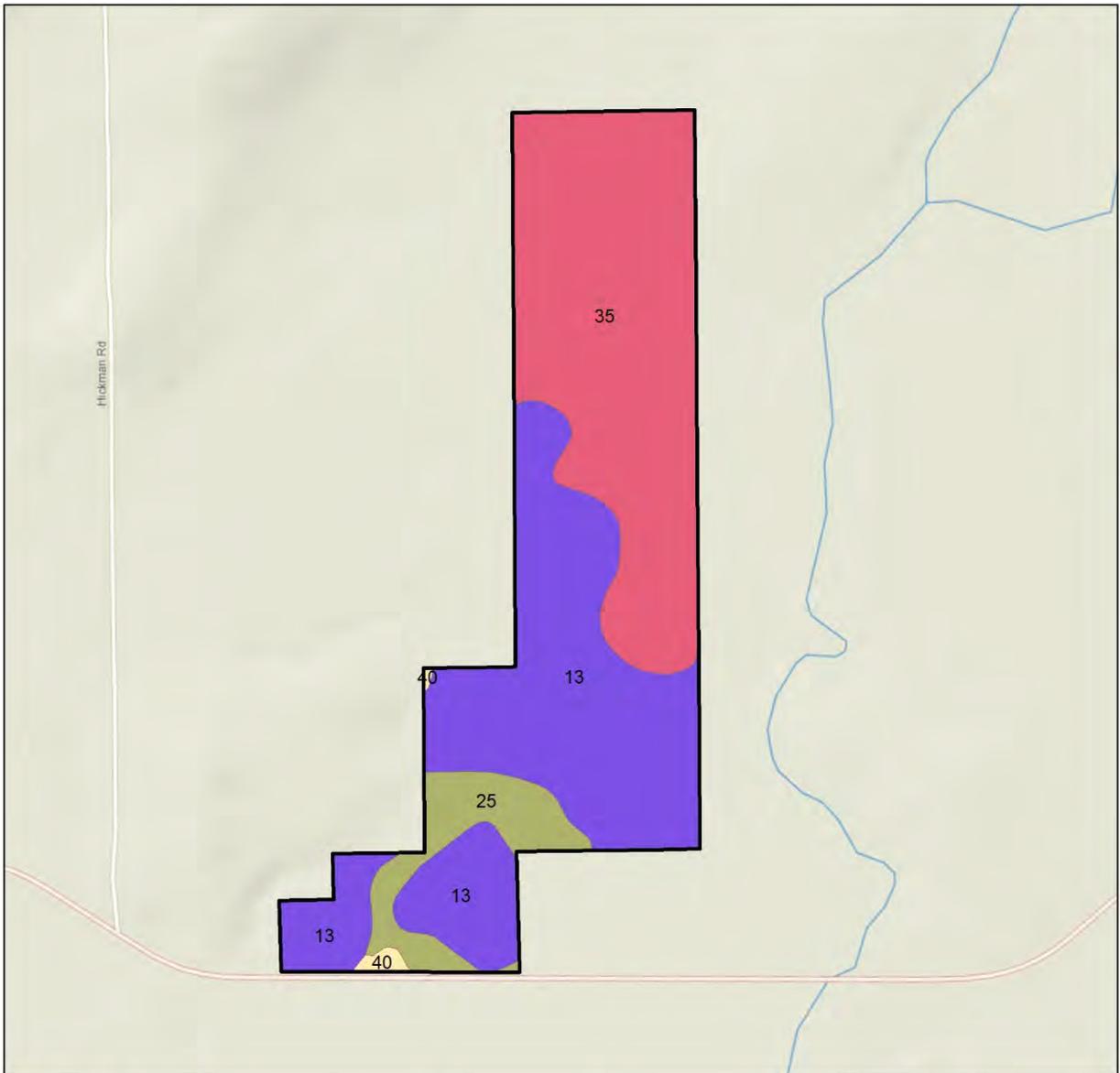


Figure 13. Soils - Wander Parcel

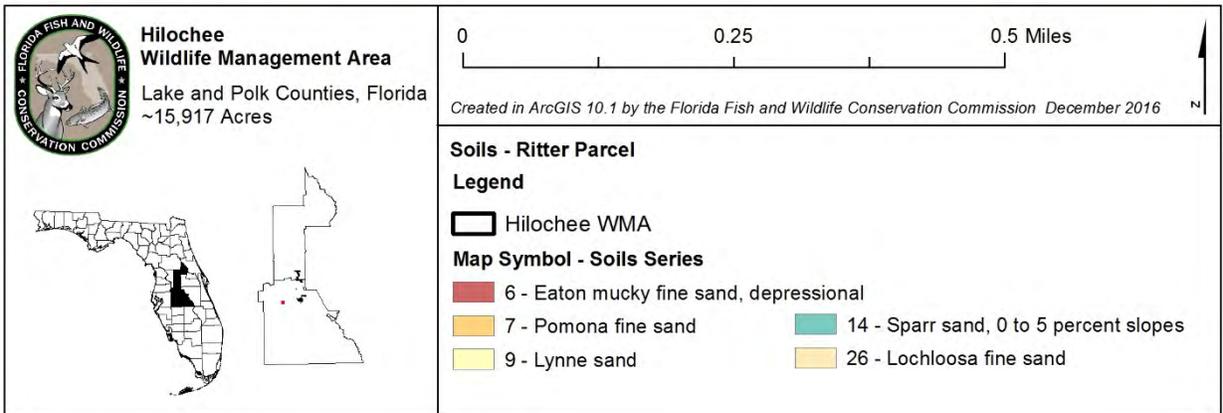
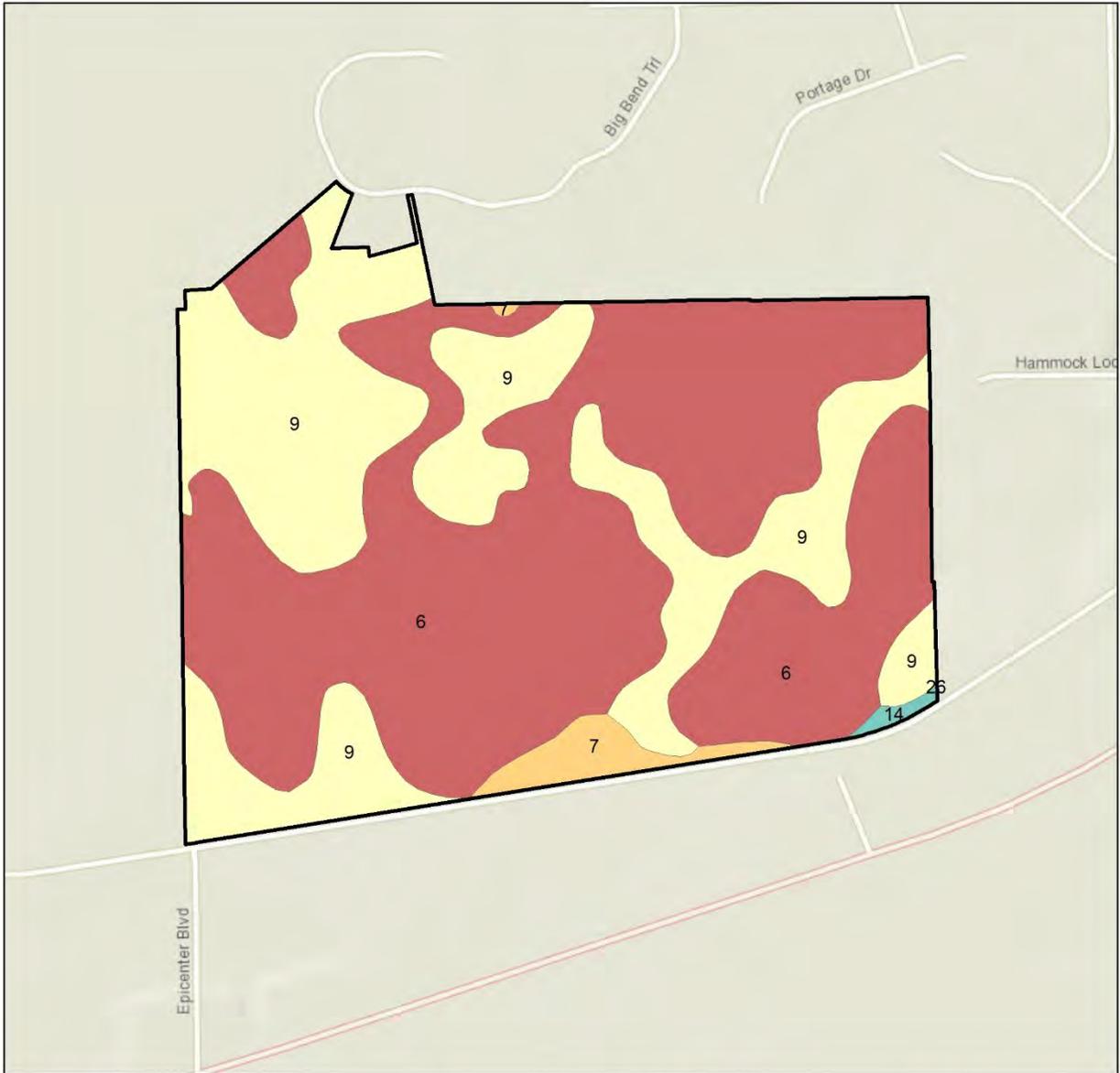


Figure 14. Soils - Ritter Parcel

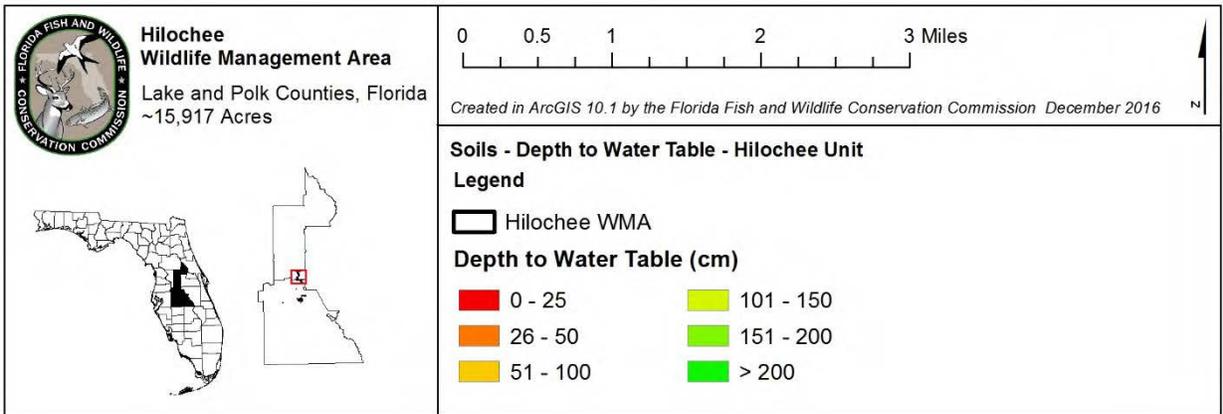
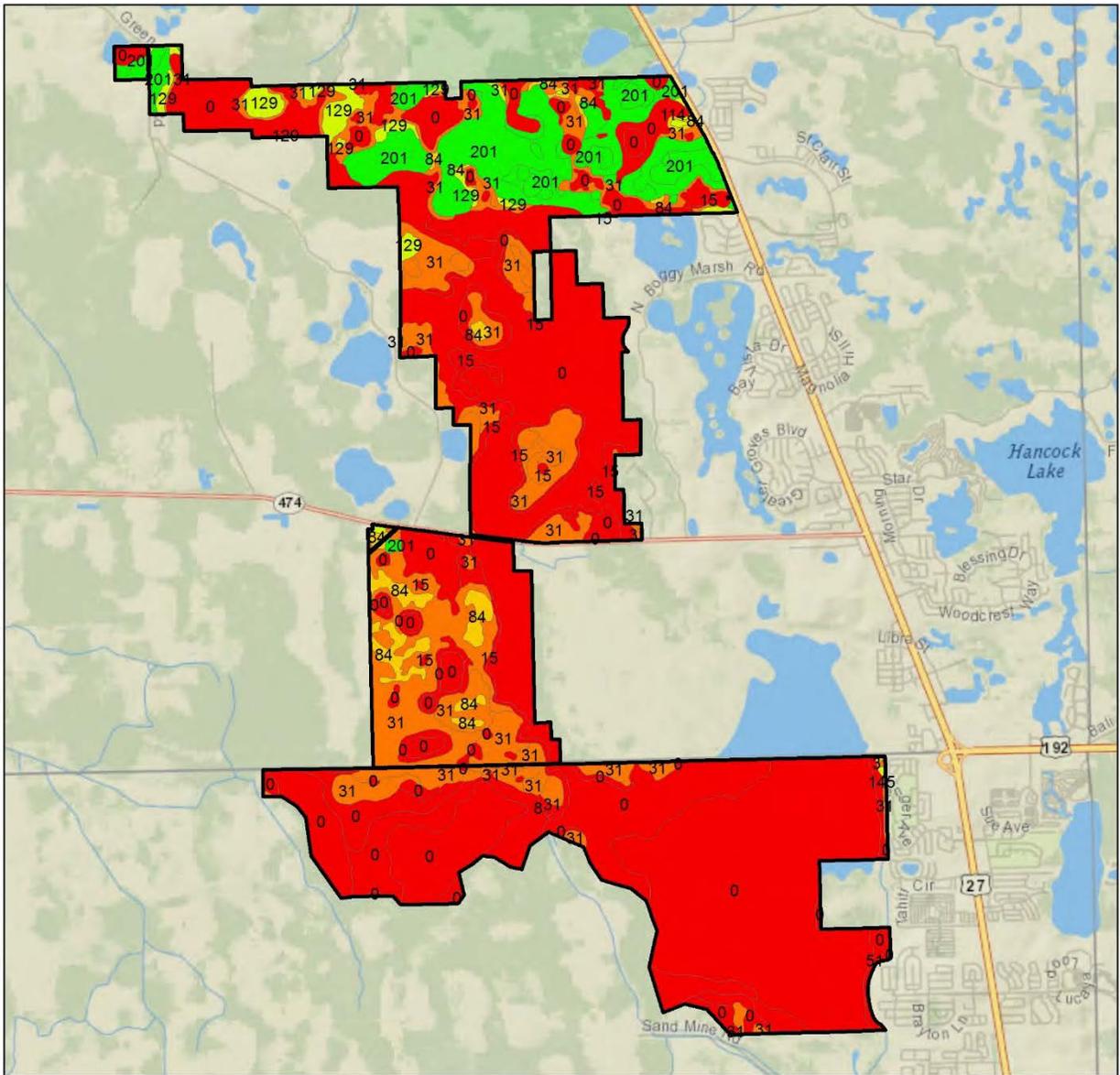


Figure 15. Depth to Water Table - Hilochee Unit

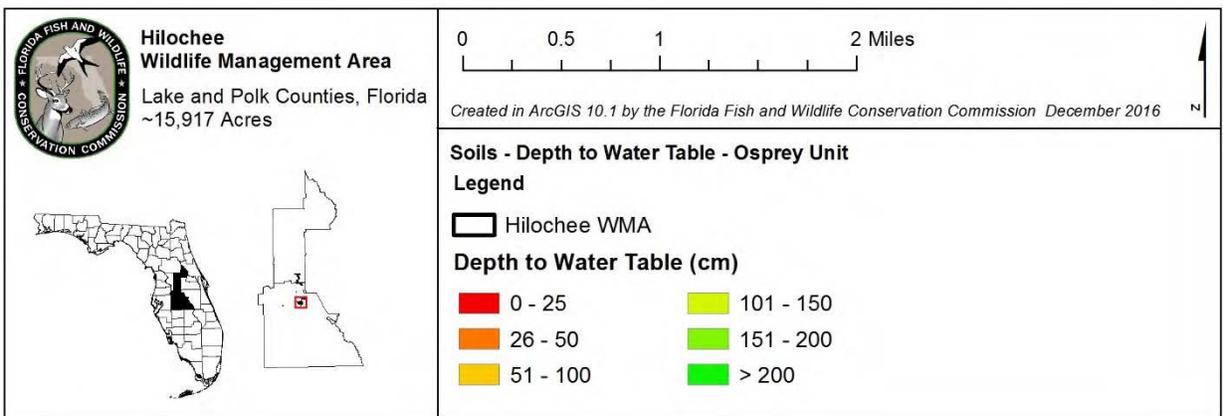
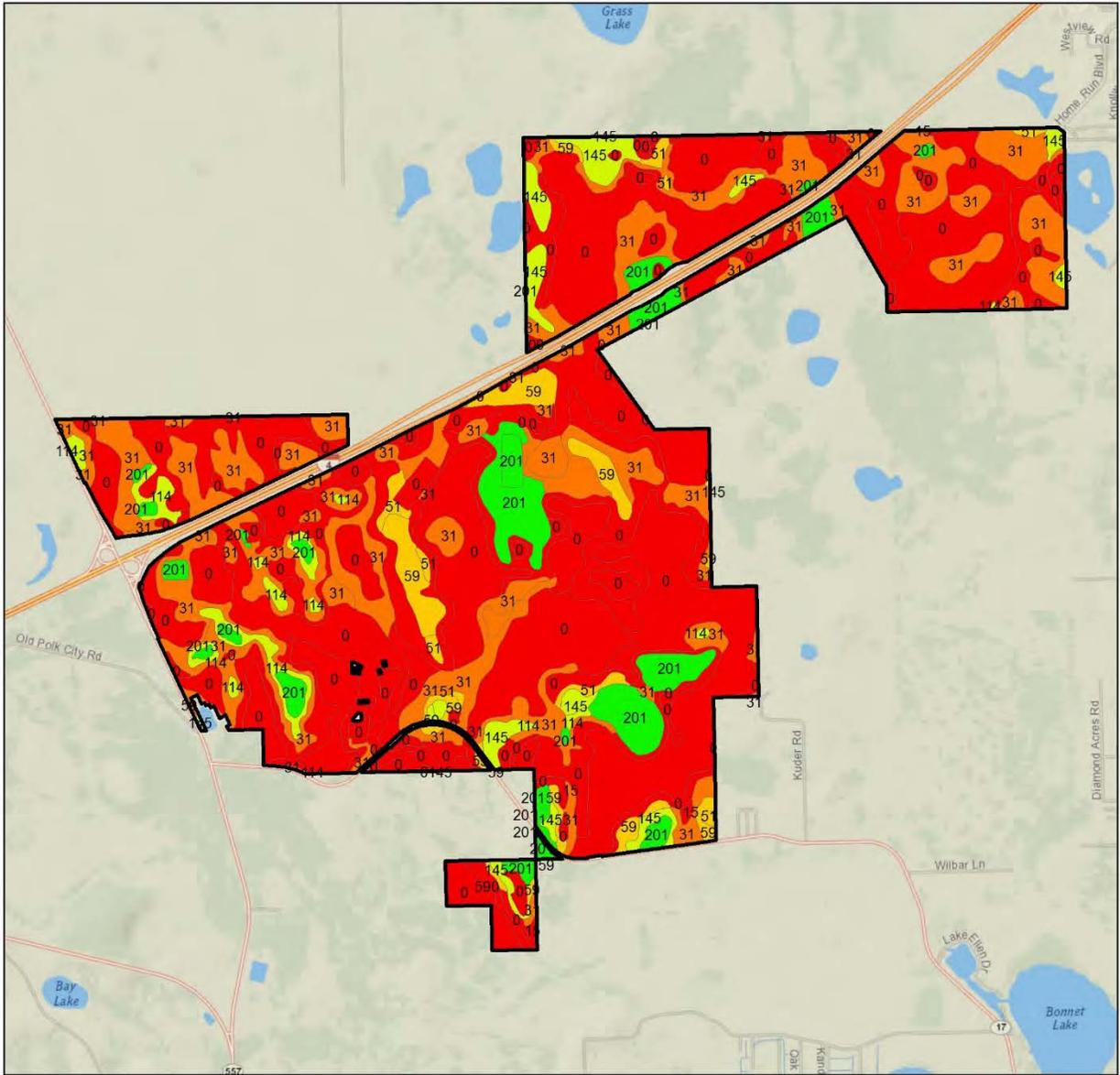


Figure 16. Depth to Water Table - Osprey Unit

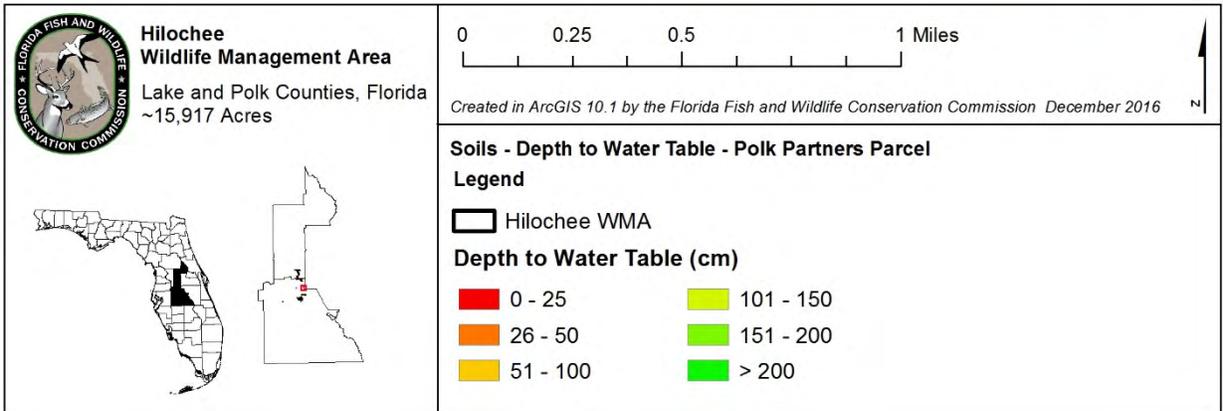
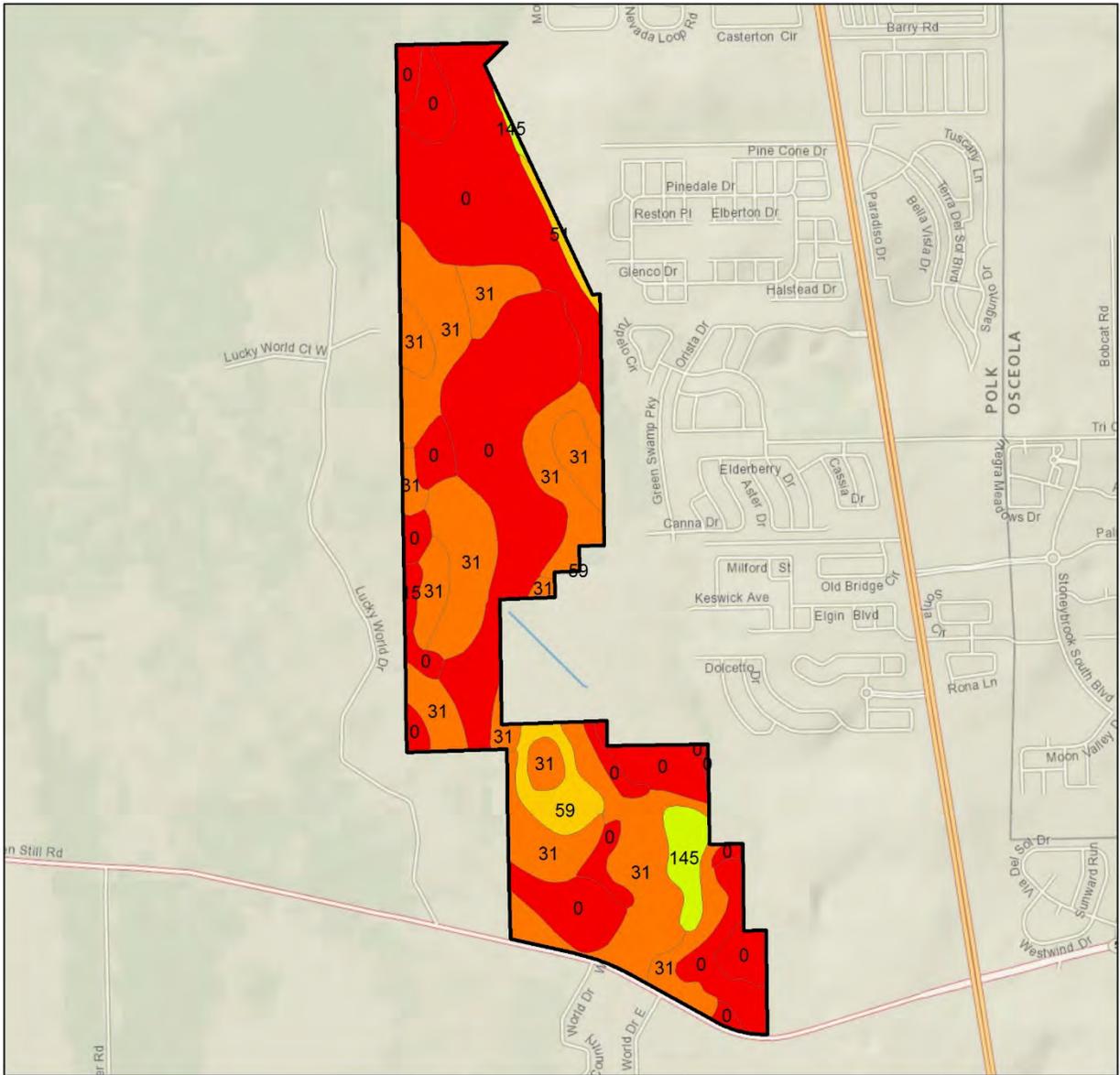


Figure 17. Depth to Water Table - Polk Partners Parcel

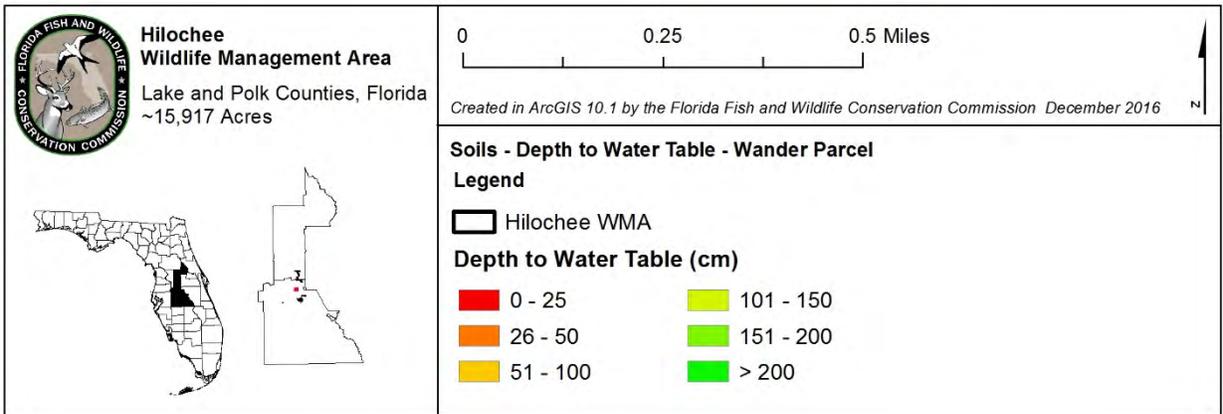
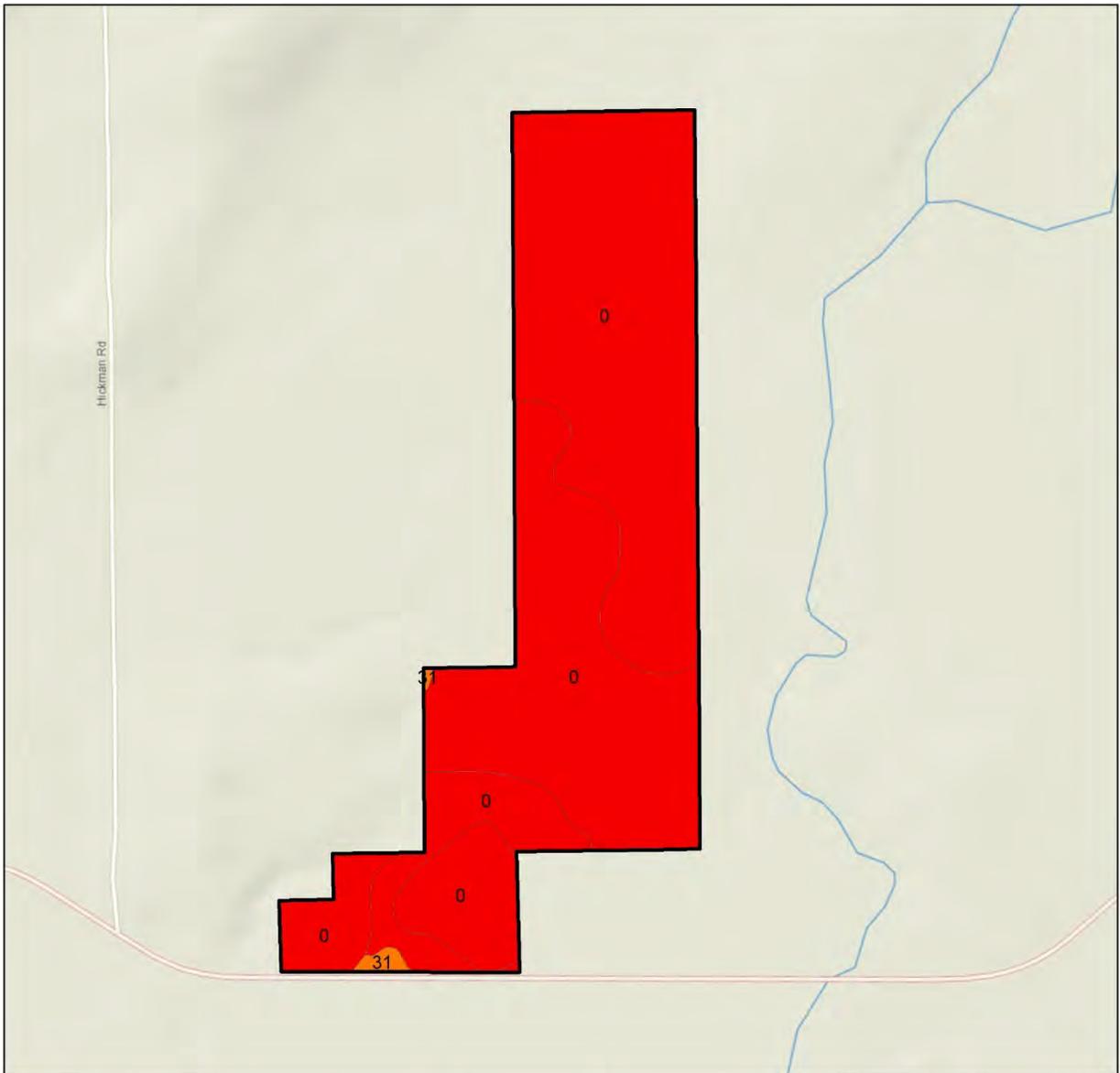


Figure 18. Depth to Water Table - Wander Parcel

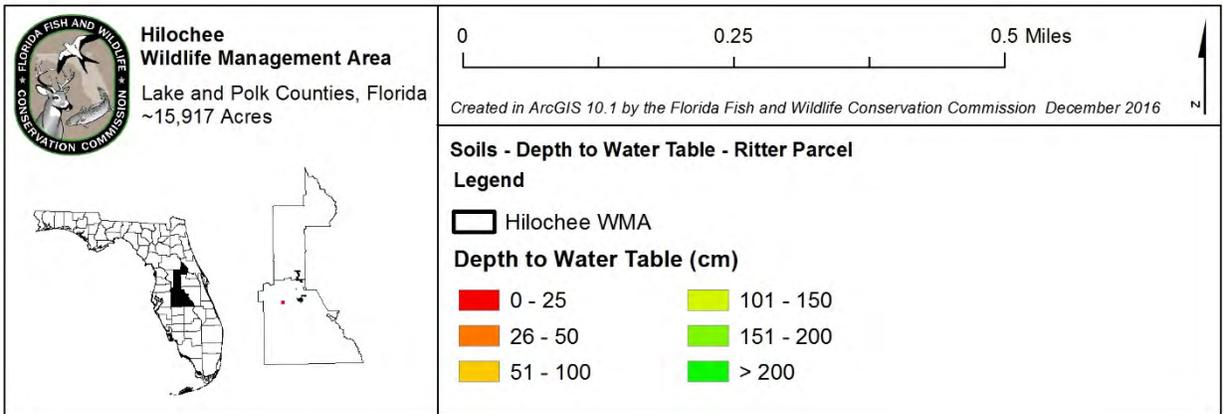
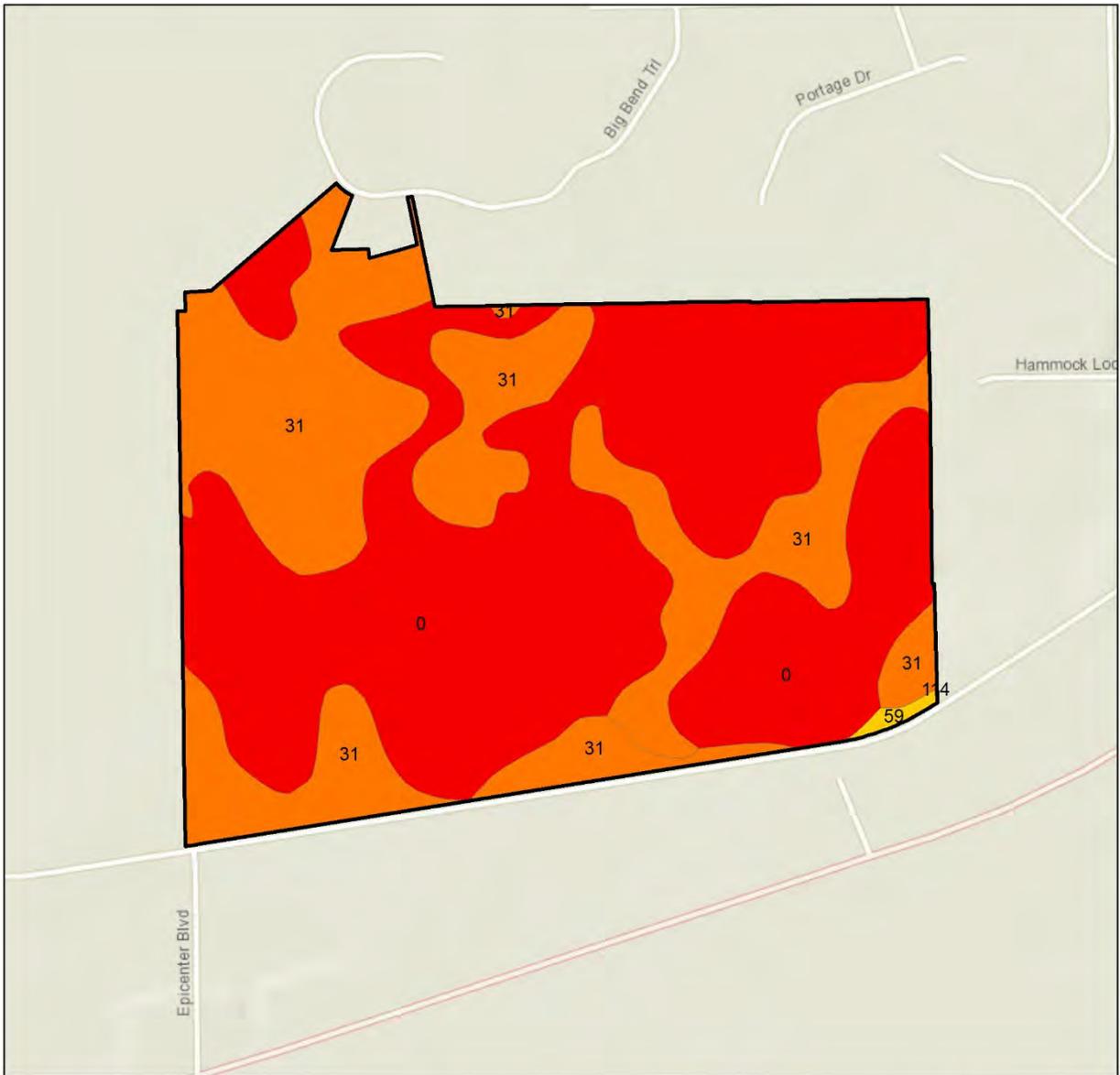


Figure 19. Depth to Water Table - Ritter Parcel

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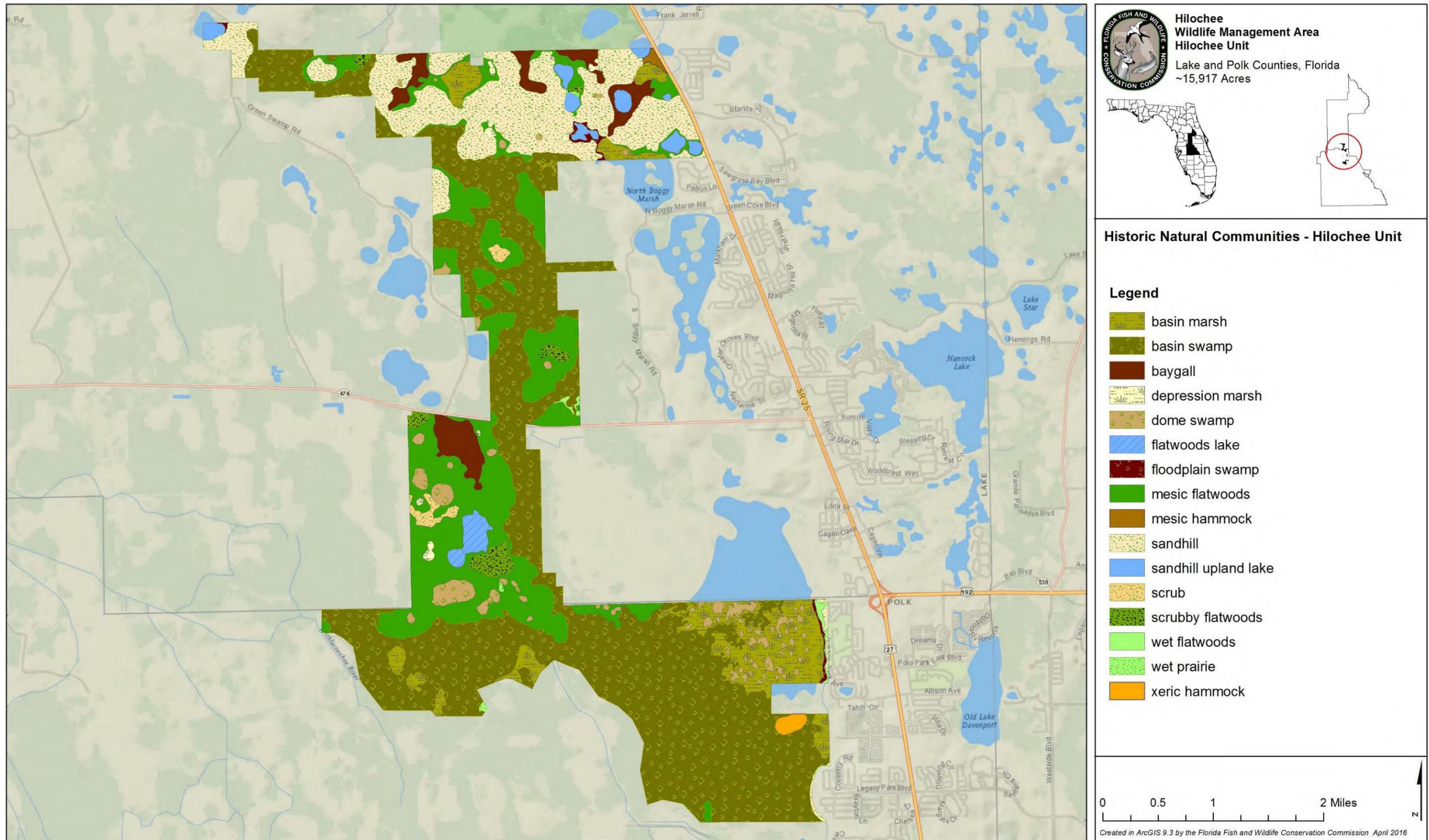


Figure 20. Historic Natural Communities - Hilochee Unit

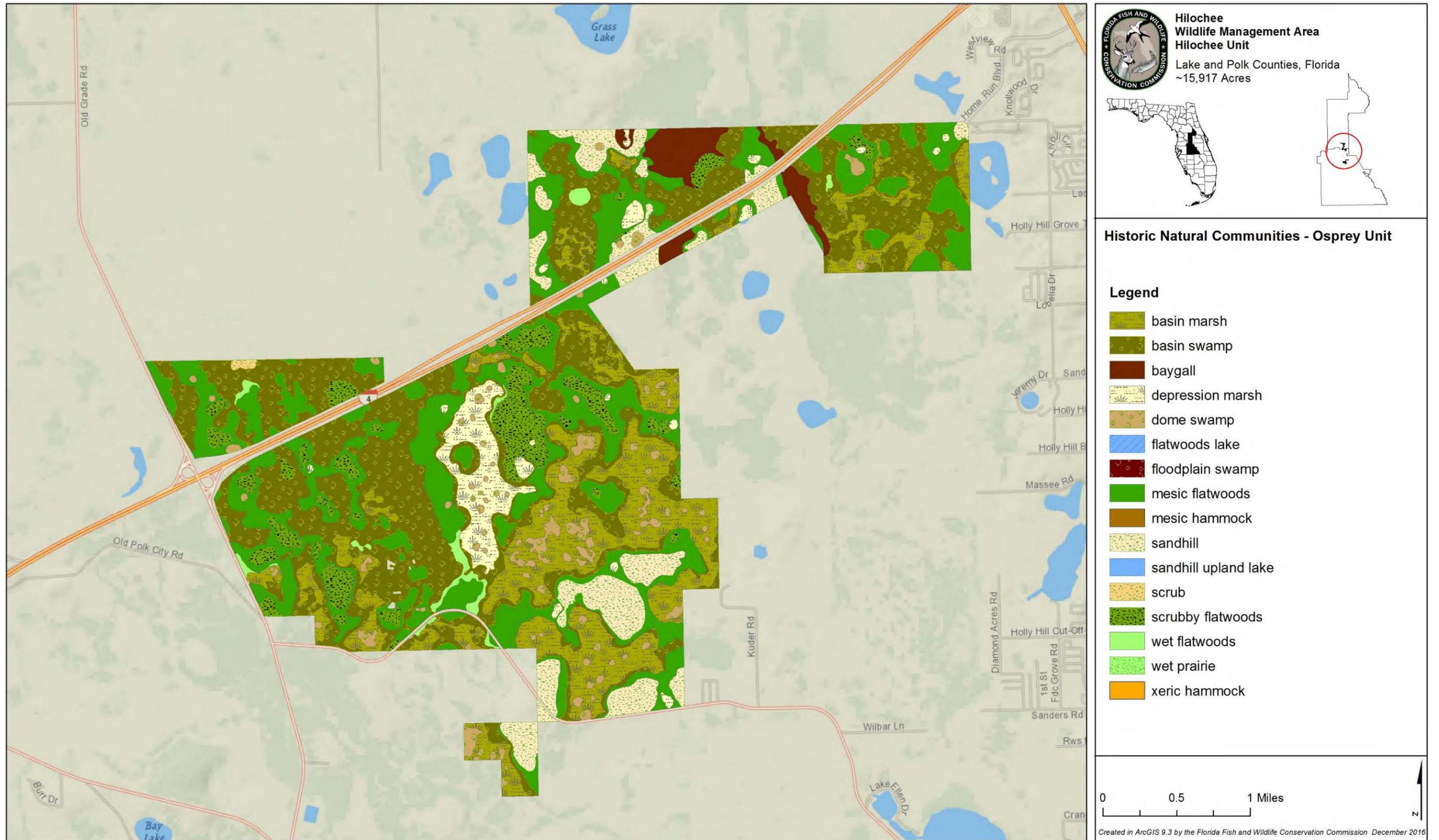


Figure 21. Historic Natural Communities - Osprey Unit

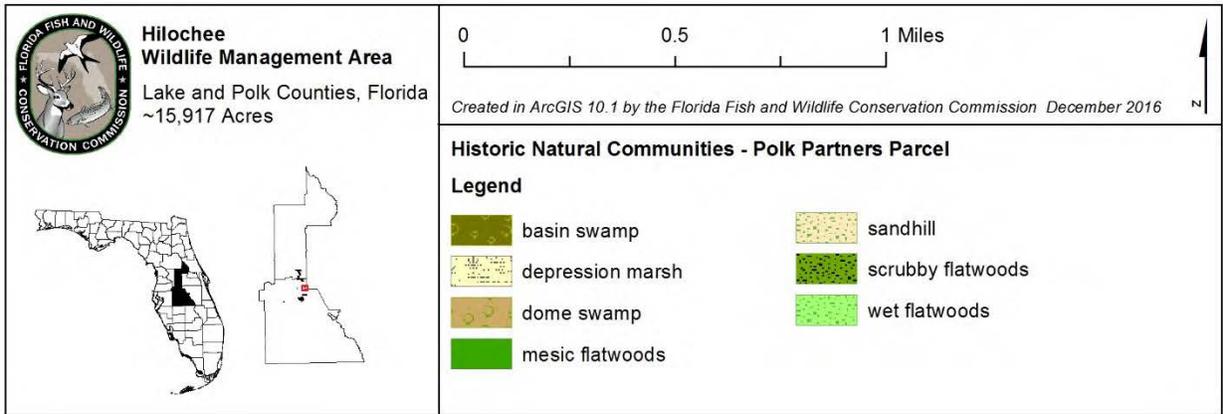
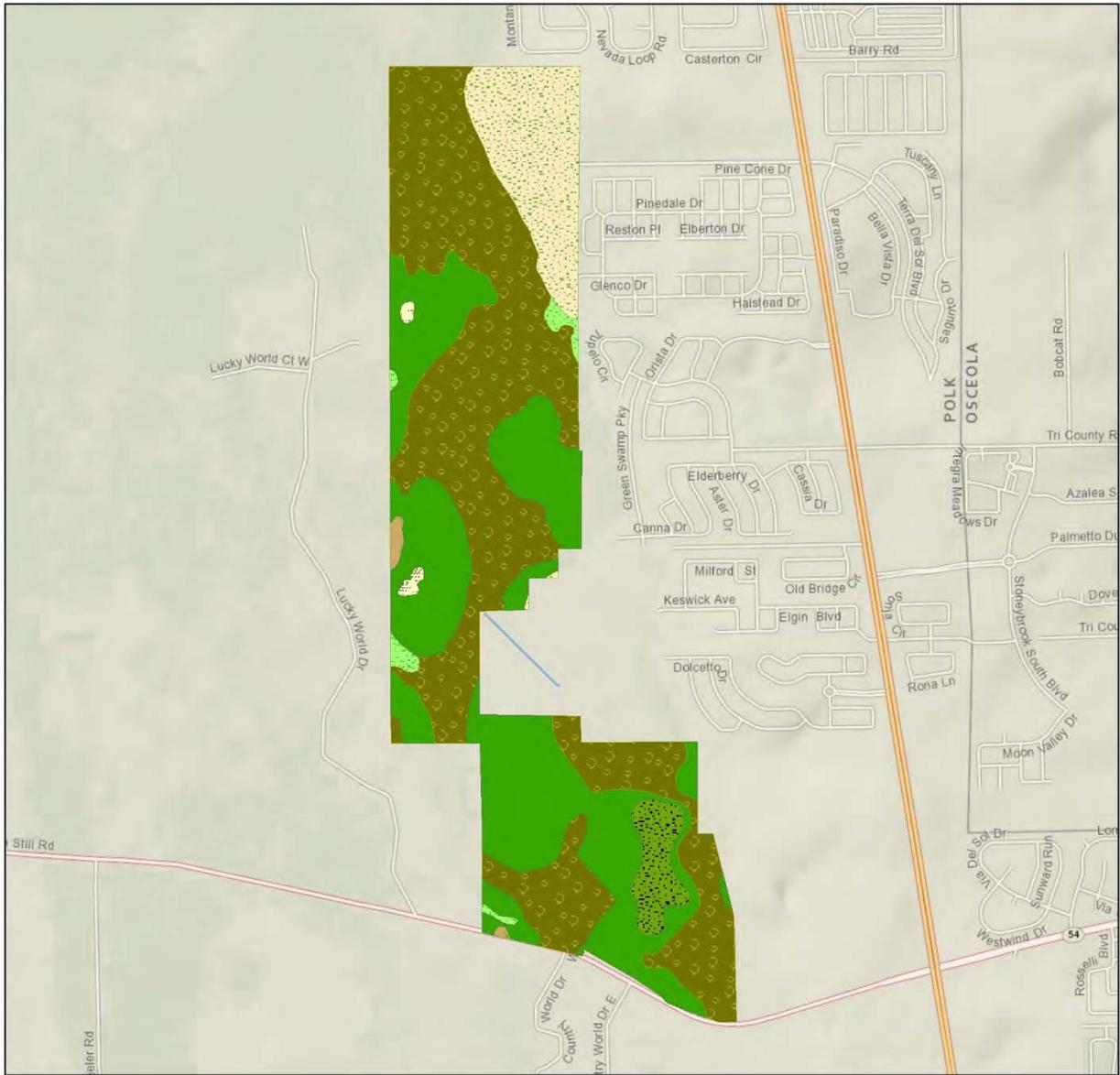


Figure 22. Historic Natural Communities - Polk Partners Parcel



Figure 23. Historic Natural Communities - Wander Parcel

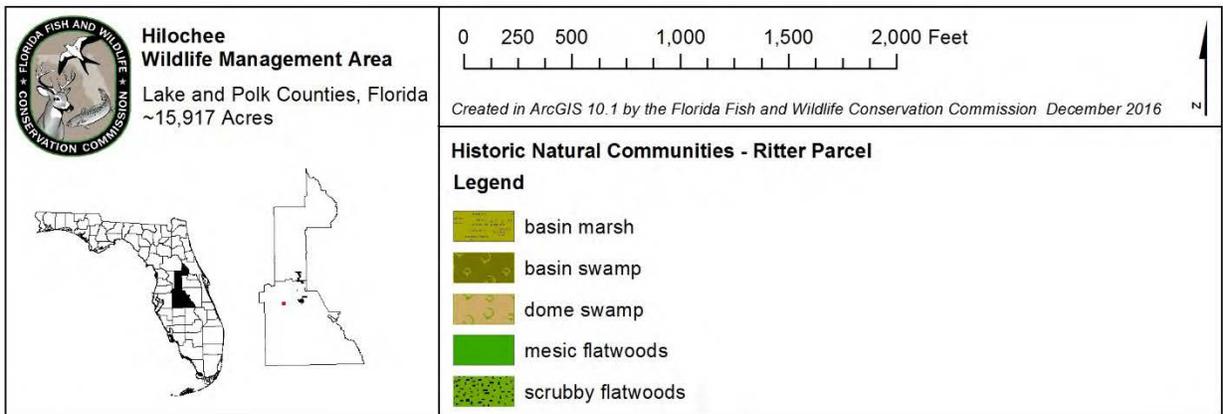


Figure 24. Historic Natural Communities - Ritter Parcel

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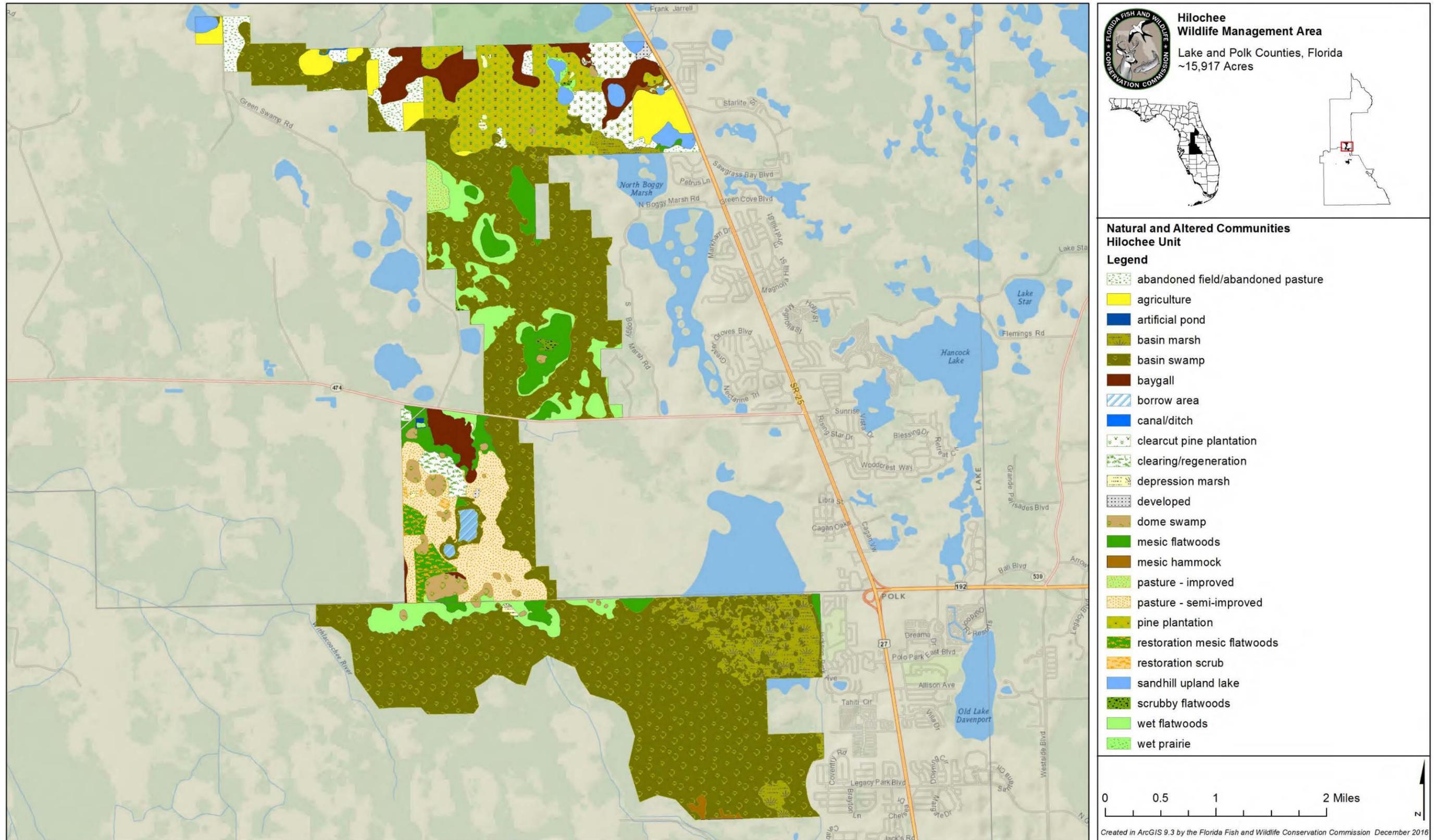


Figure 25. Natural and Altered Communities - Hilochee Unit

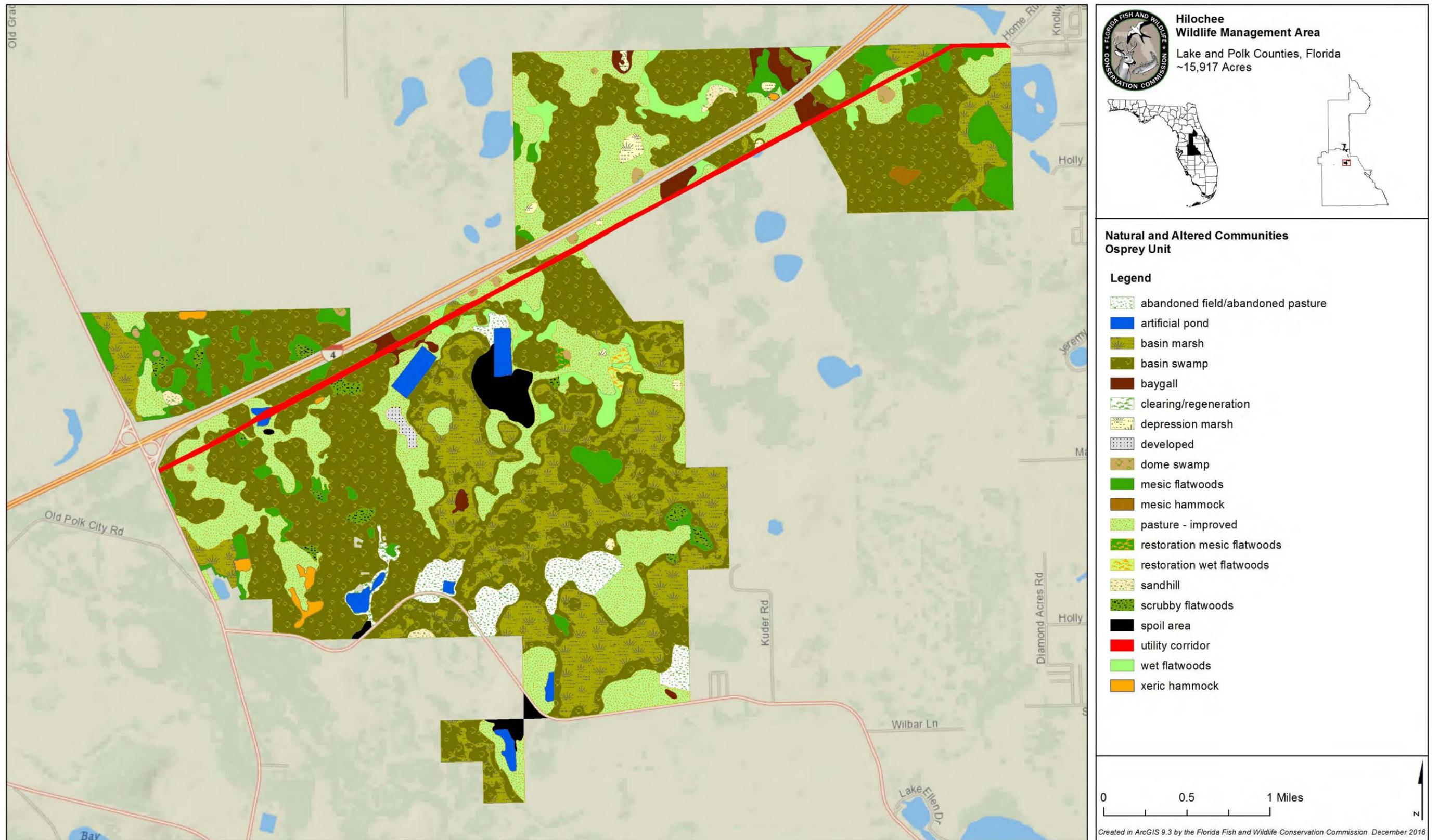


Figure 26. Natural and Altered Communities - Osprey Unit

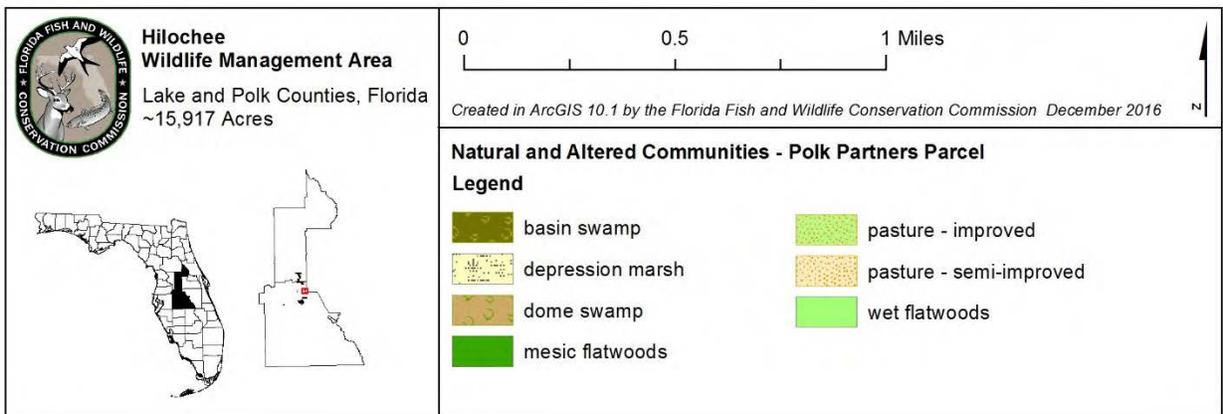
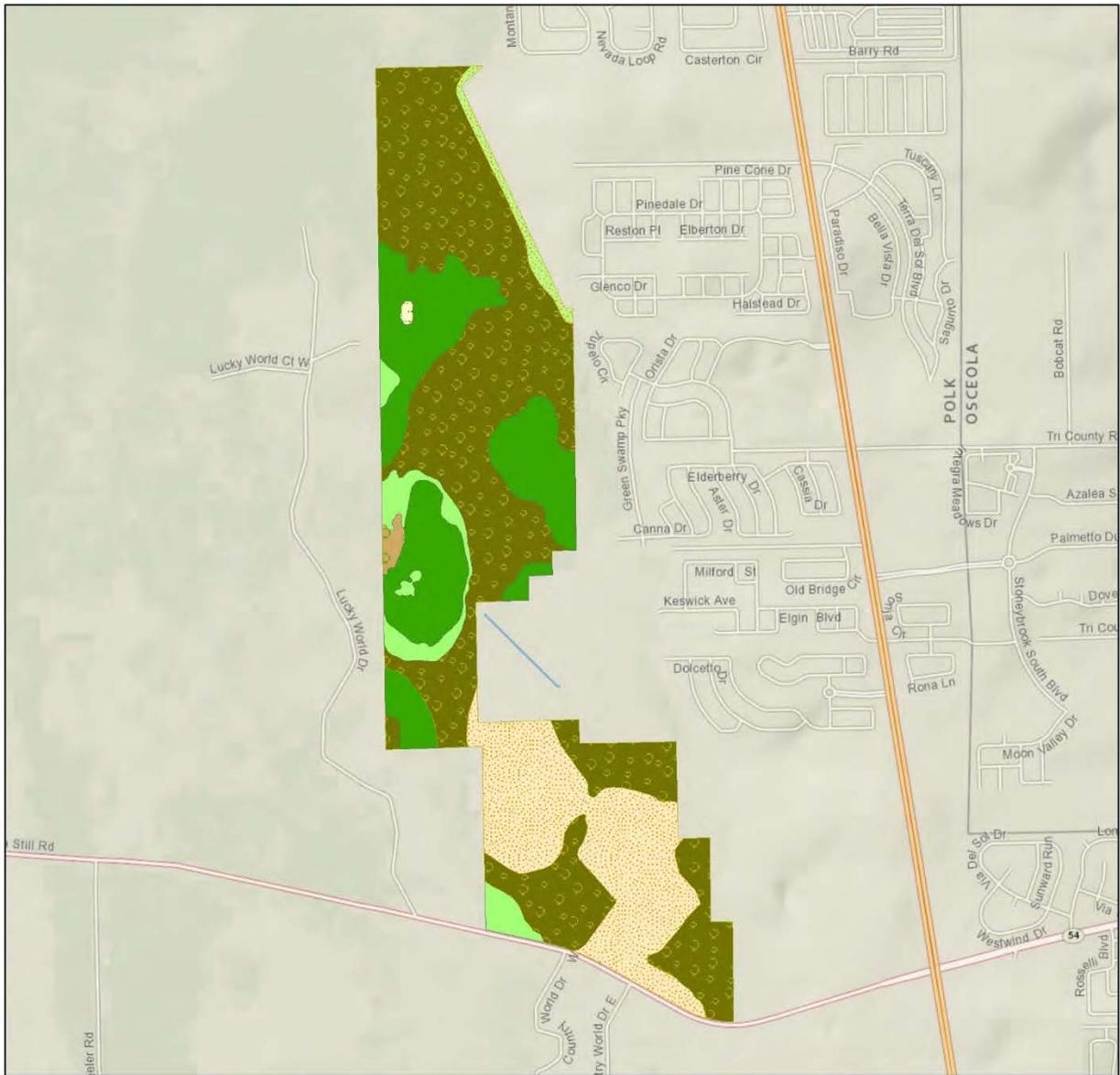


Figure 27. Natural and Altered Communities - Polk Partners Parcel

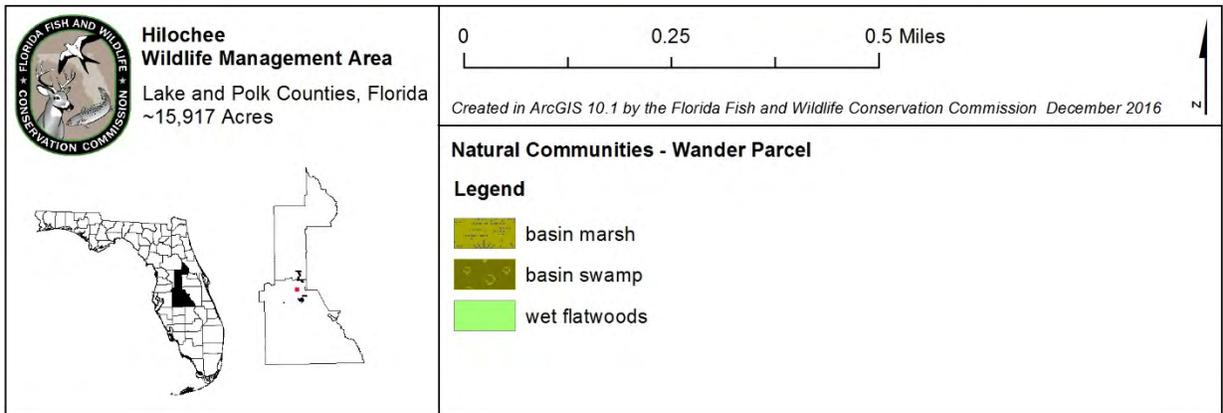
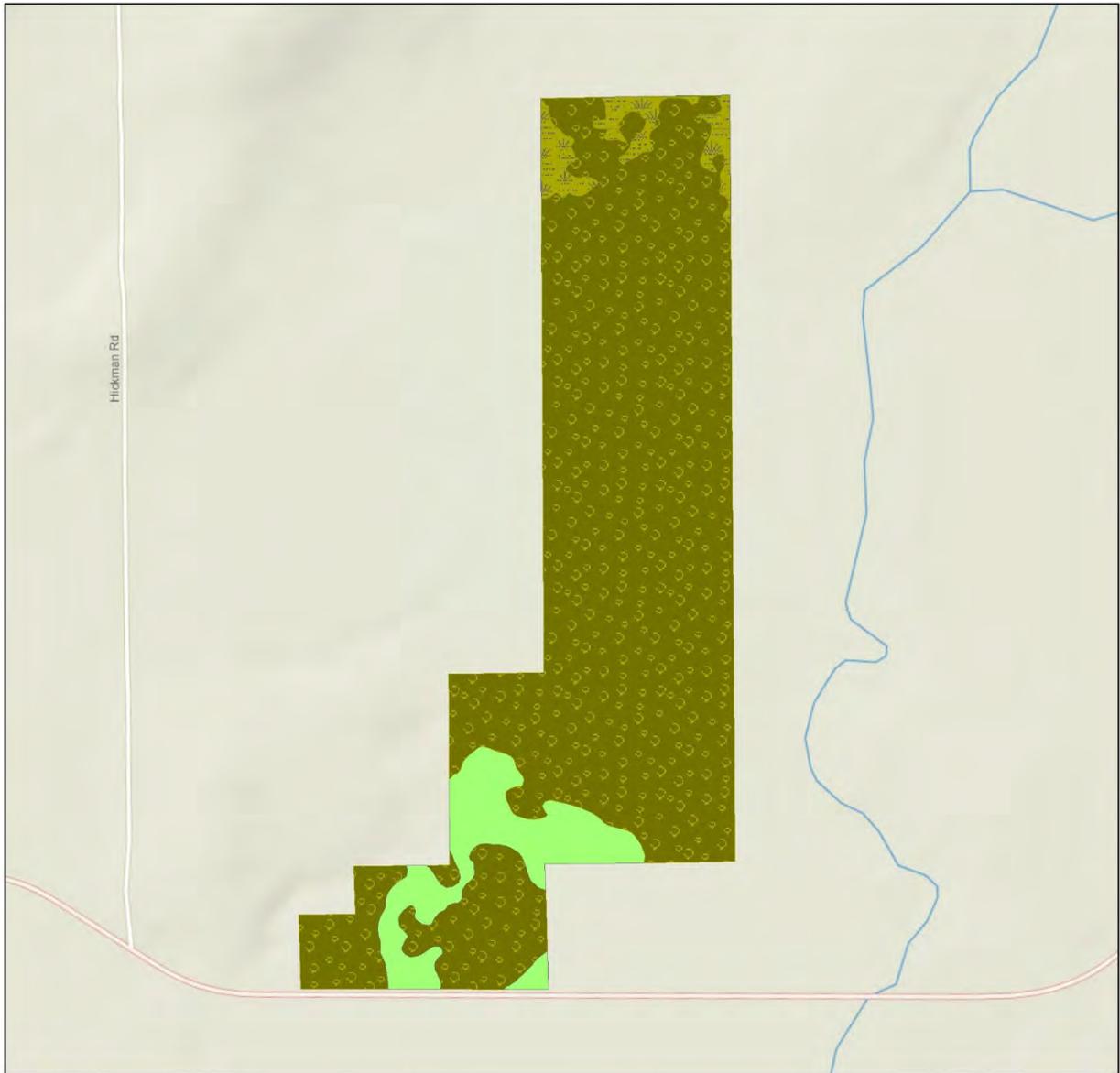


Figure 28. Natural and Altered Communities - Wander Parcel

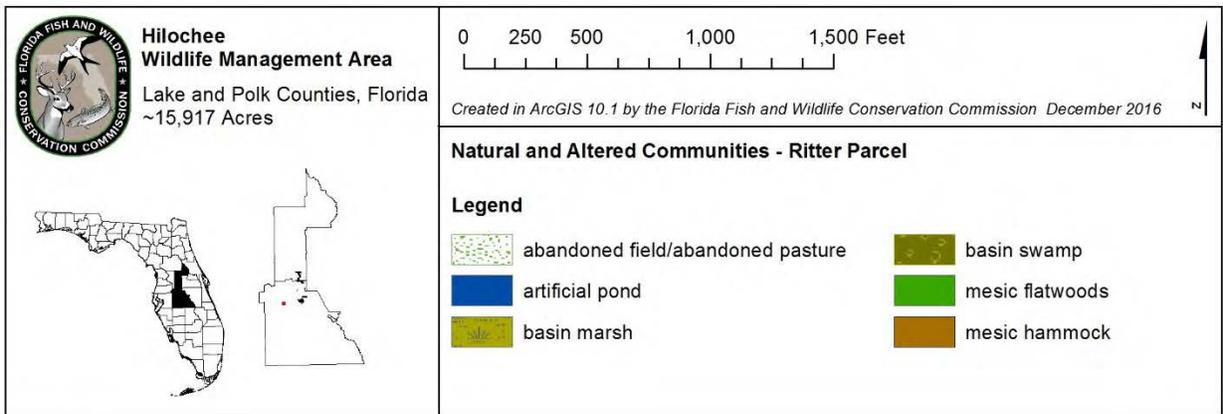


Figure 29. Natural and Altered Communities - Ritter Parcel

Table 3. Natural and Altered Communities of HWMA

<u>Natural or Altered Community</u>	<u>Acres</u>	<u>Percentage of Area</u>
Basin swamp	8,217.0	51.8%
Basin marsh	1,367.6	8.6%
Pasture - improved	1,154.4	7.3%
Mesic flatwoods	883.3	5.6%
Wet flatwoods	718.4	4.5%
Pine plantation	619.2	3.9%
Pasture - semi-improved	601.8	3.8%
Baygall	458.6	2.9%
Abandoned field/abandoned pasture	428.8	2.7%
Agriculture	223.8	1.4%
Clearcut pine plantation	169.3	1.1%
Dome swamp	167.2	1.1%
Utility corridor	117.8	0.7%
Sandhill upland lake	101.6	0.6%
Restoration mesic flatwoods	89.7	0.6%
Spoil area	86.8	0.5%
Clearing/regeneration	85.0	0.5%
Artificial pond	82.4	0.5%
Scrubby flatwoods	61.3	0.4%
Depression marsh	50.0	0.3%
Mesic hammock	41.0	0.3%
Borrow area	35.0	0.2%
Xeric hammock	28.5	0.2%
Developed	22.9	0.1%
Sandhill	17.6	0.1%
Restoration wet flatwoods	11.9	0.1%
Wet prairie	10.2	0.1%
Restoration scrub	6.0	0.0%
Canal/ditch	2.9	0.0%

Table 4. Native plant species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
American beautyberry	<i>Callicarpa americana</i>
American waterfern	<i>Azolla filiculoides</i>
American white waterlily	<i>Nymphaea odorata</i>
Anglestem primrosewillow	<i>Ludwigia leptocarpa</i>
Atlantic St. John's wort	<i>Hypericum reductum</i>
Baldwin's nutrush	<i>Scleria baldwinii</i>
Beaksedges	<i>Rhynchospora</i> spp.
Bear grass	<i>Yucca filamentosa</i>
Beggarticks	<i>Bidens alba</i>
Blackberry	<i>Rubus</i> sp.
Blackroot	<i>Pterocaulon pycnostachyum</i>
Blue huckleberry	<i>Gaylussacia frondosa</i> var. <i>nana</i>
Blue maidencane	<i>Amphicarpum muhlenbergianum</i>
Blueberry	<i>Vaccinium</i> sp.
Bluejack oak	<i>Quercus incana</i>
Bog white violet	<i>Viola lanceolata</i>
Bottlebrush threeawn	<i>Aristida spiciformis</i>
Bracken fern	<i>Pteridium aquilinum</i>
Branched hedgehyssop	<i>Gratiola ramosa</i>
Broadleaf arrowhead	<i>Sagittaria latifolia</i>
Broomsedge	<i>Andropogon</i> spp.
Broomsedge bluestem	<i>Andropogon virginicus</i>
Buckwheat	<i>Eriogonum tomentosum</i>
Bunched beaksedge	<i>Rhynchospora cephalantha</i>
Bushy bluestem	<i>Andropogon glomeratus</i>
Buttonbush	<i>Cephalanthus occidentalis</i>
Carolina redroot	<i>Lachnanthes carolina</i>
Carolina rockrose	<i>Helianthemum carolinianum</i>
Carolina willow	<i>Salix caroliniana</i>
Carolina yelloweyed grass	<i>Xyris caroliniana</i>
Carpetgrass	<i>Axonopus furcatus</i>
Cattails	<i>Typha</i> spp.
Chalky bluestem	<i>Andropogon capillipes</i>
Chapman's goldenrod	<i>Solidago odora</i> var. <i>chapmanii</i>
Chapman's oak	<i>Quercus chapmanii</i>

Table 4. Native plant species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Cinnamon fern	<i>Osmunda cinnamomea</i>
Climbing hempweed	<i>Mikania scandens</i>
Clustered beakrush	<i>Rhynchospora globularis</i>
Clustered bushmint	<i>Hyptis alata</i>
Coastalplain chaffhead	<i>Carphephorus corymbosus</i>
Coastalplain milkwort	<i>Polygala setacea</i>
Coastalplain staggerbush	<i>Lyonia fruticosa</i>
Common cattail	<i>Typha latifolia</i>
Crowngrass	<i>Paspalum</i> sp.
Cutthroat grass	<i>Panicum abscissum</i>
Dahoon	<i>Ilex cassine</i>
Darrow's blueberry	<i>Vaccinium darrowii</i>
Dock	<i>Rumex</i> sp.
Dogfennel	<i>Eupatorium capillifolium</i>
Duckweed	<i>Lemna</i> sp.
Dwarf huckleberry	<i>Gaylussacia dumosa</i>
Eastern purple bladderwort	<i>Utricularia purpurea</i>
Eggleaf witchgrass	<i>Dichanthelium ovale</i>
Elliot's bluestem	<i>Andropogon gyrans</i>
Elliott's milkpea	<i>Galactia elliotii</i>
Elliott's yelloweyed grass	<i>Xyris elliotii</i>
Evening primrose	<i>Oenothera</i> sp.
False nettle	<i>Boehmeria cylindrica</i>
Fascicled beaksedge	<i>Rhynchospora fascicularis</i>
Fetterbush	<i>Lyonia lucida</i>
Fireweed	<i>Erechtites hieraciifolius</i>
Flattened pipewort	<i>Eriocaulon compressum</i>
Floating bladderworts	<i>Utricularia</i> spp.
Florida alicia	<i>Chapmannia floridana</i>
Florida greeneyes	<i>Berlandiera subacaulis</i>
Florida ticktrefoil	<i>Desmodium floridanum</i>
Fourpetal St. Johns wort	<i>Hypericum tetrapetalum</i>
Fringed yelloweyed grass	<i>Xyris fimbriata</i>
Gallberry	<i>Ilex glabra</i>
Giant airplant	<i>Tillandsia fasciculata</i>

Table 4. Native plant species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Giant goldenrod	<i>Solidago gigantea</i>
Giant orchid	<i>Pteroglossaspis ecristata</i>
Gopher apple	<i>Licania michauxii</i>
Groundsel tree	<i>Baccharis halimifolia</i>
Hatpins	<i>Syngonanthus flavidulus</i>
Hemlock witchgrass	<i>Dichantherium portoricense</i>
Honeycomb head	<i>Balduina angustifolia</i>
Hooded pitcherplant	<i>Sarracenia minor</i>
Lady tresses orchid	<i>Spiranthes</i> sp.
Lance leaved arrowhead	<i>Sagittaria lancifolia</i>
Laurel greenbrier	<i>Smilax laurifolia</i>
Leather fern	<i>Blechnum serrulatum</i>
Lichens	<i>Cladonia</i> spp.
Little bluestem	<i>Schizachyrium stoloniferum</i>
Live oak	<i>Quercus virginiana</i>
Lizard's tail	<i>Saururus cernuus</i>
Loblolly bay	<i>Gordonia lasianthus</i>
Longleaf pine	<i>Pinus palustris</i>
Longleaf threeawn	<i>Aristida palustris</i>
Lopsided Indiangrass	<i>Sorghastrum secundum</i>
Maidencane	<i>Panicum hemitomon</i>
Marsh pennywort	<i>Hydrocotyle</i> sp.
Meadow beauty	<i>Rhexia mariana</i>
Mermaidweed	<i>Proserpinaca pectinata</i>
Mexican clover	<i>Richardia</i> sp.
Mohr's thoroughwort	<i>Eupatorium mohrii</i>
Muscadine	<i>Vitis rotundifolia</i>
Myrtle oak	<i>Quercus myrtifolia</i>
Myrtleleaf St. John's wort	<i>Hypericum myrtifolium</i>
Narrowfruit horned beaksedge	<i>Rhynchospora inundata</i>
Narrowleaf silkgrass	<i>Pityopsis graminifolia</i>
Needlepod rush	<i>Juncus scirpoides</i>
Netted pawpaw	<i>Asimina reticulata</i>
Netted shield fern	<i>Woodwardia areolata</i>
Northern needleleaf	<i>Tillandsia balbisiana</i>

Table 4. Native plant species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Nuttall's meadowbeauty	<i>Rhexia nuttallii</i>
Panic grass	<i>Dichanthelium ensifolium</i> var. <i>ensifolium</i>
Passion flower	<i>Passiflora incarnata</i>
Pawpaw	<i>Asimina</i> sp.
Peelbark St. John's wort	<i>Hypericum fasciculatum</i>
Persimmon	<i>Diospyros virginiana</i>
Pickernelweed	<i>Pontederia cordata</i>
Piedmont pinweed	<i>Lechea torreyi</i>
Pine lily	<i>Lilium catesbaei</i>
Pinebarren beaksedge	<i>Rhynchospora intermedia</i>
Pinebarren goldenrod	<i>Solidago fistulosa</i>
Pinweed	<i>Lechea</i> sp.
Plumegrass	<i>Saccharum giganteum</i>
Pond cypress	<i>Taxodium ascendens</i>
Purple bluestem	<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>
Queens delight	<i>Stillingia sylvatica</i>
Rattlesnake master	<i>Eryngium yuccifolium</i>
Red maple	<i>Acer rubrum</i>
Redtop panicum	<i>Panicum rigidulum</i>
Rosy camphorweed	<i>Pluchea rosea</i>
Rough boneset	<i>Eupatorium pilosum</i>
Roundpod St. John's wort	<i>Hypericum cistifolium</i>
Royal fern	<i>Osmunda regalis</i>
Runner oak	<i>Quercus minima</i>
Sand live oak	<i>Quercus geminata</i>
Sandyfield beaksedge	<i>Rhynchospora megalocarpa</i>
Savannah primrosewillow	<i>Ludwigia virgata</i>
Saw palmetto	<i>Serenoa repens</i>
Sawgrass	<i>Cladium jamaicense</i>
Scrub buckwheat	<i>Eriogonum longifolium</i> var. <i>gnaphalifolium</i>
Sensitive brier	<i>Mimosa quadrivalvis</i>
Shield fern	<i>Thelypteris</i> sp.
Shiny blueberry	<i>Vaccinium myrsinites</i>
Shore rush	<i>Juncus marginatus</i>
Shortleaf gayfeather	<i>Liatris tenuifolia</i>

Table 4. Native plant species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Shortleaf rosegentian	<i>Sabatia brevifolia</i>
Shortleaf yelloweyed grass	<i>Xyris brevifolia</i>
Shortspike bluestem	<i>Andropogon brachystachyus</i>
Silk bay	<i>Persea borbonia</i> var. <i>humilis</i>
Slash pine	<i>Pinus elliottii</i>
Slender goldenrod	<i>Euthamia caroliniana</i>
Slenderfruit nutrush	<i>Scleria georgiana</i>
Smallfruit beggarticks	<i>Bidens mitis</i>
Soft rush	<i>Juncus effusus</i>
Southern umbrella sedge	<i>Fuirena scirpoidea</i>
Sowthistle	<i>Sonchus</i> spp.
Spanglegrass	<i>Chasmanthium laxum</i>
Sphagnum moss	<i>Sphagnum</i> sp.
Spikerush	<i>Eleocharis</i> spp.
Splitbeard bluestem	<i>Andropogon ternarius</i>
Spoonleaf sundew	<i>Drosera intermedia</i>
Spreading beaksedge	<i>Rhynchospora divergens</i>
Swamp bay	<i>Persea palustris</i>
Swamp tupelo	<i>Nyssa sylvatica</i> var. <i>biflora</i>
Sweetbay	<i>Magnolia virginiana</i>
Switchgrass	<i>Panicum virgatum</i>
Tall elephant's foot	<i>Elephantopus elatus</i>
Tall pinebarren milkwort	<i>Polygala cymosa</i>
Taperleaf waterhorehound	<i>Lycopus rubellus</i>
Tenangle pipewort	<i>Eriocaulon decangulare</i>
Threadleaf beaksedge	<i>Rhynchospora filifolia</i>
Tough buckthorn	<i>Sideroxylon tenax</i>
Tree huckleberry	<i>Vaccinium arboreum</i>
Turkey oak	<i>Quercus laevis</i>
Virginia chain fern	<i>Woodwardia virginica</i>
Virginia marsh St. John's wort	<i>Triadenum virginicum</i>
Virginia willow	<i>Itea virginica</i>
Warty sedge	<i>Carex verrucosa</i>
Water cowbane	<i>Oxypolis filiformis</i>
Water oak	<i>Quercus nigra</i>

Table 4. Native plant species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Water spangles	<i>Salvinia minima</i>
Wavyleaf noseburn	<i>Tragia urens</i>
Wax myrtle	<i>Myrica cerifera</i>
Whitehead bogbutton	<i>Lachnocaulon anceps</i>
Whitetop aster	<i>Sericocarpus tortifolius</i>
Winged sumac	<i>Rhus copallinum</i>
Wiregrass	<i>Aristida stricta</i>
Witchgrass	<i>Dichanthelium</i> sp.
Yellow eyed grass	<i>Xyris</i> sp.
Yellow milkwort	<i>Polygala rugelii</i>
Yellow thistle	<i>Cirsium horridulum</i>

Table 5. Imperiled plant species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>	<u>Status</u>
Cutthroat grass	<i>Panicum abscissum</i>	SE
Giant airplant	<i>Tillandsia fasciculata</i>	SE
Giant orchid	<i>Pteroglossaspis ecristata</i>	ST
Hooded pitcherplant	<i>Sarracenia minor</i>	ST
Northern needleleaf	<i>Tillandsia balbisiana</i>	ST
Pine lily	<i>Lilium catesbaei</i>	ST
Scrub buckwheat	<i>Eriogonum longifolium</i> var. <i>gnaphalifolium</i>	FE
Spoonleaf sundew	<i>Drosera intermedia</i>	ST

Acronym Key

FE = Federally endangered

SE = State endangered

ST = State threatened

Table 6. Exotic Invasive Plant Species Observed on HWMA

<u>Common name</u>	<u>Scientific name</u>	<u>FLEPPC Category</u>
Air-potato	<i>Dioscorea bulbifera</i>	I
Bahia grass	<i>Paspalum notatum</i>	-
Balsam apple	<i>Momordica charantia</i>	II
Bermuda grass	<i>Cynodon dactylon</i>	-
Brazilian-pepper	<i>Schinus terebinthifolius</i>	I
Caeserweed	<i>Urena lobata</i>	II
Centipede grass	<i>Eremochloa ophiuroides</i>	-
Chinaberry	<i>Melia azedarach</i>	II

Table 6. Exotic Invasive Plant Species Observed on HWMA

<u>Common name</u>	<u>Scientific name</u>	<u>FLEPPC Category</u>
Chinese tallow tree	<i>Triadica sebifera</i>	I
Cogongrass	<i>Imperata cylindrica</i>	I
Coral vine	<i>Antigonon leptopus</i>	II
Guineagrass	<i>Urochloa maxima</i>	II
Japanese climbing fern	<i>Lygodium japonicum</i>	I
Kudzu	<i>Pueraria montana var. lobata</i>	I
Lantana	<i>Lantana camara</i>	I
Mimosa	<i>Albizia julibrissin</i>	I
Natal grass	<i>Melinis repens</i>	I
Old World climbing fern	<i>Lygodium microphyllum</i>	I
Paragrass	<i>Urochloa mutica</i>	I
Peruvian primrosewillow	<i>Ludwigia peruviana</i>	I
Purple sesban	<i>Sesbania punicea</i>	II
Rosary pea	<i>Abrus precatorius</i>	I
Shrub verbena	<i>Lantana camara</i>	I
Smutgrass	<i>Sporobolus indicus</i>	-
Torpedo grass	<i>Panicum repens</i>	I
Tropical soda apple	<i>Solanum viarum</i>	I
Water hyacinth	<i>Eichhornia crassipes</i>	I
Wisteria	<i>Wisteria sinensis</i>	II

Natural Communities

Basin marsh

Basin marsh is an herb-dominated community that occurs in large, often irregularly shaped depressions. Basin marshes are regularly inundated freshwater herbaceous wetlands that may occur in a variety of situations, but in contrast to depression marshes, are not small or shallow inclusions within a fire-maintained natural community. Plant species composition is heterogeneous, both within and between marshes, but can generally be divided into

submersed, floating-leaved, emergent, and grassy zones from deepest to shallowest portions; shrub patches may be present within any of these zones.

On HWMA, basin marsh is an open, inundated herbaceous wetland dominated by grasses, sedges, and aquatic emergent, occurring as small inclusions in, or along the fringes of, larger basin swamps. Examples of the inclusion type of basin marsh occur within the larger basin swamp and are interspersed with cypress forest and open water. Occasionally they occur as herbaceous fringes of sandhill upland lakes and flatwoods lakes. An example of the “fringe” type of basin marsh occurs on the eastern edge of the large Green Swamp basin swamp at the base of the Lake Wales Ridge. These particular basin marshes may be influenced by the considerable ditching and clearing in the area. Other regional accounts variously describe these herbaceous wetlands as “floodplain marsh” and “slough.”

On HWMA, maidencane is invariably the dominant species in basin marshes; it sometimes forms dense mats of both living and dead vegetation. Other common herbaceous species include pickerel weed, broadleaf arrowhead, American white waterlily, water spangles, duckweed, mosquito fern, bladderworts, flatsedges, smallfruit beggarticks, and soft rush. Common cattail and sawgrass occasionally occur in patches, particularly along marsh edges. Shrub species occur sporadically within basin marshes and often form dense thickets along the edges. Shrub species include Carolina willow, buttonbush, and young pond cypress saplings. Exotic species observed in disturbed areas of basin marshes include Peruvian primrose willow, water hyacinth, and torpedo grass.

Basin swamp

Basin swamp is a forested wetland community that occurs in large irregularly shaped depressions, and is vegetated with hydrophytic trees and shrubs that can withstand an extended hydroperiod. Basin swamps are highly variable in size, shape, and species composition. Mixed species tree canopies are common, often including both evergreen and deciduous tree species. This natural community typically occurs in any type of large landscape depression such as old lake beds, river basins, and ancient coastal swales and lagoons that existed during higher sea levels.

Basin swamps occur throughout HWMA in low areas, and also as bands around sandhill upland lakes and flatwoods lakes. Some forested areas surrounding large basin marshes were also characterized as basin swamps. Basin swamps occupy greater acreage than any other community type on HWMA. Basin swamps on HWMA are characterized by the presence of pond cypress and are permanently inundated except during periods of extreme drought.

Large basin swamps, such as those found in the southeastern corner of the Hilochee Unit, contain forests of pond cypress interspersed with herbaceous wetlands and open water. Hardwood species occur as co-dominants in areas with shallow water and include swamp

tupelo, sweetbay, swamp bay, and red maple. Shrub species are often abundant and include buttonbush, dahoon, wax myrtle, Virginia willow, and fetterbush. Areas with shallow water or exposed soil support many fern species such as leather fern, cinnamon fern, Virginia chain fern, and shield fern. Other herbaceous vegetation includes pickerelweed, lizard's tail, maidencane, smallfruit beggarticks, soft rush, Virginia marsh St. John's wort, sawgrass, floating bladderworts, eastern purple bladderwort, duckweed, common cattail, and mosquito fern. Exotic species that sporadically occur in deepwater basin swamps include water hyacinth and Peruvian primrose willow.

Smaller basin swamps on HWMA are similar in species composition to larger swamps but differ in that canopy and subcanopy strata are generally dominated by young, dense cypress, with few or no hardwood sub-dominants. Perhaps because of past logging, most of the smaller basin swamps contain very dense shrub strata. Ferns are common in these dense swamps. Basin swamps with severe or recent logging have little or no canopy and are often dominated by dense growths of weedy or invasive species. Shallow borders of basin swamps often support an herbaceous ground cover under a canopy of young cypress. Herb species common to open edges include narrowfruit horned beaksedge, bunched beaksedge, other beaksedge species, warty sedge, purple bluestem, spikerush, plumegrass, and fringed yelloweyed grass.

Baygall

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

On HWMA, baygall are forested wetlands with high moisture levels maintained by downslope seepage or high water tables and dominated by evergreen shrubs or bay trees. Extensive baygall forests with interspersed cypress swamps were observed in the southwestern corner of HWMA.

Baygall forests are compositionally similar to basin swamps but are distinguished by the predominance of bay trees in the canopy and subcanopy strata. Although pond cypress is often present, it is not a dominant canopy species. An abundance of loblolly bay typifies HWMA's baygall forests. Other common canopy and subcanopy tree species include sweetbay, swamp bay, pond cypress, and blackgum. The shrub strata are typically very dense and include fetterbush, dahoon, wax myrtle, Virginia willow, blueberry, and buttonbush. Dominant herbaceous species include ferns such as leather fern, cinnamon

fern, royal fern, Virginia chain fern, netted chain fern, and shield fern, and sedges such as warty sedge, and beaksedge species. Other common herbaceous species are maidencane, fringed yelloweyed grass, Carolina redroot, and sphagnum moss.

Depression marsh

Depression marsh, an herbaceous wetland community found in low flatlands, forms the characteristic pockmarked landscape seen on aerial photographs of the flat landscapes of the Florida peninsula. Depression marsh is usually characterized as a shallow, rounded depression in sand substrate with herbaceous vegetation and shrubs, often in concentric bands. These marshes also frequently form an outer rim around swamp communities such as dome swamps. They form when the overlying sands slump into depressions dissolved in underlying limestone. Depression marshes often burn with the surrounding landscape, and are seasonally inundated. Depression marshes typically occur in landscapes occupied by fire-maintained natural communities such as mesic flatwoods, dry prairie, or sandhill.

Depression marshes are common on the Hilochee Unit, where they are found in both flatwoods and altered upland landscapes. Tree canopies are absent, although many HWMA marshes support dense shrub cover, perhaps as a result of fire suppression and hydrologic alteration. Common shrub species include Carolina willow, buttonbush, wax myrtle, swamp tupelo, dahoon, sweetbay, and groundsel tree. Many HWMA depression marshes have dense growths of the weedy invasive shrub, Peruvian primrose willow. Sandweed St. John's wort often forms a uniform short shrub stratum in shallow outer zones of depression marshes. Herbaceous vegetation is usually dense and consists of wetland graminoids, ferns, and emergent aquatic forbs. Species include maidencane, beakrushes, blue maidencane, pickerelweed, broadleaf arrowhead, American white waterlily, Virginia chain fern, and leather fern.

Dome swamp

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 HWMA, dome swamps are forested wetlands, typically dominated by pond cypress, occupying small, shallow, often rounded depressions. Dome swamps are very similar in

composition to basin swamps, are inundated much of the year, and are usually embedded within a large mesic flatwoods matrix. Trees in the center are taller than those on the edges, which gives the stand a dome-like profile. Dome swamps on HWMA have fairly dense canopies of pond cypress; the subcanopy is usually sparse and consists of evergreen hardwoods such as dahoon and sweetbay. The shrub layer may be sparse or very dense and is usually dominated by fetterbush and wax myrtle. A few dome swamps observed had very sparse shrub cover but supported a diverse herb layer that includes maidencane, Virginia chain fern, leather fern, warty sedge, blue maidencane, taperleaf waterhorehound, smallfruit beggarticks, narrowfruit horned beaksedge, bunched beaksedge, other beaksedge species, tenangle pipewort, flattened pipewort, mermaidweed, spikerush, floating bladderworts, and fringed yelloweyed grass.

Mesic flatwoods

Mesic flatwoods is the most widespread natural community in Florida, covering the flat sandy terraces left behind by former high sea levels. Mesic flatwoods is characterized by an open canopy of tall pines and a dense, low ground layer of shrubs, grasses, and forbs. 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 (spodic horizon) formed within several feet of the soil surface. The soils may be alternately xeric during dry periods, and saturated or even inundated after heavy rain events.

At HWMA, mesic flatwoods are pine woodlands on relatively flat terrain with temporarily saturated soils during wet seasons and a diverse ground cover vegetation of low shrubs and herbaceous species. Historically, these communities burned frequently, with natural fire return intervals estimated as once every two to five years. Prior to the clearing and site conversion of the past century, mesic flatwoods were likely the most common upland community at HWMA. Today, only remnants and small patches remain. Mesic flatwoods remnants are found along the edges of small ridges in areas that were missed during clearing and conversion to pasture or citrus groves. Intact mesic flatwoods are found on several small ridges on the Osprey Unit.

Slash pine is typically the dominant canopy species, mixed with oaks and, rarely, older longleaf pines. Shrub cover and composition is variable, depending on past fire frequency and intensity and local moisture conditions. Some sites where the reintroduction of fire has been problematic have very thick shrub vegetation that includes gallberry, fetterbush, coastalplain staggerbush, wax myrtle, and saw palmetto. Sites with a history of recent fire have lower cover of the aforementioned shrubs, and higher prevalence of small-stature shrub species such as Atlantic St. John's wort, shiny blueberry, dwarf huckleberry, blue huckleberry, runner oak, and netted pawpaw. Wiregrass was present in most of the intact

mesic flatwoods, although it was more abundant in areas with recent fire. Other grass and forb species prominent in these sites include broomsedge bluestem, shortspike bluestem, lopsided Indiangrass, little bluestem, hemlock witchgrass, panic grass, bottlebrush threeawn, fourpetal St. Johns wort, whitetop aster, Nuttall's meadowbeauty, tall elephant's foot, narrowleaf silkgrass, shortleaf gayfeather, Carolina yelloweyed grass, shortleaf yelloweyed grass, blackroot, pinebarren goldenrod, shortleaf rosegentian, and Elliott's milkpea. Weedy species present in areas of past soil disturbance include slender goldenrod, blackberry, and muscadine.

Mesic hammock

Mesic hammock is a well-developed evergreen hardwood and/or palm forest, typically with a closed canopy of live oak. Mesic hammock may occur as "islands" on high ground within basin or floodplain wetlands, as patches of oak/palm forest in dry prairie or flatwoods communities, on river levees, or in ecotones between wetlands and upland communities. Historically, mesic hammocks were likely restricted to fire shadows, or other naturally fire-protected areas such as islands and peninsulas of lakes. Other landscape positions that can provide protection from the spread of fire are likely places for mesic hammock development, including edges of lakes, sinkholes, other depressional or basin wetlands, and river floodplains. Although mesic hammock is not generally considered a fire-adapted community, some small patches of hammock occurring as islands within marshes or prairies may experience occasional low-intensity ground fires. Mesic hammocks occur on well-drained sands mixed with organic matter and are rarely inundated. High moisture is maintained by heavy shading of the ground layer and accumulation of litter. Where limestone is near the surface, rocky outcrops are common in mesic hammocks.

At HWMA, mesic hammock is a hardwood-dominated forests with dense canopies of live oak and a shrub-dominated understory occurring in naturally fire-protected areas on upper slopes around lakes, swamps, and marshes. A few of the mesic hammocks slightly resemble baygall in composition.

Sandhill

Sandhill occurs on rolling hills with deep, often yellowish, well-drained sands. These are open, xeric communities dominated by widely spaced longleaf pine trees with a sparse midstory of deciduous oaks and a moderate to dense groundcover of grasses, herbs, and low shrubs. The midstory trees and low shrubs can be sparse to dense, depending on fire history, and typically include turkey oak, bluejack oak, sand live oak, sand post oak, sparkleberry, dwarf huckleberry, pricklypear, and gopher apple. The diverse herbaceous groundcover is often dominated by wiregrass, with other grasses and herbs including pineywoods dropseed, lopsided indiangrass, and a variety of forbs with many species of legumes and asters.

Historically, sandhill was likely the predominant community type of HWMA's xeric ridge tops. Today, the vast majority of this area has been converted to pasture, citrus groves, and sand mines. Extant sandhills on HWMA are either tiny, fire-suppressed remnants that escaped clearing, or highly degraded sites where pasture conversion was attempted in the past. The latter contain a few native sandhill species, but dominant species are pasture grasses, principally bahia and centipede grass, with other exotics occurring, including tropical soda apple. The few remnant sandhill parcels observed have sparse canopies of longleaf and slash pine, and fairly dense shrub layers of sand live oak, bluejack oak, turkey oak, Chapman's oak, persimmon, lowbush blueberries, and saw palmetto. Herbaceous ground cover includes wiregrass, lopsided Indiangrass, little bluestem, hemlock witchgrass, eggleaf witchgrass, gopher apple, tall elephant's foot, bracken fern, narrowleaf silkgrass, Chapman's goldenrod, Elliot's milkpea, pinweed, whitetop aster, splitbeard bluestem, Elliot's bluestem, Florida alicia, Florida greeneyes, sensitive brier, rattlesnake master, buckwheat, honeycomb head, switchgrass, wavyleaf noseburn, queens delight, Carolina rockrose, pinebarren beaksedge, and Florida ticktrefoil. Old-field and weedy species include passion flower, slender goldenrod, dogfennel, broomsedge bluestem, and smutgrass.

Sandhill upland lake

Sandhill upland lake are generally shallow, rounded solution depressions occurring in sandy upland communities. Sandhill upland lakes are usually permanent water bodies, although water levels may vary substantially.

Several sandhill upland lakes are located on the northern unit of HWMA. Once embedded in a matrix of sandhill, they are now surrounded by pine plantations and agricultural fields. Most are bordered, at least in part, by forested wetlands such as basin swamp or baygall. A few species of floating or emergent aquatic plants are visible on the lake surface, including duckweed, American waterfern, and fragrant waterlily. Otherwise vegetation is restricted to a narrow band of hydrophytic plants along the shore. Pond cypress is scattered along the shoreline as is loblolly bay. Buttonbush, dahoon, and wax myrtle form occasional shrubby thickets on the shoreline, with intervening patches of grasses and herbs such as maidencane and lance leaved arrowhead. Several weedy or invasive species are also present along the shore of some of the lakes, including paragrass, wisteria, groundsel tree, Peruvian primrosewillow, and cattails.

Scrub

Scrub is a community composed of evergreen, xerophytic shrubs, with or without a canopy of pines, and is found on dry, infertile, sandy ridges. Scrub communities dominated by a canopy of sand pine are usually found on the highest sandy ridgelines. The pine canopy may range from widely scattered trees with a short, spreading growth form, to tall thin trees forming a dense canopy of uniform height. Scrub is located on dry, infertile, sandy ridges which often mark the location of former shorelines. Scrub is a fire-maintained

community, with fires occurring every 20 to 80 years. In the absence of fire, scrub may succeed to xeric hammock. One small patch of scrub was delineated on HWMA.

Scrubby flatwoods

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

At HWMA, the scrubby flatwoods community comprises a canopy of longleaf or slash pine, shrub and herb layers characteristic of scrub or mesic flatwoods, and numerous patches of bare sand. Scrubby flatwoods occur as broad transition zones between scrub and mesic flatwoods communities. Today, scrubby flatwoods are rare on HWMA, as most of the habitat has been converted to pasture or citrus groves. Some remnants of former scrubby flatwoods are now better characterized as xeric hammock, which developed as a result of fire suppression. The best remaining remnants occur north of Interstate 4 on the Osprey unit.

Current scrubby flatwoods either lack a canopy or support only a few widely scattered longleaf or slash pines. They generally occur in small areas on narrow ridge tops, surrounded by mesic and/or wet flatwoods. Short and tall shrub strata are typically very dense, with thick growths of sand live oak, fetterbush, coastalplain staggerbush, saw palmetto, and gallberry. Dwarf shrubs are common, including shiny blueberry, Atlantic St. John's wort, and blue huckleberry. Herb cover is very sparse and patchy, and consists of wiregrass, shortspike bluestem, little bluestem, hemlock witchgrass, panic grass, coastalplain chaffhead, shortleaf gayfeather, shortleaf yelloweyed grass, blackroot, Elliot's milkpea, sandyfield beaksedge, piedmont pinweed, sensitive brier, and Chapman's goldenrod. Patches of ground lichens are common in unburned scrubby flatwoods.

Wet flatwoods

Wet flatwoods occur in broad, low flatlands, often in a mosaic with other communities. They are found in the ecotones between mesic flatwoods, shrub bogs, wet prairies, dome swamps, or strand swamps. Wet flatwoods are pine forests with a sparse or absent midstory and a dense groundcover of hydrophytic grasses, herbs, and low shrubs. The relative density of shrubs and herbs varies greatly in wet flatwoods. Shrubs tend to dominate where fire has been absent for a long period or where cool season fires predominate; herbs are more abundant in locations that are frequently burned. Soils and

hydrology also influence the relative density of shrubs and herbs. Soils of shrubby wet flatwoods are generally poorly to very poorly drained sands. These soils generally have a mucky texture in the uppermost horizon. Loamy sands are typical of soils in grassy wet flatwoods.

At HWMA, wet flatwoods are open, pine woods occurring on seasonally inundated flatlands with sandy soils, and characterized by woody and herbaceous species that tolerate alternating periods of soil saturation and drought. A natural disturbance regime of frequent fires and hydrologic fluctuations historically maintained the open aspect of wet flatwoods in central Florida. High quality wet flatwoods typically support a sparse canopy of longleaf and slash pines and a dense, diverse ground cover of evergreen shrubs, perennial grasses and forbs. Wiregrass is usually the dominant grass, persisting in evenly spaced hummocks.

High quality examples of wet flatwoods are rare on HWMA; one was observed in an area in the southwestern portion of the Hilochee unit, west of the Green Swamp. This site supports a rich, wiregrass-dominated ground cover, although the overstory pines have been removed. Recent prescribed and wildfires have reduced shrub dominance; species comprising the shrub strata include gallberry, wax myrtle, myrtleleaf St. John's wort, patchy saw palmetto, and slash pine saplings. The dense herb cover is dominated by wiregrass, little bluestem, blue maidencane, purple bluestem, and carpetgrass. The presence of weedy species such as Carolina redroot and blackberry indicates past soil disruption from cattle and hog foraging.

A wet flatwoods variant containing cutthroat grass was observed near the northern-most boundary of the Osprey Unit. This narrow strip of mesic and wet flatwoods borders a large, dense baygall forest. Cutthroat grass occurs in thick patches mixed with wiregrass and other typical wet flatwoods species.

The wet flatwoods designation was applied frequently on HWMA to seasonally inundated pine woodlands that are degraded versions of wet flatwoods and also to areas that were likely wet prairies historically that have been invaded by pines as a result of fire suppression. Currently, these areas support sparse to dense stands of young slash pines, patchy to dense shrub strata of evergreen shrubs and vines, swamp bay, dahoon, laurel greenbrier, and ground cover dominated by blue maidencane, Carolina redroot, maidencane, fringed yelloweyed grass, and Virginia chain fern. These areas are devoid of wiregrass and the other herb species that characterize the higher quality wet flatwoods on HWMA. Large areas of this wet flatwoods type exist on the Osprey unit, and to a lesser extent on the Wander Parcel.

Wet prairie

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.

On HWMA, this community is compositionally similar to wet flatwoods but lacks canopy strata and wiregrass. Wet prairies are uncommon on HWMA and usually occur around dome and basin swamps. Often, there is dense pond cypress invasion from neighboring swamps, perhaps as a result of fire suppression. Evergreen shrub cover is patchy and consists mainly of wax myrtle, swamp bay, and loblolly bay. In some cases, there exists a dense low shrub layer of sandweed St. John's wort. Dominant grasses are maidencane, blue maidencane, purple bluestem, and chalky bluestem. Other herb species include longleaf threeawn, tenangle pipewort, flattened pipewort, slenderfruit nutrush, narrowfruit horned beaksedge, water cowbane, rosy camphorweed, tall pinebarren milkwort, southern umbrella sedge, Elliott's yelloweyed grass, fringed yelloweyed grass, and Virginia chain fern. Weedy and exotic herb species are often present, particularly in disturbed areas. These include Carolina redroot, slender goldenrod, caeserweed, Peruvian primrose willow, and torpedo grass.

Xeric hammock

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

On HWMA, xeric hammock type represents some former sandhill or scrubby flatwoods, now oak-dominated as a result of fire-exclusion. The understory is generally open in aspect, with patchy saw palmetto, gallberry, and shiny dwarf blueberry. Occasional hammock species are present in the larger sites, including American beautyberry, sparkleberry, and spanglegrass.

Altered Communities

Abandoned field/abandoned pasture

Abandoned field/abandoned pasture are old fields, fallow pastures, early successional areas that were formerly grazed or in agriculture production that lack recent activity to maintain the area as pasture or planted field. These areas are often dominated by weedy native and non-native species.

Agriculture

Agriculture lands at HWMA are areas that at some time were converted to and managed for the production of citrus fruits, principally oranges. Groves vary from frozen-out remnants with residual trees to fully operational stands that are commercially harvested. In all cases, the ground cover between rows is dominated almost exclusively by weedy species. Groves generally occupy lands that once supported sandhill and perhaps less frequently scrubby flatwoods.

Artificial pond

Artificial pond is a created habitat meant for water retention, cattle ponds, etc.

Borrow area

Borrow areas are either dry or wet depressions resulting from past or present mining operations and commonly include phosphate pits, sand pits, clay pits, etc.

Canal/ditch

Canal/ditch are artificial linear drainage ways.

Clearcut pine plantation

Clearcut pine plantation are areas of pine plantations that have undergone clearcutting of the pine canopy, but have not yet been replanted with pine trees. These areas are often dominated by weedy native and non-native species.

Clearing/regeneration

Clearing/regeneration areas are dove fields, wildlife food plots, old homesites, or recent or historic clearings that have significantly altered the groundcover and/or overstory of the original natural community.

Developed

Developed areas include check stations, ORV use areas, parking lots, buildings, maintained lawns, botanical or ornamental gardens, campgrounds, recreational, industrial, and residential areas.

Pasture - improved

Improved pastures are defined as former natural areas that have been stripped of most or all native vegetation and replanted in pasture grasses. These areas are open grasslands managed at one time for grazing and characterized by exotic grasses. Pastures occupy the majority of upland acreage on HWMA, and include areas of former sandhill, as well as scrubby, mesic, and wet flatwoods. Trees are generally absent, other than occasional patches of live oak and sand live oak. In wetter areas, patches of wax myrtle and gallberry may be present. The ground cover consists of weedy native and exotic grasses and sedges. Bahia grass is ubiquitous and is the only herbaceous species present in some pastures. Other exotic species include centipede grass, caeserweed, tropical soda apple, cogongrass, Mexican clover, sowthistle, shrub verbena, dock, and torpedo grass. Native species composition varies greatly, probably in response to moisture availability and the severity and frequency of past land alteration. Common native species include broomsedge bluestem, bushy bluestem, dogfennel, blackberry, fireweed, slender goldenrod, carpet grass, yellow thistle, smutgrass, giant goldenrod, evening primrose, meadow beauty, marsh pennywort, clustered beakrush, bunched beaksedge, fascicled beakrush, soft rush, and shore rush.

Pasture - semi-improved

Semi-improved pasture is defined as natural areas that have been stripped of a significant percentage of their native vegetation and seeded in pasture grasses, but still retain some natural structure. Pasture – semi-improved occupy areas of former sandhill, as well as scrubby, mesic, and wet flatwoods. Trees are generally absent, other than occasional patches of live oak and sand live oak. In wetter areas, patches of wax myrtle and gallberry may be present. The ground cover consists of weedy native and exotic grasses and sedges. Bahia grass is often common. Other exotic species include centipede grass, caeserweed, tropical soda apple, cogongrass, Mexican clover, sowthistle, the invasive shrub verbena, dock, and torpedo grass. Native species composition varies greatly, probably in response to moisture availability and the severity and frequency of past land alteration. Common native species include broomsedge bluestem, bushy bluestem, dogfennel, blackberry, fireweed, slender goldenrod, carpet grass, yellow thistle, smutgrass, giant goldenrod, evening primrose, meadow beauty, marsh pennywort, clustered beakrush, bunched beaksedge, fascicled beakrush, soft rush, and shore rush.

Pine plantation

Pine plantation is silvicultural lands managed at one time for pine production, with varying levels of disturbance of midstory and ground cover. At HWMA, this designation was applied to dense forests of apparently planted or seeded slash pines. Pines are typically evenly spaced and even-aged; older plantations have closed canopies. Midstory and ground cover vegetation is generally very sparse. Most pine plantations observed on HWMA were likely established in areas that formerly supported wet flatwoods; understory species include gallberry, blue maidencane, southern umbrella sedge, fringed yelloweyed grass, Virginia chain fern, Carolina redroot, slender goldenrod, and torpedo grass.

Restoration natural community

Restoration Natural Community is an altered landcover type where active restoration has been initiated in order to return the community to its historic state. Examples of restoration activities include pine thinning, longleaf pine planting, groundcover restoration, hydrology restoration, and removal of exotics and other undesirable vegetation. In historically pyrogenic natural communities, restoration activities are accompanied by the application of prescribed fire.

Spoil Area

Spoil areas are sites where dredge or spoil material is deposited. These areas may or may not be re-colonized by vegetation.

Utility corridor

Utility corridors are often linear features that house electric, gas, and/or telephone infrastructures and an associated right-of-way that is commonly open and periodically maintained by herbicide or mowing.

2.2.2 Forest Resources

Forest resources found on HWMA include mature pine stands within the natural communities of mesic flatwoods, wet flatwoods, sandhill and scrubby flatwoods. To a lesser extent, ~619 acres (3.9%) of HWMA is pine plantation currently undergoing thinning and restoration. Section 5.8 has additional information on FWC's management of the HWMA forest resources.

2.3 Fish and Wildlife Resources

The area's diverse vegetative communities provide the resources necessary to sustain a diversity of wildlife assemblages (Tables 7 - 13). Common wildlife species include white-tailed deer, wild turkey, northern bobwhite, gray squirrel, resident and migratory birds, and wading birds. Several wildlife species inhabiting HWMA are considered imperiled (endangered, threatened, or species of special concern), including Sherman's fox squirrel, eastern indigo snake, gopher tortoise, Audubon's crested caracara, and wood stork.

Table 7. Bird species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Acadian flycatcher	<i>Empidonax virescens</i>
American bittern	<i>Botaurus lentiginosus</i>
American black duck	<i>Anas rubripes</i>
American coot	<i>Fulica americana</i>
American crow	<i>Corvus brachyrhynchos</i>
American goldfinch	<i>Spinus tristis</i>
American kestrel	<i>Falco sparverius</i>
American redstart	<i>Setophaga ruticilla</i>
American robin	<i>Turdus migratorius</i>
American swallow-tailed kite	<i>Elanoides forficatus</i>
American wigeon	<i>Anas americana</i>
American woodcock	<i>Scolopax minor</i>
American yellow warbler	<i>Setophaga aestiva aestiva</i>
Anhinga	<i>Anhinga anhinga</i>
Audubon's crested caracara	<i>Polyborus plancus audubonii</i>
Bachman's sparrow	<i>Peucaea aestivalis</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Barn swallow	<i>Hirundo rustica</i>
Barred owl	<i>Strix varia georgica</i>
Bay-breasted warbler	<i>Setophaga castanea</i>
Belted kingfisher	<i>Megaceryle alcyon</i>
Black rail	<i>Laterallus jamaicensis</i>
Black vulture	<i>Coragyps atratus</i>
Black-and-white warbler	<i>Mniotilta varia</i>
Blackburnian warbler	<i>Setophaga fusca</i>
Black-crowned night heron	<i>Nycticorax nycticorax hoactli</i>
Black-necked stilt	<i>Himantopus mexicanus</i>
Blackpoll warbler	<i>Setophaga striata</i>
Black-throated blue warbler	<i>Setophaga caerulescens</i>
Black-throated green warbler	<i>Setophaga virens</i>
Blue grosbeak	<i>Passerina caerulea</i>
Blue jay	<i>Cyanocitta cristata</i>
Blue-gray gnatcatcher	<i>Poliophtila caerulea</i>
Blue-headed vireo	<i>Vireo solitaries</i>
Blue-winged teal	<i>Anas discors</i>

Table 7. Bird species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Blue-winged warbler	<i>Vermivora cyanoptera</i>
Boat-tailed grackle	<i>Quiscalus major</i>
Brown creeper	<i>Certhia americana</i>
Brown thrasher	<i>Toxostoma rufum</i>
Brown-headed cowbird	<i>Molothrus ater</i>
Brown-headed nuthatch	<i>Sitta pusilla</i>
Bufflehead	<i>Bucephala albeola</i>
Canvasback	<i>Aythya valisineria</i>
Cape May warbler	<i>Setophaga tigrina</i>
Carolina chickadee	<i>Poecile carolinensis</i>
Carolina wren	<i>Thryothorus ludovicianus</i>
Cattle egret	<i>Bubulcus ibis</i>
Cedar waxwing	<i>Bombycilla cedrorum</i>
Cerulean warbler	<i>Setophaga cerulea</i>
Chestnut-sided warbler	<i>Setophaga pensylvanica</i>
Chimney swift	<i>Chaetura pelagica</i>
Chipping sparrow	<i>Spizella passerina</i>
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>
Clay-colored sparrow	<i>Spizella pallida</i>
Common barn-owl	<i>Tyto alba pratincola</i>
Common goldeneye	<i>Bucephala clangula americana</i>
Common grackle	<i>Quiscalus quiscula</i>
Common ground-dove	<i>Columbina passerina</i>
Common moorhen	<i>Gallinula chloropus cachinnans</i>
Common nighthawk	<i>Chordeiles minor chapmani</i>
Common snipe	<i>Gallinago gallinago</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Cooper's hawk	<i>Accipiter cooperii</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 screech-owl	<i>Megascops asio</i>

Table 7. Bird species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Eastern towhee	<i>Pipilo erythrophthalmus</i>
Field sparrow	<i>Spizella pusilla</i>
Fish crow	<i>Corvus ossifragus</i>
Florida sandhill crane	<i>Grus canadensis pratensis</i>
Gadwall	<i>Anas strepera</i>
Glossy ibis	<i>Plegadis falcinellus</i>
Golden-winged warbler	<i>Vermivora chrysoptera</i>
Grasshopper sparrow	<i>Ammodramus savannarum pratensis</i>
Gray catbird	<i>Dumetella carolinensis</i>
Gray kingbird	<i>Tyrannus dominicensis</i>
Gray-cheeked thrush	<i>Catharus minimus</i>
Great blue heron	<i>Ardea herodias</i>
Great crested flycatcher	<i>Myiarchus crinitus</i>
Great egret	<i>Ardea alba egretta</i>
Great horned owl	<i>Bubo virginianus</i>
Greater sandhill crane	<i>Grus canadensis tabida</i>
Greater scaup	<i>Aythya marila nearctica</i>
Greater yellowlegs	<i>Tringa melanoleuca</i>
Green-backed heron	<i>Butorides striata</i>
Green-winged teal	<i>Anas crecca</i>
Hairy woodpecker	<i>Picoides villosus audubonii</i>
Hermit thrush	<i>Catharus guttatus</i>
Herring gull	<i>Larus argentatus</i>
Hooded merganser	<i>Lophodytes cucullatus</i>
Hooded warbler	<i>Setophaga citrina</i>
House wren	<i>Troglodytes aedon</i>
Indigo bunting	<i>Passerina cyanea</i>
Kentucky warbler	<i>Geothlypis formosa</i>
Killdeer	<i>Charadrius vociferus</i>
King rail	<i>Rallus elegans</i>
Least bittern	<i>Ixobrychus exilis</i>
Least sandpiper	<i>Calidris minutilla</i>
Least tern	<i>Sternula antillarum</i>
Lesser scaup	<i>Aythya affinis</i>
Lesser yellowlegs	<i>Tringa flavipes</i>

Table 7. Bird species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Limpkin	<i>Aramus guarauna pictus</i>
Little blue heron	<i>Egretta caerulea</i>
Loggerhead shrike	<i>Lanius ludovicianus</i>
Louisiana waterthrush	<i>Parkesia motacilla</i>
Magnolia warbler	<i>Setophaga magnolia</i>
Mallard	<i>Anas platyrhynchos</i>
Marsh wren	<i>Cistothorus palustris</i>
Merlin	<i>Falco columbarius</i>
Mississippi kite	<i>Ictinia mississippiensis</i>
Mottled duck	<i>Anas fulvigula</i>
Mourning dove	<i>Zenaida macroura</i>
Nashville warbler	<i>Leiothlypis ruficapilla</i>
Northern bobwhite	<i>Colinus virginianus</i>
Northern cardinal	<i>Cardinalis cardinalis</i>
Northern flicker	<i>Colaptes auratus</i>
Northern harrier	<i>Circus cyaneus hudsonius</i>
Northern mockingbird	<i>Mimus polyglottos</i>
Northern oriole	<i>Icterus galbula</i>
Northern parula	<i>Setophaga americana</i>
Northern pintail	<i>Anas acuta</i>
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>
Northern shoveler	<i>Anas clypeata</i>
Orange-crowned warbler	<i>Leiothlypis celata</i>
Osprey	<i>Pandion haliaetus carolinensis</i>
Ovenbird	<i>Seiurus aurocapilla</i>
Palm warbler	<i>Setophaga palmarum</i>
Peregrine falcon	<i>Falco peregrinus tundrius</i>
Pied-billed grebe	<i>Podilymbus podiceps</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Pine warbler	<i>Setophaga pinus</i>
Prairie warbler	<i>Setophaga discolor</i>
Prothonotary warbler	<i>Protonotaria citrea</i>
Purple gallinule	<i>Porphyrio martinica</i>
Purple martin	<i>Progne subis</i>
Red-bellied woodpecker	<i>Melanerpes carolinus</i>

Table 7. Bird species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Red-eyed vireo	<i>Vireo olivaceus</i>
Redhead	<i>Aythya americana</i>
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>
Red-shouldered hawk	<i>Buteo lineatus alleni</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Ring-billed gull	<i>Larus delawarensis</i>
Ring-necked duck	<i>Aythya collaris</i>
Roseate spoonbill	<i>Platalea ajaja</i>
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>
Ruby-crowned kinglet	<i>Regulus calendula</i>
Ruby-throated hummingbird	<i>Archilochus colubris</i>
Ruddy duck	<i>Oxyura jamaicensis rubida</i>
Rufous-sided towhee	<i>Pipilo erythrophthalmus</i>
Rusty blackbird	<i>Euphagus carolinus</i>
Savannah sparrow	<i>Passerculus sandwichensis</i>
Scarlet tanager	<i>Piranga olivacea</i>
Sedge wren	<i>Cistothorus platensis</i>
Sharp-shinned hawk	<i>Accipiter striatus velox</i>
Short-tailed hawk	<i>Buteo brachyurus fuliginosus</i>
Smooth-billed ani	<i>Crotophaga ani</i>
Snowy egret	<i>Egretta thula</i>
Solitary vireo	<i>Vireo solitarius</i>
Song sparrow	<i>Melospiza melodia</i>
Sora	<i>Porzana carolina</i>
Southeastern American kestrel	<i>Falco sparverius paulus</i>
Spotted sandpiper	<i>Actitis macularius</i>
Summer tanager	<i>Piranga rubra</i>
Swainson's thrush	<i>Catharus ustulatus</i>
Swamp sparrow	<i>Melospiza georgiana</i>
Tennessee warbler	<i>Leiothlypis peregrina</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>

Table 7. Bird species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Upland sandpiper	<i>Bartramia longicauda</i>
Veery	<i>Catharus fuscescens</i>
Vesper sparrow	<i>Poocetes gramineus</i>
Virginia rail	<i>Rallus limicola</i>
Water pipit	<i>Anthus spinoletta</i>
Western kingbird	<i>Tyrannus verticalis</i>
Whip-poor-will	<i>Caprimulgus vociferus</i>
White ibis	<i>Eudocimus albus</i>
White-eyed vireo	<i>Vireo griseus</i>
White-throated sparrow	<i>Zonotrichia albicollis</i>
White-winged dove	<i>Zenaida asiatica</i>
Wild turkey	<i>Meleagris gallopavo osceola</i>
Wilson's snipe	<i>Gallinago delicata</i>
Wood duck	<i>Aix sponsa</i>
Wood stork	<i>Mycteria americana</i>
Worm-eating warbler	<i>Helmitheros vermivorum</i>
Yellow rail	<i>Coturnicops noveboracensis</i>
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Yellow-crowned night heron	<i>Nyctanassa violacea</i>
Yellow-rumped warbler	<i>Setophaga coronata</i>
Yellow-throated vireo	<i>Vireo flavifrons</i>
Yellow-throated warbler	<i>Setophaga dominica</i>

Table 8. Amphibian species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Florida cricket frog	<i>Acris dorsalis</i>
Southern cricket frog	<i>Acris gryllus gryllus</i>
Two-toed amphiuma	<i>Amphiuma means</i>
Oak toad	<i>Anaxyrus quercicus</i>
Southern toad	<i>Anaxyrus terrestris</i>
Southern dusky salamander	<i>Desmognathus auriculatus</i>
Eastern narrow-mouthed toad	<i>Gastrophryne carolinensis</i>
Green treefrog	<i>Hyla cinerea</i>
Pine woods treefrog	<i>Hyla femoralis</i>
Barking treefrog	<i>Hyla gratiosa</i>
Squirrel treefrog	<i>Hyla squirella</i>
Little grass frog	<i>Pseudacrisocularis</i>
Southern chorus frog	<i>Pseudacris nigrata</i>
Ornate chorus frog	<i>Pseudacris ornata</i>
Gopher frog	<i>Lithobates capito</i>
Bullfrog	<i>Lithobates catesbeiana</i>
Bronze frog	<i>Lithobates clamitans clamitans</i>
Pig frog	<i>Lithobates grylio</i>
River frog	<i>Lithobates heckscheri</i>
Southern leopard frog	<i>Lithobates sphenocephal asphenocephala</i>
Eastern spadefoot	<i>Scaphiopus holbrookii</i>

Table 9. Reptile species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Blue-striped garter snake	<i>Thamnophis sirtalis similis</i>
Broad-headed skink	<i>Eumeces laticeps</i>
Brown water snake	<i>Nerodia taxispilota</i>

Table 9. Reptile species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Central Florida crowned snake	<i>Tantilla relicta neilli</i>
Coachwhip	<i>Masticophis flagellum</i>
Common musk turtle	<i>Sternotherus odoratus</i>
Common snapping turtle	<i>Chelydra serpentina</i>
Corn snake	<i>Elaphe guttata guttata</i>
Eastern diamondback rattlesnake	<i>Crotalus adamanteus</i>
Eastern glass lizard	<i>Ophisaurus ventralis</i>
Eastern hog-nosed snake	<i>Heterodon platirhinos</i>
Eastern indigo snake	<i>Drymarchon corais couperi</i>
Eastern kingsnake	<i>Lampropeltis getula</i>
Eastern mud snake	<i>Farancia abacura</i>
Eastern slender glass lizard	<i>Ophisaurus attenuatus longicaudus</i>
Florida box turtle	<i>Terrapene bauri</i>
Florida brown snake	<i>Storeria victa</i>
Florida chicken turtle	<i>Deirochelys reticularia chrysea</i>
Florida cottonmouth	<i>Agkistrodon piscivorus conanti</i>
Florida green water snake	<i>Nerodia floridana</i>
Florida kingsnake	<i>Lampropeltis getula floridana</i>
Florida mud turtle	<i>Kinosternon subrubrum steindachneri</i>
Florida red-bellied turtle	<i>Pseudemys nelsoni</i>
Florida scarlet snake	<i>Cemophora coccinea coccinea</i>
Florida scrub lizard	<i>Sceloporus woodi</i>
Florida softshell turtle	<i>Trionyx ferox</i>
Florida water snake	<i>Nerodia fasciata pictiventris</i>
Florida worm lizard	<i>Rhineura floridana</i>
Glossy crayfish snake	<i>Regina rigida</i>
Gopher tortoise	<i>Gopherus polyphemus</i>
Green anole	<i>Anolis carolinensis</i>
Ground skink	<i>Scincella lateralis</i>
Island glass lizard	<i>Ophisaurus compressus</i>
Loggerhead musk turtle	<i>Sternotherus minor minor</i>
Milk snake	<i>Lampropeltis triangulum</i>
Mole kingsnake	<i>Lampropeltis calligaster</i>
North American coral snake	<i>Micrurus fulvius</i>
North Florida swamp snake	<i>Seminatrix pygaea pygaea</i>

Table 9. Reptile species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Peninsula cooter	<i>Pseudemys peninsularis</i>
Peninsula mole skink	<i>Eumeces egregius onocrepis</i>
Peninsula ribbon snake	<i>Thamnophis sauritus sackenii</i>
Peninsular crowned snake	<i>Tantilla relicta relicta</i>
Pine snake	<i>Pituophis melanoleucus mugitus</i>
Pine woods snake	<i>Rhadinaea flavilata</i>
Pygmy rattlesnake	<i>Sistrurus miliarius barbouri</i>
Rainbow snake	<i>Farancia erythrogramma</i>
Rough green snake	<i>Opheodrys aestivus</i>
Scarlet kingsnake	<i>Lampropeltis triangulum elapsoides</i>
Short-tailed snake	<i>Stilosoma extenuatum</i>
Six-lined racerunner	<i>Cnemidophorus sexlineatus</i>
South Florida swamp snake	<i>Seminatrix pygaea cyclas</i>
Southeastern five-lined skink	<i>Eumeces inexpectatus</i>
Southern black racer	<i>Coluber constrictor priapus</i>
Southern fence lizard	<i>Sceloporus undulatus undulatus</i>
Southern hog-nosed snake	<i>Heterodon simus</i>
Southern ring-necked snake	<i>Diadophis punctatus punctatus</i>
Striped crayfish snake	<i>Regina alleni</i>
Striped mud turtle	<i>Kinosternon baurii</i>
Suwannee cooter	<i>Pseudemys concinna suwanniensis</i>
Yellow rat snake	<i>Elaphe alleghaniensis</i>

Table 10. Mammal species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Bobcat	<i>Lynx rufus</i>
Brazilian free-tailed bat	<i>Tadarida brasiliensis cynocephala</i>

Table 10. Mammal species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Cotton mouse	<i>Peromyscus gossypinus</i>
Cotton rat	<i>Sigmodon hispidus</i>
Eastern cottontail	<i>Sylvilagus floridanus</i>
Eastern harvest mouse	<i>Reithrodontomys humulis</i>
Eastern mole	<i>Scalopus aquaticus</i>
Eastern pipistrelle	<i>Perimyotis subflavus subflavus</i>
Eastern woodrat	<i>Neotoma floridana</i>
Evening bat	<i>Nycticeius humeralis</i>
Florida black bear	<i>Ursus americanus floridanus</i>
Florida mouse	<i>Podomys floridanus</i>
Golden mouse	<i>Ochrotomys nuttalli</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
Gray squirrel	<i>Sciurus carolinensis</i>
Least shrew	<i>Cryptotis parva floridana</i>
Long-tailed weasel	<i>Mustela frenata</i>
Marsh rice rat	<i>Oryzomys palustris</i>
Northern yellow bat	<i>Lasiurus intermedius floridanus</i>
Oldfield mouse	<i>Peromyscus polionotus</i>
Raccoon	<i>Procyon lotor</i>
River otter	<i>Lontra canadensis</i>
Round-tailed muskrat	<i>Neofiber alleni</i>
Seminole bat	<i>Lasiurus seminolus</i>
Sherman's fox squirrel	<i>Sciurus niger shermani</i>
Southern short-tailed shrew	<i>Blarina carolinensis</i>
Southeastern myotis	<i>Myotis austroriparius</i>
Southeastern pocket gopher	<i>Geomys pinetis</i>
Southeastern shrew	<i>Sorex longirostris</i>
Southern flying squirrel	<i>Glaucomys volans</i>
Spotted skunk	<i>Spilogale putorius</i>
Striped skunk	<i>Mephitis mephitis</i>
Virginia opossum	<i>Didelphis virginiana pigra</i>
White-tailed deer	<i>Odocoileus virginianus</i>

Table 11. Fish species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Black crappie	<i>Pomoxis nigromaculatus</i>
Bluegill	<i>Lepomis macrochirus</i>
Bowfin	<i>Amia calva</i>
Eastern mosquitofish	<i>Gambusia holbrooki</i>
Florida gar	<i>Lepisosteus platyrhincus</i>
Golden shiner	<i>Notemigonus crysoleucas</i>
Lake chubsucker	<i>Erimyzon sucetta</i>
Largemouth bass	<i>Micropterus salmoides</i>
Warmouth	<i>Lepomis gulosus</i>

Table 12. Non-native wildlife occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>
Mammals	
Coyote*	<i>Canis latrans</i>
Nine-banded armadillo*	<i>Dasyus novemcinctus</i>
Feral hog	<i>Sus scrofa</i>
Birds	
Eurasian collared-dove	<i>Streptopelia decaocto</i>
European starling	<i>Sturnus vulgaris</i>
Rock dove	<i>Columba livia</i>

*Native to North America

2.3.1 Integrated Wildlife Habitat Ranking System

The FWC has developed the Integrated Wildlife Habitat Ranking System (IWHRS) as a 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 HWMA has a high mean wildlife value of 6.9 (Figure 30).

2.3.2 Imperiled Species

For the purposes of this Management Plan, the term “Imperiled Species” refers to plant and animal species that are designated as Endangered, Threatened, or a Species of Special Concern by FWC, or that are designated as Endangered or Threatened by the U.S. Fish and Wildlife Service (Table 13). This designation is also commonly known as “listed species.”

All abbreviations and status determinations are derived from *Florida’s Endangered and Threatened Species* published by the FWC in January, 2017. The FWC maintains the state list of wildlife 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, of the Florida Administrative Code

At its November 2016 Commission Meeting, the FWC approved its Imperiled Species Management Plan, which includes changes to the listing status for many species. The rule changes included in the Imperiled Species Management Plan came into effect in January 2017. The list of wildlife presented here reflects those changes to the rules. All federally listed species that occur in Florida are included on Florida’s list as federally-designated endangered or federally-designated threatened species. Additionally, species that are not federally listed but which have been identified by the state as being at risk of extinction are listed as state-designated threatened. Finally, the FWC maintains a separate species of special concern category. This category was reviewed as part of the January 2017 rule changes and the majority of the species contained within the category were either removed from the imperiled species list due to conservation success or had their status changed to state threatened. However, six species remain listed as species of special concern. More detailed descriptions and management prescriptions are available on the FWC website: <http://www.myfwc.com/wildlifehabitats/profiles/>.

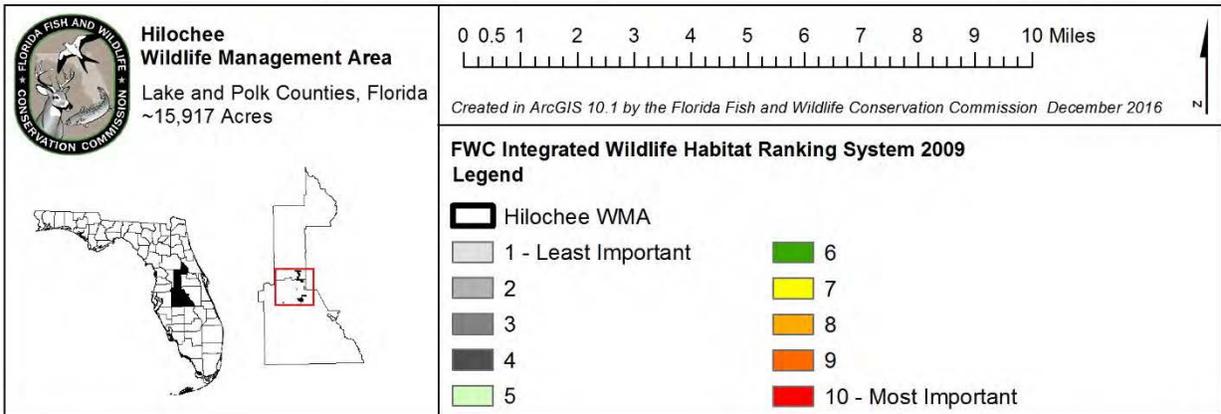
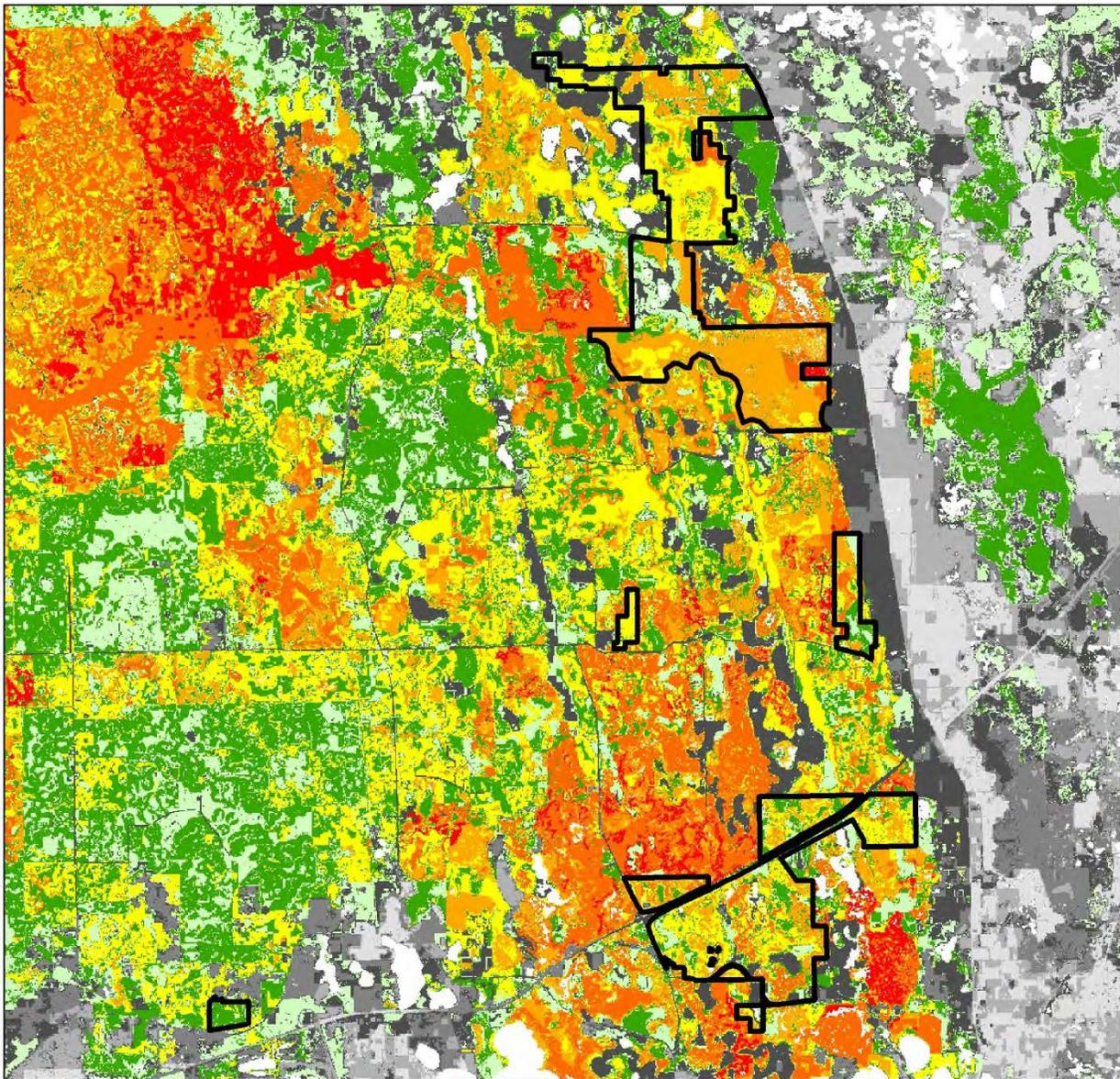


Figure 30. FWC Integrated Wildlife Habitat Ranking System

Table 13. Imperiled wildlife species occurring on HWMA

<u>Common name</u>	<u>Scientific name</u>	<u>Status</u>
Mammals		
Sherman's fox squirrel	<i>Sciurus niger shermani</i>	SSC
Birds		
Audubon's crested caracara	<i>Polyborus plancus audubonii</i>	FT
Florida sandhill crane	<i>Grus canadensis pratensis</i>	ST
Least tern	<i>Sterna antillarum</i>	ST
Little blue heron	<i>Egretta caerulea</i>	ST
Roseate spoonbill	<i>Platalea ajaja</i>	ST
Southeastern American kestrel	<i>Falco sparverius paulus</i>	ST
Tricolored heron	<i>Egretta tricolor</i>	ST
Wood stork	<i>Mycteria americana</i>	FT
Reptiles		
American alligator	<i>Alligator mississippiensis</i>	FT (S/A)
Eastern indigo snake	<i>Drymarchon corais couperi</i>	FT
Gopher tortoise	<i>Gopherus polyphemus</i>	ST
Short-tailed snake	<i>Stilosoma extenuatum</i>	ST

Acronym Key

FE = Federally Endangered
 FT = Federally Threatened
 FT (S/A) = Federally Threatened due to similarity of appearance

 ST = State Threatened
 SSC = State Species of Special Concern

2.3.3 FWC Wildlife Observations and FNAI Element Occurrences

GIS data maintained by FWC (Wildlife Observations) and FNAI (Element Occurrences; data usage agreement Appendix 13.6) indicate that HWMA has numerous documented occurrences of wildlife and a diverse assemblage of animal species (Figure 31).

2.4 Native Landscapes and Scenic Resources

The principle native landscapes and scenic resources of HWMA are the area's upland and wetland habitats. These native landscapes include the predominant natural communities of basin swamp, basin marsh, mesic flatwoods, and wet flatwoods. Complete descriptions of the natural communities found on HWMA may be found in Section 2.2.1 of this Management Plan.

2.5 Water Resources

All surface waters of the State are classified by DEP according to designated uses as described in Chapter 62-302.44 FAC. The surface waters of HWMA 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). No portion of HWMA is designated as OFW. However, the adjacent Lake Louisa State Park to the north of HWMA is a designated OFW. No degradation of water quality, other than that allowed in subsections Chapter 62-4.242(2) and (3) FAC, is permitted within an OFW, notwithstanding any other DEP rules that may allow water quality lowering.

Seven drainage basins are associated with HWMA, including those of Big Creek, Cypress Lake Outlet, Dixie Lake Outlet, Lake Hickorynut Drain, Little Creek, Pony Creek, and the Withlacoochee River (Figure 32). The area has the highest groundwater altitude in peninsular Florida and is considered to be critical to the recharge of the Floridan Aquifer. As part of the Green Swamp system, HWMA has been designated an Area of Critical State Concern.

In addition, numerous natural and man-made lakes and ponds exist on HWMA, and support freshwater sport fishing and paddling recreational opportunities. In addition, numerous wetlands are interspersed throughout the area. However, no part of HWMA is part of an aquatic preserve or is currently under consideration for such designation.

2.6 Beaches and Dunes

There are no beaches or dunes located on HWMA.

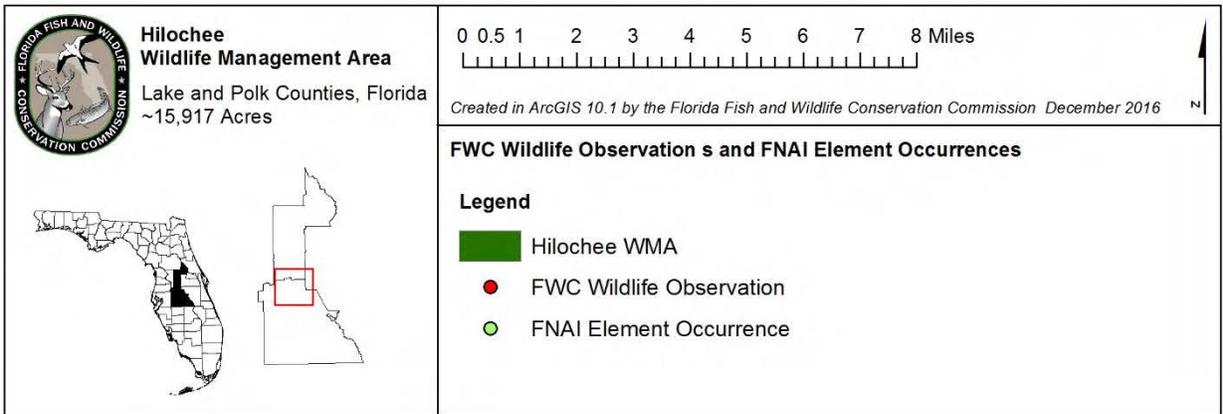
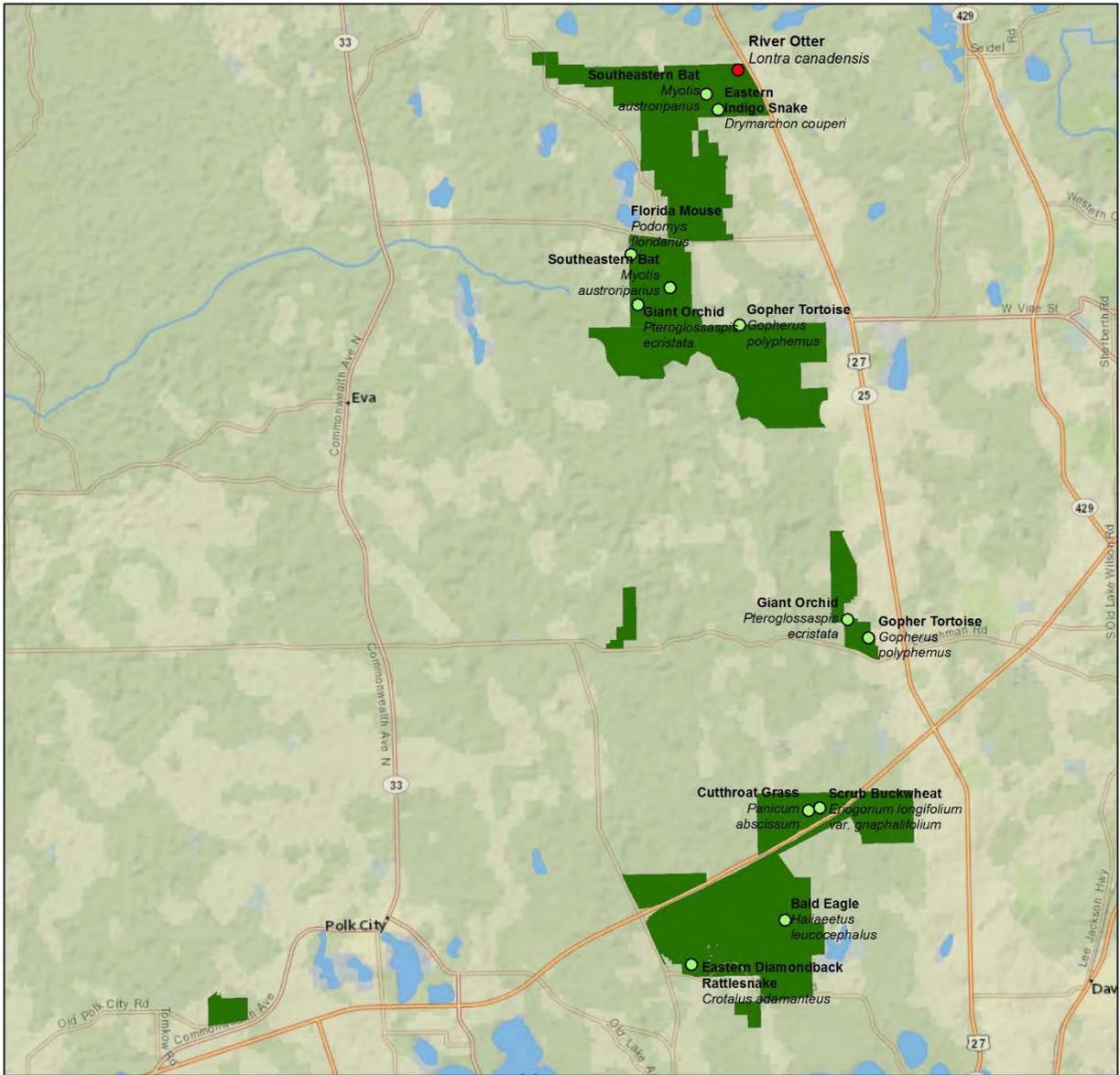


Figure 31. FWC Wildlife Observation and FNAI Element Occurrences

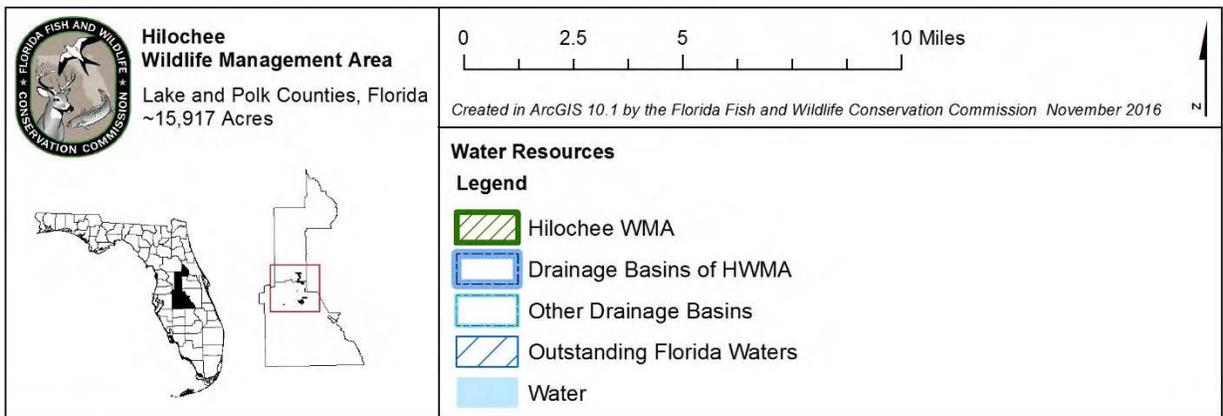
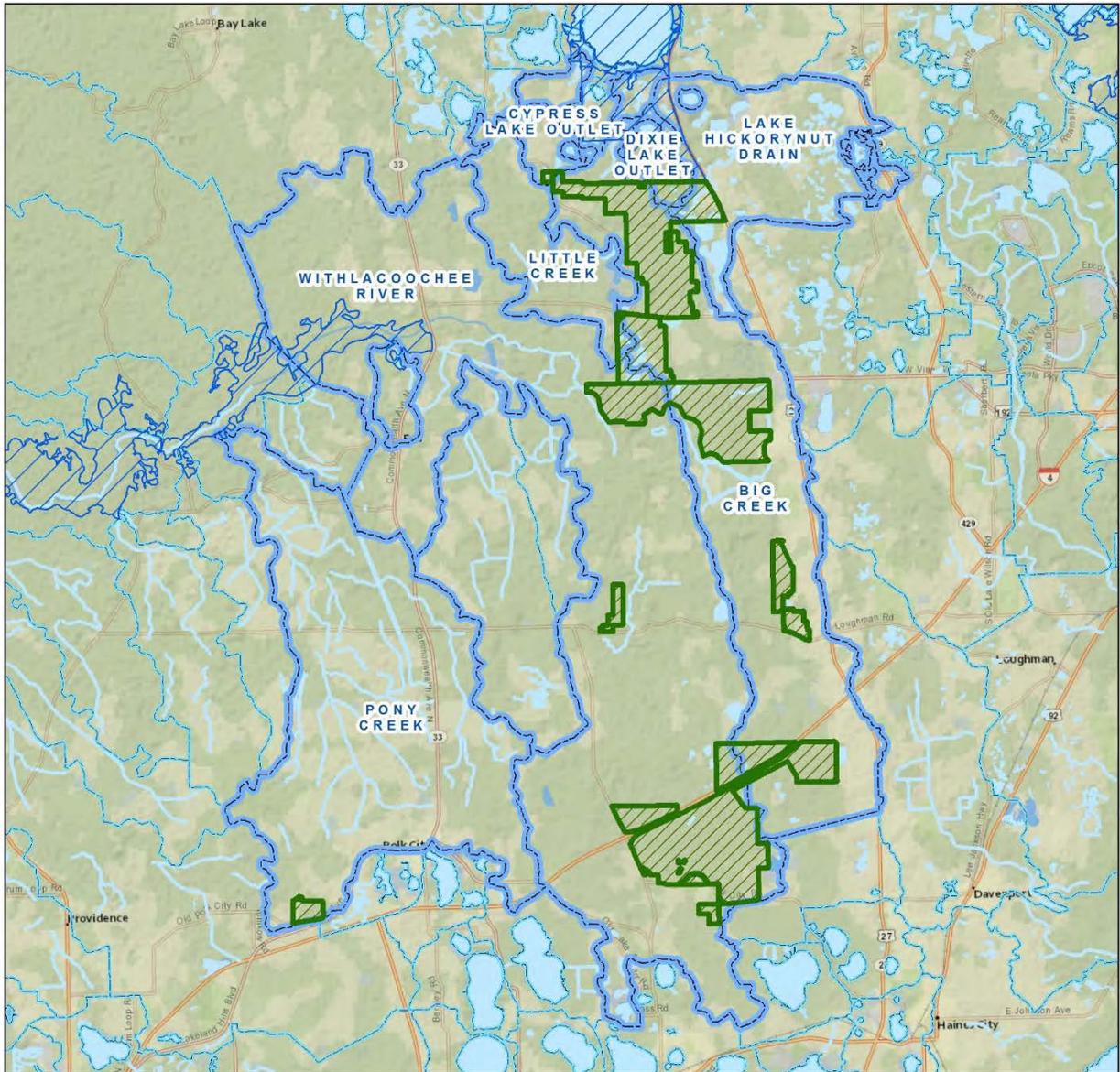


Figure 32. Water Resources

2.7 Mineral Resources

The mineral resources of HWMA are described under Geologic Conditions (Section 2.1.2) of this Management Plan. No deposits of commercially valuable minerals (oil, gas, phosphate, or limerock) are known to occur on the area in quantities considered economically feasible to develop.

2.8 Historical Resources

The Master Site File GIS data (Appendix 13.7) maintained by the Florida Department of State's Division of Historical Resources (DHR) indicates there are 33 known historical sites (LA02203, LA02881, LA02882, LA02883, LA02884, LA02885, LA02886, LA02887, LA02888, LA02889, LA0290, LA02991, PO01035, PO04606, PO04607, PO04608, PO06112, PO06113, PO06114, PO06117, PO06118, PO06119, PO06121, PO06122, PO06123, PO06125, PO06154, PO06176, PO06182, PO06183, PO06202, PO06209, PO06210, PO07643, PO07644) on HWMA, and include prehistoric lithic scatters, habitation, and campsites. Thirty-two field surveys have been conducted on HMWA.

3 Uses of the Property

3.1 Previous Use and Development

Prior to European settlement, the landscape of Florida, including this area of the Florida peninsula, was settled and used by a variety of aboriginal peoples whose culture relied mainly on hunting, fishing, and subsistence agriculture. Though some land alteration occurred, only minor alteration of the landscape is thought to have taken place until the advent of European settlement beginning with the Spanish occupation of Florida in the sixteenth century.

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 the 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 agriculture and associated development.

Rangeland cattle grazing and timber harvesting were among the primary land uses within the Green Swamp during Florida's early historical settlement period of 19th and early 20th centuries. From the 20th century until the present day, more extensive land development occurred with the advent of citrus production, mining, and residential development within the Green Swamp. As a result, the northeastern portions of the Green Swamp - Hilochee

Corridor Florida Forever project, south of the town of Clermont, Lake Louisa State Park and Lake Louisa itself, have been developed extensively for a variety of agricultural, mining and residential purposes. Citrus culture is extensive in the upland portions of the region, though the practice is economically marginal and risky in this particular area of the state because of the likelihood of freezes that may destroy citrus trees. A major freeze in 1985 resulted in many acres of frozen groves, and their subsequent conversion to pine tree plantations, primarily slash and sand pines. Much of the acreage remaining in citrus was either protected from the freeze by virtue of location near the south shore of one or more of the region's numerous lakes, through use of irrigation systems for freeze protection, or by some combination of the two. Other acres within currently remaining in citrus were replanted since the freeze, and in most cases have since been provided with some form of artificial freeze protection as a supplement to location near ponds or wetlands. Hayfields were also developed on some of these lands prior to State acquisition.

The Jahna parcel of the HWMA was previously used for cattle grazing, and pine and cypress logging. The Polk Partners parcel was previously used for cattle grazing, cypress logging, and currently has a natural gas pipeline easement traversing the property. Most of the Wander parcel is swamp and was previously exposed to a small amount of cypress logging. The Ritter parcel was previously used for cattle grazing, and a small amount of timber harvesting. Previous uses on the Osprey Unit include sand and clay mining, citrus production, cattle grazing, cypress and upland timber harvest, a cypress mulch plant facility, a go-kart racetrack, and billboard displays. There is also a major power transmission line currently traversing the Osprey Unit, and a natural gas pipeline runs within the power line easement.

3.2 Current Use of the Property

The HWMA is being managed as a multiple-use conservation land. On state-owned conservation lands, multiple-use management strategies incorporate uses related to wildlife, fisheries, forest management, and natural resource based public outdoor recreation. Provisions have been made for fish and wildlife-based public outdoor educational and recreational opportunities that are compatible with the original purposes for acquiring the HWMA. Therefore, HWMA is managed by FWC as a Wildlife Management Area in conformance with the provisions of the Board of Trustees' lease to FWC to protect and provide for water conservation; maintain ecological diversity; conserve habitat for imperiled, rare, and common wildlife species; and to provide a diversity of public outdoor recreational opportunities that are fish and wildlife-oriented, and that do not adversely impact the long-term well-being of fish and wildlife habitats and their associated wildlife populations.

A wide range of operational and resource management actions are conducted on HWMA each year including activities such as prescribed burning; wildlife habitat restoration and improvement; invasive exotic species maintenance and control; road repairs and

maintenance; imperiled species management, monitoring and protection; facilities and infrastructure maintenance and repair; conservation acquisition and stewardship activities; archeological and historical resources monitoring and protection; and research related activities.

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

Due to the proximity of population centers in Lake and Polk counties, public use can be expected to increase as public awareness of opportunities increases. 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 HWMA, and contribute to the overall economy for region of Florida. For Fiscal Year 2015 - 2016, an estimated 9,219 people visited the HWMA. As a result of this visitation and use of the area, FWC economic analysis estimates indicate that the HWMA generated an estimated annual retail sales economic benefit of \$1,053, 271 for the State and the central Florida region. This estimated annual retail sales economic impact has aided in the support or creation of an estimated 18 jobs.

Further revenue generating potential of the HWMA will depend upon future uses described in this Management Plan. Additional revenue from HWMA 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 human health.

3.3 Single- or Multiple-use Management

The HWMA will be managed under the multiple-use concept as a Wildlife Management Area. The HWMA 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 HWMA 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 HWMA. 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 13.8). 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 HWMA are made in accordance with the requirements of Section 253.034(10) FS, and other applicable Florida constitution, statute, rule, and policy requirements, as well as other provisions governing applications for proposed incompatible uses or linear facilities on state-owned conservation lands. Upon approval and implementation of this management plan, any proposed future uses that have been classified herein as Rejected, or other proposed future uses that are determined to be incompatible with the purposes of acquisition or other management authorizations and guidance, will be forwarded for review and approval consideration to the DSL, ARC and the Board of Trustees prior to any incompatible use or linear facility being authorized on the HWMA.

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 HWMA (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 HWMA 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 HWMA is recommended for potential surplus review.

4 Accomplished Objectives from the HWMA Management Plan 2004 - 2014

This section is dedicated to reporting the extent to which the Objectives described in the HWMA Management Plan 2004 - 2014 were successfully completed. Accomplishments for HWMA during the previous planning timeframe are further discussed in more comprehensive detail throughout **Section 5 Management Activities and Intent** of this Management Plan. The degree to which FWC was able to accomplish the planned activities during this period is reflected as Percent Accomplished for each associated Objective.

Goals and Objectives	Percent Accomplished
Goal 1: Restore, maintain and protect native plant and animal communities to promote natural abundance, composition and distribution of native species.	
Objective 1: Continue to implement the prescribed fire plan for the Lake County portion of HWMA (ongoing).	100%
Objective 2: Continue to survey for listed wildlife species and map their locations using GPS and GIS technologies (ongoing). <i>Comment: In 2008 six southeastern American kestrel nest boxes were installed and are annually monitored. Since 2010 a WCPR strategy has been developed and implemented, which includes monitoring of imperiled and focal species as well as opportunistic wildlife surveys. In 2012 annual avian point count surveys were initiated. In 2013 a gopher frog survey was conducted. In 2014 pilot gopher tortoise surveys were conducted using the line transect distance sampling method.</i>	100%
Objective 3: Using prescribed fire, mechanical, and chemical treatments, continue to control invasive exotic plant species including cogon grass, tropical soda apple, lygodium, Chinese tallow, and Chinaberry (ongoing). <i>Comment: Seventy-five percent of upland habitat has been treated and brought into maintenance rotation for treatment of exotic plant species.</i>	75%

Goals and Objectives	Percent Accomplished
<p>Objective 4: To improve wildlife habitat, and in cooperation with FFS, conduct selective thinning and timber harvests where appropriate (ongoing).</p> <p><i>Comment: In 2010, removed three sand pine (off-site species) plantations (160 acres). In 2010 and 2013, thinned slash pine plantations to a basal area of 40 square feet per acre (957 acres total), and thinned wetland edges. In 2014, conducted a salvage cut of slash pine plantation due to southern pine beetle infestation (135 acres).</i></p>	100%
<p>Objective 5: Secure HWMA by maintaining necessary fences and gates, and providing adequate law enforcement (ongoing).</p> <p><i>Comment: Seventy-five percent of the area has been fenced. To date HWMA needs 9 miles of new fence to complete fencing for the area.</i></p>	75%
<p>Objective 6: In consultation with the SJRWMD, the SWFWMD, and the Lake County Water Authority, fill ditches, and breach trams and dikes; install ditch plugs, culverts, low-water crossings, and other water control structures where necessary (ongoing, this addresses recommendation 3 of the DSL 2000 Land Management Review).</p> <p><i>Comment: Ditches have been plugged and low water portions have been installed to restore the Big Creek drainage on the Ray Ranch portion of HWMA. Due to lack of funding, significant additional hydrological restoration was not possible.</i></p>	25%
<p>Objective 7: Develop and implement a prescribed fire plan for the Osprey Unit and other parcels located in Polk County by 2004.</p>	100%
<p>Objective 8: To minimize residual smoke and wildfire hazard from the 2001 Osprey Unit wildfire, fell and rollerchop the burned stand by 2004.</p> <p><i>Comment: In 2008 this stand was felled and burned during the Turkey Roost wildfire (175 acres).</i></p>	100%
<p>Objective 9: By 2004 develop a contract to survey small mammals, reptiles and amphibians (this addresses recommendation 1 and checklist finding 2 of the DSL 2000 Land Management Review).</p> <p><i>Comment: Small mammal, reptiles, and amphibian surveys have been completed for HWMA.</i></p>	100%

Goals and Objectives	Percent Accomplished
<p>Objective 10: Contract with FNAI to complete mapping the natural communities and survey rare and endangered plants by 2004 (this addresses recommendation 1 and checklist finding 1 of the DSL 2000 Land Management Review).</p> <p><i>Comment: In 2004 the entire area was mapped by FNAI. In 2014 the natural areas were recertified. Each survey included delineation of rare and endangered plants.</i></p>	100%
<p>Objective 11: By 2004, complete an evaluation of plant community conditions necessary to develop vegetative management objectives.</p> <p><i>Comment: In 2004 the entire area was mapped. In 2014 the natural areas were recertified. Each survey included rare and endangered plants.</i></p>	100%
<p>Objective 12: Using the results of plant community survey and mapping efforts, delineate management units, and develop quantifiable vegetation management objectives by 2004.</p> <p><i>Comment: In 2006, using the FNAI GIS mapping, management units were established and OBVM was implemented.</i></p>	100%
<p>Objective13: By 2005, develop and implement management actions to maintain or increase listed species populations on HWMA including Florida sandhill crane, gopher tortoise, Florida mouse, wading birds, and Eastern indigo snake.</p> <p><i>Comment: Since 2010, a WCPR strategy was developed and implemented, including monitoring protocols for imperiled and focal species, as well as opportunistic wildlife observations. To improve listed species habitat, associated management actions such as prescribed fire, mechanical treatments, timber thinning, long leaf pine planting, and invasive exotic species treatments were implemented on the area.</i></p>	100%
<p>Objective 14: In cooperation with SJRWMD and SWFWMD, assess the hydrological restoration needs for the Osprey Unit by 2006 (this addresses recommendation 3 of the DSL 2000 Land Management Review).</p> <p><i>Comment: To date, a hydrologic study has not been completed due to budget constraints, but is anticipated during the current planning timeline.</i></p>	0%
<p>Objective 15: By 2006 develop a contract to survey invertebrates (this addresses recommendation 1 and checklist finding 2 of the DSL 2000 Land Management Review).</p> <p><i>Comment: This survey was completed in 2004.</i></p>	100%

Goals and Objectives	Percent Accomplished
Goal 2: Maintain revenue-generating activities other than hunting and fishing.	
Objective 1: Manage some disturbed habitats (e.g., citrus groves, off-site planted pines) to generate revenue needed for management (ongoing). <i>Comment: Remaining viable groves on the area continue to be managed through a citrus contract.</i>	100%
Objective 2: Continue to administer existing apiary contracts (ongoing). <i>Comment: Two apiary leases are under contract (totaling six sites).</i>	100%
Objective 3: Continue to collect day-use fees from users (ongoing). <i>Comment: Standard FWC day use fees continue to be collected.</i>	100%
Goal 3: Provide diverse outdoor recreational opportunities compatible with the management of the area's natural and cultural resources.	
Objective 1: Annually plant native and non-invasive agronomic species to facilitate recovery of altered systems and to provide wildlife food plots and wildlife openings on 10 acres (ongoing) (this addresses recommendation 2 of the DSL 2000 land Management Review). <i>Comment: Food plots and wildlife openings continue to be maintained on HWMA.</i>	100%
Objective 2: Continue to provide special-opportunity dove, archery, muzzleloading gun, general gun hog, small game, and spring turkey hunts on established parcels other than Osprey Unit (ongoing). <i>Comment: These recreational opportunities continue to be offered on HWMA.</i>	100%
Objective 3: Continue to minimize conflicts among user groups through spatial and/or temporal separation of uses (ongoing). <i>Comment: Currently use levels require only minimal spatial and temporal separation of uses. FWC will continue to evaluate recreational uses and potential conflicts among user groups.</i>	100%
Objective 4: Continue to maintain 50 acres of special-opportunity dove fields on the Ray Ranch parcel (ongoing) and develop 50 additional acres of dove fields on the Osprey Unit by 2004. <i>Comment: Ray Ranch parcel has 58 acre dove field. Osprey field was established then discontinued due to a lack of staff time and resources.</i>	50%

Goals and Objectives	Percent Accomplished
<p>Objective 5: By 2004, plant at least 60 acres of additional food plots and wildlife openings (this addresses recommendation 2 of the DSL 2000 land Management Review).</p> <p><i>Comment: There are currently 30 acres of food plots established.</i></p>	50%
<p>Objective 6: Develop one boat ramp using Geoweb substrate on Peat Lake by 2004.</p> <p><i>Comment: In 2006 a small craft boat ramp was established at Peat Lake.</i></p>	100%
<p>Objective 7: Develop mowed-bank fishing access on the shoreline of Little Peat and Stock Lakes by 2004.</p> <p><i>Comment: FWC continues to maintain mowed bank fishing access at these locations.</i></p>	100%
<p>Objective 8: Propose establishment of small game, dove, and feral hog hunts on the Osprey Unit by 2004; evaluate the potential for establishing turkey and deer hunting seasons on the Osprey Unit if populations of these species increase sufficiently (ongoing).</p> <p><i>Comment: The Osprey Unit of HWMA currently has feral hog, hog-dog, small game, family, archery and muzzleloading gun hunts.</i></p>	100%
<p>Objective 9: Develop a fishing pier on Stock Lake by 2004.</p> <p><i>Comment: In 2005 a fishing structure was established at Stock Lake.</i></p>	100%
<p>Objective 10: Develop parking facilities adequate to accommodate horse trailers at an appropriate location in the Osprey Unit by 2004.</p> <p><i>Comment: Two parking facilities adequate to accommodate horse trailers were established at the Osprey Unit in 2010.</i></p>	100%
<p>Objective 11: By 2004, determine the feasibility of establishing the Osprey Unit as part of the Great Florida Birding Trail (this addresses recommendation 2 of the DSL 2000 Land Management Review).</p> <p><i>Comment: FWC has evaluated this and decided that it is not feasible or appropriate at this time.</i></p>	100%
<p>Objective 12: Enlarge the existing grass parking area at the U.S. 27 entrance (Riddick Grove Rd.) by 2004.</p> <p><i>Comment: In 2004 this parking area was expanded and improved.</i></p>	100%

Goals and Objectives	Percent Accomplished
<p>Objective 13: By 2005, determine the feasibility of linking equestrian trails on Lake Louisa State Park with trails on HWMA. <i>Comment: After this issue was originally contemplated, it was determined not to be feasible. However, FWC will continue to investigate the feasibility of connecting trails with Lake Louisa State Park.</i></p>	100%
<p>Objective 14: In cooperation with the Florida Trail Association develop marked trails for hiking, equestrian, and nature interpretation by 2007. <i>Comment: Public access points have been developed and trails have been established on non-motorized vehicle roads. FWC will develop a Recreation Master Plan for HWMA during the upcoming planning cycle.</i></p>	0%
<p>Objective 15: Continue to provide high-quality fishing opportunities on HWMA lakes by issuing limited day-use fishing permits and enforcing specific size and bag limits on game fish harvested (ongoing), and determine the need to stock selected lakes by 2008. <i>Comment: FWC continues to provide fishing opportunities on HWMA.</i></p>	100%
<p>Goal 4. Develop facilities and infrastructure to enhance management and recreational use of the area.</p>	
<p>Objective 1: Based on management needs and the results of the proposed hydrological study, replace, repair or remove culverts and water control structures as recommended (ongoing). <i>Comment: Culverts and low water crossings continue to be maintained on the HWMA.</i></p>	100%
<p>Objective 2: Improve 4 miles of existing designated roads (Riddick Grove and Lake Roads) by 2004, and maintain 15 miles of existing roads on the Osprey Unit (ongoing).</p>	100%
<p>Objective 3: Develop a new Osprey Unit check station by 2004. <i>Comment: The FWC continues to maintain a mobile check station at the Osprey Unit as necessary.</i></p>	100%

Goals and Objectives	Percent Accomplished
<p>Objective 4: Develop one boat ramp using Geoweb substrate on Peat Lake by 2004. <i>Comment: In 2006 a small craft boat ramp was established at Peat Lake.</i></p>	100%
<p>Objective 5: Develop mowed-bank fishing access on the shoreline of Little Peat and Stock Lakes by 2004.</p>	100%
<p>Objective 6: Develop a fishing pier on Stock Lake by 2004. <i>Comment: In 2004, a fishing pier was constructed and the associated parking area was expanded and improved.</i></p>	100%
<p>Objective 7: Maintain 15 miles of existing boundary fence along permanent boundaries (ongoing); replace at least 5 miles of fencing on the Osprey Unit and erect 3 miles of new fence on the newly acquired Polk County parcels by 2004. <i>Comment: Three miles of fencing on Polk Partners completed. Osprey Unit fencing needs to be improved, but to date has not been completed due to budgetary constraints.</i></p>	75%
<p>Objective 8: Enlarge the existing grass parking area at the U.S. 27 entrance (Riddick Grove Rd.) by 2004. <i>Comment: In 2004 this parking area was expanded and improved.</i></p>	100%
<p>Objective 9: Develop parking facilities adequate to accommodate horse trailers at an appropriate location in the Osprey Unit by 2004. <i>Comment: Two parking facilities adequate to accommodate horse trailers were established at the Osprey Unit in 2010.</i></p>	100%
<p>Objective 10: Establish appropriate parking for each of the three new Polk County parcels by 2007. <i>Comment: This project was delayed due to surplus land analysis and budgetary constraints.</i></p>	0%
<p>Goal 5: Provide informational and interpretive materials describing recreation opportunities and natural resources of HWMA.</p>	
<p>Objective 1: Develop informational and interpretive brochures, maps, and kiosks for HWMA by 2007.</p>	100%

Goals and Objectives	Percent Accomplished
Objective 2: Develop and administer a website that describes the recreational opportunities and natural resources of HWMA by 2007.	100%
Goal 6. Identify, manage and protect archaeological, historic and cultural resources.	
Objective 1: Post signage advising the public of protection provided to cultural resources by Chapter 267, F. S. by 2004.	100%
Objective 2: Contact DHR to arrange for a survey to identify cultural resources on the area by 2004.	100%
Goal 7: Assure an optimum boundary for HWMA by continuing to identify and pursue acquisition needs.	100%
Objective 1: To minimize fragmentation of the area, continue to identify strategic parcels for acquisition (ongoing).	100%
Objective 2: Maintain a GIS shapefile, acreage, and other necessary data to facilitate nominations for the FWC Inholdings and Additions Program (ongoing).	100%

5 Management Activities and Intent

The following section provides a description of agency plans to locate, identify, protect, preserve or otherwise use fragile natural resources and nonrenewable historical resources. In general, the FWC management intent for HWMA 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 HWMA. 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

The 2016 LMR Report for HWMA (Appendix 13.4) found that FWC was managing the area in accordance with the purpose(s) of acquisition. The recommendations of the LMR were considered and addressed in the development of this Management Plan, including development of management intent language, goals and objectives, identification of management challenges and development of solution strategies (Sections 5 - 8).

5.2 Adaptive Management

Adaptive management¹ is "learning by doing"; 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.^{1,2} 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.^{2,3} 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.^{2,3}

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 HWMA.

5.2.1 Monitoring

A well-developed monitoring protocol is also one of the principal, required criteria for the management of HWMA. 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.²

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 Services Office (PASO), and work in conjunction with the establishment and adjustment of public access carrying capacities (Section 5.6.3). Historical resources (Section 5.9) are monitored with guidance from the Florida Department of State's Division of Historical Resources (DHR).

5.2.2 Performance Measures

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

5.2.3 Implementation

The HWMA 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, PASO, Recreation Master Plans, etc.) underway to accomplish needed conservation actions that are planned to manage the natural resources of HWMA, 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 HWMA, 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. HWMA has high-quality native communities including basin marsh, basin swamp, baygall, depression marsh, dome swamp, mesic flatwoods, mesic hammock, sandhill, scrubby flatwoods, wet flatwoods, wet prairie, and xeric hammock that FWC will continue to

manage and protect. On disturbed upland sites, FWC intends to continue ground cover and natural community restoration.

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

5.3.1 Objective-Based Vegetation Management

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

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

After natural communities have been mapped, FWC land managers will identify those natural communities that will influence and guide management decisions, known as the actively managed natural communities. Through OBVM monitoring, FWC collects data on a number of specific vegetation attributes that provide insight about the condition of the natural community. Because FWC is interested in the overall effect of management on the natural communities, OBVM data is analyzed at the natural community level.

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

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

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

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

5.3.2 Prescribed Fire and Fire Management

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

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

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

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

Single drum (with standard, not offset blades), one-pass roller chopping can be a valuable management tool, enabling the use of prescribed fires in areas heavily invaded by dense woody vegetation. However, roller chopping may damage the herbaceous ground cover. Generally, 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 2 - 5 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 HWMA. This plan will include, but not be limited to, delineation of burn management units, detailed descriptions of prescribed fire methodology, safety, and smoke management guidelines.

During the previous 10-year planning period, FWC has applied prescribed fire to many of the area's fire-adapted communities. Currently, approximately 1,755 acres (46%) of the fire-adapted communities are within the recommended fire return intervals. As detailed in the goals and objectives in Section 6 below, FWC plans to conduct prescribed burning on 1,500 acres (39%) of the area's fire adapted communities annually, resulting in 100% of the area being maintained within the recommended fire return intervals during this planning period. The configuration of HWMA, with its disjunct and dispersed parcels, as well as its interface with developed areas within the region, significantly the bisection of the Osprey Unit by Interstate 4, presents significant challenges to achieving 100% fire return intervals for the fire-adapted natural communities of HWMA. Potential challenges to the continued

successful implementation of prescribed fire on the area are further described in Section 7 below.

5.3.3 Habitat Restoration

In conjunction with the OBVM program and prescribed burning activities described above, habitat restoration and management activities on HWMA will focus on enhancing the area's natural communities (Table 3), maintaining recommended fire return intervals for fire-adapted communities, treating and removing exotic plant species, and controlling vegetation mechanically through mowing and roller chopping as needed. Additional chemical and mechanical treatments may also be implemented in some select natural communities such as mesic flatwoods, scrubby flatwoods, mesic hammock and sandhill, in order to restore these areas to an earlier successional condition. Exotic species control is more extensively discussed below in Section 5.5. Further specific habitat management and improvement objectives planned for HWMA are described below in Section 6.

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 HWMA. In managing for wildlife species, an emphasis will be placed on conservation, protection and management of natural communities. As noted above, the predominant natural communities important to wildlife include basin swamp, basin marsh, mesic flatwoods, and wet flatwoods. Other important natural communities that are less represented on HWMA include baygall, dome, swamp, scrubby flatwoods, depression marsh, mesic hammock, xeric hammock, sandhill, and wet prairie.

The size and natural community diversity of HWMA 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, HWMA 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. 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. The following Section 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

During the previous 10-year planning period, the FWC conducted imperiled and focal species surveys. Species monitored include gopher frog, gopher tortoise, as well as breeding bird surveys for multiple species. The FWC also monitored eight southeastern American kestrel nest boxes. Surveying and monitoring of these imperiled and focal species, along with other ongoing imperiled and focal species management activities, will continue to be implemented in accordance with the HWMA WCPR Species Management Strategy (Appendix 13.9).

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

The WCPR program helps FWC take a proactive, science-based approach to species management on FWC-managed lands. This approach assesses information from statewide potential habitat models and Population Viability Analysis, and in conjunction with input from species experts and people with knowledge of the area, creates site-specific wildlife assessments for imperiled wildlife species and a select suite of focal species. Staff combines these assessments with area-specific management considerations to develop a wildlife management strategy for the area. Each strategy contains area-specific measurable objectives for managing priority species and their habitat, prescribes management actions to achieve these objectives, and establishes monitoring protocols to verify progress towards meeting the objectives. By providing FWC managers with information on actions they should undertake, the FWC intends for the strategy to assure the presence and persistence of Florida's endangered and threatened fish and wildlife species (<http://myfwc.com/media/1515251/threatened-endangered-species.pdf>), as well as select focal species found on the area.

In summary, for FWC-managed areas, the WCPR program helps assess imperiled and focal wildlife species needs and opportunities, prioritize what FWC does for imperiled and focal species, prescribe management actions to aid in species recovery, prescribe monitoring protocols to allow evaluation of the species' response to management, and ensure the information is shared with others. Through the actions of this program, FWC will facilitate fulfilling the needs of focal and imperiled wildlife species on HWMA. 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

For comprehensive information regarding monitoring and specific management actions for focal species, please refer to the HWMA WCPR Species Management Strategy (Appendix 13.9). Where applicable, measurable objectives contained within the HWMA WCPR Species Management Strategy are included in Section 6 of this Management Plan.

The FWC conducted a WCPR workshop in February, 2010 for HWMA, and has subsequently developed a WCPR Species Management Strategy based on input received at the workshop. After incorporating input from an array of wildlife species experts, the WCPR Species Management Strategy was reviewed and approved, and will include monitoring and management actions for imperiled and focal species including the gopher frog, gopher tortoise, breeding birds, southeastern American kestrel. Species for which active management with measureable objectives were developed include gopher frog, gopher tortoise, and southeastern American kestrel. Through opportunistic observations, documentation of other imperiled species will also be performed.

5.5 Exotic and Invasive Species Maintenance and Control

Currently, control and maintenance of invasive exotic plant species (Table 6) continues to be a significant management challenge at HWMA. During the previous 10-year planning period, FWC has continued to implement extensive exotic and invasive species control and maintenance activities throughout HWMA. For fiscal years 2012 - 2013 and 2013 - 2014, FWC treated a cumulative total of 1,954 acres within areas classified as infested. An estimated 2,640 acres (16.6%) of HWMA remains classified in an infested condition, thus requiring continued intensive treatments. The FWC will continue to focus control and maintenance activities on areas identified as having invasive exotic plant infestations, as well as treating any new occurrences as they are identified through continued monitoring activities. Ongoing exotic plant species objectives and challenges for HWMA are further detailed in Sections 6 - 7 below.

The FWC will prioritize efforts to control the establishment and spread of Florida Exotic Pest Plant Council (FLEPPC) Category I or II plants on HWMA. 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 HWMA and treated annually by FWC include air-potato, bahia grass, balsam apple, Bermuda grass, Brazilian-pepper, Caeserweed, centipede grass, Chinaberry, Chinese tallow tree, cogongrass, coral vine, guineagrass, Japanese climbing fern, kudzu, lantana, mimosa, natal grass, Old World climbing fern, paragrass, Peruvian primrosewillow, purple sesban, rosary pea, shrub verbena, smutgrass, torpedo grass, tropical soda apple, water hyacinth, and wisteria. Exotic and invasive plant species have been identified as occurring at varying densities on approximately 2,640 acres of the HWMA. 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 overall 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 HWMA by inspecting any vehicles and equipment brought onto the area by contractors and requiring that they be free of vegetation and dirt. If vehicles or equipment used by contractors are found to be contaminated, they will be referred to an appropriate location to clean the equipment prior to being allowed on the area. This requirement is included in every contract for contractors

who are conducting any operational or resource management work on the area. In this way, FWC implements a proactive approach to controlling the introduction of exotic pests and pathogens to the area.

An exotic animal species of concern on the HWMA 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

To facilitate wildlife viewing and other recreational opportunities on the area, FWC has continued to establish and maintain facilities and infrastructure, interpretive kiosks, nine entrances, parking areas, a fishing platform, a small craft boat launch and boat ramps, 5.5 miles of trails, and 57 miles of roads.

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 ADA⁴ 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 HWMA. To accomplish this, FWC has worked with recreational stakeholders and the general public to develop a Recreation Master Plan for HWMA that is used to further design and develop

appropriate infrastructure that supports the recreational use of the area by the general public. This Recreation Master Plan will include planning for parking, trail design, and area resource interpretation.

The FWC will continue to implement public access, recreational, and educational opportunities on the area in accordance with the Recreational Master Plan (RMP) that has been developed for HWMA (Appendix 13.10). Planned recreational, public access, and facility improvement objectives are also detailed in Section 6 below. Ongoing public access and recreational opportunity management challenges are addressed in Section 7 below.

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 HWMA can currently support 200 visitors per day. However, an objective to increase the public access carrying capacity to 370 visitors per day has been proposed in Section 6.5.4 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 HWMA 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 HWMA is home to a variety of resident wildlife found in its upland forests, basin swamps, bottomland forests, and marshes, as well as a wide variety of migrant and neotropical species. With the diversity of natural communities and ongoing active wildlife management practices, the HWMA is an excellent place to view wildlife. Additionally, wildlife viewing opportunities are projected to increase upon the completion of planned improvements for public access and wildlife viewing as described in Section 6.5 of this Management Plan.

5.6.5 Hunting

Hunting opportunities at HWMA include seasons for archery, small game, general gun, muzzleloading gun, spring turkey, migratory bird, and wild hog. An evaluation of the hunting opportunities offered on HWMA 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/2789780/Hilochee.pdf> and <http://myfwc.com/hunting/wma-brochures/sw/osprey-unit/>.

5.6.6 Fishing

Currently, fishing is authorized year-round at HWMA on Saturdays and Sundays only, with the issuance of a fishing quota permit. Black crappie, black bass and bream are the most popular freshwater species available. Additional information about the current fishing opportunities and regulations on the area may be found at <http://myfwc.com/media/2789780/Hilochee.pdf> and <http://myfwc.com/hunting/wma-brochures/sw/osprey-unit/>.

5.6.7 Boating and Paddling

The FWC maintains a small craft boat launch along Peat Lake which allows paddling access by kayak, canoe, and small water craft, where internal combustion engines are currently prohibited. Outboard motors no more than 10 horsepower are currently permitted on waterbodies of the Osprey Unit.

5.6.8 Trails: Hiking, Bicycling, and Equestrian

Currently, HWMA offers 10 miles of multi-use trails on the HWMA, some of which were established in 2016 (4.4 miles). In addition, Section 6.5 of this draft Management Plan proposes to design and develop up to 8 miles of additional hiking trails, as well as maps for all established trails on HWMA.

5.6.9 Geocaching

Geocaching, also known as 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.

5.7 Hydrological Preservation and Restoration

5.7.1 Hydrological Assessment, Restoration, and Management

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

5.7.2 Water Resource Monitoring

Currently, the FWC cooperates with DEP, SWFWMD and SJRWMD for the monitoring of surface and ground water quality and quantity. In addition, the FWC will continue to cooperate with the water management districts and the DEP to develop and implement any additional surface water quality and quantity monitoring protocols for HWMA. In this capacity, the FWC will primarily rely on the expertise of the water management districts 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 water management districts.

5.8 Forest Resource Management

A Timber Assessment of the timber resources of HWMA will be conducted by the Florida Forest Service, or a contracted professional forester. 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 overstory, 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.

Pursuant to OBVM management goals, 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.

5.9 Historical Resources

Procedures outlined by DHR will be followed to preserve the historical sites of HWMA. The FWC will consult with DHR in an attempt to locate any additional historical features on the area. Currently, HWMA staff has received DHR Archaeological Resources Management (ARM) training and FWC will ensure that future management staff will also receive ARM training. The FWC will continue to 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 HWMA.

To date, the DHR Master Site File indicates 36 known historical sites on HWMA. The FWC will submit subsequently located historic sites on HWMA to DHR for inclusion in their Master Site File. In cooperation with DHR, all 36 of the known historical sites on HWMA have been identified as meeting the DHR's special criteria for annual monitoring and reporting. Therefore, FWC will continue to monitor and report on these sites annually.

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.

Eighteen facilities currently are present at HWMA (Figures 33 - 34). Capital facilities and infrastructure on HWMA include administrative structures (office, staff residence, equipment maintenance and storage), check stations, parking areas, informational kiosks, fishing platform, small craft boat launches, multi-use trails, as well as designated public and service roads.

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).

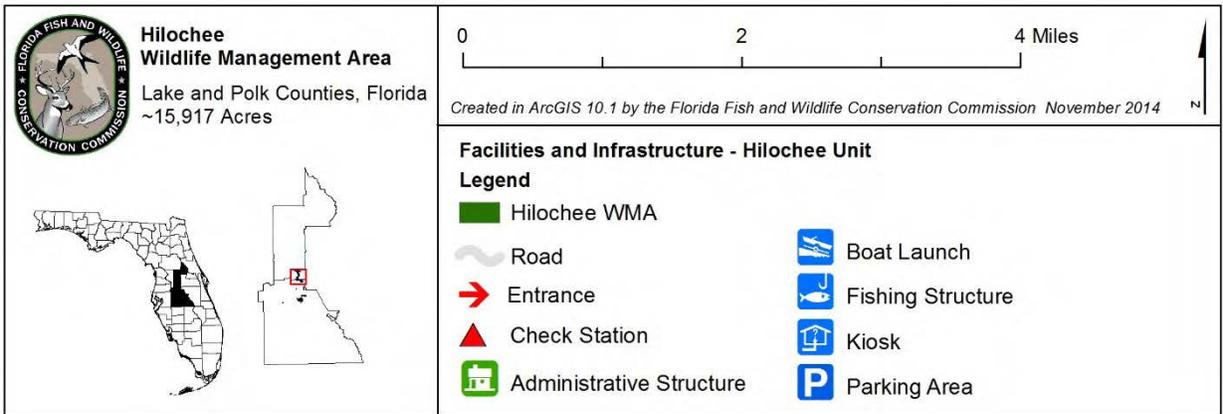
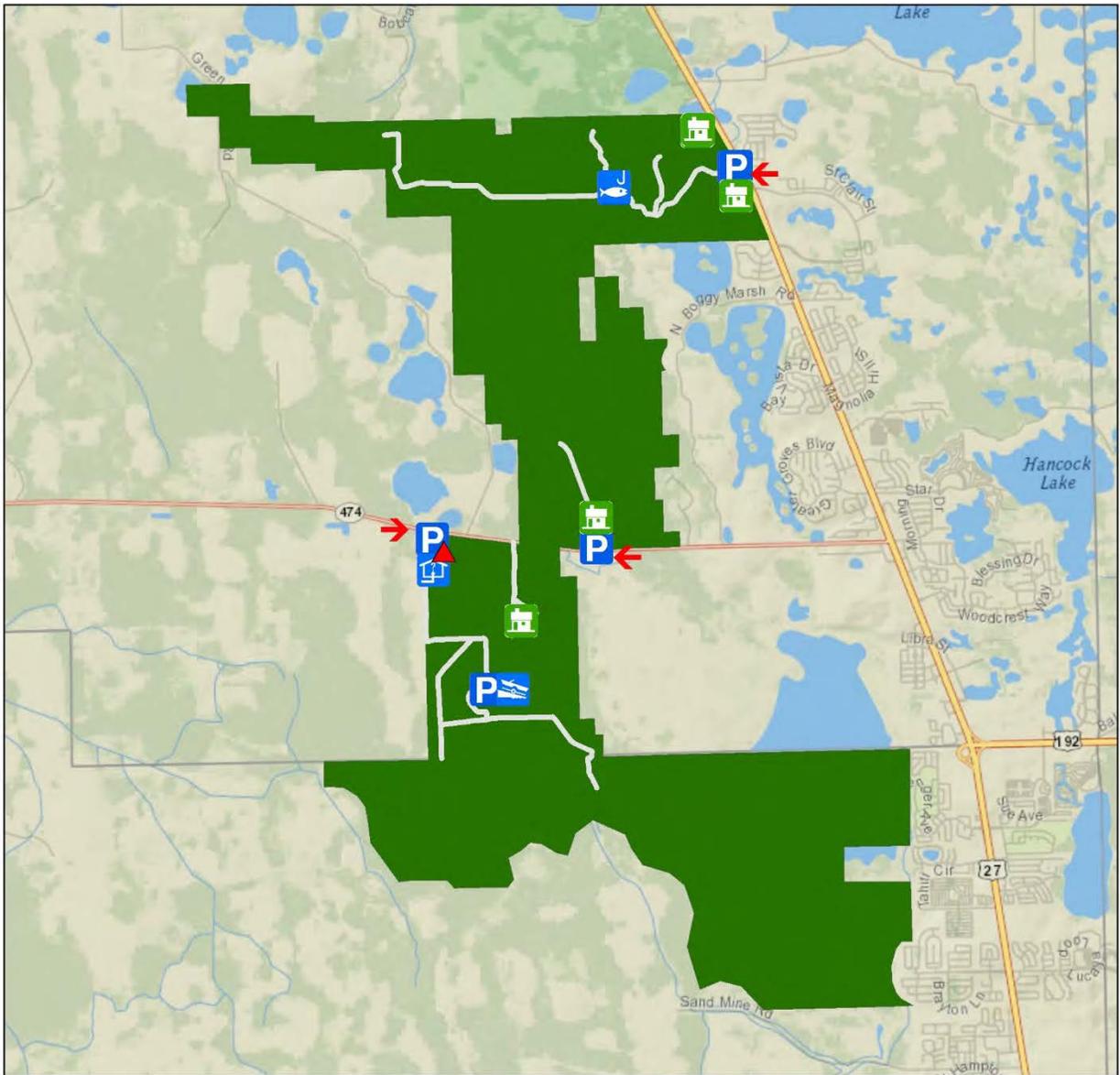


Figure 33. Facilities and Infrastructure - Hilochee Unit

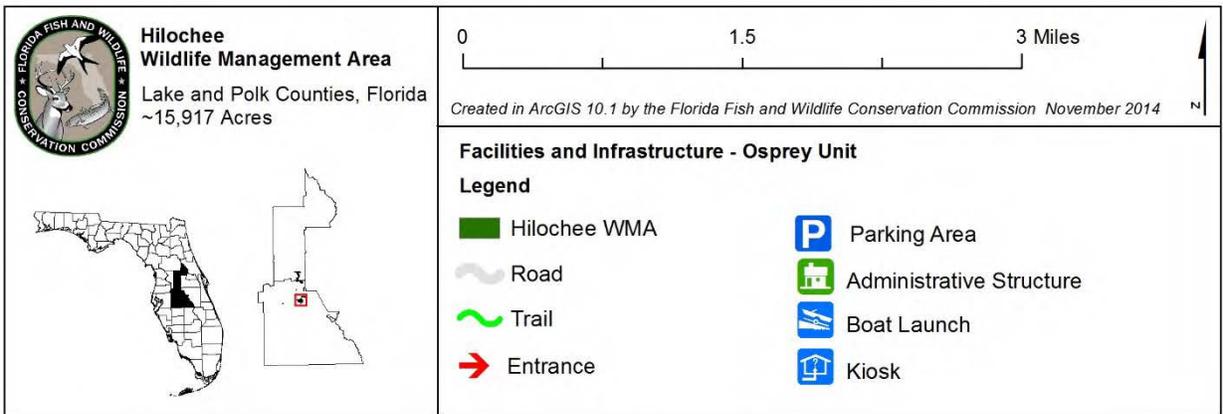
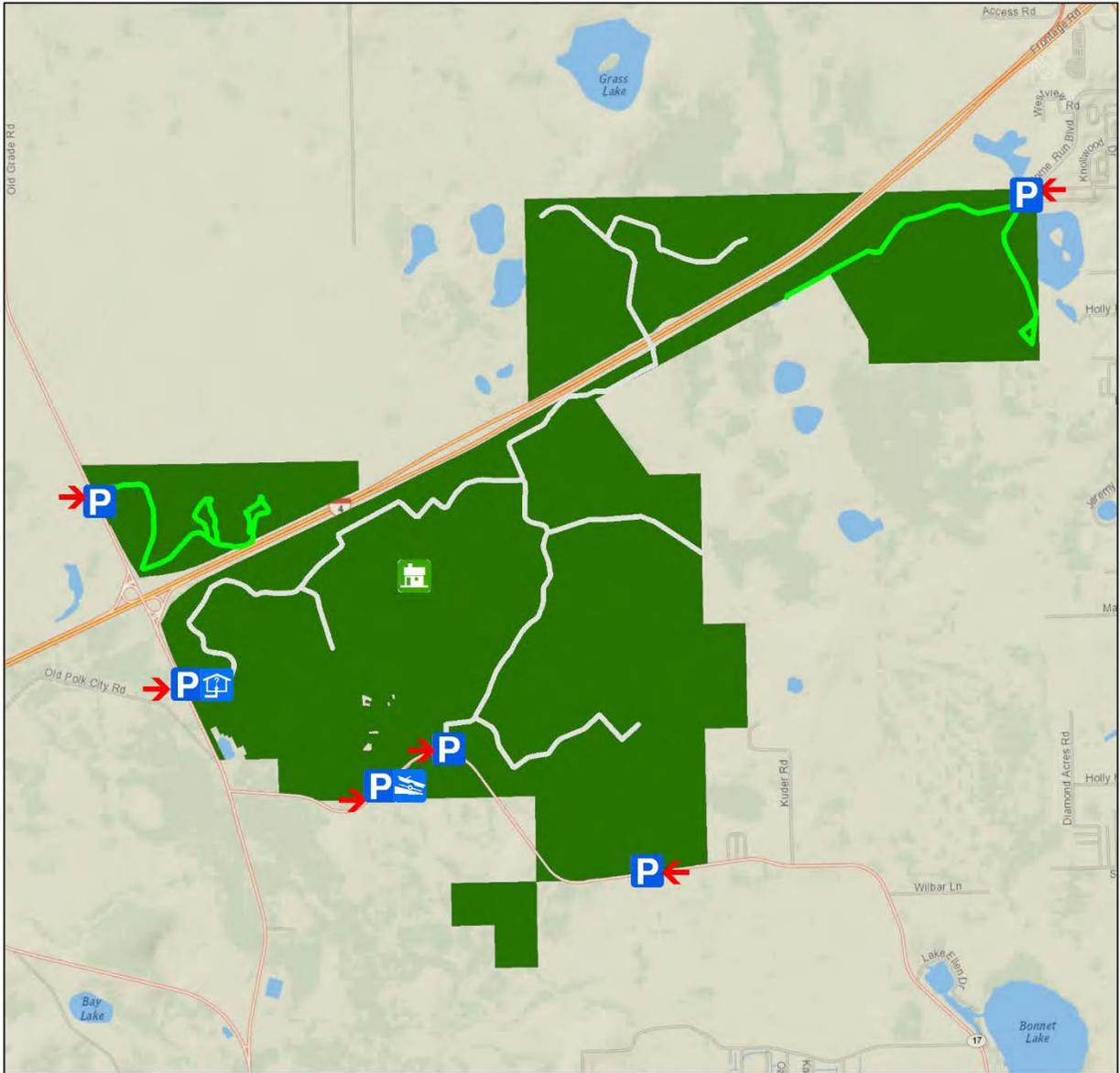


Figure 34. Facilities and Infrastructure - Osprey Unit

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 (Figure 35). 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 HWMA. 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.

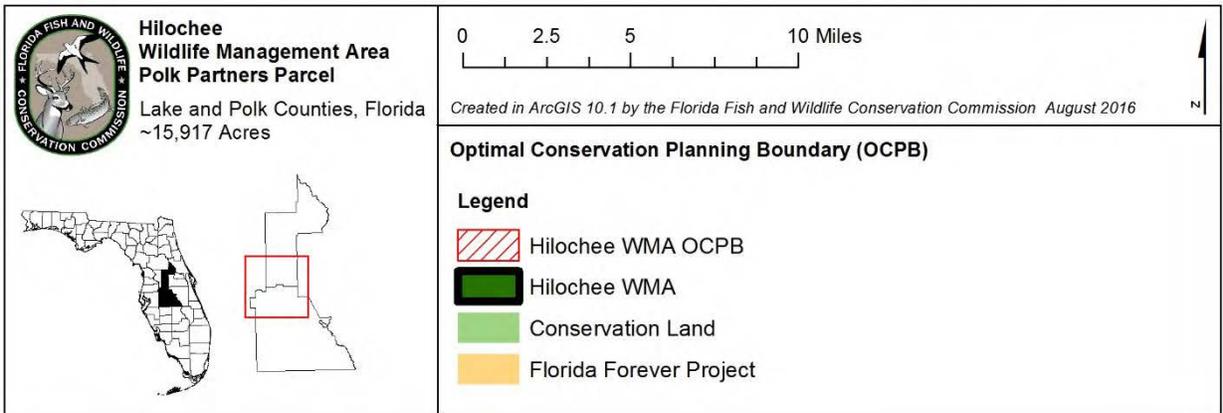
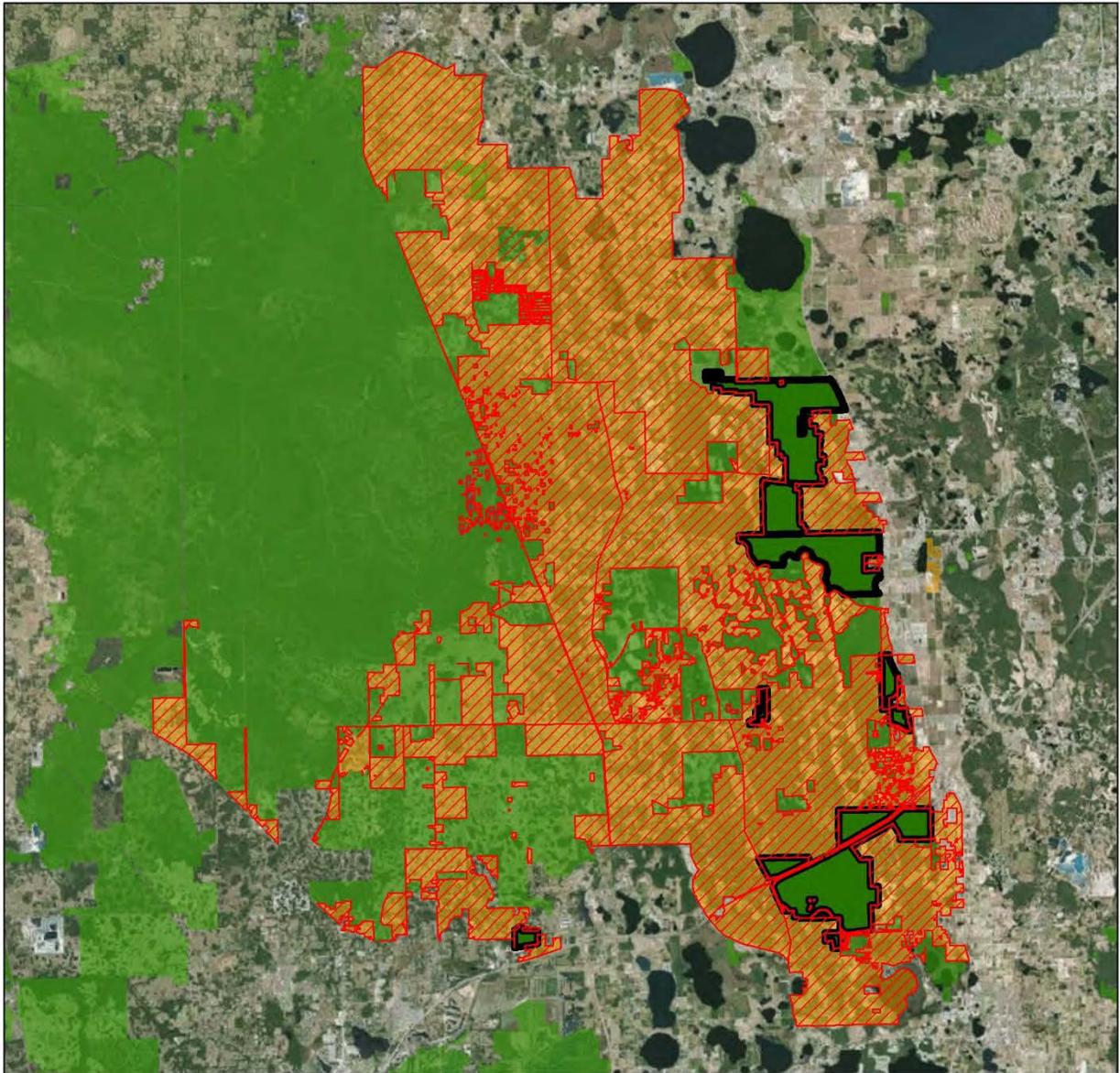


Figure 35. Optimal Conservation Planning Boundary

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 identified and prioritized 12,640 acres of potential additions or privately held inholdings for HWMA. In addition, 162,454 acres of the Green Swamp Florida Forever project remain to be acquired. Upon completion of the CAS, additions to the FWC Florida Forever Additions and Inholdings acquisition list may be recommended.

5.12 Research Opportunities

The FWC intends to cooperate with researchers, universities, and others as feasible and appropriate. For HWMA, 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 HWMA 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 HWMA 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 13.7) are followed with regard to any ground-disturbing activities. In addition, the Florida Department of Agriculture and Consumer Service's FFS is a designated cooperating agency, and assists FWC by providing technical assistance on forest resource management. Also, FWC cooperates and consults with the SJRWMD, the SWFWMD and the DEP for the monitoring and management of both ground and surface water resources and the overall management of HWMA.

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 HWMA. 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 HWMA, 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 HWMA. 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

Currently, no cattle grazing occurs on any portion of HWMA. However, FWC will investigate the feasibility of utilizing cattle grazing as a fuel reduction management tool for portions of the area where the application of prescribed fire and associated smoke are problematic. This is especially a concern along the Interstate 4 corridor within the HWMA Osprey Unit. Objective 6.1.19 of this management plan addresses this issue.

5.13.4 Apiaries

Currently, apiaries are operating on HWMA under private contract. The use of apiaries is conditionally approved for HWMA, 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 13.8). Location, management, and

administration of apiaries on HWMA will be guided by the FWC Apiary Policy (Appendix 13.11).

5.14 Climate Change

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

The Intergovernmental Panel on Climate Change (IPCC), a multi-national scientific body, reports that climate change is likely proceeding at a rate where there will be unavoidable impacts to humans, wildlife, and habitat. Given current levels of heat-trapping greenhouse gas emissions, shifts in local, regional, and national climate patterns including changes in precipitation, temperature, increased frequency and intensity of extreme weather events, rising sea levels, tidal fluctuations, and ocean acidification are projected. The current trend of global temperature increase has appeared to accelerate in recent decades, and continued greenhouse gas emissions may result in projected global average increases of 2 –11.5° F by the end of the century.⁵

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;^{6, 7, 8} more frequent invasions and outbreaks of exotic invasive species;⁹ and loss of habitat in coastal areas due to sea level rise.¹⁰ 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.¹¹ 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.

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.^{12, 13, 14, 15} The effects of sea level rise in the recent past have been observed on coastal WMAs; 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.^{16, 17} 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.

Elements of climate change that may potentially affect HWMA include more frequent and more potent storm events, alteration of vegetation reproductive cycles, and changes in the fire regime. To address the potential impacts of climate change on the HWMA, Goals and Objectives have been developed as a component of this Management Plan (Section 6.12). Depending on the recommendations of the adaptive management strategies described above, additional specific goals and objectives to mitigate potential climate change impacts may be developed for the HWMA 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. For more information on HWMA soil and water resources see Sections 2.1.3 and 2.5 of this Management Plan.

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 HWMA. 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 Annually prescribe burn 1,500 acres of fire adapted communities including wet flatwoods, sandhill, mesic flatwoods, scrubby flatwoods, pasture-improved, pasture-semi-improved, pine plantation, ruderal, and wet prairie.
- 6.1.2 Maintain 1,755 acres of fire adapted communities (46%) within 2 - 5 year target fire return interval.
- 6.1.3 Update the HWMA prescribed burn plan.

- 6.1.4 Conduct habitat/natural community improvement on 175 acres per year using chemical and mechanical treatments.
- 6.1.5 Conduct habitat/natural community restoration activities including longleaf pine planting on 40 acres.
- 6.1.6 Conduct a timber harvest for the purposes of habitat restoration on 105 acres.
- 6.1.7 Continue to implement FWC's OBVM program.
- 6.1.8 As described in the HWMA WCPR Strategy, create a restoration plan for historic sandhill natural communities, and continue to initiate restoration actions within the Sandhill Restoration Strategic Management Area (SMA).
- 6.1.9 As described in the HWMA WCPR Strategy, continue to meet objectives to complete existing groundcover restoration activities within the Pasture SMA.

Long-term

- 6.1.10 Continue to annually prescribe burn 1,500 acres of fire adapted communities including wet flatwoods, sandhill, mesic flatwoods, scrubby flatwoods, pasture-improved, pasture-semi-improved, pine plantation, ruderal, and wet prairie.
- 6.1.11 Continue to maintain 3,835 acres of fire adapted communities (100%) within the 2 - 5 year target fire return interval.
- 6.1.12 Continue to implement FWC's OBVM program.
- 6.1.13 Continue to conduct habitat/natural community improvement on 150 acres per year.
- 6.1.14 Continue to conduct habitat/natural community restoration activities on 40 acres per year.
- 6.1.15 Continue to conduct timber harvest for the purposes of habitat restoration on 600 acres.
- 6.1.16 As described in the HWMA WCPR Strategy, continue to initiate restoration actions within the Sandhill Restoration SMA.
- 6.1.17 As described in the HWMA WCPR Species Management Strategy, continue to meet objectives to complete existing groundcover restoration activities within the Pasture SMA.

- 6.1.18 In conjunction with the recommendations of the HWMA fisheries management plan and the HWMA hydrological assessment and conceptual restoration plan, explore the feasibility of establishing littoral zones on area borrow pits and abandoned mine water bodies.
- 6.1.19 Determine the feasibility of utilizing cattle grazing to reduce fuel loads within the Osprey Unit.

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 HWMA WCPR Strategy.
- 6.2.2 As described in the HWMA WCPR Strategy, continue to monitor four imperiled and focal species (gopher frog, gopher tortoise, southeastern American kestrel, and a breeding bird survey).
- 6.2.3 As described in the HWMA WCPR Strategy, conduct a gopher frog survey by 2018. If gopher frogs are detected, repeat in 2 - 5 years. If they are not detected, discontinue surveys until the HWMA WCPR Strategy is updated.
- 6.2.4 As described in the HWMA WCPR Strategy, continue to maintain and monitor all southeastern American kestrel nest boxes.
- 6.2.5 Continue to collect opportunistic wildlife species occurrence data per WCPR Opportunistic Wildlife Observations Standard Monitoring Protocol and WCPR Opportunistic Plant Observations Standard Monitoring Protocol.

Long-term

- 6.2.6 Continue to implement the HWMA WCPR Strategy.
- 6.2.7 As described in the HWMA WCPR Strategy, continue to monitor four imperiled and focal species (gopher frog, gopher tortoise, southeastern American kestrel, and a breeding bird survey).
- 6.2.8 As described in the HWMA WCPR Strategy, continue to monitor and maintain all southeastern American kestrel nest boxes.
- 6.2.9 As described in the HWMA WCPR Strategy, conduct a gopher tortoise survey, and repeat a gopher tortoise survey approximately every 10 years.

6.2.10 Continue to collect opportunistic wildlife species occurrence data per WCPR Opportunistic Wildlife Observations Standard Monitoring Protocol and WCPR Opportunistic Plant Observations Standard Monitoring Protocol.

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 maintain and monitor 3 bat houses.
- 6.3.2 To enhance the HWMA species occurrence list, continue to collect opportunistic wildlife occurrence data.
- 6.3.3 Continue to maintain 30 acres of wildlife openings and food plots.
- 6.3.4 Continue to maintain 58 acres of dove field.
- 6.3.5 Continue to maintain at least 8 wood duck nest boxes.
- 6.3.6 Continue to maintain at least 12 blue bird nest boxes.

Long-term

- 6.3.7 Continue to maintain and monitor 3 bat houses.
- 6.3.8 To enhance the HWMA species occurrence list, continue to collect opportunistic wildlife occurrence data.
- 6.3.9 Continue to maintain 30 acres of wildlife openings and food plots.
- 6.3.10 Continue to maintain 58 acres of dove field.
- 6.3.11 Continue to maintain at least 8 wood duck nest boxes.
- 6.3.12 Continue to maintain at least 12 blue bird nest boxes.
- 6.3.13 By 2020 develop a fishery management plan for the Osprey Unit.

6.4 Exotic and Invasive Species Maintenance and Control

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

Short-term

- 6.4.1 Annually treat at least 1,500 acres of FLEPPC Category I and Category II invasive exotic plant species, including bahia grass, natal grass, Japanese climbing fern, old world climbing fern, tropical soda apple, cogon grass, air potato, Chinese tallow, and China berry.
- 6.4.2 Utilizing hunting and trapping, implement control measures on 1 (wild hog) exotic and nuisance animal species.
- 6.4.3 Continue to monitor for invasive exotic species, including bahia grass, natal grass, Japanese climbing fern, old world climbing fern, tropical soda apple, cogon grass, air potato, Chinese tallow, and China berry.

Long-term

- 6.4.4 Continue to annually treat at least 1,500 acres of FLEPPC Category I and Category II invasive exotic plant species, including bahia grass, natal grass, Japanese climbing fern, old world climbing fern, tropical soda apple, cogon grass, air potato, Chinese tallow, and China berry.
- 6.4.5 On the Ritter, Wander, and Polk Partners parcels, contract to conduct survey and mapping of invasive exotic plant species by 2025.
- 6.4.6 Utilizing hunting and trapping, implement control measures on 1 (wild hog) exotic and nuisance animal species.
- 6.4.7 Continue to monitor for invasive exotic species, including bahia grass, natal grass, Japanese climbing fern, old world climbing fern, tropical soda apple, cogon grass, air potato, Chinese tallow, and China berry.

6.5 Public Access and Recreational Opportunities

Goal: Provide public access and recreational opportunities.

Short-term

- 6.5.1 Continue to provide hunting opportunities for deer, turkey, small game and feral hogs.
- 6.5.2 Implement the HWMA RMP.
- 6.5.3 Maintain public access and recreational opportunities to allow for a recreational carrying capacity of 200 visitors per day.

- 6.5.4 Develop additional public access and recreational opportunities to allow for a carrying capacity of 370 visitors/day.
- 6.5.5 Continue to provide paddling opportunities on appropriate water bodies.
- 6.5.6 Continue to provide fishing opportunities on appropriate water bodies.
- 6.5.7 Continue to provide website, bird list, 2 kiosks with interpretive panels, and 2 hunt brochures for interpretation and education.
- 6.5.8 Develop trail maps for newly designated trails.
- 6.5.9 As guided by the HWMA RMP, establish at least 8 miles of new trails.
- 6.5.10 Cooperate with other agencies, Counties, stakeholders, and regional landowners to investigate regional recreational opportunities including linking hiking, and multi-use trail systems between adjacent public areas.

Long-term

- 6.5.11 Continue to implement the HWMA RMP.
- 6.5.12 Monitor trails annually for visitor impacts.
- 6.5.13 Reassess recreational opportunities every three years.
- 6.5.14 Continue to provide hunting opportunities for deer, turkey, small game and feral hogs.
- 6.5.15 Continue to provide paddling opportunities on appropriate water bodies.
- 6.5.16 Continue to provide fishing opportunities on appropriate water bodies.
- 6.5.17 In conjunction with the HWMA fisheries management plan, explore the feasibility of expanding fishing opportunities.
- 6.5.18 Cooperate with other agencies, Counties, stakeholders, and regional landowners to investigate regional recreational opportunities including linking hiking, and multi-use trail systems between adjacent public areas.
- 6.5.19 Continue to identify partnerships that may provide environmental educational programs and outreach opportunities.
- 6.5.20 Assess the feasibility to establish improved public access to the Wander, Ritter, and Polk Partner parcels.

6.6 Hydrological Preservation and Restoration

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

Short-term

- 6.6.1 Conduct or obtain an HWMA hydrological assessment to identify potential hydrology restoration needs, and to develop recommendations for ground and surface water quality and quantity monitoring.
- 6.6.2 To maintain and enhance natural hydrological functions, install and maintain low-water crossings and culverts as appropriate.
- 6.6.3 Continue to cooperate with DEP, SWFWMA, and SJRWMD for the monitoring of surface and ground water quality and quantity.

Long-term

- 6.6.4 Implement hydrological Conceptual Restoration Plan.
- 6.6.5 As recommended by the Hydrology Assessment and Conceptual Restoration Plan, install and maintain low-water crossings and culverts as appropriate to maintain and enhance natural hydrological functions.
- 6.6.6 Continue to cooperate with DEP, SWFWMD, and SJRWMD for the monitoring of surface and ground water quality and quantity.
- 6.6.7 As recommended by the Hydrology Assessment and Conceptual Restoration Plan, implement augmented surface and ground water quality and quantity monitoring if feasible and appropriate.

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 FFS or professional forester contract to update the HWMA 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 Prepare and implement a HWMA Forest Management Plan including reforestation, harvesting, and prescribed burning activities based on restoration and maintenance needs of the natural communities and other goals established for management of HWMA by 2020.
- 6.7.4 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 Ensure all known sites are recorded in the Florida Division of Historical Resources Master Site file.
- 6.8.2 As guided by DHR, continue to monitor, protect, and preserve as necessary the 33 historical sites identified by DHR.
- 6.8.3 Continue to follow DHR's Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Properties for the management of cultural and historic resources.

Long-term

- 6.8.4 Cooperate with DHR in designing site plans for development of infrastructure.
- 6.8.5 Cooperate with DHR to manage and maintain known existing cultural resources.
- 6.8.6 As guided by DHR, continue to monitor, protect, and preserve as necessary the 33 historical sites identified by DHR.
- 6.8.7 Coordinate with DHR for cultural resource management guideline staff training.
- 6.8.8 Continue to follow DHR's Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Properties for the management of cultural and historic resources.
- 6.8.9 Coordinate with DHR to assess the need for conducting additional cultural resource surveys.

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

Florida Fish and Wildlife Conservation Commission | Hilochee WMA Management Plan

- 6.9.1 Continue to maintain 18 facilities on HWMA.
- 6.9.2 Continue to maintain 57 miles of roads on HWMA.
- 6.9.3 Continue to maintain 10 miles of trails existing on HWMA.
- 6.9.4 As guided by the HWMA RMP, establish at least 8 miles of new trails.
- 6.9.5 Demolish abandoned mulch plant and go-cart track on the Osprey Unit.
- 6.9.6 Monitor trails and infrastructure biannually for visitor impacts.

Long-term

- 6.9.7 Monitor trails and infrastructure biannually for visitor impacts.
- 6.9.8 Continue to maintain 18 facilities on HWMA.
- 6.9.9 Continue to maintain 57 miles of roads on HWMA.
- 6.9.10 Continue to maintain 18 miles of trails existing on HWMA.
- 6.9.11 Construct one new five bay Equipment Maintenance and Storage Building.
- 6.9.12 As guided by the RMP, improve the Riddick Grove Road public entrance; improve or relocate the main entrance to Osprey Unit; add three small kiosks (one at Polk Partners, one at Ritter, and one at Home Run Blvd Osprey Unit).
- 6.9.13 Replace two existing information kiosks (one at main entrance to Main Unit and main entrance to Osprey Unit).
- 6.9.14 If recommended by the HWMA Hydrological Assessment and Conceptual Restoration Plan, construct a low water crossing, and improve two miles of public access road within the Polk Partners parcel.
- 6.9.15 Determine the feasibility of developing a secondary public entrance to the Osprey Unit off County Road 17; if feasible, develop this secondary public entrance.
- 6.9.16 Determine the feasibility of developing a secondary public entrance to the Osprey Unit at the current location of the former go-cart track; if feasible develop this secondary public entrance.
- 6.9.17 As determined by the HWMA RMP and the fisheries management plan construct three fishing/wildlife viewing structures.

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

Long-term

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

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

6.11 Cooperative Management and Special Uses

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

Short-term

- 6.11.1 Continue to coordinate and cooperate with first responder entities and the Department of Defense military branches to allow for training opportunities for military personnel and other initiatives as appropriate and compatible with the conservation of HWMA.
- 6.11.2 Continue to administer billboard advertising leases along Interstate 4.

Long-term

- 6.11.3 Continue to coordinate and cooperate with first responder entities and the Department of Defense military branches to allow for training opportunities for military personnel and other initiatives as appropriate and compatible with the conservation of HWMA.
- 6.11.4 Continue to administer billboard advertising leases along Interstate 4.

6.12 Climate Change

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

Long-term

- 6.12.1 Coordinate with FWC's Fish and Wildlife Research Institute (FWRI) Climate Change Adaptation Initiative to identify potential impacts of projected climate change on fish and wildlife resources and operational management of the HWMA.
- 6.12.2 Incorporate appropriate climate change monitoring protocols and management strategies into the OBVM and WCPR programs for the HWMA.
- 6.12.3 Incorporate appropriate climate change adaptation strategies into the WCPR Strategy for HWMA.
- 6.12.4 As appropriate, update the HWMA Prescribed Fire Plan to incorporate new scientific information regarding projected climate change, such as increased frequency of drought, on the fire regime of HWMA'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 Assess the need to pursue cooperative research opportunities through universities, Fish and Wildlife Research Institute, or other research entities.
- 6.13.2 Continue to cooperate with researchers, universities, and others as appropriate.
- 6.13.3 Continue to assess the need for and pursue environmental education partnership opportunities as appropriate.

7 Resource Management Challenges and Strategies

The following section identifies and describes further management needs and challenges associated with HWMA 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.

7.1 **Challenge: The units of HWMA are disjunct, not well connected internally, and are far apart resulting in higher management costs and continuing resource management challenges.**

7.1.1 Strategy: Advocate for increased acquisition of parcels within the Green Swamp Florida Forever Project to provide increased connectivity, manageability, and improved public access.

7.1.2 Strategy: Implement the OCPB and CAS; cooperate and coordinate with Polk and Lake Counties as well as other partners.

7.2 **Challenge: Currently the number of public entrances at HWMA create potential management issues.**

7.2.1 Strategy: Explore the feasibility of eliminating and/or relocating select entrances.

7.3 **Challenge: Currently there are smoke management challenges during prescribed burns due to major roadways, especially on the Osprey Unit.**

7.3.1 Strategy: Use mechanical treatments where needed to minimize fuel in areas that cannot be burned. Work with Florida Forest Service to apply fire when it is possible.

7.4 **Challenge: There are several prohibited activities occurring on the HWMA including off-road vehicle travel that have negative impacts on sensitive plant communities and water quality, degrade aesthetic qualities of the area, and damage wildlife species or their habitats.**

7.4.1 Strategy: Through news media outlets, postings at entrance kiosks, and signage, inform public about these activities and their detrimental effects on the area.

7.4.2 Strategy: Install additional gates and fences/guard rails adjacent to gates as needed to control off-road vehicle access.

7.4.3 Strategy: Improve compliance with designated road regulations through directed law enforcement patrols of problem areas.

- 7.5 Challenge: Facility vandalism, littering that have negative impacts on sensitive plant communities and water quality, degrade aesthetic qualities of the area, and damage wildlife species or their habitats.**
- 7.5.1 Strategy: Through news media outlet, postings at entrance kiosks, and signage, inform public about these activities and their detrimental effects on the area.
- 7.5.2 Strategy: Improve compliance with designated road regulations, litter laws, and protection of facilities through directed law enforcement patrols of problem areas.
- 7.6 Challenge: As identified in the HWMA WCPR Strategy, currently there is insufficient habitat to sustain viable populations of some imperiled and focal species on HWMA without depending on populations on adjacent conservation lands.**
- 7.6.1 Strategy: Pursue conservation efforts on lands surrounding or adjacent to HWMA that have potential for expanding habitat for these imperiled and focal species.
- 7.7 Challenge: The HWMA is not a well-known public outdoor recreation destination.**
- 7.7.1 Strategy: Improve public access points to increase visibility and accessibility.
- 7.7.2 Strategy: Work with local and county tourism boards to promote HWMA.
- 7.7.3 Strategy: Cross-promote HWMA with other regional public conservation lands.
- 7.8 Challenge: Public outreach and conservation education efforts for HWMA and the Green Swamp should be expanded.**
- 7.8.1 Strategy: Coordinate outreach and conservation education efforts with FWC's Tenoroc Youth Conservation Center.
- 7.9 Challenge: A boundary survey of HWMA is incomplete.**
- 7.9.1 Strategy: Explore the feasibility of contracting for boundary survey.
- 7.10 Challenge: Currently, area staffing is below FWC's staffing standard.**
- 7.10.1 Strategy: Explore feasibility for increasing area staffing to FWC's staffing standard.
- 7.11 Challenge: While currently at minimal levels, unauthorized access, illegal dumping, vandalism, poaching, and unauthorized ORV use may pose an increased threat in the future.**

7.11.1 Strategy: Continue to provide area-wide security through FWC law enforcement patrols.

8 Cost Estimates and Funding Sources

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

The cost estimate below, although exceeding what FWC typically receives through the appropriations process, is estimated to be what is necessary for optimal management, and is consistent with the current and planned resource management and operation of HWMA. 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 2016 - 2017 operational plan showing detailed cost estimates by activity and categories of expenditures, may be found in Appendix 13.12.

Hilochee WMA Management Plan Cost Estimate
Maximum expected one year expenditure

<u>Resource Management</u>	<u>Expenditure</u>	<u>Priority</u>
Exotic Species Control	\$91,278	(1)
Prescribed Burning	\$232,082	(1)
Cultural Resource Management	\$1,503	(1)
Timber Management	\$3,007	(1)
Hydrological Management	\$41,248	(1)
Other (Restoration, Enhancement, Surveys, Monitoring, etc.)	\$1,490,884	(1)
Subtotal	\$1,860,002	
<u>Administration</u>		
General administration	\$26,181	(1)
<u>Support</u>		
Land Management Planning	\$34,095	(1)
Land Management Reviews	\$4,609	(3)
Training/Staff Development	\$1,503	(1)
Vehicle Purchase	\$117,644	(2)
Vehicle Operation and Maintenance	\$34,492	(1)
Other (Technical Reports, Data Management, etc.)	\$6,649	(1)
Subtotal	\$198,992	
<u>Capital Improvements</u>		
New Facility Construction	\$471,957	(2)
Facility Maintenance	\$95,227	(1)
Subtotal	\$567,184	
<u>Visitor Services/Recreation</u>		
Info./Education/Operations	\$20,190	(1)
<u>Law Enforcement</u>		
Resource protection	\$14,535	(1)
<u>Total</u>	\$2,687,084	*

Priority schedule:

- (1) Immediate (annual)
- (2) Intermediate (3-4 years)
- (3) Other (5+ years)

* Based on the characteristics and requirements of this area, 3 FTE positions would be optimal to fully manage this area. All land management funding is dependent upon annual legislative appropriations.

Hilochee WMA Management Plan Cost Estimate
Ten-year projection

	<u>Expenditure</u>	<u>Priorit</u>
		<u>y</u>
<u>Resource Management</u>		
Exotic Species Control	\$801,981	(1)
Prescribed Burning	\$2,039,099	(1)
Cultural Resource Management	\$13,209	(1)
Timber Management	\$26,417	(1)
Hydrological Management	\$362,409	(1)
Other (Restoration, Enhancement, Surveys, Monitoring, etc.)	\$13,099,066	(1)
Subtotal	\$16,342,180	
<u>Administration</u>		
General administration	\$230,027	(1)
<u>Support</u>		
Land Management Planning	\$299,560	(1)
Land Management Reviews	\$14,560	(3)
Training/Staff Development	\$13,209	(1)
<i>Vehicle Purchase</i>	\$413,995	(2)
Vehicle Operation and Maintenance	\$303,050	(1)
Other (Technical Reports, Data Management, etc.)	\$58,417	(1)
Subtotal	\$1,102,791	
<u>Capital Improvements</u>		
<i>New Facility Construction</i>	\$1,263,853	(2)
Facility Maintenance	\$836,671	(1)
Subtotal	\$2,100,524	
<u>Visitor Services/Recreation</u>		
Info./Education/Operations	\$177,394	(1)
<u>Law Enforcement</u>		
Resource protection	\$127,705	(1)
<u>Total</u>	\$20,080,622	*

Priority schedule:

- (1) Immediate (annual)
- (2) Intermediate (3-4 years)
- (3) Other (5+ years)

* Based on the characteristics and requirements of this area, 3 FTE positions would be optimal to fully manage this area. All land management funding is dependent upon annual legislative appropriations.

9 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 | | ✓ |

10 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 HWMA 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 13.8). Such uses also comply with the authorities of the FWC as derived from Article IV, Section 9 of the Florida Constitution as well as the guidance and directives of Chapters, 253, 259, 327, 370, 379, 403, 870, 373, 375, 378, 487, and 597 FS.

The FWC has developed and utilizes an Arthropod Control Plan for HWMA in compliance with Chapter 388.4111 F.S. (Appendix 13.13). This plan was developed in cooperation with the local Lake and Polk Counties’ arthropod control agency. This plan is also in conformance with the Local Government Comprehensive Plan as approved and adopted for Lake and Polk Counties, Florida, (Appendix 13.14).

11 Endnotes

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