

A Management Plan for
John C. and Mariana Jones/Hungryland
Wildlife and Environmental Area
2014 - 2024



Martin and Palm Beach 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

RICK SCOTT
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CLIFFORD D. WILSON III
INTERIM SECRETARY

December 17, 2014

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

**RE: John C. and Mariana Jones/Hungryland Wildlife and Environmental Area -
Leases 4271 and 4480**

Dear Mr. Cochran:

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 Apalachicola River Wildlife and Environmental Area management plan. The next management plan update is due December 17, 2024.

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,

Marianne S. Gengenbach
Office of Environmental Services
Division of State Lands

www.dep.state.fl.us

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**A Management Plan
for
John C. and Mariana Jones/Hungryland
Wildlife and Environmental Area**

Martin and Palm Beach Counties, Florida

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



September 2014

Approved _____ SIGNATURE ON FILE

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: John C. and Mariana Jones/Hungryland Wildlife and Environmental
 Location: Martin and Palm Beach Counties, Florida
 Acreage Total: 12679 acres
 Acreage Breakdown:

<u>Land Cover Classification</u>	<u>Acres</u>	<u>Percent of Total Area</u>
Bare Soil/Clearcut	18.15	0.14%
Citrus	1.78	0.01 %
Cypress Swamp	20.34	0.16 %
Cypress/Pine/Cabbage Palm	0.81	0.01 %
Dry Prairie	50.57	0.4 %
Freshwater Marsh and Wet Prairie	6,903.62	54.45 %
Hardwood Hammocks and Forest	10.67	0.08 %
High Impact Urban	24.93	0.2 %
Improved Pasture	78.69	0.62 %
Low Impact Urban	1.08	0.01 %
Mixed Wetland Forest	0.48	0 %
Open Water	657.41	5.19 %
Pinelands	4,837.28	38.15 %
Shrub and Brushland	26.57	0.21 %
Shrub Swamp	46.24	0.36 %
TOTAL:	12,678.61	100 %

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

Lease/Management Agreement No.: 4271, 4480, and 00287 (Appendix 13.1)

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

Designated Land Use: Wildlife and Environmental Area
 Sublease (s): Pending Lemon Grove Mitigation Bank Agreement
 Encumbrances: R. G. Reserve Water Mitigation Easement; MacArthur Foundation Spoil Reservations; MacArthur Foundation/Lemon Grove Mitigation Reservations; Pal-Mar Water Control District Easement Reservations
 Type Acquisition: Fish and Wildlife Habitat Program
 Unique Features: Natural: Stellar savannas, flatwoods, and marshes
 Archaeological/Historical: None documented within JCMJHWEA.
 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; new office and shop facilities, staff housing.
 Acquisition Needs/Acreage: At present, no acres are on FWC Additions and Inholdings list but some will be recommended; 9,954 acres remaining in the Pal-Mar Florida Forever Project (Figure 3).
 Surplus Lands/Acreage: None
 Public Involvement: Management Advisory Group consensus building meeting and Public Hearing (Appendix 13.2)

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

ARC Approval Date _____ BTIITF Approval Date: _____

Comments: _____

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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	3
3	Degree of title interest held by the Board, including reservations and encumbrances such as leases.	18-2.021	7, 108-152
4	The legal description and acreage of the property.	18-2.018 & 18-2.021	1, 108-152
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	6, 70
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	51
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	71, 72
8	Identification of adjacent land uses that conflict with the planned use of the property, if any.	18-2.021	13
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, 49
10	Proximity of property to other significant State, local or federal land or water resources.	18-2.021	9-13, 15

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	50
12	A description of past and existing uses, including any unauthorized uses of the property.	18-2.018 & 18-2.021	48, 50
13	A description of alternative or multiple uses of the property considered by the lessee and a statement detailing why such uses were not adopted.	18-2.018	50, 51
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	74
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	74, 82, 411
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	74, 105

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)	50, 51
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	106
19	Letter of compliance from the local government stating that the LMP is in compliance with the Local Government Comprehensive Plan.	BOT requirement	433
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	51, 56-86
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	49-51
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	259
23	A statement regarding incompatible use in reference to Ch. 253.034(10).	253.034(10)	3, 50

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

Section C: Public Involvement Items

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
24	A statement concerning the extent of public involvement and local government participation in the development of the plan, if any.	18-2.021	14
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)	174

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)	14, 153
27	Summary of comments and concerns expressed by the advisory group for parcels over 160 acres	18-2.021	153
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)	14, 160
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	56, 213
30	Summary of comments and concerns expressed by the management review team, if required by Section 259.036, F.S.	18-2.021	213
31	If manager is not in agreement with the management review team's findings and recommendations in finalizing the required 10-year update of its management plan, the managing agency should explain why they disagree with the findings or recommendations.	259.036	N/A

Section D: Natural Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
32	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding soil types. <i>Use brief descriptions and include USDA maps when available.</i>	18-2.021	17, 20
33	Insert FNAI based natural community maps when available.	ARC consensus	21
34	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding outstanding native landscapes containing relatively unaltered flora, fauna and geological conditions.	18-2.021	18-33
35	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding unique natural features and/or resources including but not limited to virgin timber stands, scenic vistas, natural rivers and streams, coral reefs, natural springs, caverns and large sinkholes.	18-2.018 & 18-2.021	18-33
36	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding beaches and dunes.	18-2.021	47
37	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding mineral resources, such as oil, gas and phosphate, etc.	18-2.018 & 18-2.021	47

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	18-45
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	41, 43
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	30
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)	56-104
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.	↓	56-104
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.		77-98
42-C.	The associated measurable objectives to achieve the goals.		77-98
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>		263-338, 363
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.		102, 414
43	***Quantitative data description of the land regarding an inventory of forest and other natural resources and associated acreage. <i>See footnote.</i>	253.034(5)	18-33
44	Sustainable Forest Management, including implementation of prescribed fire management		
44-A.	Management needs, problems and a desired outcome (see requirement for # 42-A).		56-104
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) ↓	77-98
44-C.	Measurable objectives (see requirement for #42-C).		77-98
44-D.	Related activities (see requirement for #42-D).		263-338, 363
44-E.	Budgets (see requirement for #42-E).		102, 414
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).	↓	56-104

45-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		77-98
45-C.	Measurable objectives (see requirement for #42-C).		77-98
45-D.	Related activities (see requirement for #42-D).		263-338, 363
45-E.	Budgets (see requirement for #42-E).		102, 414
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)
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	424
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).	↓	63, 80, 102
48-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		80
48-C.	Measurable objectives (see requirement for #42-C).		80
48-D.	Related activities (see requirement for #42-D).		63, 80, 102
48-E.	Budgets (see requirement for #42-E).		102, 414

Section E: Water Resources

Item #	Requirement	Statute/Rule	Page Numbers and/or Appendix
49	A statement as to whether the property is within and/or adjacent to an aquatic preserve or a designated area of critical state concern or an area under study for such designation. <i>If yes, provide a list of the appropriate managing agencies that have been notified of the proposed plan.</i>	18-2.018 & 18-2.021	9
50	Location and description of known and reasonably identifiable renewable and non-renewable resources of the property regarding water resources, including water classification for each water body and the identification of any such water body that is designated as an Outstanding Florida Water under Rule 62-302.700, F.A.C.	18-2.021	47
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	18-33, 47
52	***Quantitative description of the land regarding an inventory of hydrological features and associated acreage. <i>See footnote.</i>	253.034(5)	47, 67
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).	↓	67, 82, 100
53-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		82
53-C.	Measurable objectives (see requirement for #42-C).		82

53-D.	Related activities (see requirement for #42-D).		67
53-E.	Budgets (see requirement for #42-E).		102, 414

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	47, 68, 411
55	***Quantitative data description of the land regarding an inventory of significant land, cultural or historical features and associated acreage.	253.034(5)	47, 68, 411
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	47, 68, 411
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).	↓	47, 68, 82
57-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		82
57-C.	Measurable objectives (see requirement for #42-C).		82
57-D.	Related activities (see requirement for #42-D).		82, 411
57-E.	Budgets (see requirement for #42-E).		102, 414

**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)	69
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).	↓	63-67, 69, 83
59-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		83
59-C.	Measurable objectives (see requirement for #42-C).		83
59-D.	Related activities (see requirement for #42-D).		83
59-E.	Budgets (see requirement for #42-E).		102, 414
60	*** Quantitative data description of the land regarding an inventory of recreational facilities and associated acreage.	253.034(5)	414
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).	↓	63, 67
61-B.	Detailed description of both short and long-term management goals (see requirement for # 42-B).		83
61-C.	Measurable objectives (see requirement for #42-C).		83
61-D.	Related activities (see requirement for #42-D).		83
61-E.	Budgets (see requirement for #42-E).		102, 414

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	vii
63	Place the Executive Summary at the front of the LMP. Include a physical description of the land.	ARC and 253.034(5)	v
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	52
65	Key management activities necessary to achieve the desired outcomes regarding other appropriate resource management.	259.032(10)	56, 104
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)	102, 414
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)	102, 414
68	A statement of gross income generated, net income and expenses.	18-2.018	102, 414

*** = 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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1 Introduction and General Information

Named after conservation advocates, John C. and Mariana Jones, the John C. and Mariana Jones/Hungryland Wildlife and Environmental Area (JCMJHWEA) is set within some of the highest quality, relatively undisturbed pine flatwoods, hammocks and marshes that remain in South Florida. Conserving one of the larger of remaining ecotones or transition zones between the pine flatwoods of interior Southeast Florida and the sawgrass marshes of the Everglades, the JCMJHWEA provides vital habitat for imperiled, rare and more common wildlife, protects important wetlands that are a part of the larger Everglades ecosystem. Providing important watershed protection for Hungryland Slough and the Loxahatchee River into which it flows, the JCMJHWEA also fulfills a critical role in conserving South Florida water quality along with a diverse assemblage of natural communities that sustain a large variety of wildlife. Extensive wet flatwoods and wet prairies in association with depression marshes creates good habitat conditions for far-ranging species and allows seasonal movement of animals in response to fluctuating water levels and food supplies.

Set within a larger landscape mosaic of surrounding public conservation lands, the JCMJHWEA also serves as a pivotal link in a wildlife conservation corridor spanning nearly thirty miles from Lake Okeechobee to the west, beginning with the Dupuis Reserve and the J.W. Corbett Wildlife Management Area, to Jonathan Dickinson State Park on the eastern edge of the corridor near the Atlantic coast. Extensive fish and wildlife based public recreational opportunities such as hunting, fishing, hiking, camping, horseback riding, and wildlife viewing are available on this popular wildlife area that is within easy driving range of metropolitan areas along the east coast in Martin and Palm Beach counties.

The JCMJHWEA is managed by the Florida Fish and Wildlife Conservation Commission (FWC) to conserve habitat for an array of imperiled and other native wildlife including the wood stork, round-tailed muskrat, and Florida sandhill crane, among others, while also providing stellar opportunities for wildlife viewing and other fish and wildlife based public outdoor recreation opportunities such as hunting, biking, horseback riding, camping and hiking. The FWC currently has lead management authority on 12,679 acres of JCMJHWEA and is cooperative manager of an additional 4,290 acres owned and managed by the South Florida Water Management District (SFWMD) and Martin County cumulatively totaling 16,969 acres for the entire management area. This management plan covers only those lands within the JCMJHWEA on which the FWC is the lead managing agency (12,679 acres).

1.1 Management Plan Purpose

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

This Management Plan is submitted for review to the Acquisition and Restoration Council (ARC) acting on behalf of the Board of Trustees of the Internal Improvement Trust Fund (Board of Trustees) of the State of Florida through the Florida Department of Environmental Protection's Division of State Lands (DSL), in compliance with paragraph seven of Lease No. 4271 and No. 4480 (Appendix 13.1) and pursuant to Chapters 253 and 259, Florida Statutes (FS), and Chapters 18-2 and 18-4, Florida Administrative Code (FAC). Format and content were drafted in accordance with ARC requirements for management plans and the model plan outline provided by the staff of DSL. Terms (Appendix 13.13) 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

FWC's planning philosophy includes emphasizing management recommendation consensus-building among stakeholders that includes technical expertise and input from other public conservation agencies, conservation organizations, along with input from recreational 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 13.2). The FWC also engages area, district, and regional agency staff, as well as other FWC staff expertise, in developing this Management Plan, thereby facilitating area biologist and manager "ownership" of the Management Plan, and thus the development of meaningful management intent language, goals with associated measurable objectives, timelines for completion, and the identification of challenges and solution strategies for inclusion in the JCMJHWEA 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 JCMJHWEA. The LMR report (Section 5.1, Appendix 13.3) 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 the FWC so they may be adequately addressed in this Management Plan, and thus guide the implementation of the LMR team recommendations on JCMJHWEA.

Furthermore, the 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

Located within the FWC's South Region, the JCMJHWEA consists of four disjunct areas, combining five different parcels, separated by private land, that are managed as one unit. Located just eight miles inland from the coastal city of Jupiter, JCMJHWEA straddles the boundary between Martin and Palm Beach counties. It is situated five miles southeast of Indiantown, 15 miles northwest of Palm Beach Gardens, and one half mile east of the J.W. Corbett Wildlife Management Area. The main entrance is located along CR 711 (Pratt Whitney Road) about 1.4 miles north of its intersection with SR 706 (Indiantown Road).

1.3 Acquisition

1.3.1 Purpose for Acquisition of the Property

In the late 1960s, the area known as Pal Mar, which includes the area now designated as JCMJHWEA, was ditched to drain the property for development. Local citizens groups opposed the development and, ultimately, Martin County filed a successful lawsuit that ended the project. Following that action, the Pal-Mar Acquisition Project was approved and initiated with the lands comprising JCMJHWEA subsequently being acquired by the state of Florida, the SFWMD, and Martin County as described in Section 1.3.2.

The lands acquired within the Pal-Mar Acquisition Project, that now comprise the JCMJHWEA, were acquired under the State of Florida's Save Our Rivers (SOR), Conservation and Recreational Lands



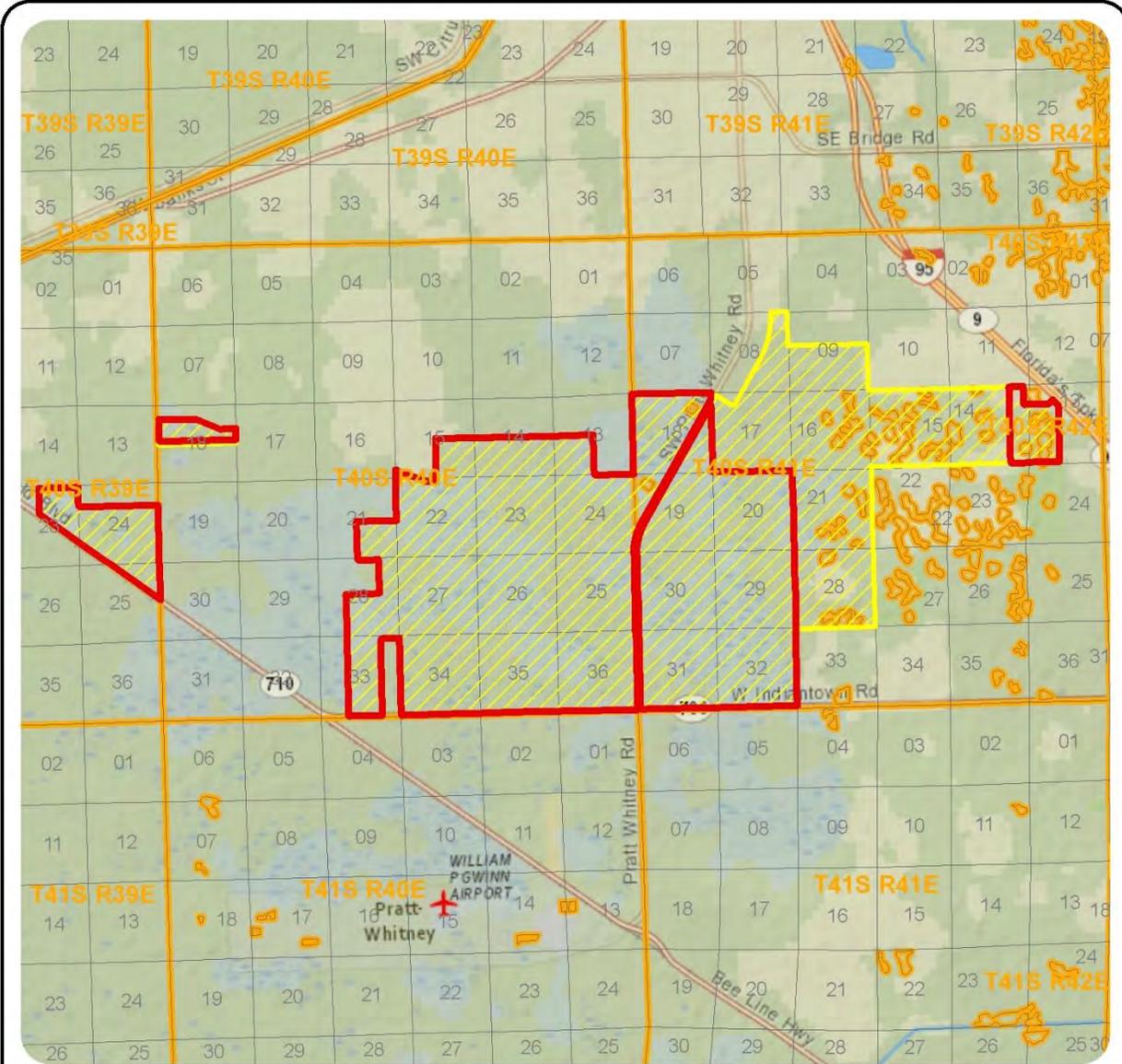
(CARL), and Preservation 2000 (P-2000) programs, as well as Martin County environmental land conservation programs to accomplish the following: 1) Conserve and protect environmentally unique and irreplaceable lands that contain native, relatively unaltered flora and fauna; 2) Conserve and protect significant habitat for native, endangered and threatened species; 3) Conserve, protect, manage, or restore important ecosystems, landscapes and forests; and 4) Provide areas for natural resource-based public outdoor recreation.

In keeping with the original purposes of acquisition, the unique ecological qualities, general location and the accessibility to the general public make JCMJHWEA extremely valuable for the multiple-use, restoration and improvement of relatively unaltered fish and wildlife resources and their habitats, as well as hydrologic function in the South region of Florida.

1.3.2 Acquisition History

The lands comprising the JCMJHWEA were purchased in 1994 and 1997 under the SOR program and in 1999 with funds from the CARL program, and funds appropriated to FWC as its share of the P-2000 Additions and Inholdings Program, as provided from each P-2000 bond series. The CARL Trust Fund was approved in 1979 and relies on funds generated principally from the documentary stamp tax and severance taxes on phosphate rock. The CARL program was established for the purpose of purchasing environmentally endangered lands and other lands such as those which have the potential for public recreation. Both the SOR and P- 2000 programs, along with the current Florida Forever Program were funded and established similarly for the same purpose of acquiring and conserving environmentally endangered lands.

The JCMJHWEA was originally established as a 10,294 acre WEA in June 2001. An additional 2,121 acres located in Palm Beach County were incorporated into the area in September 2004 by the FWC, Palm Beach County and the SFWMD under the Preservation 2000 Program. The JCMJHWEA consists of four disjunct areas, combining five separate tracts separated by private land. Acquisitions by Martin County and the SFWMD were incorporated into the JCMJHWEA in 2010 and 2012. In 2010, Pal-Mar East, also known as Nine Gems, was added to JCMJHWEA as the William H. Lee unit. Located directly across County Road 711 from the original recreation site, the William H. Lee unit is made up of 320 acres of dedicated state lands and 3,000 acres purchased jointly by Martin County and the SFWMD. In 2012, the 2,424 acre SFWMD and Martin County owned parcel, Culpepper parcel, was incorporated into the JCMJHWEA bringing the total area managed by the FWC to 16,969 acres. The SFWMD and Martin County lands are now leased to the FWC as a cooperative management unit and established as the William H. Lee unit of the JCMJHWEA.





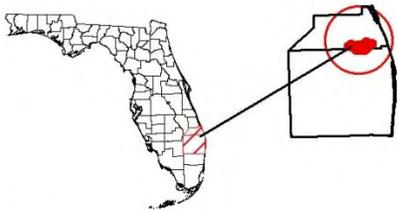
**John C and Mariana Jones
Hungryland WEA**
Martin and Palm Beach
Counties, Florida

**John C and Mariana Jones/Hungryland WEA
Proximity Map**

Created in ArcGIS 9.3 by the Florida Fish and Wildlife Conservation Commission October, 2012.

Legend

- John C and Mariana Jones/Hungryland WEA FWC Lead Managed Area
- John C and Mariana Jones/Hungryland WEA Entire Established Area
- Township/Range
- Section



0 0.5 1 2 Miles

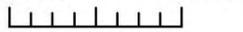




Figure 1: The location of JCMJHWEA

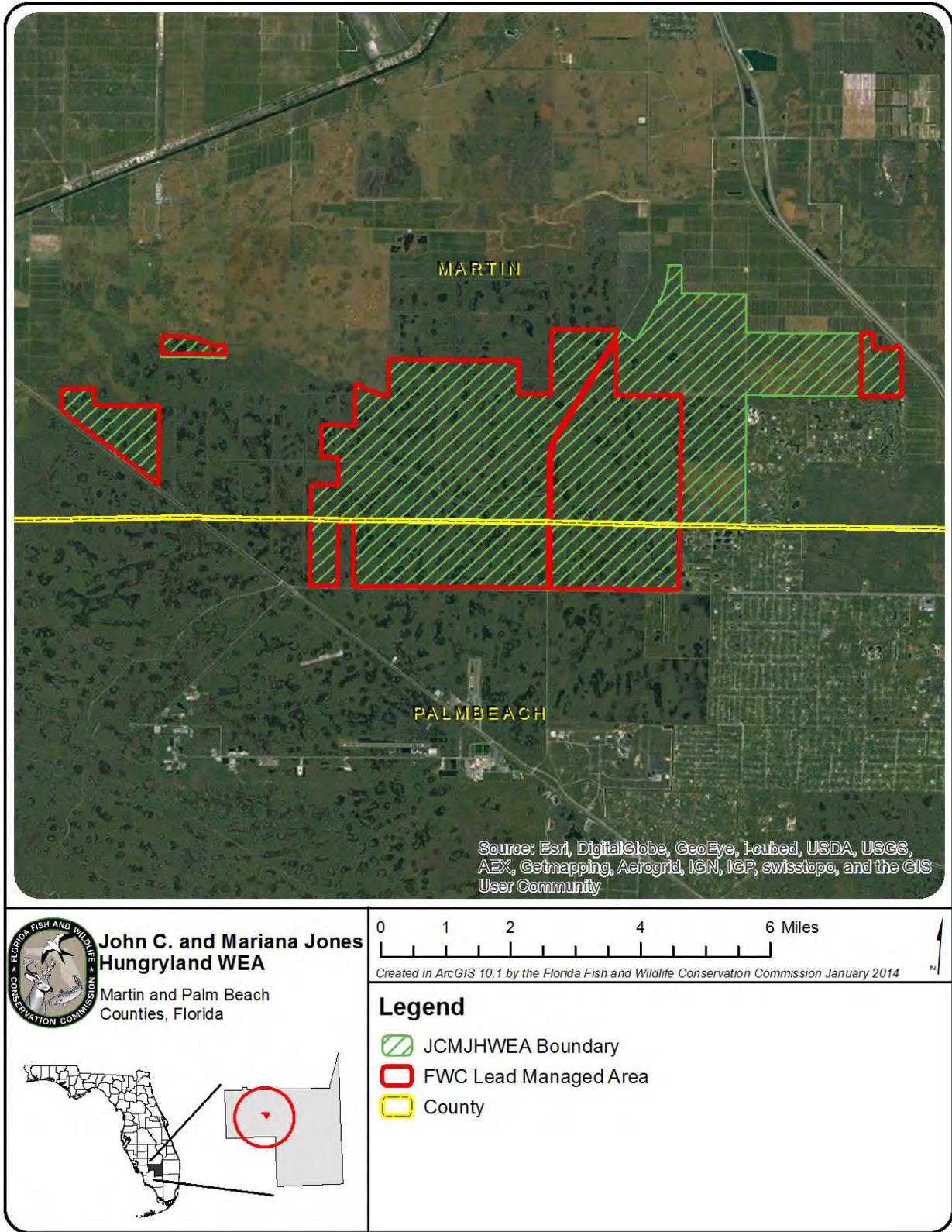


Figure 2: JCMJHWEA FWC Lead Managed Area

1.4 Management Authority

As described above, the FWC is currently assigned lead management authority for approximately 12,769 acres of JCMJHWEA. This lead managed area is composed of approximately 7,741 acres owned jointly by the Board of Trustees and the SFWMD (Lease 4271), 2,553 acres solely owned by the SFWMD (Contract 00287), and 2,441 acres solely owned by the Board of Trustees (Lease 4480).

Additionally, FWC leases approximately 4,234 acres from Martin County and the SFWMD for cooperative management. As noted above, both the SFWMD and Martin County lands are included within the established boundary for JCMJHWEA to provide recreational hunting and other cooperative management opportunities. This cooperative management unit has consists of the William H. Lee and the Culpepper units of JCMJHWEA. Totaled together with the lands for which FWC is the lead managing agency, there are a total of approximately 16,969 acres encompassed within the Establishment Order for JCMJHWEA. The boundary and managing interests on JCMJHWEA are shown in Figure 2. The SFWMD and Martin County are the lead managing agencies for the William H. Lee and Culpepper units of the JCMJHWEA. This management plan covers only the approximately 12,735 acres of JCMJHWEA on which FWC is the lead managing agency.

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 of the FS. 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 Agreements 4480 and 4271 with the FWC direct the 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 agreements further direct the 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

The Governor and Cabinet sitting as the Board of Trustees, Martin County, and the SFWMD hold title to land within the JCMJHWEA. The JCMJHWEA is a combination of five different properties in four separate areas. The Board of Trustees holds 100% undivided title interest on 2,441 acres (Lease number 4480). The Board of Trustees and SFWMD each hold a 50% undivided interest in the 7,741 acre Pal-Mar area property (Lease number 4271). The SFWMD holds 100% undivided title interest on the 2,553 acre West Jupiter Wetlands (Contract number 00287). The 1,810 acre William H. Lee unit, also

known as Pal-Mar East, (Contract number 07051); and the 2,424 acre Culpepper Parcel (Contract 07051) are jointly owned by Martin County and SFWMD.

RG Reserve is a permitted wetland mitigation bank with a limited access easement across part of JCMJHWEA. The recorded easement lies along the northern boundary of JCMJHWEA and allows for ingress, egress, utilities and drainage 50 feet in width. This easement includes the berm road and the drainage swale immediately north of the road. Additionally, the John D. and Catherine T. MacArthur Foundation (Foundation) and the Pal-Mar Water Control District hold spoil and flowage easement rights on the area.

1.6.1 Lemon Grove Mitigation Bank

On November 13, 2002, the Board of Trustees approved an option agreement to purchase 2,018.88 acres within the Pal-Mar Florida Forever Project from Palm Beach County (County). The transaction closed on May 3, 2004. The County had previously acquired the property from the Foundation and entered into a ten-year mitigation agreement (mitigation agreement) with the Foundation. The mitigation agreement covering approximately 263 acres known as Lemon Grove was assigned to Mitigation Services, LLC. Mitigation Services has obtained the rights formerly held by the Foundation to perform mitigation services on the property.

In 2008, the Board of Trustees authorized the DEP and FWC to begin negotiations with Mitigation Services, LLC to develop a proposal allowing the operation of a mitigation bank on approximately 263 acres of JCMJHWEA. As approved by the Board of Trustees and FWC, the DEP and FWC are in ongoing negotiations on a contract between the Board of Trustees, FWC and Mitigation Services, LLC for a mitigation bank, or other mitigation project, on the Lemon Grove property. The term of the pending contract will be for ten years with one five-year renewal, at the sole option of Mitigation Services, if: 100 percent success has been demonstrated per the terms of the mitigation bank permit issued by the SFWMD; Mitigation Services is in compliance with all of the terms and conditions of the SFWMD mitigation bank permit, the contract and the FWC's management plan; and Mitigation Bank credits remain to be sold. During the term of the proposed contract, Mitigation Services shall be required to pay the FWC a minimum annual fee equal to the Base Fee, plus applicable sales tax, in advance on the effective date of the contract and on each subsequent anniversary of the effective date of the contract. As further approved by the Board of Trustees, in addition to the Base Fee, Mitigation Services shall also be required to pay to the FWC a Supplemental Payment the following at the end of each contract year unless the Base Fee exceeds both Supplemental Payment. Over the life of the contract, Mitigation Services shall be required to pay FWC a minimum of \$394,500. The SFWMD will be the permitting agency for the mitigation bank. Mitigation Services shall be required to set aside a portion of the proceeds from each sale of a full or partial mitigation credit at Lemon Grove Mitigation Bank in a maintenance endowment for the perpetual maintenance of the property. FWC, as lessee of the land, and/or the Board of Trustees, as owner of the land, will be responsible for the perpetual maintenance of the property. At the

completion of the construction phase of the SFWMD permit, the FWC has agreed to accept the permit for operation and maintenance responsibilities and will be bound by all terms and conditions of the permit. The funding will be based on the sales of mitigation credits only. However, this will not relieve Mitigation Services from any other regulatory requirements or obligations. The contract is not assignable or transferrable. Upon completion of Mitigation Services' obligations, FWC will not continue any mitigation banking activities nor are they to sell any mitigation bank credits. However, to date, final agreement and execution on the Agreement is pending. Once executed by the parties, the Agreement will be incorporated into the appendix of this plan.

1.7 Proximity to Other Public Properties

As shown in Figure 3, the JCMJHWEA is located in the vicinity of a large number of publicly owned conservation areas and several Florida Forever projects. Tables 1 and 2 list the Florida Forever projects and conservation lands within a 20-mile radius of the JCMJHWEA, including lands managed by public and private entities, that conserve cultural and natural resources within this region of Florida.



Most of the conservation lands listed in Table 2 are owned in full-fee by a public entity. However, some of these areas fall within a less-than-fee ownership classification where the land is owned and being managed by a private landowner while a public agency or not-for-profit organization holds a conservation easement on the land.

Table 1: Florida Forever Projects in Vicinity of the JCMJHWEA

Project Name	GIS Acres
Indian River Lagoon Blueway	28,060
Atlantic Ridge Ecosystem	14,403
Pal-Mar	36,229

Table 2: Conservation Lands in Vicinity of JCMJHWEA

Federal Government	Managing Agency
Arthur R. Marshall Loxahatchee National Wildlife Refuge	US Fish & Wildlife Service
Hobe Sound National Wildlife Refuge	US Fish & Wildlife Service
Jupiter Inlet Lighthouse Outstanding Natural Area	Bureau of Land Management
State of Florida	Managing Agency

Table 2: Conservation Lands in Vicinity of JCMJHWEA

Atlantic Ridge Preserve State Park	DEP
J. W. Corbett Wildlife Management Area	FWC
John D. MacArthur Beach State Park	DEP
Jonathan Dickinson State Park	DEP
Savannas Preserve State Park	DEP
Seabranh Preserve State Park	DEP
St. Lucie Inlet Preserve State Park	DEP

Water Management District	Managing Agency
----------------------------------	------------------------

Allapattah Flats	SFWMD
Atlantic Ridge Ecosystem	SFWMD
C-44 Stormwater Treatment Area	SFWMD
C-51 and L-8 Reservoir	SFWMD
Cypress Creek/Loxahatchee	SFWMD
Dupuis Reserve	SFWMD
Gentle Ben Flowage Easement	SFWMD
Herbert Hoover Dike	SFWMD
JCMJHWEA (Culpepper & William H. Lee Units)	SFWMD
Okeechobee Watershed Water Quality Treatment Facilities	SFWMD
Lakeside Ranch STA	SFWMD
River of Grass	SFWMD
Stormwater Treatment Areas	SFWMD

County/City	Managing Agency
--------------------	------------------------

Acreage Pines Natural Area	Palm Beach County
Alex's Beach Park	Martin County
Atlantic Ridge Parcels	Martin County
Banner Lake Park Conservation Area	Martin County
Bathtub Beach Park	Martin County
Beachwalk Pasley	Martin County
Bluefield Ranch	St. Lucie County
Bob Graham Beach Park	Martin County
Bryn Mawr Beach	Martin County
C-18 Triangle Natural Area	Palm Beach County
C-44 Park Parcel	Martin County
Carlin Park	Palm Beach County
Chastain Beach Park	Martin County
Clifton S. Perry Beach	Martin County
Coral Cove Park	Palm Beach County
County Line Scrub Conservation Area	Martin County
Curtis Beach Park	Martin County
Cypress Creek Natural Area	Palm Beach County
Danforth Park	Martin County
Delaplane Peninsula Blueway Preserve	Martin County

Table 2: Conservation Lands in Vicinity of JCMJHWEA

Delaware Scrub Natural Area	Palm Beach County
Dollman Tract	St. Lucie County
DuBois Park	Palm Beach County
Dutcher	Martin County
Frenchman's Forest	Palm Beach County
Gables	Martin County
Glasscock Beach Park	Martin County
Gomez	Martin County
Grassy Waters Preserve	City of West Palm Beach
Halpatiokee Regional Park Conservation Area	Martin County
Hawks Hammock	Martin County
House of Refuge Park	Martin County
Hungryland Slough Natural Area	Palm Beach County
Indian Riverside Park Conservation Area	Martin County
J. W. Corbett to Loxahatchee NWR Connector	Palm Beach County
Jackson Riverfront Pines Natural Area	Palm Beach County
JCMJHWEA (Culpepper & William H. Lee Units)	Martin County
Jensen Beach Impoundment	Martin County
Jensen Beach Park	Martin County
Jensen Beach West	Martin County
Jimmy Graham Park	Martin County
Joe's River Park	Martin County
Juno Dunes Natural Area	Palm Beach County
Juno Park	Palm Beach County
Jupiter Beach Park	Palm Beach County
Jupiter Mangroves Natural Area	Palm Beach County
Jupiter Ridge Natural Area	Palm Beach County
Kiplinger	Martin County
Kitching Creek	Martin County
Lake Okeechobee Ridge	Martin County
Lake Park Scrub Natural Area	Palm Beach County
Limestone Creek Natural Area	Palm Beach County
Loggerhead Park	Palm Beach County
Lost Trailhead	Palm Beach County
Loxahatchee River Park	Martin County
Loxahatchee Slough Natural Area	Palm Beach County
Martin County Spoil Islands	Martin County
Muscara	Martin County
North Jupiter Flatwoods Natural Area	Palm Beach County
Oak Hammock Park	City of Port St. Lucie
Okeehetee Park North	Palm Beach County
Olson Property	Martin County
Orchid Island	Martin County

Table 2: Conservation Lands in Vicinity of JCMJHWEA

Oxbow	Martin County
Pahokee Marina and Campground	City of Pahokee
Palm City Park Conservation Area	Martin County
Paw-Paw Preserve	Palm Beach County
Peck Lake Park	Martin County
Pendarvis Cove Park	Martin County
Phipp's Park Conservation Area	Martin County
Pine Glades Natural Area	Palm Beach County
Pond Cypress Natural Area	Palm Beach County
Project 10B	St. Lucie County
Radnor	Palm Beach County
Rio Nature Park	Martin County
Riverbend Park	Palm Beach County
Rocky Point Hammock Park	Martin County
Royal Palm Beach Pines Natural Area	Palm Beach County
Santa Lucea	Martin County
Scrub Oak	Martin County
Sea Turtle Park	Martin County
South Fork Addition	Martin County
Spruce Bluff	St. Lucie County
Stuart Beach Addition	Martin County
Stuart Beach Park	Martin County
Sundial	Martin County
Sweetbay Natural Area	Palm Beach County
Tiger Shores Beach	Martin County
Tilton	Martin County
Timer Powers Park Conservation Area	Martin County
Twin Rivers Park	Martin County
Virginia Forrest Beach Park	Martin County
Westmoreland	City of Port St. Lucie
Winding Waters Natural Area	Palm Beach County
South Fork Addition	Martin County
Spruce Bluff	St. Lucie County
Stuart Beach Addition	Martin County
Stuart Beach Park	Martin County
Sundial	Martin County
Sweetbay Natural Area	Palm Beach County
Tiger Shores Beach	Martin County
Tilton	Martin County
Timer Powers Park Conservation Area	Martin County
Twin Rivers Park	Martin County
Virginia Forrest Beach Park	Martin County
Westmoreland	City of Port St. Lucie

Table 2: Conservation Lands in Vicinity of JCMJHWEA

Winding Waters Natural Area	Palm Beach County
Private/Public Conservation Organization	Managing Agency
Barley Barber Swamp	Florida Power and Lights
Blowing Rocks Preserve	The Nature Conservancy
Bluefield Ranch Mitigation Bank	Bluefield Ranch Mit. Bank
Citrus Boulevard Nature Sanctuary	Audubon of Martin County, Inc.
Four Rivers Nature Sanctuary	Audubon of Martin County, Inc.
Hidden Bay Nature Sanctuary	Audubon of Martin County, Inc.
Maplewood Nature Sanctuary	Audubon of Martin County, Inc.
Possam Long Nature Center	Audubon of Martin County, Inc.

1.8 Adjacent Land Uses

The area surrounding the JCMJHWEA is currently zoned A1 (Small Farms), PS (Public Servicing District) and IZ (Interim Zoning). A1 allows for rural, agriculture and silviculture uses and natural resource conservation/preservation. Residential uses are allowed with a maximum density of one dwelling unit per two acres. The PS district is designed to minimize the potential for negative impacts on surrounding properties. The PS district shall provide for essential services of the County, board of public instruction and sanitary district for the servicing and general welfare of the residents of Martin County. PS uses permitted adjacent to JCMJHWEA include parks, public recreation buildings, and playgrounds. The boundary of the Interim Zoning District is the entire unincorporated area of Martin County, excepting those areas specifically covered by another zoning district. If no trend of development has been established in the neighborhood, the minimum standards of the R-2 Single-Family Zoning District shall be in effect. The R-2 district allows for a maximum residential density of one single-family residential dwelling unit per lawfully established lot with a minimum of 7,500 (sq. ft).

JCMJHWEA is located outside of the Martin County MPO Metropolitan Planning Area but is located within the East Coast Greenway proposed by Martin County. None of the roads near JCMJHWEA are identified for capacity improvements by the Martin County Transportation Improvement Program through 2014, but CR711 is listed in the 2030 Needs Assessment of the Martin/St. Lucie County Long Range Transportation Plan as a needed expansion from two lanes to four lanes. Martin County lands are currently zoned as Interim or Public Service with a future land use of Agriculture/Conservation.

Palm Beach County lands are currently zoned as Conservation in the current Zoning and Future Land Use component of the county comprehensive plan.

Surrounding lands in the immediate vicinity of the JCMJHWEA are characterized by rural residential lots approximately 2.5 acres in size or larger as platted and subdivided when all of the area was originally proposed for development as described above. Although the vast majority of these lots they currently remain largely undeveloped primarily due to the

predominant wetland features of the surrounding landscape. For these reasons, much of the land surrounding the immediate vicinity of the area were included within the boundaries of the Pal-Mar Florida Forever Project which was designed to protect the wetland functions and natural resources of the area.

Residential development is rapidly expanding westward along Indiantown Road and other major roads. The interstate and turnpike exits at Indiantown Road make JCMJHWEA easily accessible to tourists and to communities in Martin and Palm Beach counties. The JCMJHWEA property is in multiple sections of Township 40 South, and Ranges 39, 40, and 41 East, in Martin and Palm Beach counties as shown in Figure 1.

1.9 Public Involvement

FWC conducted a MAG meeting in Palm Beach, Florida on November 7, 2012 to obtain input from both public and private stakeholders regarding management of JCMJHWEA. Results of this meeting were used by FWC to develop management goals and objectives and



to identify opportunities and strategies for inclusion in this Management Plan. A summary of issues and opportunities raised by the MAG, as well as a listing of participants, is included as Appendix 13.2.1. Further, two public hearings, as required by Chapter 259.032(10), F.S., were held in West Palm Beach on January 9, 2013 and in Stuart on January 10, 2013. The reports of those Public Hearings are

contained in Appendix 13.2. A website is also maintained for receipt of public input at <http://myfwc.com/conservation/terrestrial/management-plans/develop-mps/>. Further testimony and input is received at a public hearing held by ARC. Input received from all public involvement efforts has been considered in the development of this Management Plan

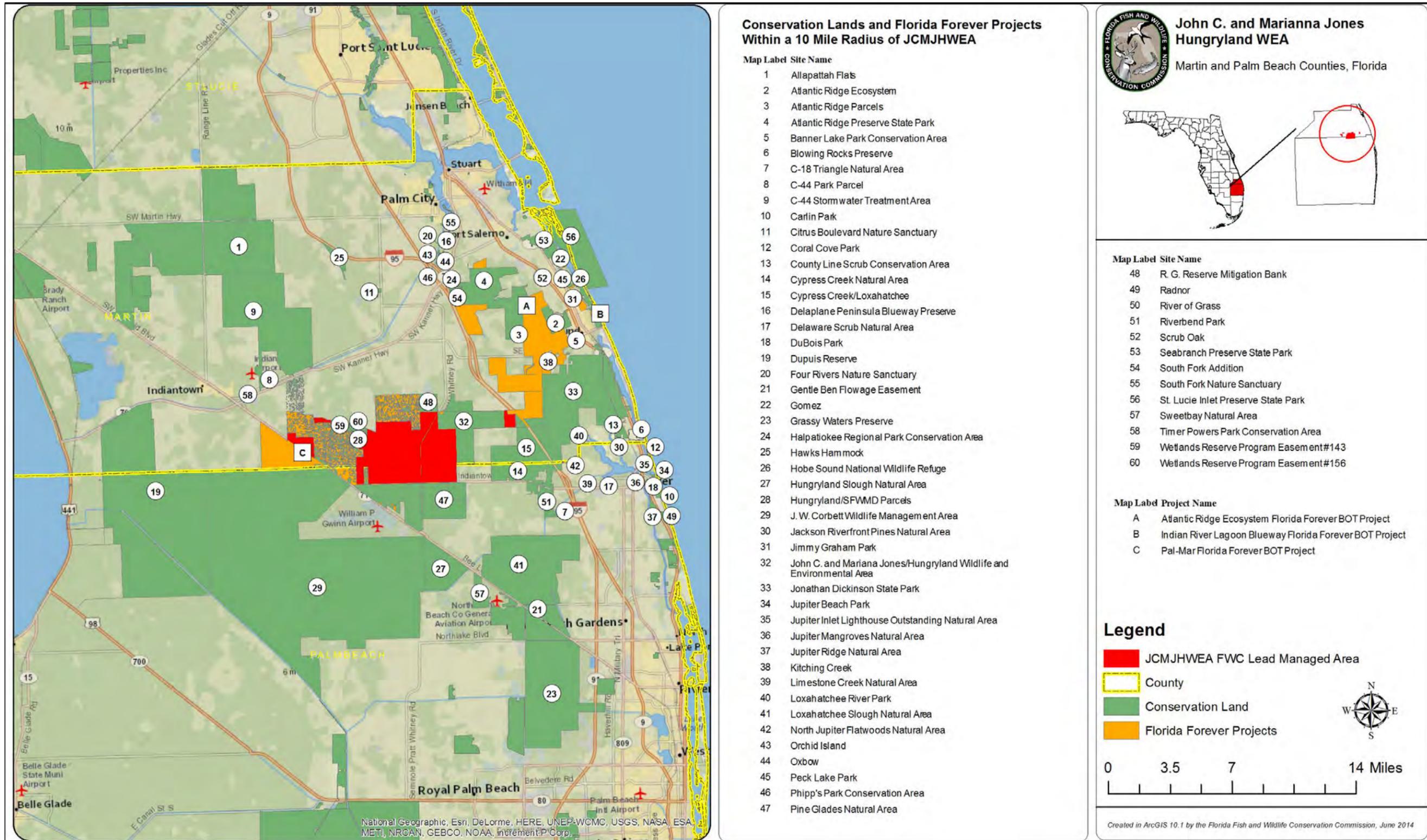


Figure 3: Conservation Lands and Florida Forever Projects Near JCMJHWEA

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2 Natural and Cultural Resources

2.1 Physiography

2.1.1 Climate

The JCMJHWEA is set within the sub-tropic region of South Florida. The climate of southern Florida is characterized by a long, warm, humid summer and a mild winter. Summer temperatures are tempered by the ocean breeze and by the frequent formation of cumulus clouds, which shade the land somewhat without completely obscuring the sun. August is the warmest month and has an average maximum temperature of about 90 degrees F, but temperatures from June to September are similar. Mean annual rainfall is 57 inches, with June through October being the wettest period.

2.1.2 Topography

The JCMJHWEA is located within the Atlantic Coastal Plain physiographic province. Both Martin and Palm Beach counties are subdivided into three physiographic regions: the Atlantic Coastal Ridge, Eastern Flatlands, and Everglades. JCMJHWEA is located within the Eastern Flatlands, which occupies the area between the Atlantic Coastal Ridge westward to the Everglades and Lake Okeechobee.

Land-surface elevations in this region range from mean sea level, in areas adjacent to the shoreline or tidal streams, to about 85 feet above mean sea level (MSL) on the tops of a few sandhills along the coastal ridge. The remainder of the county is virtually flat and elevations range from about 15 to 45 feet above MSL.

The JCMJHWEA consists almost entirely of low pine flatwoods mixed with wet prairies. There are also many ponds with water levels that fluctuate with rainfall. Several deepwater canals that have no outfall remain from earlier attempts to drain the property. The area was historically a mixture of pine flatwoods interspersed with sloughs, marsh, seasonal ponds and transitional areas. Surface drainage is slow because of the extreme flatness of the terrain. Soil permeability is also slow because of a generally high water table and a hardpan that creates a perched water table under certain conditions. This results in an upland landscape dotted with wetlands. The historical drainage was through sloughs that drained to the Atlantic Ocean. The sloughs have been channelized and diked in many areas so that what remains are isolated cypress strands, ponds and wet prairies. Areas of former Everglades' marsh have succeeded to wet prairie where the soils affected by a drop in the water table support a less hydric environment. The extensive wetlands remaining on the area continue to provide significant conservation of surface water resources. The marshes and ponds within the JCMJHWEA retain water even during times of severe drought.

2.1.3 Soils

Eleven soil map units were identified at the JCMJHWEA based on a review of the Soil Survey of Martin County, Florida, Soil Conservation Survey. The major soil types on the area include Pineda sand (32.4%), Riviera fine sand (32.1%), and Wabasso sand (21.4%).

The U.S. Department of Agriculture, Natural Resources Conservation Service defines a soil map unit as: “a collection of soil areas or non-soil areas (miscellaneous areas) delineated in a soil survey.” Soil map units may contain multiple soil components, which are given names that are unique identifiers. Figure 4 provides aggregation data for the JCMJHWEA map units, including a more complete listing of attributes and soil minor components. Figure 5 provides depth to water table information for the soil types found at the JCMJHWEA.

2.1.4 Geologic Conditions

The geology of this region represents Pliocene and Pleistocene epochs of the Tertiary Quaternary period. The formation type is shelly sediments of the Plio-Pleistocene age. Molluskbearing sediments of southern Florida contain some of the most abundant and diverse fossil faunas in the world. The shell beds have attracted much attention due to the abundance and preservation of the fossils but the biostratigraphy and lithostratigraphy of the units has not been well defined. The "formations" previously recognized within the latest Tertiary-Quaternary section of southern Florida include the latest Pliocene - early Pleistocene Caloosahatchee Formation, the early Pleistocene Bermont formation (informal) and the late Pleistocene Fort Thompson Formation. This section consists of fossiliferous sands and carbonates. The identification of these units is problematic unless the significant molluscan species are recognized. Often, exposures are not extensive enough to facilitate the collection of representative faunal samples to properly discern the biostratigraphic identification of the formation. Lithologically these sediments are complex, varying from unconsolidated, variably calcareous and fossiliferous quartz sands to well indurated, sandy, fossiliferous limestones (both marine and freshwater). Clayey sands and sandy clays are present. These sediments form part of the surficial aquifer system.

2.2 Vegetation

JCMJHWEA contains a variety of natural communities that sustain a large diversity of wildlife. Extensive wet flatwoods and wet prairies in association with depression marshes creates good habitat conditions for far-ranging species and allows seasonal movement of animals in response to fluctuating water levels and food supplies.

Depression marshes, wet flatwoods, and wet prairies encompass over 80 percent of the JCMJHWEA. The area was historically a mix of pine flatwoods interspersed with sloughs draining east toward the Loxahatchee River and the Atlantic Ocean. In many places sloughs have been channelized and diked so that what remain today are isolated cypress strands, seasonal ponds, and wet prairies. Some areas of former Everglades' marsh are now wet prairie.

The Florida Natural Areas Inventory (FNAI) describes ten community types existing on the JCMJHWEA. These include baygall, depression marsh, dome swamp, mesic flatwoods, mesic hammock, improved pasture, semi-improved pasture, ruderal, wet flatwoods, and wet prairie. Table 3 below lists community types known to occur on the JCMJHWEA. The FNAI natural communities map is displayed in Figure 6.

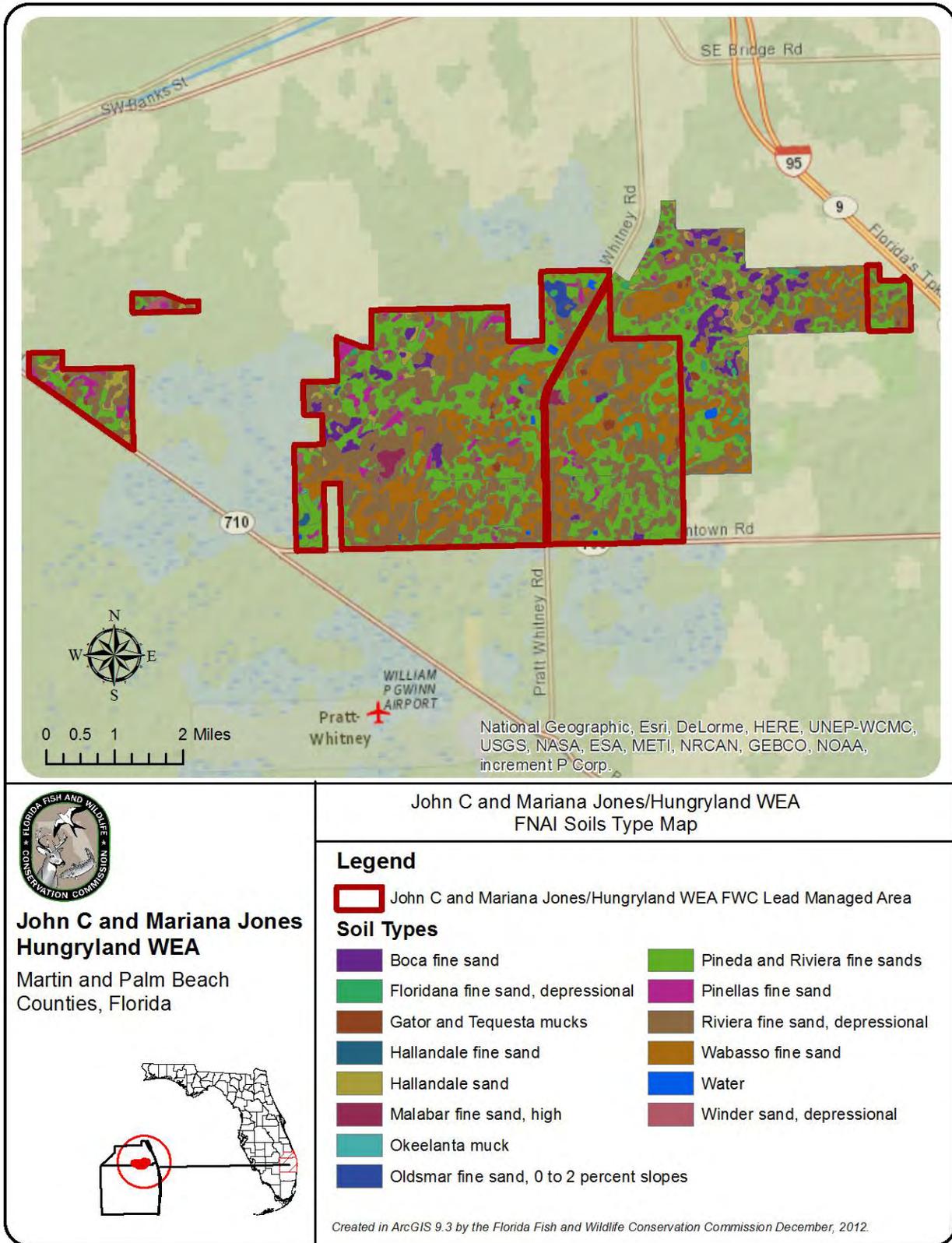
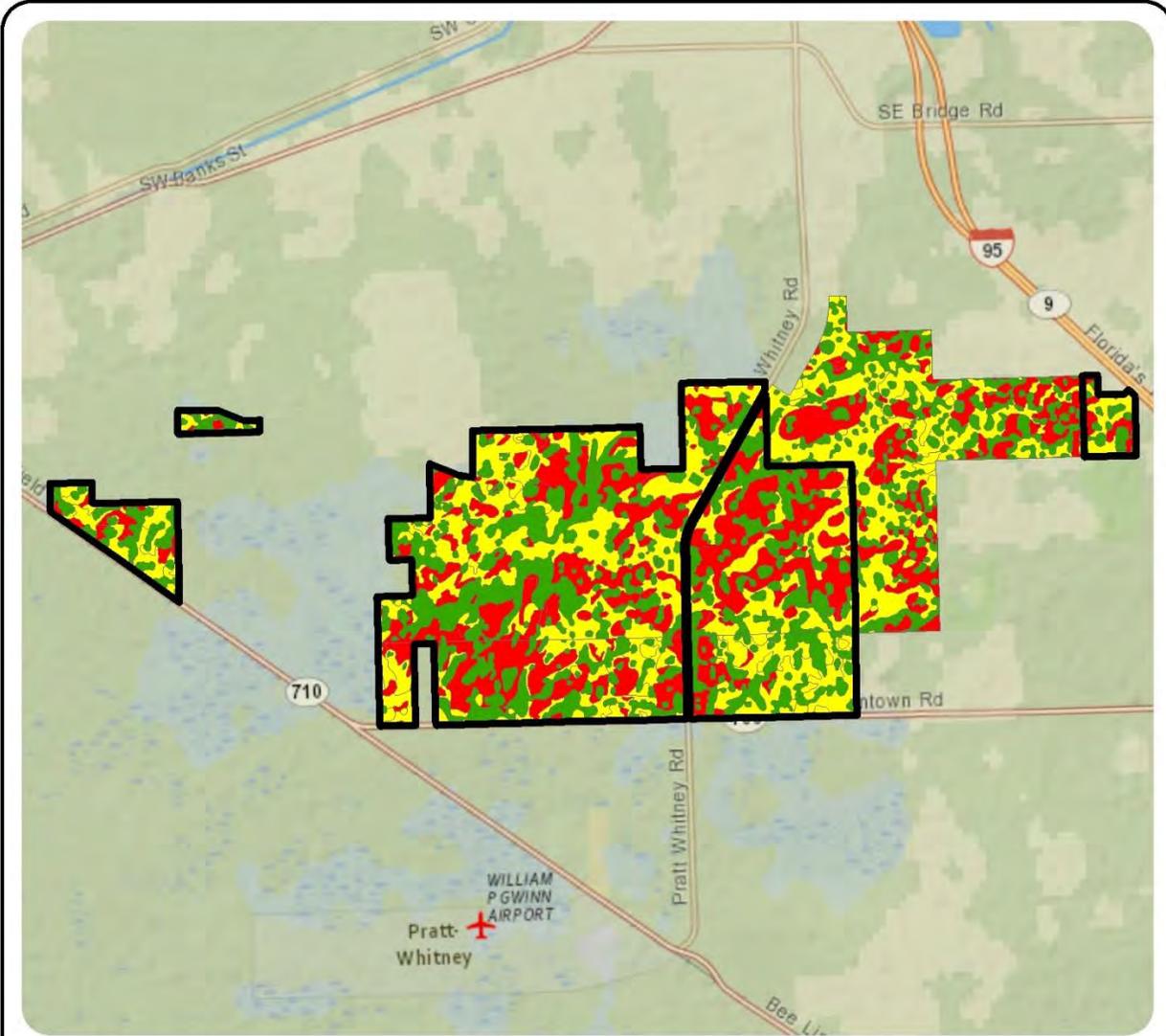
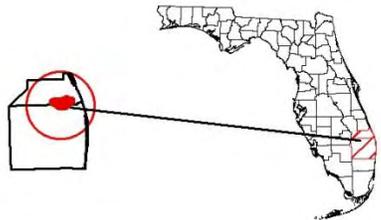


Figure 4: Soils




**John C and Mariana Jones
Hungryland WEA**

Martin and Palm Beach
Counties, Florida



John C and Mariana Jones/Hungryland WEA
Depth to Water Table Map

Legend

 John C and Mariana Jones/Hungryland WEA FWC Lead Managed Area

Depth to Water Table (cm)

-  0
-  15
-  31




*Created in ArcGIS 9.3 by the Florida Fish and Wildlife Conservation Commission
December, 2012.*

Figure 5: Soil Depth to Water Table

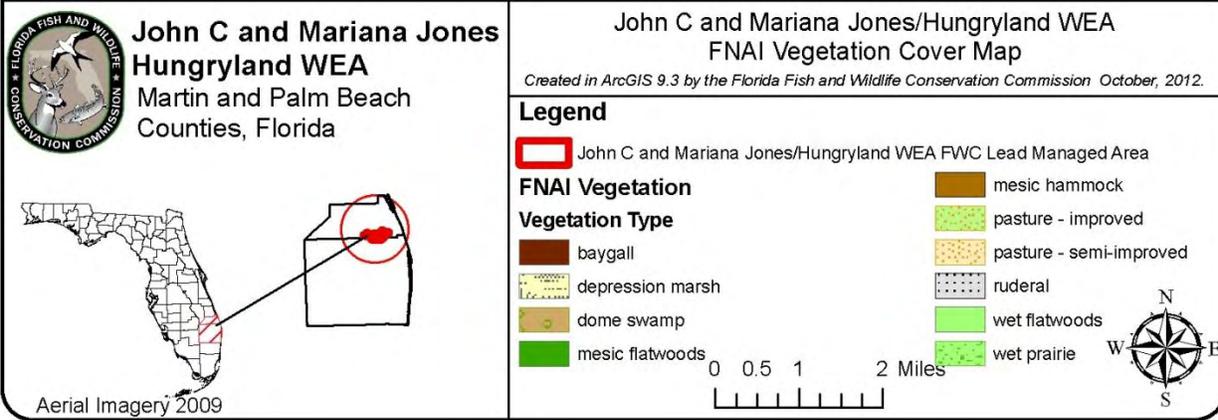
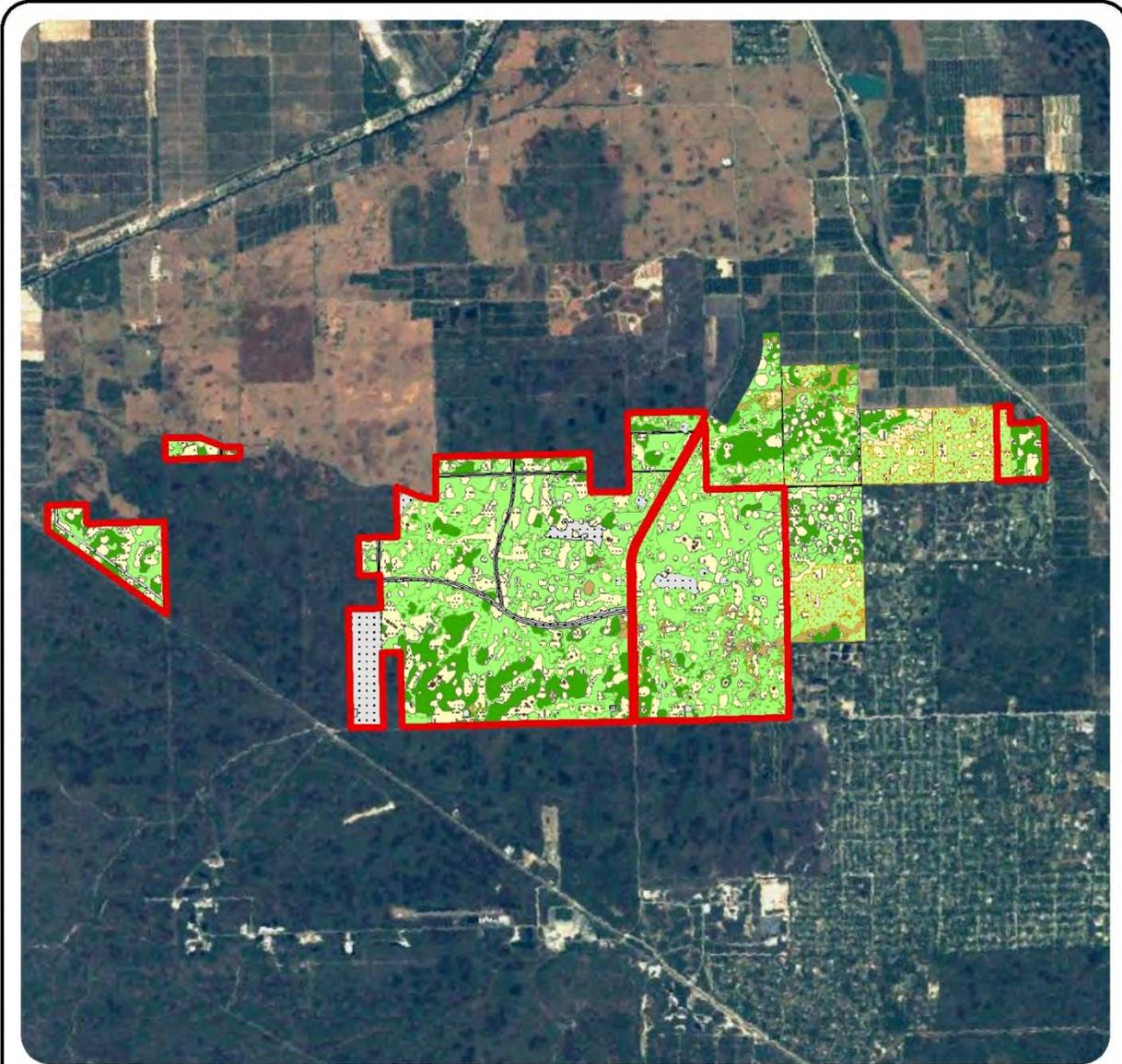


Figure 6: Natural Communities of JCMJHWEA

The native plant species that have been observed on the JCMJHWEA are listed below in Table 3. FNAI found six rare plant species and a number of invasive exotic species on the JCMJHWEA. The rare species that were documented on the area are listed in Table 4, while invasive exotic plant species found on the JCMJHWEA are listed in Table 5.

Table 3: Native Plant Species found on the JCMJHWEA

Common Name	Scientific Name
Adam's needle	<i>Yucca filamentosa</i>
Airplant	<i>Tillandsia sp.</i>
American beautyberry	<i>Callicarpa americana</i>
Arrowhead	<i>Sagittaria sp.</i>
Aster	<i>Aster sp.</i>
Bahiagrass	<i>Paspalum notatum</i>
Balbis' airplant	<i>Tillandsia balbisiana</i>
Baldwin's milkwort	<i>Polygala baldwinii</i>
Baldwin's nutrush	<i>Scleria baldwinii</i>
Baldwin's spikerush	<i>Eleocharis baldwinii</i>
Ball moss	<i>Tillandsia recurvata</i>
Bartram's rose-gentian	<i>Sabatia bartramii</i>
Beaksedge	<i>Rhynchospora sp.</i>
Bearded grass-pink	<i>Calopogon barbatus</i>
Beggarticks	<i>Bidens sp.</i>
Big carpetgrass	<i>Axonopus furcatus</i>
Black bogrush	<i>Schoenus nigricans</i>
Blackroot	<i>Pterocaulon pycnostachyum</i>
Bladderwort	<i>Utricularia sp.</i>
Blaspheme vine	<i>Smilax laurifolia</i>
Blazing star	<i>Liatris sp.</i>
Blue maidencane	<i>Amphicarpum muhlenbergianum</i>
Blue-eyed grass	<i>Sisyrinchium sp.</i>
Bluejoint panicum	<i>Panicum tenerum</i>
Bluestem	<i>Andropogon sp.</i>
Bogbuttons	<i>Lachnocaulon sp.</i>
Bottlebrush threeawn	<i>Aristida spiciformis</i>
Bracken fern	<i>Pteridium aquilinum</i>
Broomsedge bluestem	<i>Andropogon virginicus</i>
Bunched beaksedge	<i>Rhynchospora cephalantha</i>
Bush mint	<i>Hyptis alata</i>
Bushy bluestem	<i>Andropogon glomeratus</i>
Butterwort	<i>Pinguicula sp.</i>
Cabbage palm	<i>Sabal palmetto</i>
Camphorweed	<i>Pluchea sp.</i>
Candyroot	<i>Polygala nana</i>
Cardinal airplant	<i>Tillandsia fasciculata</i>

Table 3: Native Plant Species found on the JCMJHEWA

Common Name	Scientific Name
Carolina redroot	<i>Lachnanthes caroliniana</i>
Carolina yellow-eyed grass	<i>Xyris caroliniana</i>
Carpetgrass	<i>Axonopus sp.</i>
Chaffhead	<i>Carphephorus sp.</i>
Chalky bluestem	<i>Andropogon virginicus var. glaucus</i>
Cinnamon fern	<i>Osmunda cinnamomea</i>
Climbing hempvine	<i>Mikania scandens</i>
Clubmoss	<i>Lycopodium sp.</i>
Clustered mille grains	<i>Oldenlandia uniflora</i>
Coastal plain staggerbush	<i>Lyonia fruticosa</i>
Coastal plain tickseed	<i>Coreopsis gladiata</i>
Coastal plain willow	<i>Salix caroliniana</i>
Coastal plain yellow-eyed grass	<i>Xyris ambigua</i>
Coco-plum	<i>Chrysobalanus icaco</i>
Colicwood	<i>Rapanea punctata</i>
Combleaf mermaidweed	<i>Proserpinaca pectinata</i>
Common buttonbush	<i>Cephalanthus occidentalis</i>
Common grass-pink	<i>Calopogon tuberosus</i>
Common reed	<i>Phragmites australis</i>
Corkwood	<i>Stillingia aquatica</i>
Creeping primrosewillow	<i>Ludwigia repens</i>
Creeping rush	<i>Juncus repens</i>
Crestless plum orchid	<i>Pteroglossaspis ecristata</i>
Dahoon	<i>Ilex cassine</i>
Dayflower	<i>Commelina sp.</i>
Dingy-flowered star orchid	<i>Epidendrum amphotomum</i>
Dog fennel	<i>Eupatorium capillifolium</i>
Dotted smartweed	<i>Polygonum punctatum</i>
Drumheads	<i>Polygala cruciata</i>
Dwarf live oak	<i>Quercus minima</i>
Dwarf sundew	<i>Drosera brevifolia</i>
Earleaf greenbrier	<i>Smilax auriculata</i>
Early whitetop fleabane	<i>Erigeron vernus</i>
Eastern purple bladderwort	<i>Utricularia purpurea</i>
Elliott's milkpea	<i>Galactia elliotii</i>
Elliott's yellow-eyed grass	<i>Xyris elliotii</i>
False fennel	<i>Eupatorium leptophyllum</i>
False foxglove	<i>Agalinis sp.</i>
Fascicled beaksedge	<i>Rhynchospora fascicularis</i>
Fetterbush	<i>Lyonia lucida</i>
Fewflower milkweed	<i>Asclepias lanceolata</i>
Fimbry	<i>Fimbristylis sp.</i>

Table 3: Native Plant Species found on the JCMJHEWA

Common Name	Scientific Name
Fireflag	<i>Thalia geniculata</i>
Fireweed	<i>Erechtites hieracifolius</i>
Flatsedge	<i>Cyperus sp.</i>
Flattened pipewort	<i>Eriocaulon compressum</i>
Flattop goldenrod	<i>Euthamia minor</i>
Floating hearts	<i>Nymphoides aquatica</i>
Florida butterfly orchid	<i>Encyclia tampensis</i>
Florida clamshell orchid	<i>Prosthechea cochleata</i>
Florida dollar orchid	<i>Prosthechea boothiana</i>
Florida dropseed	<i>Sporobolus floridana</i>
Florida purple bladderwort	<i>Utricularia amethystina</i>
Florida threeawn	<i>Aristida rhizomophora</i>
Florida tickseed	<i>Coreopsis floridana</i>
Forked bluecurls	<i>Trichostema dichotomum</i>
Four-petal St. John's-wort	<i>Hypericum tetrapetalum</i>
Fringed nutrush	<i>Scleria ciliata</i>
Fringed yellow stargrass	<i>Hypoxis juncea</i>
Fringed yellow-eyed grass	<i>Xyris fimbriata</i>
Gallberry	<i>Ilex glabra</i>
Giant cane	<i>Arundinaria gigantea</i>
Giant ladies'-tresses	<i>Spiranthes praecox</i>
Giant leather fern	<i>Acrostichum danaeifolium</i>
Goldenrod	<i>Solidago sp.</i>
Gopher apple	<i>Licania michauxii</i>
Grassleaf silkgrass	<i>Pityopsis graminifolia</i>
Grass-leaved ladies'-tresses	<i>Spiranthes vernalis</i>
Grass-pink	<i>Calopogon sp.</i>
Grassy arrowhead	<i>Sagittaria graminea</i>
Groundsel tree	<i>Baccharis halimifolia</i>
Gulf coast spikerush	<i>Eleocharis cellulosa</i>
Hairawn muhly	<i>Muhlenbergia capillaris</i>
Heliotrope	<i>Heliotropium sp.</i>
Highbush blueberry	<i>Vaccinium corymbosum</i>
Horned beaksedge	<i>Rhynchospora corniculata</i>
Horned bladderwort	<i>Utricularia cornuta</i>
Humped bladderwort	<i>Utricularia gibba</i>
Justiceweed	<i>Eupatorium leucolepis</i>
Knotted spikerush	<i>Eleocharis interstincta</i>
Lace-lipped ladies'-tresses	<i>Spiranthes laciniata</i>
Ladies'-tresses	<i>Spiranthes sp.</i>
Lance-leaved arrowhead	<i>Sagittaria lancifolia</i>
Large gallberry	<i>Ilex coriacea</i>

Table 3: Native Plant Species found on the JCMJHEWA

Common Name	Scientific Name
Large whitetop sedge	<i>Dichromena sp.</i>
Large-flower rose-gentian	<i>Sabatia grandiflora</i>
Laurel greenbrier	<i>Smilax laurifolia</i>
Leafless beaked orchid	<i>Sacoila lanceolata</i>
Leavenworth's tickseed	<i>Coreopsis leavenworthii</i>
Lemon bacopa	<i>Bacopa caroliniana</i>
Limewater brookweed	<i>Samolus ebracteatus</i>
Little bluestem	<i>Schizachyrium scoparium</i>
Live oak	<i>Quercus virginiana</i>
Lobelia	<i>Lobelia sp.</i>
Loblolly bay	<i>Gordonia lasianthus</i>
Lopsided indiagrass	<i>Sorghastrum secundum</i>
Love vine	<i>Cassytha filiformis</i>
Lovegrass	<i>Eragrostis sp.</i>
Maidencane	<i>Panicum hemitomon</i>
Manyflower marsh pennywort	<i>Hydrocotyle umbellata</i>
Many-flowered grass-pink	<i>Calopogon multiflorus</i>
Marsh threeawn	<i>Aristida palustris</i>
Meadowbeauty	<i>Rhexia sp.</i>
Michaux's orchis	<i>Habenaria quinqueseta</i>
Mohr's thoroughwort	<i>Eupatorium mohrii</i>
Muscadine	<i>Vitis rotundifolia</i>
Myrsine	<i>Rapanea punctata</i>
Myrtle-leaf St. John's-wort	<i>Hypericum myrtifolium</i>
Narrowfruit horned beaksedge	<i>Rhynchospora inundata</i>
Narrowleaf blue-eyed grass	<i>Sisyrinchium angustifolium</i>
Narrowleaf silkgrass	<i>Pityopsis graminifolia</i>
Narrowleaf yellowtops	<i>Flaveria linearis</i>
Needleleaf airplant	<i>Tillandsia setacea</i>
Netted nutrush	<i>Scleria reticularis</i>
Netted pawpaw	<i>Asimina reticulata</i>
Night-fragrant epidendrum	<i>Epidendrum nocturnum</i>
Nutrush	<i>Scleria sp.</i>
Nuttall's meadowbeauty	<i>Rhexia nuttallii</i>
Orange milkwort	<i>Polygala lutea</i>
Pale grass-pink	<i>Calopogon pallidus</i>
Pale meadowbeauty	<i>Rhexia mariana</i>
Panic grass	<i>Dichanthelium erectifolium</i>
Partridge pea	<i>Chamaecrista fasciculata</i>
Paspalum grass	<i>Paspalum sp.</i>
Peelbark St. John's wort	<i>Hypericum fasciculatum</i>
Peppervine	<i>Ampelopsis arborea</i>

Table 3: Native Plant Species found on the JCMJHEWA

Common Name	Scientific Name
Pickeralweed	<i>Pontederia cordata</i>
Pine lily	<i>Lilium catesbaei</i>
Pineland chaffhead	<i>Carphephorus carnosus</i>
Pineland daisy	<i>Chaptalia tomentosa</i>
Pineland rayless goldenrod	<i>Bigelovia nudata</i>
Pine-pink	<i>Bletia purpurea</i>
Pink sundew	<i>Drosera capillaris</i>
Pitted stripeseed	<i>Piriqueta cistoides ssp. caroliniana</i>
Poison ivy	<i>Toxicodendron radicans</i>
Pond apple	<i>Annona glabra</i>
Pond cypress	<i>Taxodium ascendens</i>
Primrosewillow	<i>Ludwigia sp.</i>
Procession flower	<i>Polygala incarnata</i>
Purple bluestem	<i>Andropogon glomeratus var. glaucopsis</i>
Purple lovegrass	<i>Eragrostis spectabilis</i>
Purple thistle	<i>Cirsium horridulum</i>
Rabbitbells	<i>Crotalaria rotundifolia</i>
Rattlesnake master	<i>Eryngium yuccifolium</i>
Red bay	<i>Persea palustris</i>
Red maple	<i>Acer rubrum</i>
Redroot	<i>Lachnanthes caroliniana</i>
Redtop panicum	<i>Panicum rigidulum</i>
Richard's yellow-eyed grass	<i>Xyris jupicai</i>
Rose pogonia	<i>Pogonia ophioglossoides</i>
Rose-gentian	<i>Sabatia sp.</i>
Rose-of-Plymouth	<i>Sabatia stellaris</i>
Rosy camphorweed	<i>Pluchea rosea</i>
Roundleaf bluet	<i>Houstonia procumbens</i>
Roundpod St. John's wort	<i>Hypericum cistifolium</i>
Royal fern	<i>Osmunda regalis</i>
Saltmarsh umbrellasedge	<i>Fuirena breviseta</i>
Sand cordgrass	<i>Spartina bakeri</i>
Sand laurel oak	<i>Quercus hemisphaerica</i>
Sandweed St. John's wort	<i>Hypericum fasciculatum</i>
Savannah milkweed	<i>Asclepias pedicellata</i>
Savannah yellow-eyed grass	<i>Xyris flabelliformis</i>
Saw grass	<i>Cladium jamaicense</i>
Saw palmetto	<i>Serenoa repens</i>
Shaggy hedgehyssop	<i>Gratiola pilosa</i>
Shiny dwarf blueberry	<i>Vaccinium myrsinites</i>
Shiny fetterbush	<i>Lyonia lucida</i>
Shortleaf rosegentian	<i>Sabatia brevifolia</i>

Table 3: Native Plant Species found on the JCMJHEWA

Common Name	Scientific Name
Shortleaf yellow-eyed grass	<i>Xyris brevifolia</i>
Shortspike bluestem	<i>Andropogon brachystachyus</i>
Showy milkwort	<i>Polygala grandiflora</i>
Slash pine	<i>Pinus elliottii</i>
Slender flattop goldenrod	<i>Euthamia caroliniana</i>
Small butterwort	<i>Pinguicula pumila</i>
Small purple bladderwort	<i>Utricularia resupinata</i>
Small's bogbutton	<i>Lachnocaulon minus</i>
Smutgrass	<i>Sporobolus indicus</i>
Snow squarestem	<i>Melanthera nivea</i>
Snowy orchis	<i>Platanthera nivea</i>
Soft rush	<i>Juncus effusus ssp. solutus</i>
South Florida slash pine	<i>Pinus elliottii var. densa</i>
Southeastern sneezeweed	<i>Helenium pinnatifidum</i>
Southern beaksedge	<i>Rhynchospora microcarpa</i>
Southern cattail	<i>Typha domingensis</i>
Southern needleleaf	<i>Tillandsia setacea</i>
Southern umbrellasedge	<i>Fuirena scirpoidea</i>
Spadeleaf	<i>Centella asiatica</i>
Spanish moss	<i>Tillandsia usneoides</i>
Sphagnum moss	<i>Sphagnum sp.</i>
Spikerush	<i>Eleocharis sp.</i>
Spreading air-plant	<i>Tillandsia utriculata</i>
St. Andrew's cross	<i>Hypericum hypericoides</i>
St. John's-wort	<i>Hypericum cistifolium</i>
Starrush whitetop	<i>Rhynchospora colorata</i>
Star-rush whitetop sedge	<i>Dichromena colorata</i>
Stiff yellow flax	<i>Linum medium</i>
Strangler fig	<i>Ficus aurea</i>
String lily	<i>Crinum americanum</i>
Sugarcane plumegrass	<i>Saccharum giganteum</i>
Sunbonnets	<i>Chaptalia tomentosa</i>
Sunflower	<i>Helianthus sp.</i>
Swamp bay	<i>Persea palustris</i>
Swamp fern	<i>Blechnum serrulatum</i>
Swamp laurel oak	<i>Quercus laurifolia</i>
Swampforest beaksedge	<i>Rhynchospora decurrens</i>
Sweet bay	<i>Magnolia virginiana</i>
Sweet goldenrod	<i>Solidago odora</i>
Sweet gum	<i>Liquidambar styraciflua</i>
Switchgrass	<i>Panicum virgatum</i>
Sword fern	<i>Nephrolepis exaltata</i>

Table 3: Native Plant Species found on the JCMJHEWA

Common Name	Scientific Name
Tall elephant's foot	<i>Elephantopus elatus</i>
Tall jointweed	<i>Polygonella gracilis</i>
Tall pinebarren milkwort	<i>Polygala cymosa</i>
Tall yellow-eyed grass	<i>Xyris platylepis</i>
Tar-flower	<i>Befaria racemosa</i>
Tenangle pipewort	<i>Eriocaulon decangulare</i>
Threadleaf arrowhead	<i>Sagittaria filiformis</i>
Tickseed	<i>Coreopsis sp.</i>
Toothache grass	<i>Ctenium aromaticum</i>
Toothed midsorus fern	<i>Blechnum serrulatum</i>
Toothed rein orchid	<i>Habenaria odontopetala</i>
Tracy's beaksedge	<i>Rhynchospora tracyi</i>
Turkey tangle frogfruit	<i>Lippia nodiflora</i>
Virginia chain fern	<i>Woodwardia virginica</i>
Virginia creeper	<i>Parthenocissus quinquefolia</i>
Water cowbane	<i>Oxypolis filiformis</i>
Water toothleaf	<i>Stillingia aquatica</i>
Waterlily	<i>Nymphaea sp.</i>
Water-spider orchid	<i>Habenaria repens</i>
Wax myrtle	<i>Myrica cerifera</i>
West indian dropseed	<i>Sporobolus indicus var. pyramidalis</i>
West Indian meadow beauty	<i>Rhexia cubensis</i>
White bog violet	<i>Viola lanceolata</i>
White waterlily	<i>Nymphaea odorata</i>
Whitehead bogbutton	<i>Lachnocaulon anceps</i>
Whitetop aster	<i>Aster reticulata</i>
Whitetop sedge	<i>Dichromena sp.</i>
White-top sedge	<i>Rhynchospora latifolia</i>
Wild coco	<i>Eulophia alta</i>
Wild pennyroyal	<i>Piloblephis rigida</i>
Wild petunia	<i>Ruellia sp.</i>
Wiregrass	<i>Aristida stricta var. beyrichiana</i>
Yaupon	<i>Ilex vomitoria</i>
Yellow colicroot	<i>Aletris lutea</i>
Yellow hatpins	<i>Syngonanthus flavidulus</i>
Yellow helmet orchid	<i>Polystachya concreta</i>
Yellow milkwort	<i>Polygala rugellii</i>
Yellow nutgrass	<i>Cyperus esculentus</i>
Yellow pondlily	<i>Nuphar lutea</i>
Yellow spatterdock	<i>Nuphar advena</i>
Yellow stargrass	<i>Hypoxis sp.</i>
Yellow-eyed grass	<i>Xyris sp.</i>

Table 3: Native Plant Species found on the JCMJHEWA

Common Name	Scientific Name
Zigzag jointvetch	<i>Aeschynomene rudis</i>

Table 4: Rare Plant Species Observed on the JCMJHWEA

Common Name	Scientific Name
Banded wild-pine	<i>Tillandsia flexuosa</i>
Catesby lilies	<i>Lilium catesbaei</i>
Florida threeawn	<i>Aristida rhizomophora</i>
Many-flowered grass-pink	<i>Calopogon multiflorus</i>
Giant wild pine	<i>Tillandsia utriculata</i>
Strap fern	<i>Campyloneurom phyllitidis</i>
Stiff-leaved wild pine	<i>Tillandsia fasciculata</i>

Table 5: Invasive Exotic Plant Species Found on the JCMJHWEA

Common Name	Scientific Name
Air Potato	<i>Dioscorea bulbifera</i>
Australian pine	<i>Casuarina spp.</i>
Brazilian pepper	<i>Schinus terebinthifolius</i>
Burma reed	<i>Neyraudia reynaudiana</i>
Caesar's weed	<i>Urena lobata</i>
Castor bean	<i>Ricinus communis</i>
Catclaw mimosa	<i>Mimosa pigra</i>
Chinese crown orchid	<i>Eulophia graminea</i>
Cogon grass	<i>Imperata cylindrica</i>
Downy rose-myrtle	<i>Rhodomyrtus tomentosa</i>
Dwarf papyrus	<i>Cyperus prolifer</i>
Earleaf acacia	<i>Acacia auriculiformis</i>
Guava	<i>Psidium guajava</i>
Guinea grass	<i>Panicum maximum</i>
Jaragua	<i>Hyparrhenia rufa</i>
Java plum	<i>Syzygium cumini</i>
Lantana	<i>Lantana camara</i>
Large flower Mexican clover	<i>Richardia grandiflora</i>
Limpo Grass	<i>Hemarthia altissima</i>
Melaleuca	<i>Melaleuca quinquenervia</i>
Mexican petunia	<i>Ruellia simplex</i>
Napier grass	<i>Pennisetum purpureum</i>
Natal grass	<i>Rhynchelytrum repens</i>
Old world climbing fern	<i>Lygodium microphylla</i>
Para grass	<i>Urochloa mutica</i>

Table 5: Invasive Exotic Plant Species Found on the JCMJHWEA

Common Name	Scientific Name
Peruvian primrosewillow	<i>Ludwigia peruviana</i>
Rosary pea	<i>Abrus precatorius</i>
Seaside mahoe	<i>Talipariti tiliaceum</i>
Strawberry guava	<i>Psidium cattleianum</i> (= <i>P. littorale</i>)
Torpedo grass	<i>Panicum repens</i>
Tropical soda apple	<i>Solanum viarum</i>
Water spangles	<i>Salvinia minima</i>
Water-lettuce	<i>Pistia stratiotes</i>
Wedelia	<i>Wedelia trilobata</i>

2.2.1 FNAI Natural Community Descriptions

The following are descriptions of the natural communities found on the entire JCMJHWEA. These communities are depicted in Figure 6. Table 6 lists the acreage of each community type.

Table 6: Community Types Found on the JCMJHWEA

Community Type	Acres	Percent of Area
Baygall	35.9	0.21%
Depression Marsh	4715.7	27.75%
Dome Swamp	487.7	2.87%
Mesic flatwoods	2300.0	13.53%
Mesic hammock	1.0	0.00%
Pasture-improved	1139.0	6.70%
Pasture-semi-improved	119.73	0.70%
Ruderal	1173.23	6.90%
Wet Flatwoods	3835.33	22.57%
Wet Prairie	3187.18	18.75%

2.2.1.1 Baygall

Baygalls are forested wetlands that occur in irregular depressions or lower slopes where water seepage is present. On JCMJHWEA, baygall generally occurs as “islands” within, or on the edges of, depression and basin marshes where organic material has built up. The dominant canopy species is red bay. Slash pine may be present in the canopy, but it is not a characteristic component of the community. There is typically a moderately dense tall shrub layer composed of red bay, loblolly bay, dahoon holly, wax myrtle, or myrsine. The short shrub layer is often dense and composed of saw palmetto, shiny lyonia, and coco plum. The herbaceous layer is generally represented by ferns, usually swamp fern or Virginia chain fern. Vine species are common and include laurel greenbriar, muscadine, and poison ivy.

2.2.1.2 Depression Marsh

Depression marshes are typically small, circular or oval shaped isolated wetlands situated in shallow depressions where sand has slumped around or over a sinkhole. Depression marshes are abundant on JCMJHWEA, and occur in association with all of the other communities. The substrate is usually acid sand with deepening peat toward the center. Hydrological conditions vary, with most depression marshes drying in most years. On JCMJHWEA, there is usually an inner, central zone occupied by sawgrass, fireflag, or occasionally cattail. Larger depressions may have a small shrubby island of pond apple, willow, or wax myrtle. The zone encircling the center is often dominated by maidencane, spikerush, or Tracy's beaksedge, followed by an outer herbaceous zone that often includes dense to scattered sandweed, St. John's-wort and corkwood. The diverse herbaceous layer of this outer zone includes nutrush, yellow-eyed grass, salt-marsh umbrella sedge, marsh threeawn, bladderwort, hatpins, panic grass, blue maidencane, redroot, sundew, beakrush and milkworts. Algal mats, composed of many species of blue-green algae, frequently occur around the perimeter of depression marshes at JCMJHWEA.

2.2.1.3 Dome Swamp

Dome swamps are typically small, circular or oval shaped isolated forested wetlands situated in shallow depressions. The substrate of dome swamps is usually acid sand with deepening peat toward the center. Dome swamps are infrequent on JCMJHWEA, and occur in association with depression or basin marshes.

On JCMJHWEA, dome swamps are dominated by pond cypress. The tall shrub layer, when present, consists of myrsine, wax myrtle, dahoon, buttonbush, willow, and pond apple. Sawgrass, swamp fern, and sword ferns are usually common. Herbaceous species, such as hatpins, tall milkwort, bladderwort, maidencane, blue maidencane, Tracy's beaksedge, umbrella sedge, and white-topped sedge, are diverse around the sunnier edges but become less frequent toward the center. Airplants are common.

2.2.1.4 Mesic Flatwoods

Mesic flatwoods are upland, pine-dominated forests on poorly drained to moderately well drained soils. On JCMJHWEA, mesic flatwoods occur in association with wet flatwoods, wet prairie, and depression marshes. There is typically an open slash pine canopy, occasionally with a subcanopy of cabbage palm. There is frequently a tall shrub layer of dahoon holly, loblolly bay, wax myrtle, or myrsine, and saw palmetto. Saw palmetto dominates the short shrub layer; other characteristic short shrubs include gallberry, shiny lyonia, stagger bush, and coco plum. Dwarf shrubs include St. John's wort, and shiny blueberry.

In the herbaceous layer characteristic species of high quality mesic flatwoods on JCMJHWEA are wiregrass, Florida threeawn, toothache grass, blue maidencane, muhly grass, beaksedges, sawgrass, bracken fern, rattlesnake-master, Leavenworth's tickseed, wild petunia, and chaffhead. Weedy species include slender flattop goldenrod, rosy

camphorweed, dog fennel, and witch grasses. Woody vines include muscadine and greenbriar.

2.2.1.5 Mesic Hammock

Mesic hammocks are closed-canopy forests of temperate hardwood species occurring along wetlands or as islands within wetlands where they are sheltered from fire. Fire is rare, and when mesic hammocks burn they may convert to the community they border. One occurrence of mesic hammock is present at JCMJHWEA. This habitat has formed in a fire-shadowed site of historic mesic flatwoods and is less than one acre in size. This mesic hammock is simply represented by a nearly closed canopy community of live oak with saw palmetto in the understory.

2.2.1.6 Pasture – Improved

Improved pastures are defined as natural areas that have been stripped of most or all native vegetation and replanted in pasture grasses. At JCMJHWEA, improved pasture accounts for 1,134 acres of the William H. Lee Unit. Improved pasture at JCMJHWEA contains scattered groups and individual trees, typically represented by slash pine. This community is characterized by weedy and invasive exotic herbaceous species commonly including bahia grass, broomsedge, West Indian dropseed, Caesar's weed, para grass, bluestem, chalky bluestem, dog fennel, and slender flattop goldenrod.

2.2.1.7 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. Semi-improved pasture at JCMJHWEA occurs in the northern half of the William H. Lee Unit on former mesic flatwoods, wet flatwoods, wet prairie, and depression marsh communities. Clearing in these areas was minimal, but seeding of bahia grass, invasive exotic establishment and past cattle disturbances are evident.

2.2.1.8 Ruderal

Ruderal communities are areas where the natural community has been overwhelmingly altered as a result of human activity. Typical examples of ruderal community sites are housing areas, office complexes, parking lots, roads, maintenance and equipment yards, roads, canals and similar substantially altered areas. On JCMJHWEA, ruderal areas are primarily roads, parking areas, canals, ditches and spoil areas.

2.2.1.9 Wet Flatwoods

Wet flatwoods are wetland forests on poorly drained sands over clay or limestone. On JCMJHWEA, wet flatwoods may occur as large flats or as transitional areas between mesic flatwoods and wet prairie. They are inundated for at least a month each year, with soils saturated to the surface for 3 to 4 months in most years. Wet flatwoods have a sparse canopy of widely scattered slash pine usually less than 25% coverage. Because of the lack of recent prescribed fire, there is typically a moderately dense (35 - 65% cover) tall shrub layer dominated by wax myrtle. Myrsine and dahoon holly are occasionally present. The

short shrub cover is sparse to moderately dense, dominated by wax myrtle and sandweed St. John’s wort. Saw palmetto occurs in isolated clumps. Wet flatwoods support a rich layer of grasses, and sedges; characteristic species include wiregrass, Florida threeawn, bottlebrush threeawn, muhly grass, blue maidencane, toothache-grass, beaksedges, umbrella-sedges, white-topped sedges, nutrushes, and plumegrass.

2.2.1.10 Wet Prairies

Wet Prairies are wet grasslands on poorly drained sands over clay or limestone. On JCMJHWEA, wet prairies may occur as large flats or as transitional areas between wet flatwoods and marshes. As with wet flatwoods, they are dependent on frequent fire, every 2 to 4 years, to prevent shrub invasion. Wet prairies share many of the same species as wet flatwoods. Major differences include the following: (1) wet prairies have less than 5% cover of slash pine, which tend to be small and stunted; (2) saw palmetto is typically absent or limited to infrequent small clumps; (3) wiregrass and Florida threeawn are typically absent except on the upper edges of the community; and (4) the cover of sandweed St. John’s-wort and corkwood is typically less than half that of the surrounding wet flatwoods. Beaksedges, and nutrushes dominate the herbaceous groundcover.

2.2.2 Forest Resources

The predominant forest community on JCMJHWEA is primarily pine flatwoods and wet prairies interspersed with freshwater marshes. The FWC will consult and cooperate with the Florida Forest Service (FFS) in the development and maintenance of forest resources at the JCMJHWEA as appropriate. A timber assessment for JCMJHWEA can be found in Appendix 13.6.

2.3 Fish and Wildlife Resources

The JCMJHWEA currently supports many wildlife species. Active wildlife management practices, limited access, and a diversity of natural communities make JCMJHWEA an excellent place to view wildlife. The depression marshes and wet prairie provide valuable wetlands for many transient and resident bird species, including endangered and threatened (imperiled) species. Tables 7 through 9 display the species that have been observed on the area. A list of non-native animals observed at JCMJHWEA can be found in Table 10. Table 11 lists rare and imperiled species.

Table 7: Mammal Species Documented on the JCMJHWEA

Common Name	Scientific Name
Big brown bat	<i>Eptesicus fuscus</i>
Bobcat	<i>Lynx rufus</i>
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>
Cotton mouse	<i>Peromyscus gossypinus</i>
Coyote	<i>Canis latrans</i>
Eastern cottontail	<i>Sylvilagus floridanus</i>
Eastern fox squirrel	<i>Sciurus niger</i>

Table 7: Mammal Species Documented on the JCMJHWEA

Common Name	Scientific Name
Eastern gray squirrel	<i>Sciurus carolinensis</i>
Eastern mole	<i>Scalopus aquaticus</i>
Eastern pipistrelle (tricolored bat)	<i>Perimyotis subflavus</i>
Eastern spotted skunk	<i>Spilogale putorius</i>
Eastern yellow bat	<i>Lasiurus intermedius</i>
Evening bat	<i>Nycticeius humeralis</i>
Florida panther	<i>Felis concolor coryi</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
Hispid cotton rat	<i>Sigmodon hispidus</i>
Least shrew	<i>Cryptotis parva</i>
Marsh rabbit	<i>Sylvilagus palustris</i>
Marsh rice rat	<i>Oryzomys palustris</i>
Mink	<i>Mustela vison</i>
Northern yellow bat	<i>Lasiurus intermedius</i>
Oldfield mouse	<i>Peromyscus polionotus</i>
Opossum	<i>Didelphis virginiana</i>
Raccoon	<i>Procyon lotor</i>
Rafinesque's big-eared bat	<i>Plecotus rafinesquii</i>
Red fox	<i>Vulpes vulpes</i>
River otter	<i>Lontra canadensis</i>
Round-tailed muskrat	<i>Neofiber alleni</i>
Seminole bat	<i>Lasiurus seminolus</i>
Southern flying squirrel	<i>Glaucomys volans</i>
Southern short-tailed shrew	<i>Blarina carolinensis</i>
Striped skunk	<i>Mephitis mephitis</i>
Wagner's mastiff bat	<i>Eumops glaucinus</i>
White-tailed deer	<i>Odocoileus virginianus</i>

Table 8: Reptile and Amphibian Species Documented on JCMJHWEA

Common Name	Scientific Name
American alligator	<i>Alligator mississippiensis</i>
Banded watersnake	<i>Nerodia fasciata fasciata</i>
Barking treefrog	<i>Hyla gratioia</i>
Blue-striped garter snake	<i>Thamnophis sirtalis similis</i>
Brown water snake	<i>Nerodia taxispilota</i>
Bullfrog	<i>Rana catesbiana</i>
Common musk turtle	<i>Sternotherus odoratus</i>
Corn snake	<i>Elaphe guttata guttata</i>
Cuban treefrog	<i>Osteopilus septentrionalis</i>
Dusky pygmy rattlesnake	<i>Sistrurus miliarius barbouri</i>

Table 8: Reptile and Amphibian Species Documented on JCMJHWEA

Common Name	Scientific Name
Dwarf salamander	<i>Eurycea quadridigitata</i>
Eastern coachwhip	<i>Masticophis flagellum flagellum</i>
Eastern coral snake	<i>Micrurus fulvius fulvius</i>
Eastern diamondback rattlesnake	<i>Crotalus adamanteus</i>
Eastern garter snake	<i>Thamnophis sirtalis sirtalis</i>
Eastern glass lizard	<i>Ophisaurus ventralis</i>
Eastern hognose snake	<i>Heterodon platirhinos</i>
Eastern indigo snake	<i>Drymarchon corais couperi</i>
Eastern kingsnake	<i>Lampropeltis getula getula</i>
Eastern mud snake	<i>Farancia abacura abacura</i>
Eastern narrow-mouthed toad	<i>Gastrophryne carolinensis</i>
Eastern spadefoot	<i>Scaphiopus h. holbrookii</i>
Everglades dwarf siren	<i>Pseudobranchius a. belli</i>
Florida box turtle	<i>Terrapene carolina bauri</i>
Florida brown snake	<i>Storeria dekayi victa</i>
Florida chicken turtle	<i>Deirochelys reticularia chrysea</i>
Florida chorus frog	<i>Pseudacris nigrita verrucosa</i>
Florida cottonmouth	<i>Agkistrodon piscivorus conanti</i>
Florida cricket frog	<i>Acris gryllus dorsalis</i>
Florida gopher frog	<i>Rana capito aeospus</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 pine snake	<i>Pituophis melanoleucus mugitus</i>
Florida redbelly turtle	<i>Pseudemys nelsoni</i>
Florida scarlet snake	<i>Cemophora coccinea coccinea</i>
Florida snapping turtle	<i>Chelydra serpentina osceola</i>
Florida softshell	<i>Apalone ferox</i>
Florida water snake	<i>Nerodia fasciata pictiventris</i>
Gopher tortoise	<i>Gopherus polyphemus</i>
Greater siren	<i>Siren lacertina</i>
Green anole	<i>Anolis c. carolinensis</i>
Green treefrog	<i>Hyla cinerea</i>
Greenhouse frog	<i>Eleutherodactylus p. planirostris</i>
Ground skink	<i>Scincella lateralis</i>
Island glass lizard	<i>Ophisaurus compressus</i>
Leopard frog	<i>Lithobates sphenoccephalus</i>
Little grass frog	<i>Pseudacris ocluaris</i>
Oak toad	<i>Anaxyrus quercicus</i>
Peninsula cooter	<i>Pseudemys floridana peninsularis</i>
Peninsula mole skink	<i>Eumeces egregius onocrepis</i>
Peninsula newt	<i>Notophthalmus viridescens piaropicola</i>

Table 8: Reptile and Amphibian Species Documented on JCMJHWEA

Common Name	Scientific Name
Peninsula ribbon snake	<i>Thamnophis sauritus sackenii</i>
Pig frog	<i>Lithobates grilio</i>
Pine woods snake	<i>Rhadinea flavilata</i>
Pine woods treefrog	<i>Hyla femoralis</i>
Rough green snake	<i>Opheodrys aestivus</i>
Scarlet kingsnake	<i>Lampropeltis triangulum elapsoides</i>
Six-lined racerunner	<i>Cnemidophorus sexlineatus 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 ringneck snake	<i>Diadophis punctatus punctatus</i>
Southern toad	<i>Anaxyrus terrestris</i>
Squirrel treefrog	<i>Hyla squirella</i>
Striped crayfish snake	<i>Regina alleni</i>
Striped mud turtle	<i>Kinosternon bauri</i>
Two-toed amphiuma	<i>Amphiuma means</i>
Yellow rat snake	<i>Elaphe obsoleta quadrivittata</i>

Table 9: Observed Bird Species on JCMJHWEA

Common Name	Scientific Name
Alder flycatcher	<i>Empidonax alnorum</i>
America woodcock	<i>Scolopax minor</i>
American bittern	<i>Botaurus lentiginosus</i>
American coot	<i>Fulica americana</i>
American crow	<i>Corvus brachyrhynchos</i>
American goldfinch	<i>Carduelis tristis</i>
American kestrel	<i>Falco sparverius</i>
American redstart	<i>Setophaga ruticilla</i>
American robin	<i>Turdus migratorius</i>
Anhinga	<i>Anhinga anhinga</i>
Bachmans sparrow	<i>Aimophila aestivalis</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Baltimore oriole	<i>Icterus galbula</i>
Barn owl	<i>Tyto alba</i>
Barn swallow	<i>Hirundo rustica</i>
Barred owl	<i>Strix varia</i>
Belted kingfisher	<i>Ceryle alcyon</i>
Black vulture	<i>Coragyps atratus</i>
Black-and-white warbler	<i>Mniotilta varia</i>
Black-bellied whistling ducks	<i>Dendrocygna autumnalis</i>

Table 9: Observed Bird Species on JCMJHWEA

Common Name	Scientific Name
Blackburnian warbler	<i>Dendroica fusca</i>
Black-crowned night heron	<i>Nycticorax nycticorax</i>
Black-necked stilt	<i>Himantopus mexicanus</i>
Blackpoll warbler	<i>Dendroica striata</i>
Black-throated blue warbler	<i>Dendroica caerulescens</i>
Black-throated green warbler	<i>Dendroica virens</i>
Blue jay	<i>Cyanocitta cristata</i>
Blue-gray gnatcatcher	<i>Poliptila caerulea</i>
Blue-headed vireo	<i>Vireo solitarius</i>
Blue-winged teal	<i>Anas discors</i>
Blue-winged warbler	<i>Vermivora pinus</i>
Boat-tailed grackle	<i>Quiscalus major</i>
Brewster's warbler	<i>Vermivora chrysoptera</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>
Cape May warbler	<i>Dendroica tigrina</i>
Carolina wren	<i>Thryothorus ludovicianus</i>
Cattle egret	<i>Bubulcus ibis</i>
Cedar waxwing	<i>Bombycilla cedrorum</i>
Chimney swift	<i>Chaetura pelagica</i>
Chipping sparrow	<i>Spizella passerina</i>
Chuck-will's-widow	<i>Caprimulgus carolinensis</i>
Common grackle	<i>Quiscalus quiscula</i>
Common ground dove	<i>Columbina passerina</i>
Common moorhen	<i>Gallinula chloropus</i>
Common nighthawk	<i>Chordeiles minor</i>
Common snipe	<i>Gallinago gallinago</i>
Common yellowthroat	<i>Geothlypis trichas</i>
Cooper's hawk	<i>Accipiter cooperii</i>
Crested caracara	<i>Caracara cheriway</i>
Double-crested cormorant	<i>Phalacrocorax auritus</i>
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>Saynoris phoebe</i>
Eastern screech owl	<i>Otus asio</i>
Eastern towhee	<i>Pipilo erythrophthalmus</i>
Eastern wood pewee	<i>Contopus virens</i>
Eurasian collared dove	<i>Streptopelia decaocto</i>

Table 9: Observed Bird Species on JCMJHWEA

Common Name	Scientific Name
European starling	<i>Sturnus vulgaris</i>
Field sparrow	<i>Spizella pusilla</i>
Fish crow	<i>Corvus ossifragus</i>
Florida mottled duck	<i>Anas fulvigula</i>
Florida sandhill crane	<i>Grus canadensis pratensis</i>
Glossy ibis	<i>Plegadis falcinellus</i>
Golden-winged warbler	<i>Vermivora chrysoptera</i>
Gray catbird	<i>Dumetella carolinensis</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</i>
Greater yellowlegs	<i>Tringa melanoleuca</i>
Great-horned owl	<i>Bubo virginianus</i>
Green heron	<i>Butorides virescens</i>
Hairy woodpecker	<i>Picoides villosus</i>
Hermit thrush	<i>Catharus guttatus</i>
Hooded merganser	<i>Lophodytes cucullatus</i>
Hooded warbler	<i>Wilsonia citrina</i>
House sparrow	<i>Passer domesticus</i>
House wren	<i>Troglodytes aedon</i>
Indigo bunting	<i>Passerina cyanea</i>
Kentucky warbler	<i>Oporornis formosus</i>
Killdeer	<i>Charadrius vociferus</i>
King rail	<i>Rallus elegans</i>
Least bittern	<i>Ixobychnus exilis</i>
Least flycatcher	<i>Empidonax minimus</i>
Least sandpiper	<i>Calidris minutilla</i>
Lesser yellowlegs	<i>Tringa flavipes</i>
Limpkin	<i>Aramus guarauna</i>
Little blue heron	<i>Egretta caerulea</i>
Loggerhead shrike	<i>Lanius ludovicianus</i>
Long-billed dowitcher	<i>Limnodromus scolopaceus</i>
Louisiana waterthrush	<i>Seirus motacilla</i>
Magnolia warbler	<i>Dendroica magnolia</i>
Mallard	<i>Anas platyrhynchos</i>
Marsh wren	<i>Cistothorus palustris</i>
Merlin	<i>Falco columbarius</i>
Monk parakeet	<i>Myiopsitta monachus</i>
Mourning dove	<i>Zenaida macroura</i>
Mourning warbler	<i>Oporornis philadelphia</i>
Nashville warbler	<i>Vermivora ruficapilla</i>

Table 9: Observed Bird Species on JCMJHWEA

Common Name	Scientific Name
Northern bobwhite	<i>Colinus virginianus</i>
Northern cardinal	<i>Cardinalis cardinalis</i>
Northern flicker	<i>Colaptes auratus</i>
Northern harrier	<i>Circus cyaneus</i>
Northern mockingbird	<i>Mimus polyglottos</i>
Northern parula	<i>Parula americana</i>
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>
Northern waterthrush	<i>Seiurus noveboracensis</i>
Orange-crowned warbler	<i>Vermivora celata</i>
Osprey	<i>Pandion haliaetus</i>
Ovenbird	<i>Seiurus aurocapillus</i>
Painted bunting	<i>Passerina ciris</i>
Palm warbler	<i>Dendroica palmarum</i>
Peregrine falcon	<i>Falco peregrinus</i>
Philadelphia vireo	<i>Vireo philadelphicus</i>
Pied-billed grebe	<i>Podilymbus podiceps</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Pine warbler	<i>Dendroica pinus</i>
Prairie warbler	<i>Dendroica discolor</i>
Prothonotary warbler	<i>Protonotaria citrea</i>
Purple gallinule	<i>Porphyryula martinica</i>
Red-bellied woodpecker	<i>Melanerpes carolinus</i>
Red-eyed vireo	<i>Vireo olivaceus</i>
Red-headed woodpecker	<i>Melanerpes erythrocephalus</i>
Red-shouldered hawk	<i>Buteo lineatus</i>
Red-tailed hawk	<i>Buteo jamaicensis</i>
Red-winged blackbird	<i>Agelaius phoeniceus</i>
Ring-necked duck	<i>Aythya collaris</i>
Rock dove	<i>Columba livia</i>
Roseate spoonbill	<i>Ajaja ajaja</i>
Rose-breasted grosbeak	<i>Pheucticus ludovicianus</i>
Ruby-crowned kinglet	<i>Regulus calendula</i>
Ruby-throated hummingbird	<i>Archilochus colubris</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</i>
Short-tailed hawk	<i>Buteo brachyurus</i>
Smooth-billed ani	<i>Crotophaga ani</i>
Snail kite	<i>Rostrhamus sociabilis</i>
Snowy egret	<i>Egretta thula</i>
Song sparrow	<i>Melospiza melodia</i>

Table 9: Observed Bird Species on JCMJHWEA

Common Name	Scientific Name
Sora	<i>Porzana carolina</i>
Spotted sandpiper	<i>Actitis macularia</i>
Summer tanager	<i>Piranga rubra</i>
Swainson's thrush	<i>Catharus ustulatus</i>
Swallow-tailed kite	<i>Elanoides forficatus</i>
Swamp sparrow	<i>Melospiza georgiana</i>
Tennessee warbler	<i>Vermivora peregrina</i>
Thick-billed vireo	<i>Vireo crassirostris</i>
Tree swallow	<i>Tachycineta bicolor</i>
Tricolored heron	<i>Egretta tricolor</i>
Turkey vulture	<i>Cathartes aura</i>
Veery	<i>Catharus fuscescens</i>
Virginia rail	<i>Rallus limicola</i>
Western kingbird	<i>Tyrannus verticalis</i>
Western sandpiper	<i>Calidris mauri</i>
Western spindalis	<i>Spindalis zena</i>
Whip-poor-will	<i>Caprimulgus vociferus</i>
White ibis	<i>Eudocimus albus</i>
White pelican	<i>Pelecanus erythrorhynchos</i>
White-eyed vireo	<i>Vireo griseus</i>
White-tailed kite	<i>Elanus leucurus</i>
White-winged dove	<i>Zenaida asiatica</i>
Wild turkey	<i>Meleagris gallopavo</i>
Winter wren	<i>Troglodytes troglodytes</i>
Wood duck	<i>Aix sponsa</i>
Wood stork	<i>Mycteria americana</i>
Worm-eating warbler	<i>Helmitheros vermivorum</i>
Yellow warbler	<i>Dendroica petechia</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>Dendroica coronata</i>
Yellow-throated vireo	<i>Vireo flavifrons</i>
Yellow-throated warbler	<i>Dendroica dominica</i>

Table 10: Exotic Animal Species Documented on the JCMJHWEA

Common Name	Scientific Name
Black rat or roof rat	<i>Rattus rattus</i>
Great green gguana	<i>Iguana iguana</i>
House mouse	<i>Mus musculus</i>

Table 10: Exotic Animal Species Documented on the JCMJHWEA

Common Name	Scientific Name
Nine-banded armadillo	<i>Dasypus novemcinctus</i>
Norway rat	<i>Rattus norvegicus</i>
Wild hog	<i>Sus scrofa</i>

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 ranks 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 JCMJHWEA has a very high mean wildlife value of 7.7 (Figure 7).

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 and the Florida Department of Agriculture and Consumer Services, or that are designated as federally Endangered or Threatened by the U.S. Fish and Wildlife Service. This designation is also commonly known as “listed species.” As depicted in Table 10, 20 imperiled animal species have been observed on JCMJHWEA.

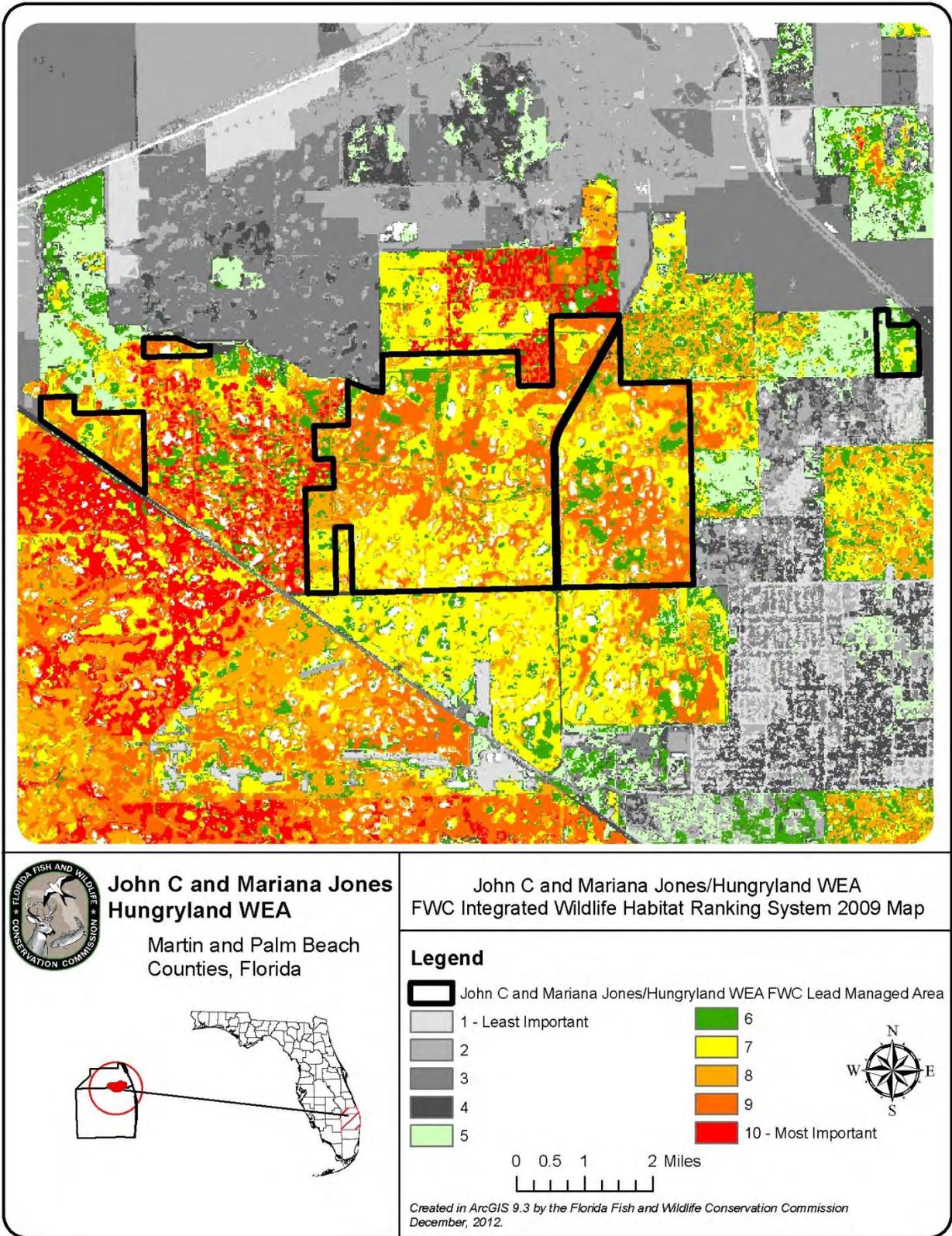


Figure 7: IWHRs

Table 11: Rare and Imperiled Wildlife Species Observed on the JCMJHWEA

Common Name	Scientific Name	Status
Burrowing owl	<i>Athene cunicularia</i>	SSC
Eastern indigo snake	<i>Drymarchon corais couperi</i>	FT
Florida pine snake	<i>Pituophis melanoleucus mugitus</i>	SSC
Florida sandhill crane	<i>Grus canadensis pratensis</i>	ST
Gopher frog	<i>Lithobates capito</i>	SSC
Gopher tortoise	<i>Gopherus polyphemus</i>	ST
Limpkin	<i>Aramus guarauna</i>	SSC
Little blue heron	<i>Egretta caerulea</i>	SSC
Snail kite	<i>Rostrhamus sociabilis</i>	FE
Snowy egret	<i>Egretta thula</i>	SSC
Swallow-tailed kite	<i>Elanoides forficatus</i>	NL
Tricolor heron	<i>Egretta tricolor</i>	FE

Abbreviation	Status
FE	Federal Endangered
FT	Federal Threatened
SSC	State Species of Special Concern
ST	State Threatened
NL	Not Listed

All abbreviations and status determinations were derived from *Florida's Endangered and Threatened Species List* published by FWC in May 2013. FWC maintains the state list of animals designated as Federally-designated endangered or threatened, State-designated threatened, or State-designated species of special concern, in accordance with Rules 68A-27.003 and 68A-27.005, respectively, of the F.A.C.

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

In June 2009, a Wildlife Conservation Prioritization and Recovery Species Management Strategy (WCPR strategy) was developed for the JCMJHWEA. Using statewide landcover-based habitat models, the WCPR Strategy identifies 23 focal species as having potential habitat on JCMJHWEA (Table 11). Except for those species identified with an alphabetical

superscript, workshop participants and expert reviewers determined that ongoing management would meet the needs of the species. In the following species list, an ^A denotes species for which a measurable objective is identified, a ^B for species for which some level of monitoring is recommended, a ^C for species for which a Strategic Management Area (SMA) is recommended, and a ^D for species for which species management is recommended. For species with no alphabetical superscripts, participants and reviewers agreed there is no need for measureable objectives, monitoring, SMAs, or species-specific management. Occasionally, statewide models indicate a species has potential habitat on the area, but the local assessment indicates there is little opportunity to manage for these species. These limited opportunity species are denoted with an *. Section 5.4.3 discusses the WCPR program in greater detail and the WCPR Strategy for the JCMJHWEA is attached to this Management Plan as Appendix 13.7.

Table 12: Focal Species Having Potential Habitat on JCMJHWEA

Common Name	Scientific Name	Status
American swallow-tailed kite	<i>Elanoides forficatus</i>	NL
Bachman’s sparrow	<i>Aimophila aestivalis</i>	NL
Crested caracara	<i>Caracara cheriway</i>	NL
Florida black bear*	<i>Ursus americanus floridanus</i>	ST
Florida mottled duck	<i>Anas fulvigula</i>	NL
Florida sandhill crane	<i>Grus canadensis pratensis</i>	ST
Gopher tortoise*	<i>Gopherus polyphemus</i>	ST
Great egret	<i>Ardea alba</i>	NL
Limpkin	<i>Aramus guarauna</i>	SSC
Little blue heron	<i>Egretta caerulea</i>	SSC
Northern bobwhite	<i>Colinus virginianus</i>	NL
Red-cockaded woodpecker	<i>Picoides borealis</i>	FE
Roseate spoonbill	<i>Platalea ajaja</i>	SSC
Round-tailed muskrat	<i>Neofiber alleni</i>	NL
Sherman’s fox squirrel*	<i>Sciurus niger shermani</i>	SSC
Short-tailed hawk	<i>Buteo brachyurus</i>	NL
Snail kite	<i>Rostrhamus sociabilis</i>	FE
Snowy egret	<i>Egretta thula</i>	SSC
Southeastern American kestrel*	<i>Falco sparverius paulus</i>	ST
Southern bald eagle	<i>Haliaeetus leucocephalus</i>	NL
Tricolored heron	<i>Egretta tricolor</i>	SSC
White ibis	<i>Eudocimus albus</i>	NL
Wood stork	<i>Mycteria americana</i>	FT

Abbreviation	Status
FE	Federal Endangered
FT	Federal Threatened
SSC	State Species of Special Concern
ST	State Threatened
NL	Not Listed

2.3.3 FWC Wildlife Observations and FNAI Element Occurrences

FNAI assigns a rank to each “element” occurrence, which is an exemplary or rare component of the natural environment. As defined by FNAI, an “element” is any exemplary or rare component of the natural environment such as a species, natural community, bird rookery, spring, sinkhole, cave, or other ecological feature. An element occurrence is a single extant habitat which sustains or otherwise contributes to the survival of a population or a distinct, self-sustaining example of a particular element. This ranking system was developed by The Nature Conservancy and the Natural Heritage Program Network based on the element’s global rank (element’s worldwide status) or state rank (status of element in Florida). The FNAI ranking system and definitions are located on the following website: www.fnai.org/ranks.cfm.

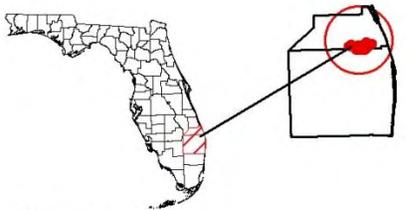
Known locations of FWC wildlife occurrences and FNAI element occurrences from the most recent GIS databases of the respective agencies are displayed in Figure 8. Appendix 13.7 contains a letter from FNAI authorizing the FWC to utilize their database for the purpose of displaying known plant and animal resources.

2.4 Native Landscapes

Some of the native landscapes on the JCMJHWEA include baygall, depression marsh, dome swamp, mesic flatwoods, wet flatwoods, and wet prairie. These landscapes are fully described in Section 2.2 of this Management Plan.

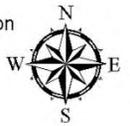
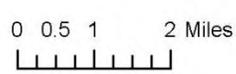


**John C and Mariana Jones
Hungryland WEA**
Martin and Palm Beach
Counties, Florida



John C and Mariana Jones/Hungryland WEA
FNAI Element Occurrences and FWC Wildlife Observations
Created in ArcGIS 9.3 by the Florida Fish and Wildlife Conservation Commission December, 2012.

- Legend**
- John C and Mariana Jones/Hungryland WEA FWC Lead Managed Area
 - ▲ Other FNAI Element Occurrence
 - ▲ FNAI Listed Species Element Occurrence
 - Other FWC Wildlife Observation
 - FWC Rare and Imperiled Species Wildlife Observation



Aerial Imagery 2009

Figure 8: FWC Wildlife Occurrences and FNAI Element Occurrences

2.5 Water Resources

The JCMJHWEA does not form a buffer along any designated Special Water Category Outstanding Florida Water. The area contains neither springs nor lakes. The JCMJHWEA is not within or adjacent to any aquatic preserve. However, much of JCMJHWEA can be considered sensitive due to the large number of wetlands.

The area consists almost entirely of low pine flatwoods mixed with wet prairies. There are also many ponds with water levels that fluctuate with rainfall. Several deepwater canals that have no outfall remain from earlier attempts to drain the property. The area was historically a mixture of pine flatwoods interspersed with sloughs, marsh, seasonal ponds and transitional areas. Surface drainage is slow because of the extreme flatness of the terrain. Soil permeability is also slow because of a generally high water table and a hardpan that creates a perched water table under certain conditions. This results in an upland landscape dotted with wetlands. The historical drainage was through sloughs that drained to the Atlantic Ocean. The sloughs have been channelized and diked in many areas so that what remains are isolated cypress strands, ponds and wet prairies. Areas of former Everglades marsh have succeeded to wet prairie where the soils affected by a drop in the water table support a less hydric environment. The extensive wetlands remaining on the area continue to provide significant conservation of surface water resources. As noted above, the lands of the JCMJHWEA retain water even during times of severe drought.

2.6 Beaches and Dunes

JCMJHWEA does not contain any beaches or dunes.

2.7 Mineral Resources

There are no known commercial deposits of minerals at JCMJHWEA, although the limerock fill represented by the canal spoil mounds is known to have a commercial value. However, MacArthur Foundation owns all of that spoil under the reserved rights retained when the lands were acquired.

2.8 Cultural Resources

Division of Historical Resources (DHR) observations are broken down into five categories: archeological sites, resource groups, historical structures, historic bridges and historic cemeteries. There are four resource group sites presently mapped or recorded by DHR for the JCMJHWEA. There are no archeological sites, historical structures, historic bridges or historic cemeteries noted on the JCMJHWEA.

The resource groups noted on JCMJHWEA are the the Davis and Jenkins Tramline site (MT01349) adjacent to the JCMJHWEA boundary, Jupiter Road (MT01453), the Mack Dairy-Culpepper Road (MT01516) and the Calvert Site (MT01404). All Master Site recordings, assessments and preservation strategies will be coordinated with DHR.

2.9 Scenic Resources

The JCMJHWEA contains expansive marshes, tall pines, and colorful wildflowers that offer numerous scenic vistas. A particularly scenic view is located along Road 3, where visitors can drive or walk along the edge of a sizeable pond or continue down to the end of the road. The view to the south looks out over depression marshes that transition into pine flatwoods.

The abundance of wildflowers in the flatwoods, prairies, and marshes on the JCMJHWEA, especially endangered and threatened species such as catesby lilies, and grass pinks add to the beauty of the area and are of interest to visitors who enjoy the many opportunities to discover and view the botanical resources of the area.

The scenic values of the area have been recognized locally. On January 26, 1993, the Martin County Board of County Commissioners designated the portion of Old Jupiter-Indiantown Road in Martin County a Scenic By-way. A portion of that By-way runs through the JCMJHWEA.

3 Uses of the Property

3.1 Previous Use and Development

Prior to European settlement, the landscape of Florida, including this area of the peninsula, was settled and used by a variety of aboriginal peoples whose culture relied mainly on hunting, fishing and subsistence agriculture. For thousands of years before Europeans arrived, Native peoples thrived in south Florida by hunting, fishing, and gathering of wild plants and shellfish. Hundreds of years after members of the original native cultures were gone, mostly dead from European diseases to which they had no resistance, the Seminole Indians, newcomers to Florida from Georgia and Alabama, sought refuge from the U.S. Army in this part of the State. The U.S. Army adopted the successful tactic of destroying the Seminole's crops and food stores until starvation forced them to surrender. The region became known to local ranchers as the "Hungryland."

Following the Seminole Wars, trading posts were established at Indiantown and Jupiter. Indians came to trade plumes, meat, hides and other natural products for manufactured goods. Around the turn of the century, pioneer families began settling the area, establishing citrus groves, farms and cattle ranches along the newly cut Jupiter-Indiantown Road. Virgin timber was harvested and processed in sawmills. Known as the Central-Dixie Highway and designated SR 29 by the State Road Department, the Jupiter-Indiantown Road was heavily used by area residents until paved roads were constructed from Indiantown to Jupiter in the late 1950s.

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.

In the late 1960s, the area currently known as Pal Mar, of which the JCMJHWEA is a part, was the epicenter of a real estate development proposal. Developers sold several thousand residential lots, mainly to out-of-state buyers. Deep canals were cut in an attempt to drain the property for development. Martin County officials became concerned when they realized that the developer had never filed a plan with the county showing home sites. Martin County filed a lawsuit that subsequently resulted in stopping the building of levees and canals, that also curtailed sales of property in Pal-Mar. Later, the Pal-Mar Water Control District fenced off the area and provided security against illegal access.

As noted earlier, John C. and Marianna Jones, local conservation advocates, along with many other citizens conservation organizations began to advocate for conservation of the area. In 1990, an application was submitted to the State to consider acquiring the area for environmental land conservation. Prior to state acquisition, the citizens of Martin and Palm Beach Counties had already begun to regard and use the area as a conservation area. The Martin County Conservation Alliance and other conservation groups conducted interpretive tours across the property. As noted above, the initial acquisition of JCMJHWEA by the State under environmental land acquisition programs was made in 1994 with additional acquisitions following in 1997, 1999, and 2004.

3.2 Current Use of the Property

Currently, JCMJHWEA is managed for the conservation and protection of fish and wildlife habitat and fish and wildlife based public outdoor recreation. A wide range of operational and resource management actions are conducted on JCMJHWEA 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 historic 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 JCMJHWEA. The area also offers excellent opportunities for bird watching, especially for wading birds. The diversity of vegetation not only harbors a variety of bird species but also provides good opportunities for mammalian wildlife

viewing. Other uses include hiking, photography, biking, sightseeing, and horseback riding.

Due to the proximity of population centers in Palm Beach County, public use can be expected to increase as public awareness of opportunities increases. Annual use of JCMJHWEA is estimated to be 120 user-days for all activities combined. The FWC administers hunts in the fall and spring for various game species including small game, deer, turkey, and feral hogs, which account for a little more than half of the user-days.

3.2.1 Visitation and Economic Benefits

Visitation and public use of the area for fish and wildlife based public outdoor recreational opportunities is the primary source of economic benefits from JCMJHWEA, and contribute to the overall economy for region of Florida. In Fiscal Year 2012-13, an estimated 54,008 people visited the JCMJHWEA. Primarily, as a result of this visitation and use of the area, FWC economic analysis estimates indicate that the JCMJHWEA generated an estimated annual economic impact of \$17,348,989.84 for the State and the South Florida region. This estimated annual economic impact has aided in the creation of an estimated 107 jobs.

Further revenue generating potential of the JCMJHWEA will depend upon future uses described in this Management Plan. Additional revenue from environmental lands such as the JCMJHWEA 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 values of ecosystem services to local and regional land and water resources from air and water quality functions of the area, among others, and to human health, are considered to be significant.

3.3 Single- or Multiple-use Management

JCMJHWEA will be managed under the multiple-use concept as a Wildlife and Environmental Area. JCMJHWEA will provide fish and wildlife resource based public outdoor recreation and educational opportunities, while protecting the natural and cultural resources found on the area. Any natural and cultural resources of JCMJHWEA 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 JCMJHWEA. 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 13.5). 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 cultural sites	✓		
Preservation of historical sites	✓		
Primitive camping		✓	
Protection of imperiled species	✓		
Off-road vehicle use			✓
Shooting sports park		✓	
Soil and water conservation	✓		
Timber harvest	✓		
Wildlife observation	✓		

3.3.2 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 JCMJHWEA (Sections 5 -8). A detailed assessment of the benefits and potential impacts of planned uses and activities on natural and cultural 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 That Should Be Declared Surplus

On conservation lands where FWC is the lead manager, FWC evaluates and identifies recommended areas for a potential surplus designation by the 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 JCMJHWEA 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 JCMJHWEA is recommended for a potential surplus designation.

4 Accomplished Objectives from the JCMJHWEA Management Plan 2002 – 2007

The following Resource Management Goals and Objectives are from the JCMJHWEA Management Plan 2002 – 2007. Planned activities for JCMJHWEA during this period were detailed in the Objectives listed below. The degree to which FWC was able to accomplish the planned activities during this period is reflected as **Percent Accomplished** with each associated Objective.

Resource Management Goals and Objectives	Percent Accomplished
Goal 1: Enhance and Maintain Upland and Wetland Communities	
Objective 1: Develop a contract for a detailed native plant community inventory by 2002.	100%
Objective 2: By 2002, develop a prescribed fire plan that includes coordination with local governments and adjacent landowners. The plan will have aspects of general education and smoke management, and implementation of rotational burning will commence by 2003.	100%
Objective 3: Identify and map exotic (non-indigenous, invasive) plant species on the area by 2002.	100%

Objective 4: Coordinate with the local Mosquito Control District to carry out activities pertaining to control of mosquitoes by 2002 <i>(Appendix 13.14).</i>	100%
Objective 5: As required by Chapter 253.036, F. S., contact the DOF Forest Management Bureau to schedule a forest assessment for the WEA by 2002. <i>A timber assessment has been scheduled, but not completed.</i>	100%
Objective 6: Develop quantifiable vegetative management objectives by 2006.	100%
Objective 7: By 2006, complete an evaluation of plant community conditions relative to the vegetative management objectives	100%
Objective 8: Develop and economic and environmental analysis to determine how to restore the old lemon groves by 2006. <i>Mitigation Services, Inc. completed an economic analysis as a component to establishing Lemon Grove Mitigation Bank on the property, which has been approved by the Board of Trustees and the South Florida Water Management District. Negotiations continue on finalizing the Mitigation Bank Agreement described in Section 1.6.1</i>	100%
Objective 9: Control exotic, invasive plant species through the use of fire, as well as mechanical and chemical means. <i>Ongoing</i>	100%
Objective 10: Evaluate management activities such as prescribed burning, exotic species removal, and hydrological management activities and make changes as necessary. <i>Ongoing</i>	100%
Objective 11: In accordance with lease number 4271, cooperate with SFWMD to develop hydrological management objectives that enhance fish and wildlife habitats. <i>Ongoing</i>	100%
Goal 2: Emphasize Multiple-use Management on the Property.	
Objective 1: By 2002, develop and submit initial public use rules and hunting/fishing regulations to become effective in July 2002.	100%

Objective 2: By 2002, contact equestrian interests for assistance in design of facilities necessary to accommodate the needs of horseback riding enthusiasts.	100%
Objective 3: In cooperation with the Florida Trail Association, locate and establish an appropriate hiking trail on the area by 2002.	100%
Objective 4: Design and install appropriate restroom facilities at strategic locations throughout the area by 2002.	100%
Objective 5: To provide reasonable public access consistent with resource protection objectives, identify and designate a public-use road system and parking areas by 2002.	100%
Objective 6: Assess the feasibility of providing primitive campsites at appropriate location(s) on the area by 2004.	100%
Objective 7: To enhance natural vistas and wildlife viewing opportunities, design and construct at least one viewing platform at an appropriate site by 2005. <i>Funding was not available for development of viewing platforms. The FWC continues to propose installing multiple viewing platforms.</i>	0%
Objective 8: Coordinate with the SFWMD and MacArthur Foundation to assure that as spoil removal takes place it facilitates and enhances recreational and management. <i>Ongoing</i>	100%
Objective 9: As necessary, provide spatial and/or temporal separation of uses to improve the quality of recreational and educational experiences for all user groups. <i>Ongoing</i>	100%
Goal 3: Define an Optimum Boundary and Provide Adequate Law Enforcement Patrols.	
Objective 1: By 2002, post boundaries, repair and upgrade gates and fences as appropriate.	100%
Objective 2: Complete ongoing negotiations to purchase Palm Beach County lands north of Indiantown Road by 2003.	100%

Objective 3: Provide routine law enforcement patrol on the boundaries and interior of the managed area. <i>Ongoing</i>	100%
Objective 4: Annually review the nomination status of prospective WEA acquisition(s) in the FWC Inholdings and Additions Program.	100%
Goal 4: Identify, Promote and Protect Cultural Resources of the Area, as Appropriate.	
Objective 1: Request assistance from the DHR to complete a cultural resource survey by 2002.	100%
Objective 2: In cooperation with the Loxahatchee Historical Society and/or others, develop interpretive signs and other trail improvements for Old Jupiter – Indiantown Road by 2003. <i>Interpretive signs were not developed, but are still an objective of the area.</i>	20%
Goal 5: Seek to Provide Adequate Funding, Staffing, and Equipment	
Objective 1: Propose to add a Fish and Wildlife Technician position to staffing for the area by 2002.	100%
Objective 2: Request funding for a swamp buggy, bush hog, tractor, disk, and permanent check station by 2002.	100%
Objective 3: Propose to add an additional Law Enforcement position to the South Region, and request funding for a vehicle and swamp buggy with trailer by 2002.	100%
Goal 6: Survey and Manage for Wildlife, with Emphasis on Threatened and Endangered (T&E) Species	
Objective 1: Assess the need for artificial nest structures for owls, wood ducks, or other appropriate species by 2002.	100%
Objective 2: Conduct and complete systematic surveys for red-cockaded woodpecker, bald eagle, wading bird rookeries, snail kite and other appropriate T&E species. <i>Ongoing</i>	100%

Objective 4: Conduct prescribed burns to enhance wildlife habitat quality. <i>Ongoing</i>	100%
Objective 5: Identify and mark the limited snag resources on the area, and protect them from fire. <i>Ongoing</i>	100%

5 Management Activities and Intent

The following section provides a description of agency plans to locate, identify, protect, preserve or otherwise use fragile natural resources and nonrenewable cultural resources. In general, the FWC management intent for JCMJHWEA 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 good fish and wildlife resource based public outdoor recreational opportunities on JCMJHWEA. 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, the management activities described in this section are in compliance with those of the Conceptual State Lands Management Plan.

5.1 Land Management Review

A land management review was conducted in March of 2011 and the results of that review and FWC responses to recommendations are included as Appendix 13.3. It was determined that the JCMJHWEA is being managed in accordance with the purposes for acquisition and that management practices, including public access, are in compliance with the management plan.

5.2 Adaptive Management

Adaptive management is "learning by doing";¹ 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. FWC will monitor conservation actions, species, habitats, and major threats to the conservation of the natural and cultural resources of JCMJHWEA.

5.2.1 Monitoring

A well-developed monitoring protocol is also one of the principal, required criteria for the management of JCMJHWEA. 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 WCPR (Section 5.4.2) program. Additional select common and game fish and wildlife species may be monitored by FWC staff as appropriate. Exotic and invasive plant and animal species (Section 5.5) are also monitored as needed and appropriate. Recreational uses are monitored through FWC's Public Access and Wildlife Viewing program, and work in conjunction with the establishment and adjustment of public access carrying capacities (Section 5.6.3). Cultural and historical resources (Section 5.9) are monitored with guidance from the DHR.

5.2.2 Performance Measures

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

5.2.3 Implementation

The JCMJHWEA Management Plan serves as the guiding framework to implement this adaptive management process. It serves as the underpinning for the integration of management programs (OBVM, WCPR, Public Access and Wildlife Viewing, Recreation Master Plans, etc.) underway to accomplish needed conservation actions that are planned to manage the natural resources of JCMJHWEA, 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 JCMJHWEA, 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. JCMJHWEA has high-quality native communities including depression marsh, wet flatwoods, and wet prairie that FWC will continue to manage and protect. On disturbed upland sites, FWC intends to initiate ground cover and natural community restoration.

As described above in Section 2.2, the FNAI has conducted surveys and mapped the current vegetative communities and historic vegetation communities on JCMJHWEA. 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. 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. FWC contracts with FNAI to provide these mapping services, and plans to have natural community maps recertified on most areas on a five-year basis. A natural community, as defined by FNAI, is a distinct and recurring assemblage of populations of plants, animals, fungi and microorganisms naturally associated with each other and their physical environment.

After natural communities have been mapped, management units are delineated. Delineating management units takes into account the distribution and extent of the current and/or historic mapped natural communities, existing and proposed infrastructure, and

other management considerations. FWC land managers then identify the predominant current or historic natural community within each management unit that guides the type and frequency of management activities that should be applied.

At the same time, 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. 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.

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 key 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 in Florida 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, construction of drainage canals and ditches on JCMJHWEA, 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 JCMJHWEA 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.

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

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

In addition to the general prescribed fire management guidelines described above, an area-specific Prescribed Fire Plan (Appendix 13.8) has been developed and implemented for JCMJHWEA. The information that is found in plan includes, but is not limited to, delineation of burn management units, detailed descriptions of prescribed fire methodology, safety, and smoke management guidelines.

5.4 Fish and Wildlife Management and Imperiled 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 JCMJHWEA. In managing for wildlife species, an emphasis will be placed on conservation, protection, and management of natural communities. Natural communities important to wildlife include depression marsh, wet flatwoods and wet prairie.

The size and natural community diversity of JCMJHWEA 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, JCMJHWEA 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 accomplished by following approved Federal and FWC species recovery plans, guidelines, and other scientific recommendations for these species. Guided by these recommendations, land management activities including prescribed burning and timber stand improvements will address rare and imperiled species requirements and habitat needs. Section 5.4.2 below provides further information on FWC's comprehensive species management strategy for rare and imperiled wildlife and their respective habitats.

5.4.2 Imperiled Species - Wildlife Conservation Prioritization and Recovery

The FWC has identified the need to: 1) demonstrate optimal wildlife habitat conservation on FWC-managed lands; 2) develop science-based performance measures to evaluate

management; 3) recover imperiled species; and 4) prevent future imperilment of declining wildlife species. To help meet these needs, the FWC uses a comprehensive resource management approach to managing FWC-managed areas. Restoring the form and function of Florida's natural communities is the foundation of this management philosophy.

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

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

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

As described earlier and listed in Section 2.3, the FWC has completed a WCPR Strategy for JCMJHWEA (Appendix 13.9) that designates 16 rare and focal species having potential habitat on the area (Table 11). Detailed species and habitat management and monitoring descriptions are provided in the WCPR Strategy developed for the area. In addition, Section 6 lists some salient WCPR objectives that have been developed for the area.

5.5 Exotic and Invasive Species Maintenance and Control

The FWC will continue efforts to control the establishment and spread of Florida Exotic Pest Plant Council (FLEPPC) Category I or II plants on JCMJHWEA. 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.

An exotic animal species of concern on the JCMJHWEA 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 archery, small game, general gun, and muzzleloading gun seasons. Trapping is another measure that may be implemented to augment ongoing feral hog control efforts and to further reduce the natural community damage and degradation caused by this species.

5.6 Public Access and Recreational Opportunities

5.6.1 Americans with Disabilities Act

When public facilities are developed on areas managed by FWC, every effort is made to comply with the Americans with Disabilities Act (Public Law 101-336). As new facilities are developed, the universal access requirements of this law are followed in all cases except where the law allows reasonable exceptions. Recreation facilities in semi-primitive or primitive zones will be planned to be universally accessible to the degree possible except as allowed by the ADA⁴ where:

1. Compliance will cause harm to cultural or historic sites, 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 JCMJHWEA. To accomplish this, the FWC, working with recreational stakeholders and the general public, has developed a Recreation Master Plan for JCMJHWEA (Appendix 13.11) that will be used to further design and develop appropriate infrastructure that will support the recreational use of the area by the general public. This Recreation Master Plan includes planning for parking, trail design, and area resource interpretation.

5.6.3 Public Access Carrying Capacity

Baseline carrying capacities for fish and wildlife based public recreational 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 JCMJHWEA can currently support 552 visitors per day. 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 cultural resources on JCMJHWEA 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 JCMJHWEA supports a wide variety of native wildlife species, both resident and seasonally migratory, that are available for visitors’ enjoyment for observation and photography. The quality of habitat found on JCMJHWEA attracts a suite of wildlife species including various bird, mammal, reptile, and amphibian wildlife throughout the JCMJHWEA.

5.6.5 Hunting

Hunting is a very popular recreation activity at JCMJHWEA. Hunting seasons on the area include archery, muzzleloading gun, general gun, small game, migratory bird and spring turkey seasons. The game species most heavily pursued by hunters include white-tailed deer, feral hogs, and turkey.

All of the seasons are well attended, with most hunters coming out on the opening days. The most popular hunting areas include the northwest corner of the property, which includes the area’s higher elevations, as well as the cooperatively managed areas of the JCMJHWEA. Dogs are prohibited, except bird dogs or retrievers may be used for hunting during the small game and migratory birds. The check station is located just inside the Main Gate but is staffed only during archery, muzzleloading gun, general gun, and spring turkey hunting seasons.

5.6.6 Fishing

Fishing is allowed year round. Popular species include largemouth bass and bluegill. When fish disperse during the rainy season, flag ponds provide good fishing opportunities. Nine miles of deep canals (approximately 17 feet deep with sandy bottoms) and several borrow pit ponds provide good fishing opportunities at JCMJHWEA. The more popular fishing spots are at the terminus of Road 3 (Gate 2) that opens into a picturesque pond and other borrow pit ponds located along Indiantown Road. The ponds are within a quarter-mile of Indiantown Road; presently there are no designated trails leading to them. None of the water bodies on the WEA is currently being managed for fishing, other than through the management of natural systems on the area. Visitors may canoe, kayak and boat in the canals or fish along the bank within the management area boundaries.

5.6.7 Boating

While boating and paddling are allowed on the area, the canals and heavily vegetated marshes do not offer desirable opportunities for these activities. Typically, boats are only used in support of fishing. There are no improved launches on the JCMJHWEA, and accessing the water requires negotiating steep banks. Only trolling motors are recommended for use on the area. Airboats are prohibited.

5.6.8 Trails

There are four separate, designated, multi-use trails at the JCMJHWEA. Descriptions of each trail follow below.

The *Old Jupiter-Indiantown Grade* (Grade) runs across Hungryland for more than five miles, spanning the entire area in an east-west direction. Martin County has claimed the entire 16-mile grade as public right-of-way and is committed to developing it into a recreational trail. The county plans to clear the entire length of the Grade (parts of it are currently overgrown), remove fences, and construct three shelters along the Grade (two within the WEA boundary). In 2006, the county cleared the grade of obstructions and improved a number of swales across the grade with geotextiles. A spur trail diverges from the Grade about 0.5 miles from its western end. This unnamed trail is an old road that intersects with Road 4W then follows the canal. Visitors can access the Grade from Pratt Whitney Road (CR 711, Gate 3 or 4) or from Road 5E and Road 5W.

The *West Jupiter Wetlands Trail* is two miles long and can be accessed from either end (Indiantown Road or Road 6S). The trail is an old, uncapped road that meanders through flatwoods and freshwater marsh ecosystems. The trail crosses the Martin County/Palm Beach County line. It also crosses a significantly wide (80-100 ft.) and deep (1-2+ ft.) wetland.

The *Grove Trail* is 1.5 miles long, and follows an old raised road originating from the end of Road 7S. It travels south alongside an old lemon grove and terminates at Indiantown Road. Access is permitted only from Road 7S.

Another unnamed trail exists on the north end of the property. It is accessed by entering the area at Gate 2 and driving to the end of Road 3. The trail is an old road and is about 1.5 miles long.

5.6.8.1 Hiking

Hiking is permitted 365 days per year on the multi-use trails described in section 5.6.8, as well as on numbered roads.

5.6.8.2 Bicycling

Biking is permitted 365 days per year on the multi-use trails described in section 5.6.8, as well as on numbered roads.

5.6.8.3 Equestrian

Horseback riding is permitted 365 days per year on the multi-use trails described in section 5.6.8, as well as on numbered roads.

5.6.9 Camping

Hungryland WEA is one of the few areas in the wildlife management system that provides year-round primitive camping opportunities. Along Road 6S there are three canal-side areas (six total campsites), each able to accommodate two tents, and one canal-side site inside Gate 2 along Road 3. Visitors are allowed to use only tents for camping and may have campfires at the designated sites.

The designated camping areas are located directly along canal roads where spoil berms were removed. Native vegetation was planted near the camping sites and will provide shade for visitors in the future. Currently, they are wide open, sunny sites with no privacy from the road. The surface of the sites is the same silty sand that is found on the roads, and becomes excessively soft and sticky when wet. The sites are not named or numbered, but are marked with small signs. None have picnic tables, fire rings or toilet facilities. None are ADA accessible.

5.6.10 Geocaching

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

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

5.6.11 Environmental Education

5.6.11.1 Interpretation

Currently, the JCMJHWEA has four interpretive kiosks. There is also a bird list available for bird watching enthusiasts. An area website is maintained to provide educational information, as well as information about recreational opportunities.

5.6.11.2 Programs

No regularly occurring educational or recreational programs are currently taking place at JCMJHWEA, but guided hikes are conducted on occasion.

5.7 Hydrological Preservation and Restoration

The JCMJHWEA is characterized by low wet flatwoods, interspersed with numerous wet prairies and depression marshes. Upland elevations range from 24'-25' NGVD, with consistently higher elevations to the west and lower elevations to the east. County Road 711 (Pratt Whitney Road) bisects the watershed, and likely impacts sheetflow to some degree.

It is generally recognized that drainage from the Martin County portion of JCMJHWEA occurs strictly by sheetflow, with no positive outfall until it reaches the Ranch Colony Canal (also known as Cypress Creek Canal) on the eastern edge of the project. In the late 1970s or early 1980s, a shallow ditch system was excavated through the southeast corner of Section 21/Township 40S/Range 41E by the MacArthur Foundation. The ditches directed water through two large culverts and into Ranch Colony Canal. A major storm event in the 1980s blew out the culverts. An open channel connection remained until spring 2001, when Martin County installed two 84" diameter culverts in the same location.

The Ranch Colony/Cypress Creek Canal is a major tributary to the Northwest Fork of the Loxahatchee River. Cypress Creek Canal enters the Loxahatchee River east of the Turnpike/I-95 inside Jonathan Dickinson State Park. The canal also drains the rural residential developments of Ranch Colony, Ranch Acres, The Links, Tailwinds, and Old Trail. In the early 1980s the U.S. Geological Survey conducted a sedimentation study of the river and it revealed that Cypress Creek Canal is the source of a high concentration of suspended sediments in the Northwest Fork.

In the late 1960s Rotunda Drainage District was formed under Chapter 298, FS. Rotunda filed a Plan of Reclamation in the early to mid 1970s and began excavating the canal network that currently exists without the benefit of any permits. In the late 1970s Martin County was successful in getting a Cease and Desist Order issued and the excavation work was halted. It was also in the late 1970s that Rotunda changed its name to the Pal-Mar Water Control District.

During the course of the excavation, more than 35 miles of canals were dug, all within Martin County, with approximately nine miles of them on what is now State owned public conservation land. The width of the major east-west canal segment averages 140 feet at the

top of the bank. The north-south segment is approximately 100 feet wide, and the smaller east-west canals are 60-70 feet wide. Canal depths vary, but are generally around 17 feet. Spoil material excavated from the canals was piled parallel to the canals along both sides. Access roads flank both sides and are approximately 3 feet above natural grade in most places.

5.7.1 Hydrological Assessment

There is no hydrological assessment specific to JCMJHWEA, but the area is included in the “Cypress Creek/Par-Mar and the Groves Basin Study 2.1.2 Wetland System Assessment.” This assessment was contracted by the SFWMD, in cooperation with Martin County, the FWC, and the DEP. The primary objective was to use the watershed approach to learn more about the hydrology and hydraulics of the basins. The study includes several items of particular importance to this area, including the development of a hydrologic model for determining historic hydroperiods; identification, characteristics, and properties of principal plant communities; identification of impacted wetlands and restoration targets; application of an appropriate model that will provide an analysis of Pal-Mar runoff, including peak discharges; application of a selected computer model to determine appropriate hydroperiods and provide restoration guidance, if needed.

5.8 Forest Resource Management

A Timber Assessment of the timber resources of JCMJHWEA will be conducted by the FFS, 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. Thinning of the forest over-story, hydrological restoration and reintroduction of prescribed burning are the most important factors in re-establishment of natural communities and the enhancement of wildlife habitats.

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

5.9 Cultural and Historical Resources

There are four resource groups presently mapped or recorded by DHR for the JCMJHWEA, which are listed in section 2.8 of this management plan, but there are no archaeological, historic, or cultural sites designated within the area.

Procedures outlined by the DHR will be followed to preserve cultural and historical resources. The FWC will continue to consult with the DHR in an attempt to locate and preserve any features on the area. In addition, FWC JCMJHEWA staff has undergone DHR Archaeological Resources Monitoring training. As appropriate and necessary, the FWC will

contact professionals from DHR for assistance prior to any ground-disturbing activity on the area.

The FWC will submit subsequently located cultural sites on JCMJHWEA to the DHR for inclusion in their Master Site file. The FWC will continue to refer to and follow the DHR's Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Properties (Appendix 13.12) for management of these resources and prior to any facility development or other ground disturbing activities.

5.10 Capital Facilities and Infrastructure

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

Current capital facilities and infrastructure on JCMJHWEA include eight designated public entrances, two pavilions with picnic tables, a horse trailer parking area, four primitive camp sites, various entrance signs, public access roads, a vault toilet, and three information kiosks. A hunter check station that was destroyed by arson in 2013 is planned to be rebuilt. There are also facilities on the cooperatively managed portion of JCMJHWEA, which include a pole barn, two parking areas, and two designated public entrances with signs. See Figure 9 for a map of the facilities at JCMJHWEA.



As described in section 6 below, the FWC plans to construct or enhance the following facilities on the area during the term of this plan: a new shop/office facility, four new fishing platform structures, one new kiosk, and one new boardwalk. There are also plans to construct several new interpretive signs and entrance signs.

As described in Section 2.4.1 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).

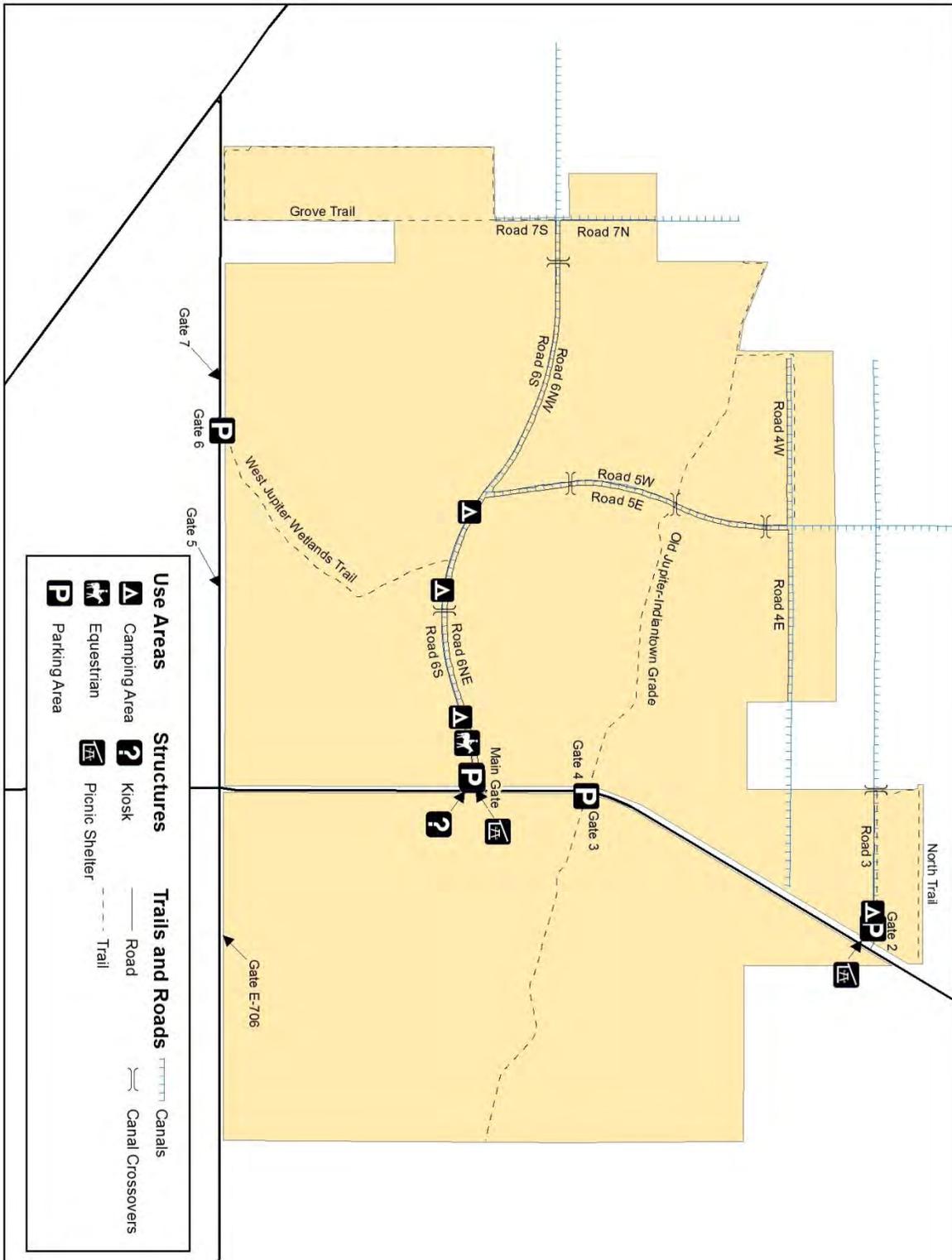


Figure 9: JCMJHWEA Facilities

5.11 Land Conservation and Stewardship Partnerships

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

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

5.11.1 Optimal Resource Boundary

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

5.11.2 Optimal Conservation Planning Boundary

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

The OCPB provides the basis for development of a broader CAS for JCMJHWEA. 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 (Figure 10). As they are currently managed, these lands appear to contribute to regional conservation and may support conservation landscape linkages.

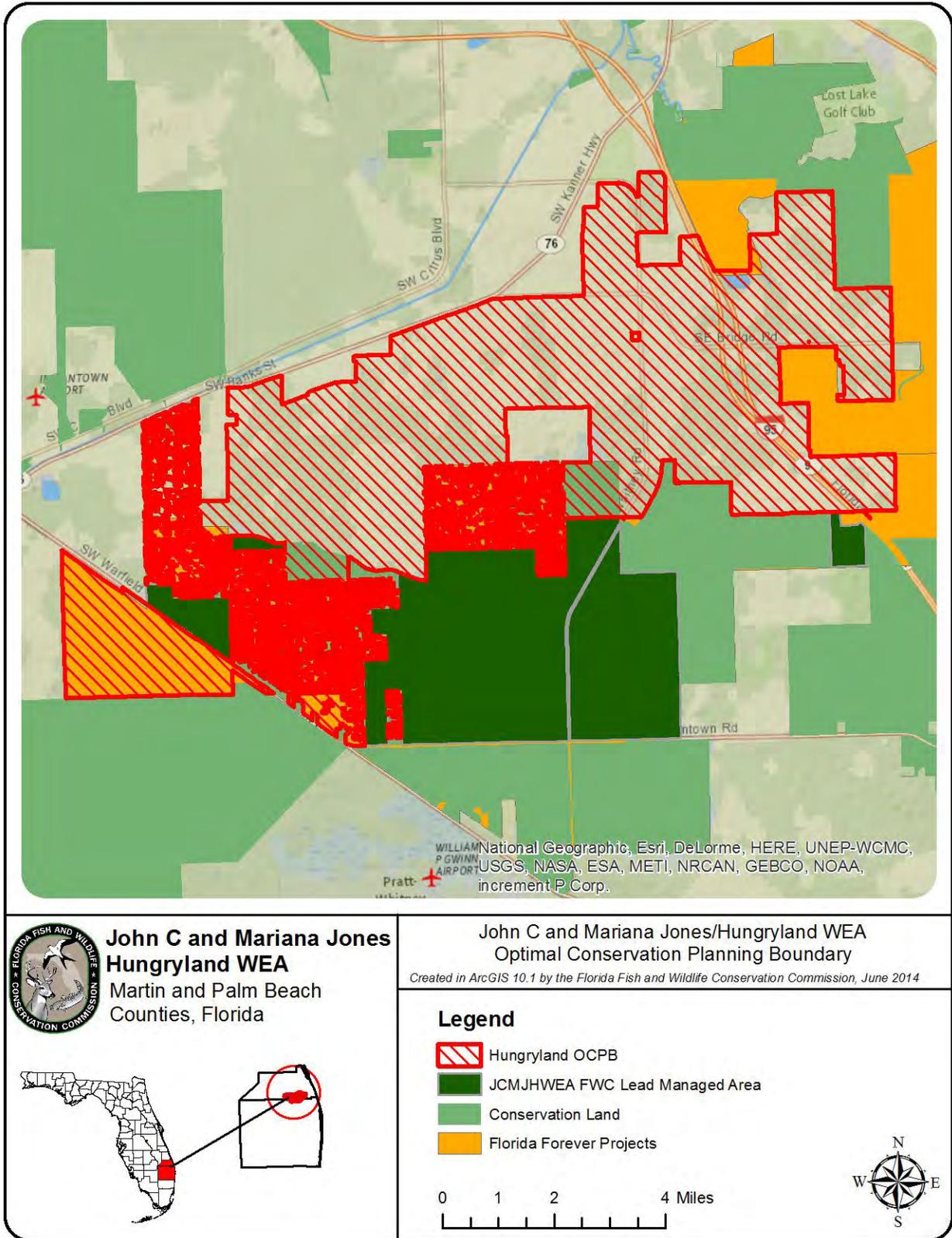


Figure 10: Optimal Conservation Planning Boundary

5.11.3 Conservation Action Strategy

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

Primary components of the CAS may include:

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

5.11.4 FWC Florida Forever Additions and Inholdings Acquisition List

Currently, FWC has not identified any acres of potential additions or privately held inholdings for JCMJHWEA. However, 18,699 acres of the Pal-Mar Florida Forever Project remain to be acquired. Additionally, all of the undeveloped acreage remaining to be acquired within the Pal-Mar Florida Forever Project remains a high priority for the FWC to conserve in order to accomplish all of the Projects that were established when it was originally approved. 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 JCMJHWEA, 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 JCMJHWEA must have the prior approval of the FWC.

5.13 Cooperative Management and Special Uses

The FWC is responsible for the overall management and operation of JCMJHWEA as set forth in the lease agreements with the Board of Trustees and the SFWMD. In keeping with the lease agreements, 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 13.12) are followed with regard to any ground-disturbing activities. In addition, the FFS is a designated cooperating agency, and assists the FWC by providing technical assistance on forest resource management. Additionally, the FWC cooperates with Martin County and Palm Beach County on management of these and surrounding public conservation lands. Also, the FWC cooperates and consults with the SFWMD and DEP for the monitoring and management of both ground and surface water resources and the overall management of JCMJHWEA.

5.13.1 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 JCMJHWEA. Such activities are considered allowable uses only when undertaken intermittently, for short periods of time (no more than a few days), and in a manner that does not impede the management and public use of JCMJHWEA, or cause unreasonable 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 JCMJHWEA. 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.

5.13.2 Apiaries

Currently, there are no apiaries operating on JCMJHWEA, although some are operating along adjacent county right of ways. The use of apiaries is conditionally approved for JCMJHWEA, 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 13.5). Location, management, and administration of apiaries on JCMJHWEA will be guided by the FWC Apiary Policy (Appendix 13.10).

5.14 Climate Change

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

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

For example, 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 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. 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.

To address the potential impacts of climate change on the JCMJHWEA, Goals and Objectives have been developed as a component of this Management Plan (Section 6.11). 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 JCMJHWEA Management Plan in the future.

5.15 Soil and Water Conservation

Soil disturbing activities will be confined to areas that have the least likelihood of experiencing erosion challenges. On areas that have been disturbed prior to acquisition, an assessment will be made to determine if soil erosion is occurring, and if so, appropriate measures will be implemented to stop or control the effects of this erosion.

6 Resource Management Goals and Objectives

The management goals described in this section are considered broad, enduring statements designed to guide the general direction of management actions to be conducted in order to achieve an overall desired future outcome for JCMJHWEA. 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** Prescribe burn 3,000 acres of fire-adapted communities on the area per year.
- 6.1.2** Maintain 6,000 acres (50% of fire adapted communities on the area) within 3-4 year target fire return interval.
- 6.1.3** Update the area's prescribed burn plan.
- 6.1.4** Conduct habitat/natural community improvement on 50 acres per year including mechanical treatment of saw palmettos.
- 6.1.5** Continue to implement OBVM on the area.

Long-term

- 6.1.6** Continue to prescribe burn 3,000 acres of fire-adapted communities on the area per year.
- 6.1.7** Continue to maintain 11,990 acres (100% of fire adapted communities) per year within 3-4 year target fire return interval.

- 6.1.8 Continue to conduct habitat/natural community improvement on 50 acres per year including mechanical treatment of saw palmettos.
- 6.1.9 Cooperate with Mitigation Services, Inc. in the continued restoration activities on the adjacent Lemon Grove Mitigation Bank.
- 6.1.10 Continue to implement OBVM on the area.

6.2 Imperiled Species Habitat Maintenance, Enhancement, Restoration, or Population Restoration

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

Short-term

- 6.2.1 Continue to implement the WCPR strategy that has been developed for the area.
- 6.2.2 As described in the area's WCPR strategy, monitor the presence of 23 imperiled and focal species including American swallow-tailed kite, Bachman's sparrow crested caracara, Florida black bear, Florida mottled duck, Florida sandhill crane, gopher tortoise, limpkin, Northern bobwhite, red-cockaded woodpecker, Sherman's fox squirrel, short-tailed hawk, snail kite, southeastern American kestrel, southern bald eagle, and various wading birds.
- 6.2.3 As described in the area's WCPR strategy, continue to monitor wading bird colonies by conducting aerial surveys a minimum of once per peak breeding season and conduct maintenance as necessary on colony site.
- 6.2.4 As described in the area's WCPR strategy, conduct marsh bird surveys every two years
- 6.2.5 Continue to collect opportunistic wildlife species occurrence data on the area.

Long-term

- 6.2.6 Continue to implement the area's WCPR strategy by managing identified habitats and monitoring identified species.
- 6.2.7 As described in the WCPR strategy, continue to monitor 23 imperiled and focal species including American swallow-tailed kite, Cooper's hawk, crested caracara, snail kite, Florida black bear, Florida mottled duck, Florida sandhill crane, gopher tortoise, limpkin, red-cockaded woodpecker, Sherman's fox squirrel, short-tailed hawk, round tailed muskrat, snowy egret, southeastern American kestrel, southern bald eagle, and various wading birds.

- 6.2.8 As described in the area's WCPR strategy, continue to monitor wading bird colony by conducting aerial surveys a minimum of once per peak breeding season and conduct maintenance as necessary on colony site.
- 6.2.9 As described in the area's WCPR strategy, continue to conduct marsh bird surveys every two years.
- 6.2.10 Continue to collect opportunistic wildlife species occurrence data for the area.
- 6.2.11 By 2019, revise and update the area's WCPR strategy.

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

Short-term

- 6.3.1 Conduct an aerial white-tailed deer survey annually on the area.
- 6.3.2 Continue to collect biological harvest data at the area's check station during each hunting season.
- 6.3.3 Continue to maintain 26 wood duck boxes on the area.
- 6.3.4 Continue to collect opportunistic wildlife occurrence data for the area.

Long-term

- 6.3.5 Continue to conduct aerial white-tailed deer survey annually on the area.
- 6.3.6 Continue to collect biological harvest data at the area's check station during each hunting season.
- 6.3.7 Continue to maintain 26 wood duck boxes on the area.
- 6.3.8 Continue to collect opportunistic wildlife occurrence data for the area.

6.4 Exotic and Invasive Species Maintenance and Control

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

Short-term

- 6.4.1** Annually treat at least 3,000 acres of EPPC Category I and Category II invasive exotic plant species including air potato, Australian pine, Brazilian pepper, burma reed, caesar's weed, castor bean, catclaw mimosa, Chinese crown orchid, cogon grass, downy rose myrtle, dwarf papyrus, earleaf acacia, guava, guinea garss, jaragua, java plum, lantana, large flower Mexican clover, limpo grass, melaleuca, Mexican petunia, napier grass, natal grass, Old World climbing fern, para grass, Peruvian primrosewillow, rosary pea, seaside mahoe, strawberry guava, torpedo grass, tropical soda apple, water spangles, water-lettuce, and wedelia.
- 6.4.2** Continue to implement Early Detection Rapid Response treatments of invasive exotic plant species as needed.
- 6.4.3** Implement control measures on one nuisance animal species (feral hog) that include hunting and trapping as needed.
- 6.4.4** Monitor for exotic animal species and control as necessary, including Burmese python, great green iguana, and Nile monitor.

Long-term

- 6.4.5** Continue to annually treat at least 3,000 acres of EPPC Category I and Category II invasive exotic plant species including air potato, Australian pine, Brazilian pepper, burma reed, caesar's weed, castor bean, catclaw mimosa, Chinese crown orchid, cogon grass, downy rose myrtle, dwarf papyrus, earleaf acacia, guava, guinea garss, jaragua, java plum, lantana, large flower Mexican clover, limpo grass, melaleuca, Mexican petunia, napier grass, natal grass, Old World climbing fern, para grass, Peruvian primrosewillow, rosary pea, seaside mahoe, strawberry guava, torpedo grass, tropical soda apple, water spangles, water-lettuce, and wedelia.
- 6.4.6** Continue to implement Early Detection Rapid Response treatments of invasive exotic plant species as needed.
- 6.4.7** Continue to implement control measures on one nuisance animal species (feral hog) that include hunting and trapping as needed.
- 6.4.8** Continue to monitor for exotic animal species and control as necessary, including Burmese python, great green iguana, and Nile monitor.

6.5 Public Access and Recreational Opportunities

Goal: Provide public access and recreational opportunities.

Short-term

- 6.5.1** Maintain public access and recreational opportunities to allow for a recreational carrying capacity of 552 visitors to the area per day.
- 6.5.2** Continue to monitor trails biannually for visitor impacts.
- 6.5.3** Continue to provide four kiosks, an area website, and bird list for interpretation and education.
- 6.5.4** Develop a trail brochure for interpretation and education.
- 6.5.5** Continue to maintain 14.8 miles of designated trails on the area.
- 6.5.6** Continue to provide hunting opportunities for deer, turkey, small game, feral hogs, and migratory birds.
- 6.5.7** Continue to provide fishing opportunities on appropriate water bodies.

Long-term

- 6.5.8** Update the area's Recreation Master Plan.
- 6.5.9** Continue to maintain public access and recreational opportunities to allow for a recreational carrying capacity of 552 visitors to the area per day.
- 6.5.10** Continue to maintain 14.8 miles of designated trails on the area.
- 6.5.11** Continue to monitor area trails annually for visitor impacts.
- 6.5.12** Reassess recreational opportunities every three years.
- 6.5.13** Continue to provide hunting opportunities for deer, turkey, small game, feral hogs, and migratory birds.
- 6.5.14** Investigate feasibility of providing youth and/or family feral hog hunts.
- 6.5.15** Continue to provide and improve fishing opportunities on appropriate water bodies.
- 6.5.16** Cooperate with other agencies, County, Conservancy Districts, stakeholders, and regional landowners to investigate regional recreational opportunities including linking hiking, and multi-use trail systems between adjacent public areas.
- 6.5.17** Continue to identify partnerships that could provide for conservation educational programs and outreach.

6.6 Hydrological Preservation and Restoration

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

Short-term

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

Long-term

- 6.6.3** In cooperation with the SFWMD, Martin County and Palm Beach County, obtain a hydrological/water quality site assessment to identify potential hydrological restoration needs.
- 6.6.4** Depending on the results of the hydrological assessment and modeling, implement hydrological restoration plan as feasible.
- 6.6.5** To enhance natural hydrological functions, continue to maintain low-water crossings and culverts as appropriate.
- 6.6.6** Continue to cooperate with the SFWMD, Martin County and Palm Beach County for the monitoring of surface and ground water quality and quantity.

6.7 Forest Resource Management

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

Short-term

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

Long-term

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

6.8 Cultural and Historical Resources

Goal: Protect, preserve and maintain cultural and historic resources.

Short-term

- 6.8.1 Monitor the four known recorded sites and submit updates of additional sites to DHR for inclusion in their Master Site file.
- 6.8.2 Ensure management staff has completed the DHR Archaeological Resources Monitoring training.
- 6.8.3 Follow the 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 Continue to monitor the four known recorded resource groups and submit updates of additional sites to DHR for inclusion in their Master Site file.
- 6.8.5 Continue to follow the 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.

6.9 Capital Facilities and Infrastructure

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

Short-term

- 6.9.1 Continue to maintain 14 facilities including eight entrances, four campsites, four kiosks, and the Gate 2 picnic area facility.
- 6.9.2 Rebuild the check station facility.
- 6.9.3 Continue to maintain 18.3 miles of roads on the area.
- 6.9.4 Continue to maintain 14.8 miles of trails on the area.
- 6.9.5 Continue to maintain/install/replace the area's fences, gates, and boundary signs as necessary.

Long-term

- 6.9.6 Monitor the area's trails and infrastructure biannually for visitor impacts.
- 6.9.7 Continue to maintain 14 facilities including eight entrances, four campsites, four kiosks, one check station facility and the Gate 2 picnic area facility on the area.
- 6.9.8 Construct interpretive signs along Old Jupiter-Indiantown Grade.
- 6.9.9 Construct seven secondary entrance signs.
- 6.9.10 Continue to maintain 18.3 miles of roads on the area.
- 6.9.11 Continue to maintain 14.8 miles of trails on the area.
- 6.9.12 Construct a new shop/office facility, four new fishing platform structures, one new kiosk, and one new boardwalk on the area. (Figure 11)
- 6.9.13 Continue to maintain/install/replace the area's fences, gates, and boundary signs as necessary.

6.10 Land Conservation and Stewardship Partnerships

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

Short-term

- 6.10.1 Identify potential important wildlife habitat, landscape-scale linkages, wildlife corridors, and operational/resource management needs.
- 6.10.2 Identify and develop conservation stewardship partnerships.
- 6.10.3 Identify and pursue conservation acquisition needs.
- 6.10.4 Develop and maintain a GIS shapefile and other necessary data to facilitate nominations from the FWC OCPB and for FWC's LAP and Land Acquisition Programs.
- 6.10.5 Develop a CAS.
- 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 Evaluate and determine if any portions of JCMJHWEA are no longer needed for conservation purposes, and therefore may be recommended for a potential surplus designation.

Long-term

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

6.10.12 Continue to identify and develop conservation stewardship partnerships.

6.10.13 Continue to identify and pursue conservation acquisition needs.

6.10.14 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.

6.10.15 Continue to propose nominations of selected properties as additions to the FWC acquisition list.

6.10.16 Continue to pursue acquisition of parcels added to the FWC acquisition list as acquisition work plan priorities and funding allow.

6.10.17 Periodically (every three to five years) continue to contact and meet with adjacent landowners to determine their willingness to participate in the CAS.

6.10.18 Coordinate and conduct landowner assistance/conservation stewardship partnership workshop(s) as necessary and appropriate.

6.10.19 Continue to evaluate and determine if any portions of JCMJHWEA are no longer needed for conservation purposes, and therefore may be recommended for a potential surplus designation.

6.11 Climate Change

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

Long-term

6.11.1 Coordinate with the FWC Fish and Wildlife Research Institute Climate Change Adaptation Initiative to identify potential impacts of projected climate change on fish and wildlife resources and operational management of the JCMJHWEA.

6.11.2 Consider participating in Peninsular Florida Land Conservation Cooperate so that the FWC continues to gain understanding and share knowledge of the key issues related to potential climate change.

- 6.11.3 Assess the need to prioritize research and monitoring to ascertain the potential impacts of climate change on the hydrologic regime and water quality of the JCMJHWEA, such as increased nutrient and sediment loads, reduced surface and groundwater recharge, and increases in water temperatures.
- 6.11.4 Assess the need to prioritize research and monitoring to determine the potential impacts of climate change on native vegetation, and the possible spread of exotic and invasive species.
- 6.11.5 Incorporate appropriate climate change monitoring protocols and management strategies into the OBVM program for the JCMJHWEA.
- 6.11.6 Incorporate appropriate climate change adaptation strategies into the WCPR for JCMJHWEA.
- 6.11.7 As appropriate, update the JCMJHWEA Prescribed Fire Plan to incorporate new scientific information regarding projected climate change, such as increased frequency of drought, on the fire regime of JCMJHWEA's fire-adapted habitats.
- 6.11.8 As science, technology, and climate policy evolve, educate natural resource management partners and the public about the agency's policies, programs and efforts to study, document and address potential climate change; assess the need to incorporate public education about climate change into the update of the Recreation Master Plan.

6.12 Research Opportunities

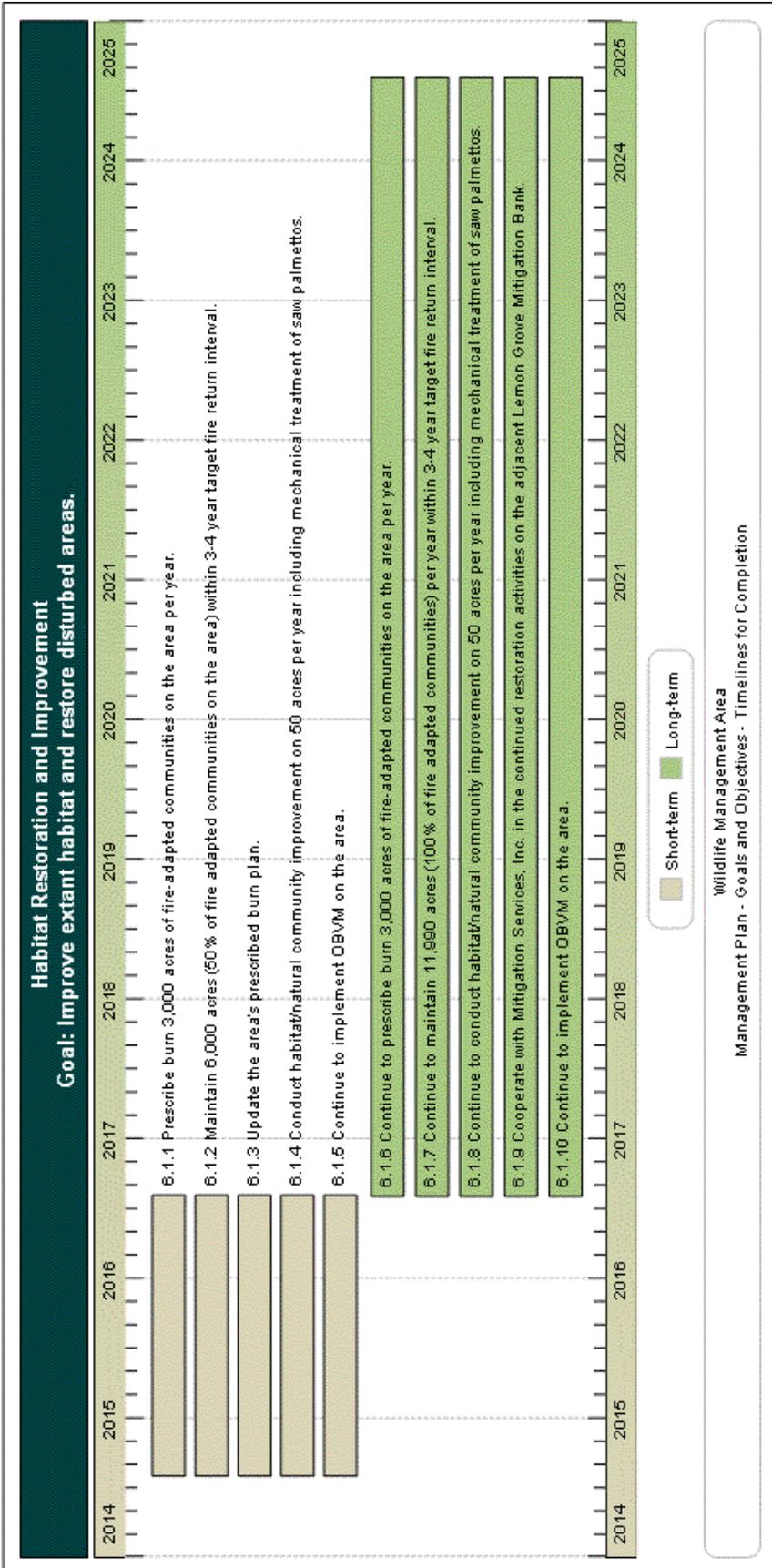
Goal: Explore and pursue cooperative research opportunities.

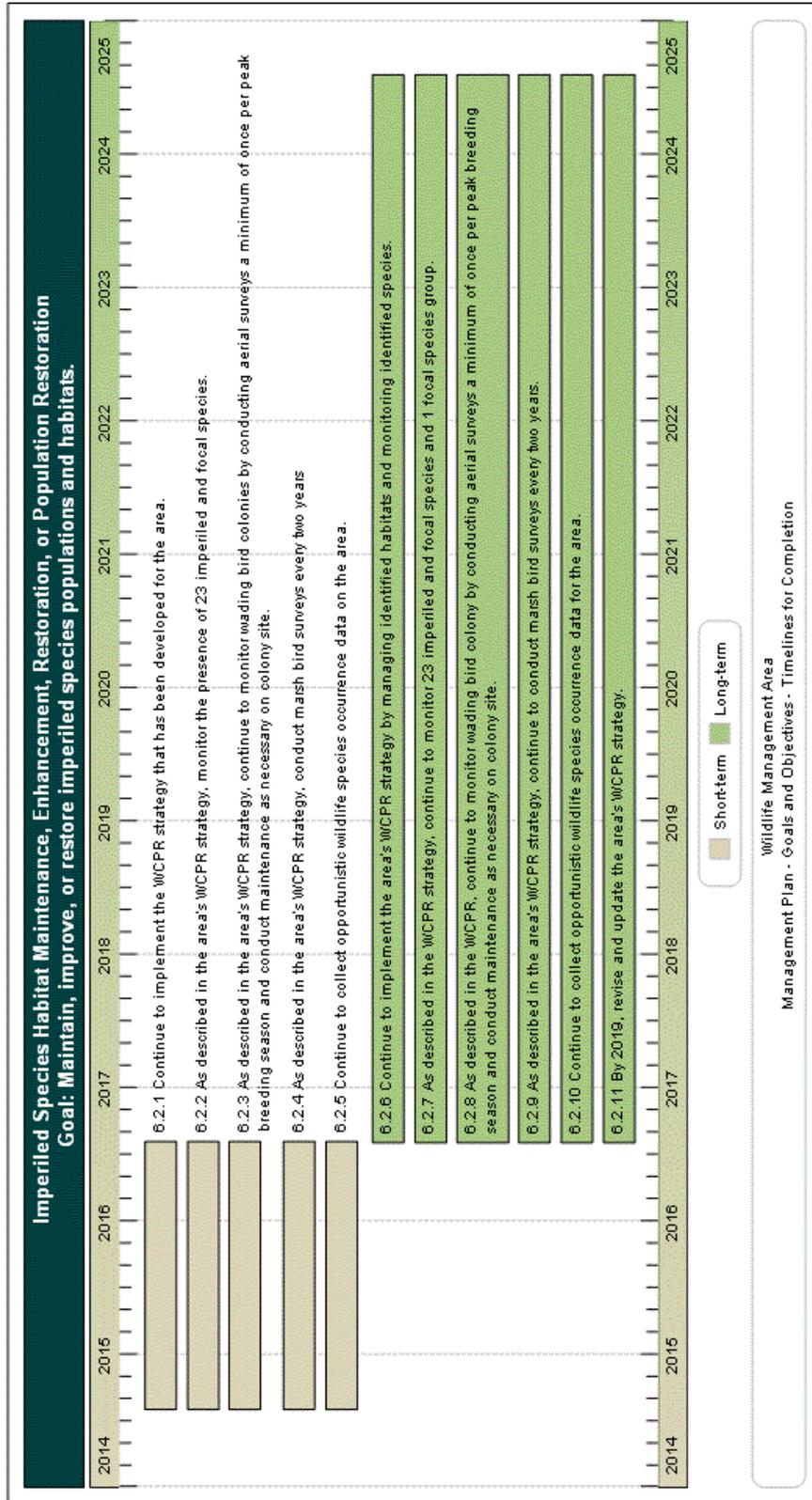
Long-term

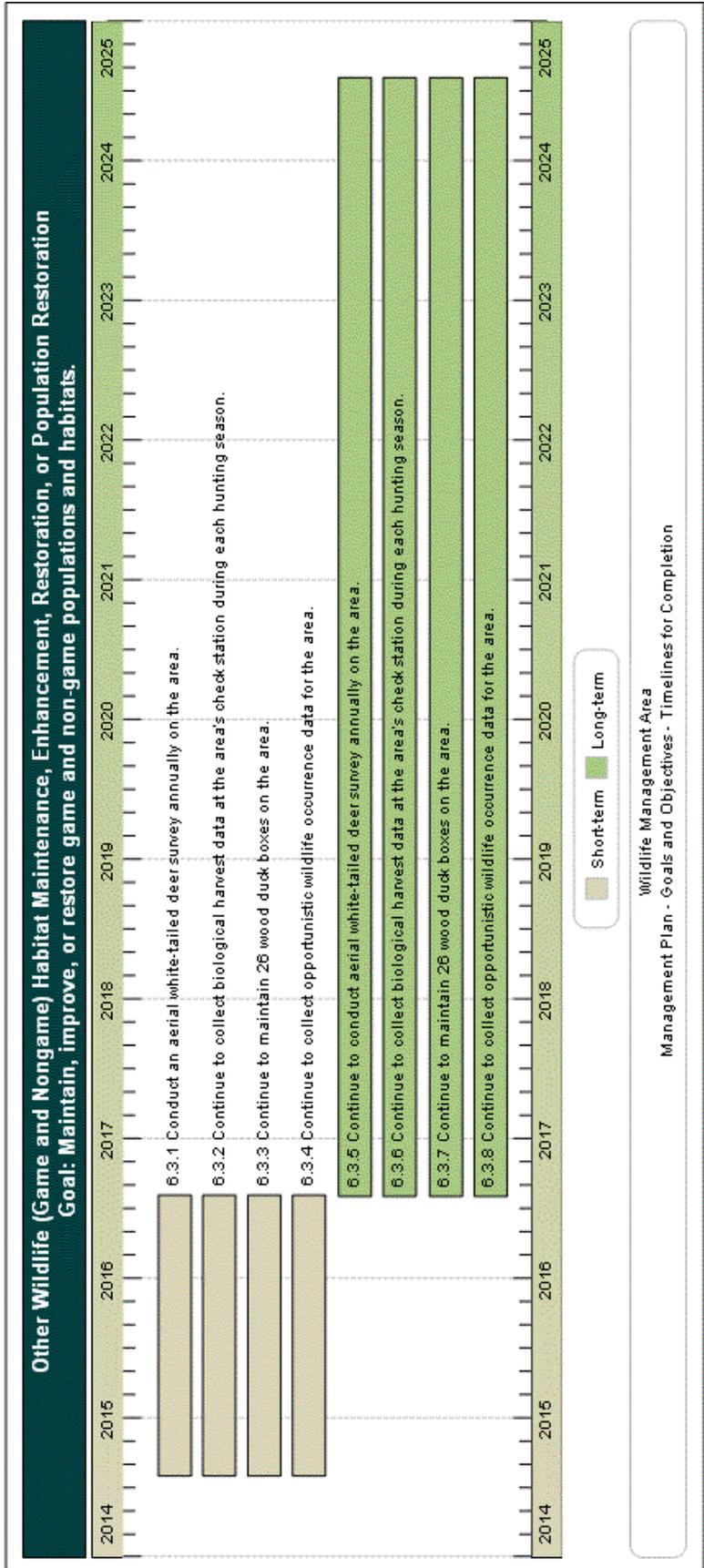
- 6.12.1 Explore and pursue cooperative research opportunities through universities, FWRI, and other agencies and organizations as appropriate.
- 6.12.2 Continue to cooperate with researchers, universities, and others as appropriate.
- 6.12.3 Continue to assess the need for and pursue research and environmental education partnership opportunities as appropriate.

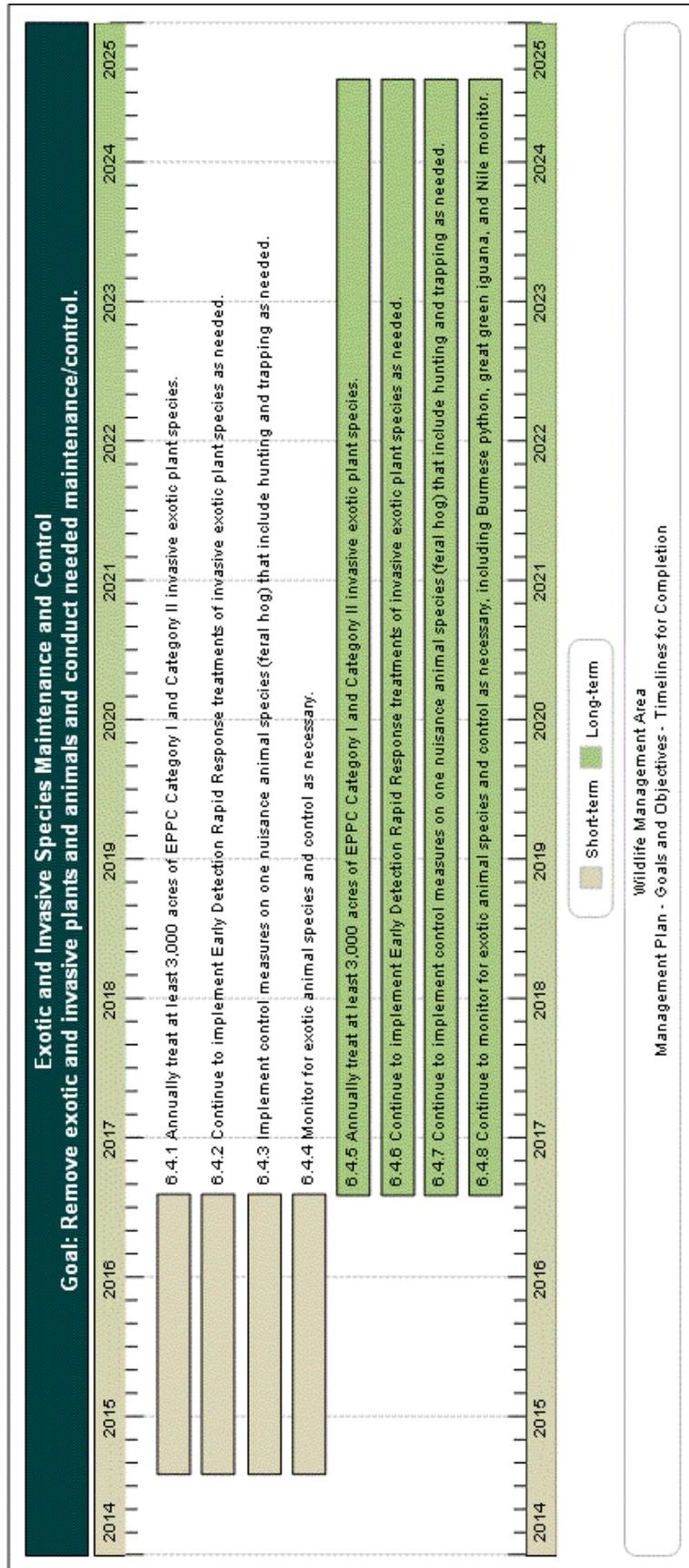
7 Schedule: Timelines for Completion of Resource Management Goals and Objectives

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

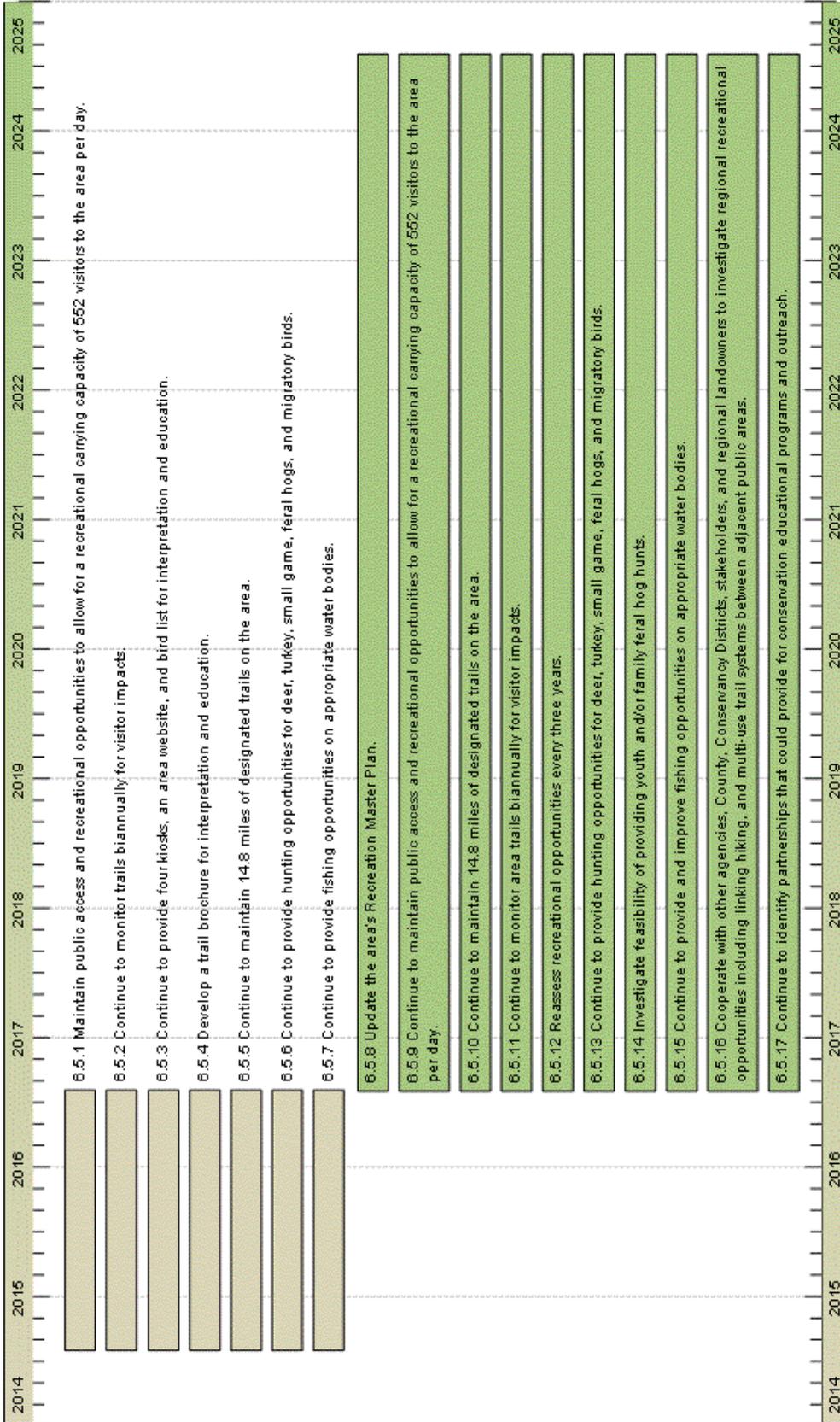






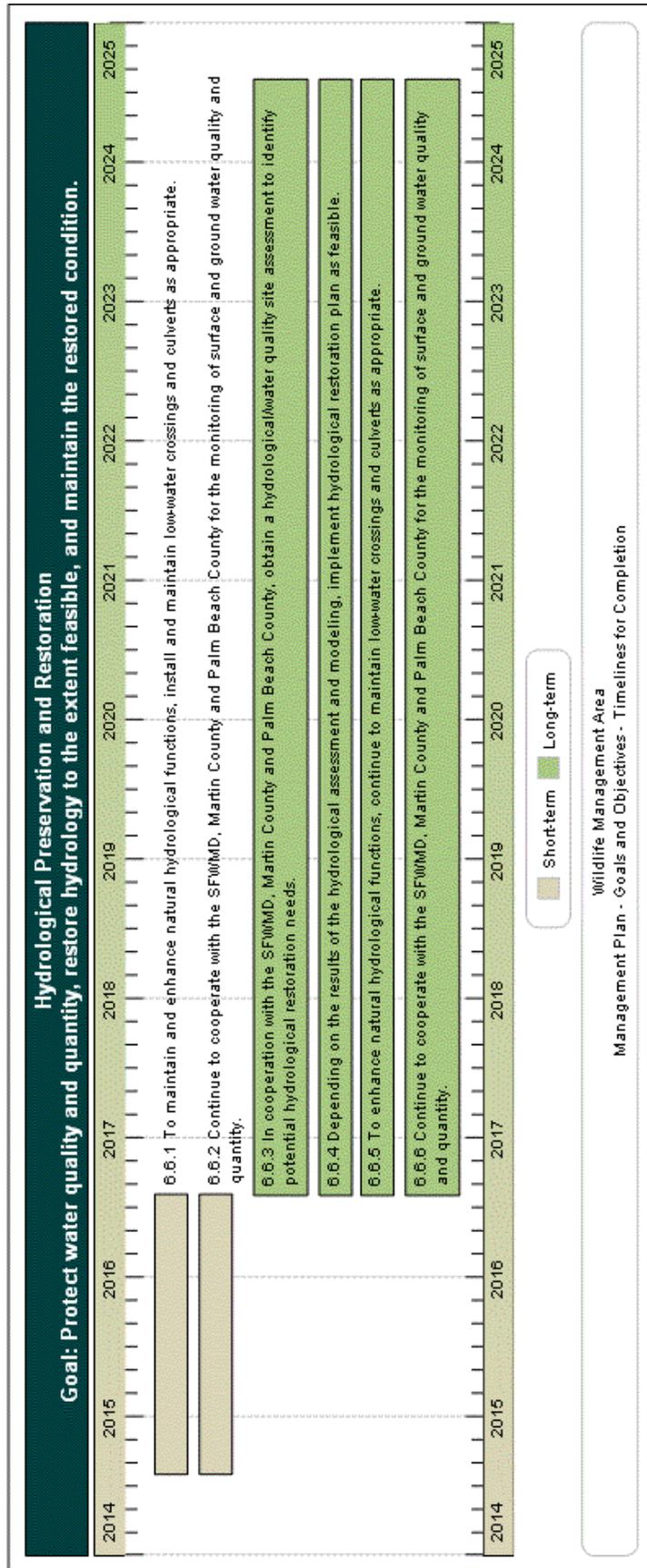


Public Access and Recreational Opportunities
Goal: Provide public access and recreational opportunities.



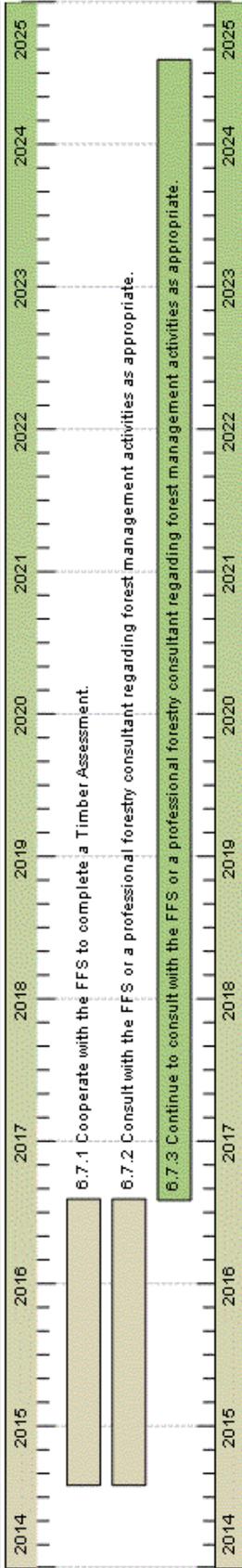
Short-term Long-term

Wildlife Management Area
 Management Plan - Goals and Objectives - Timelines for Completion



Forest Resource Management

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



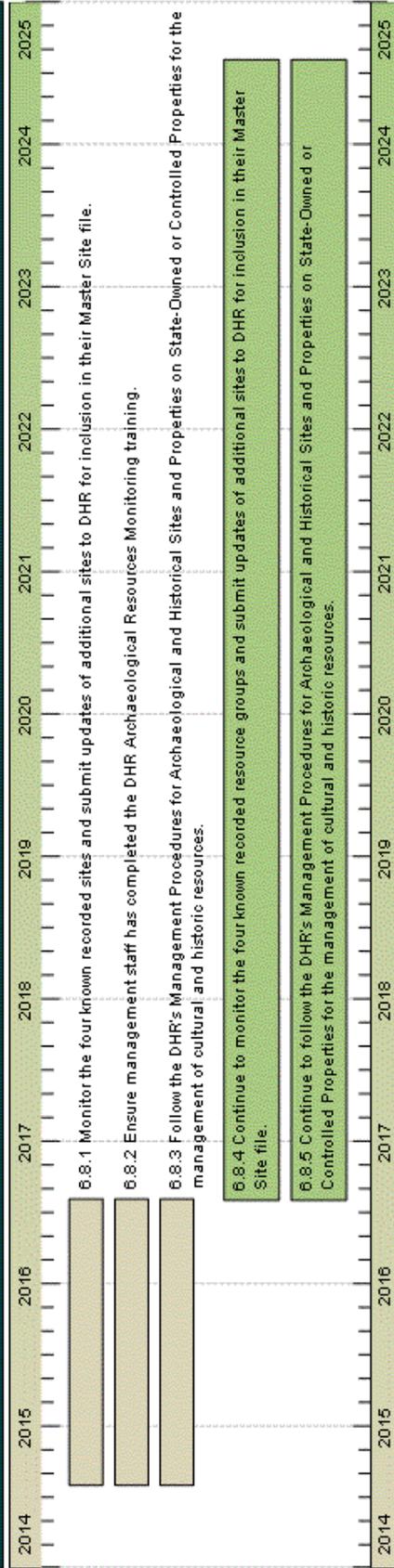
Short-term Long-term

Wildlife Management Area

Management Plan - Goals and Objectives - Timelines for Completion

Cultural and Historical Resources

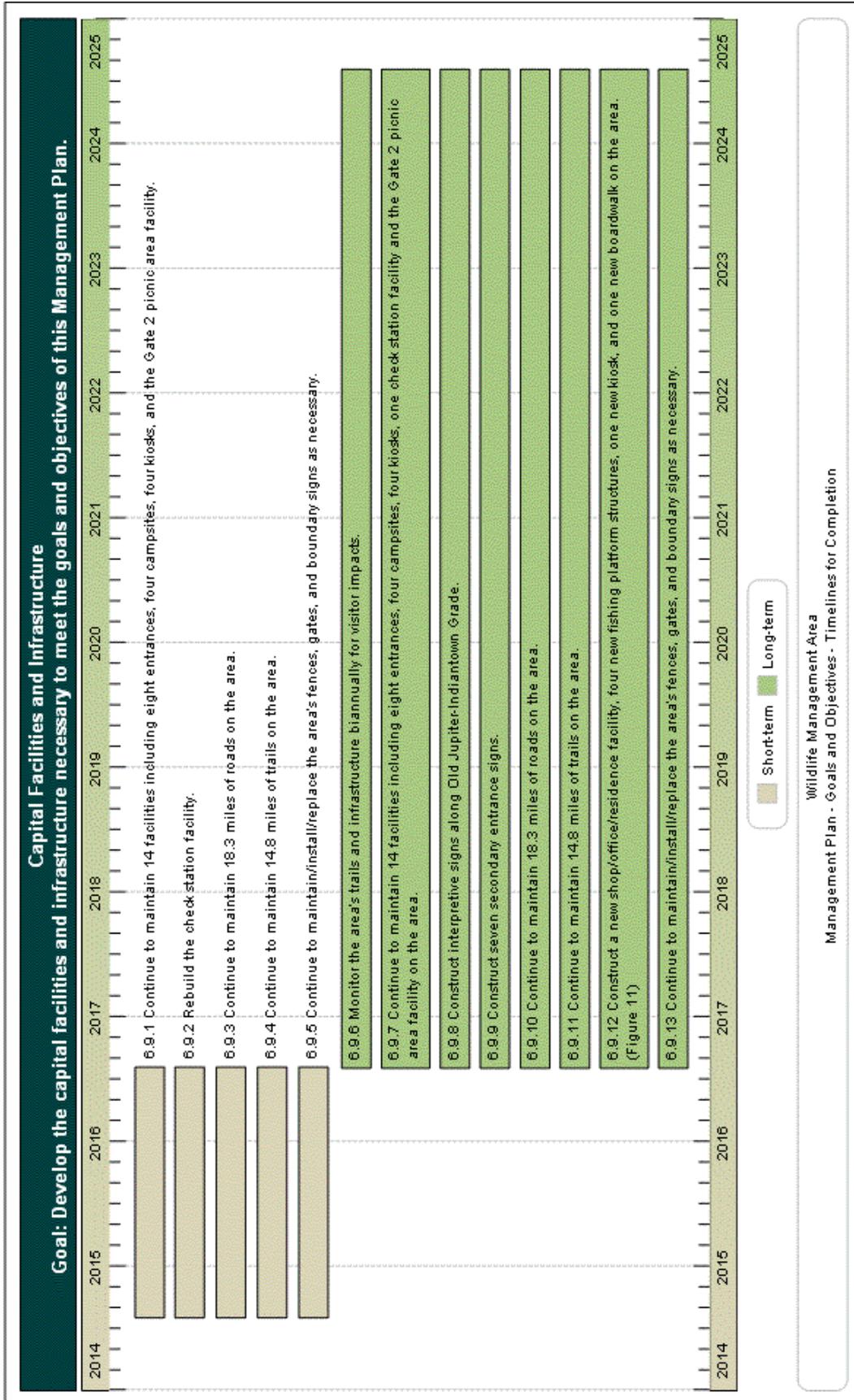
Goal: Protect, preserve and maintain cultural and historic resources.

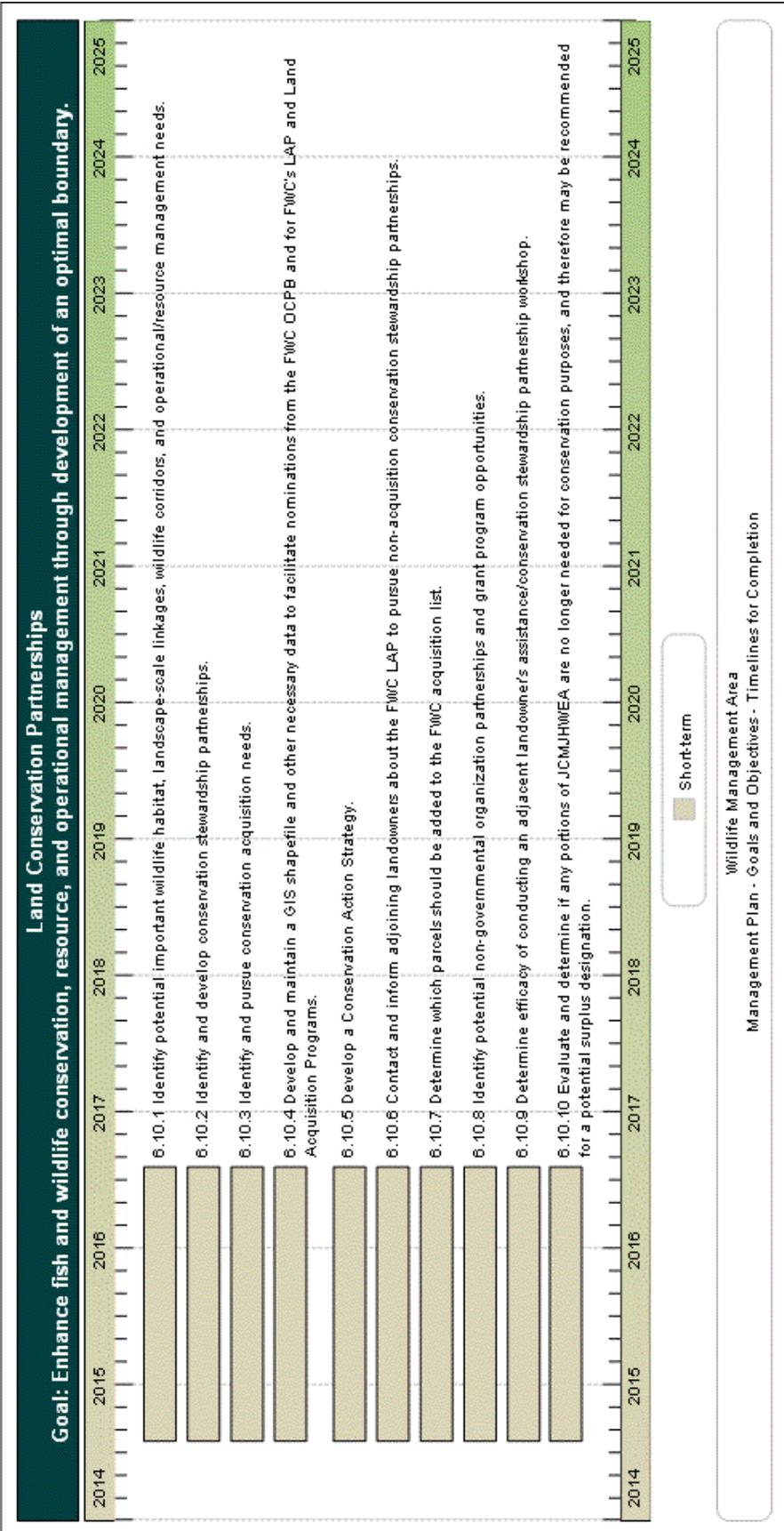


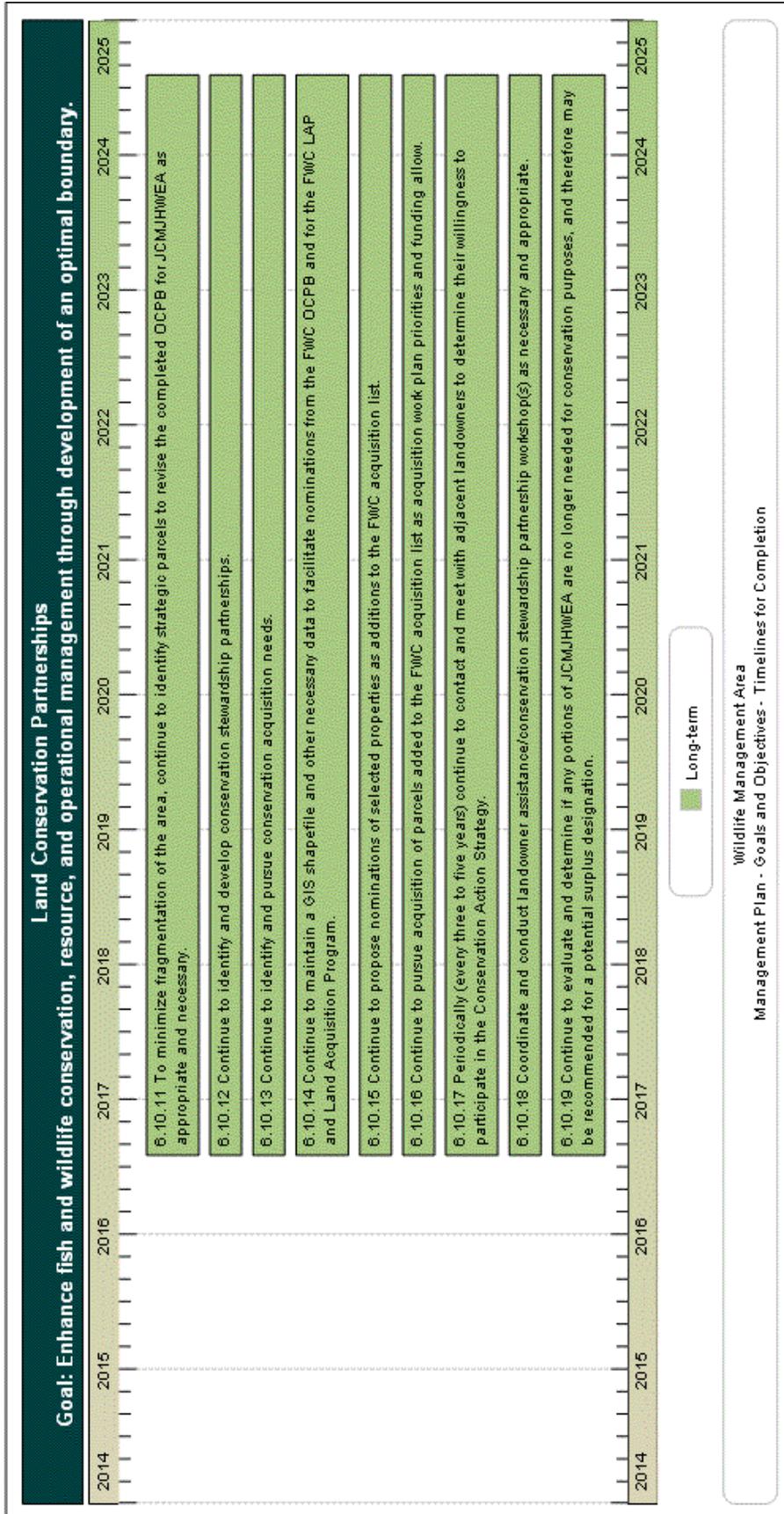
Short-term Long-term

Wildlife Management Area

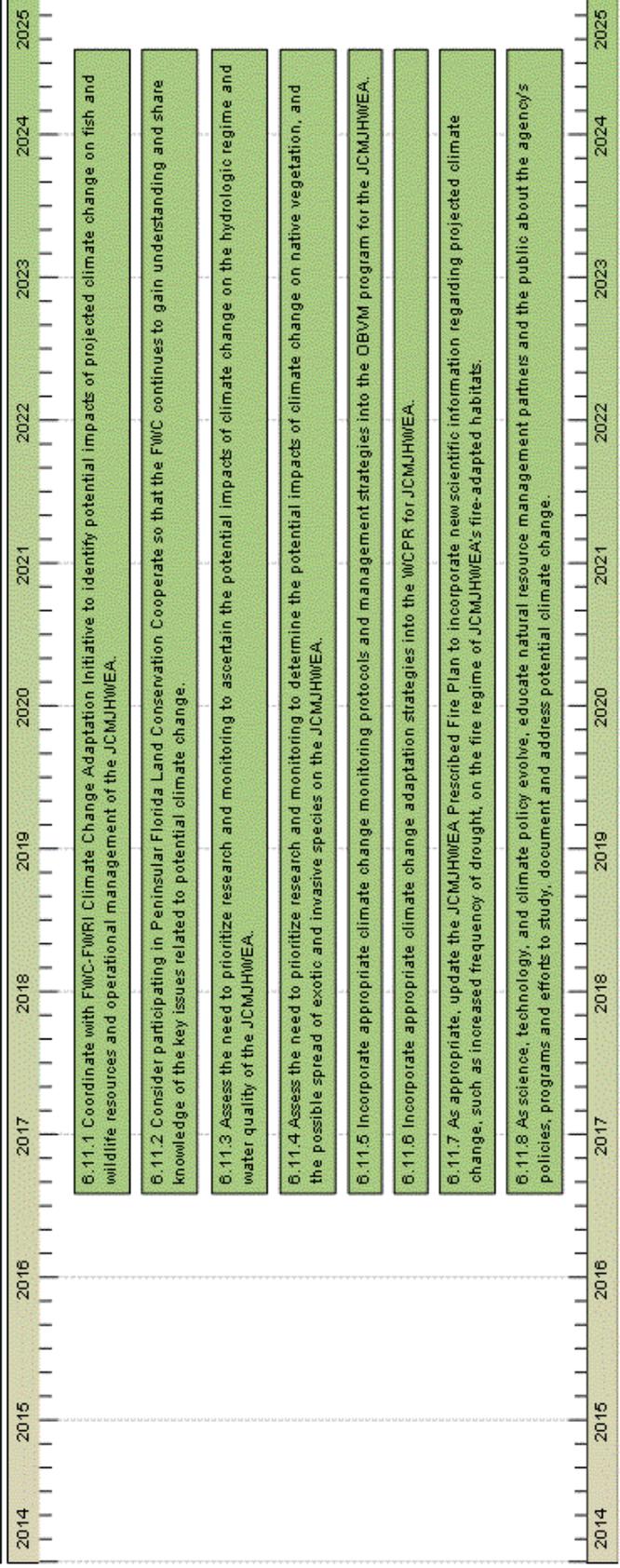
Management Plan - Goals and Objectives - Timelines for Completion





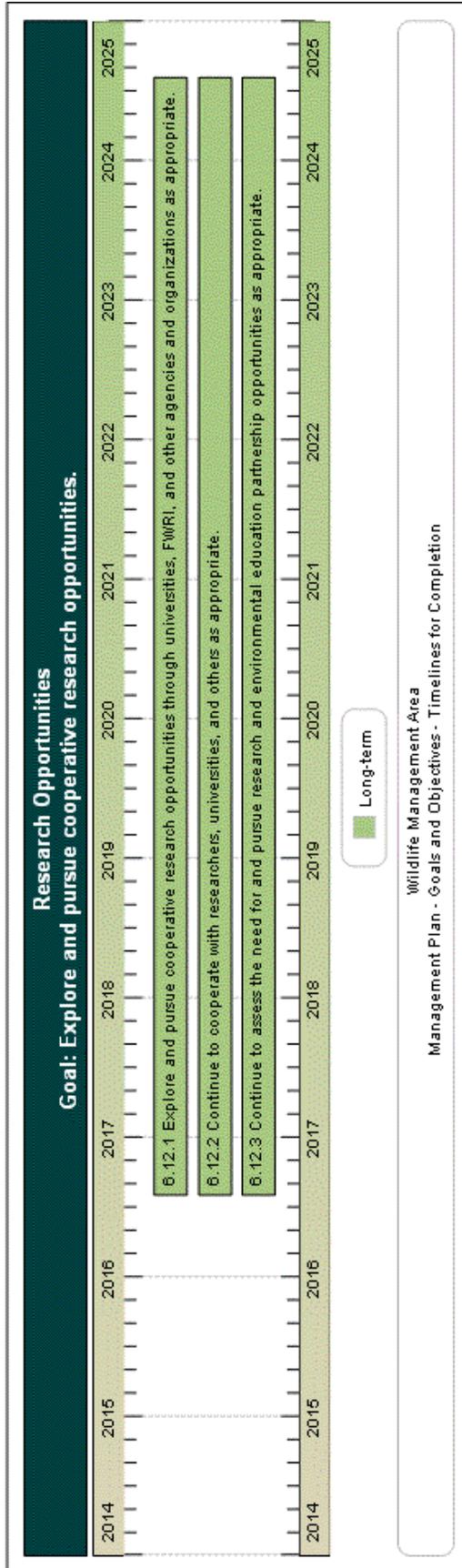


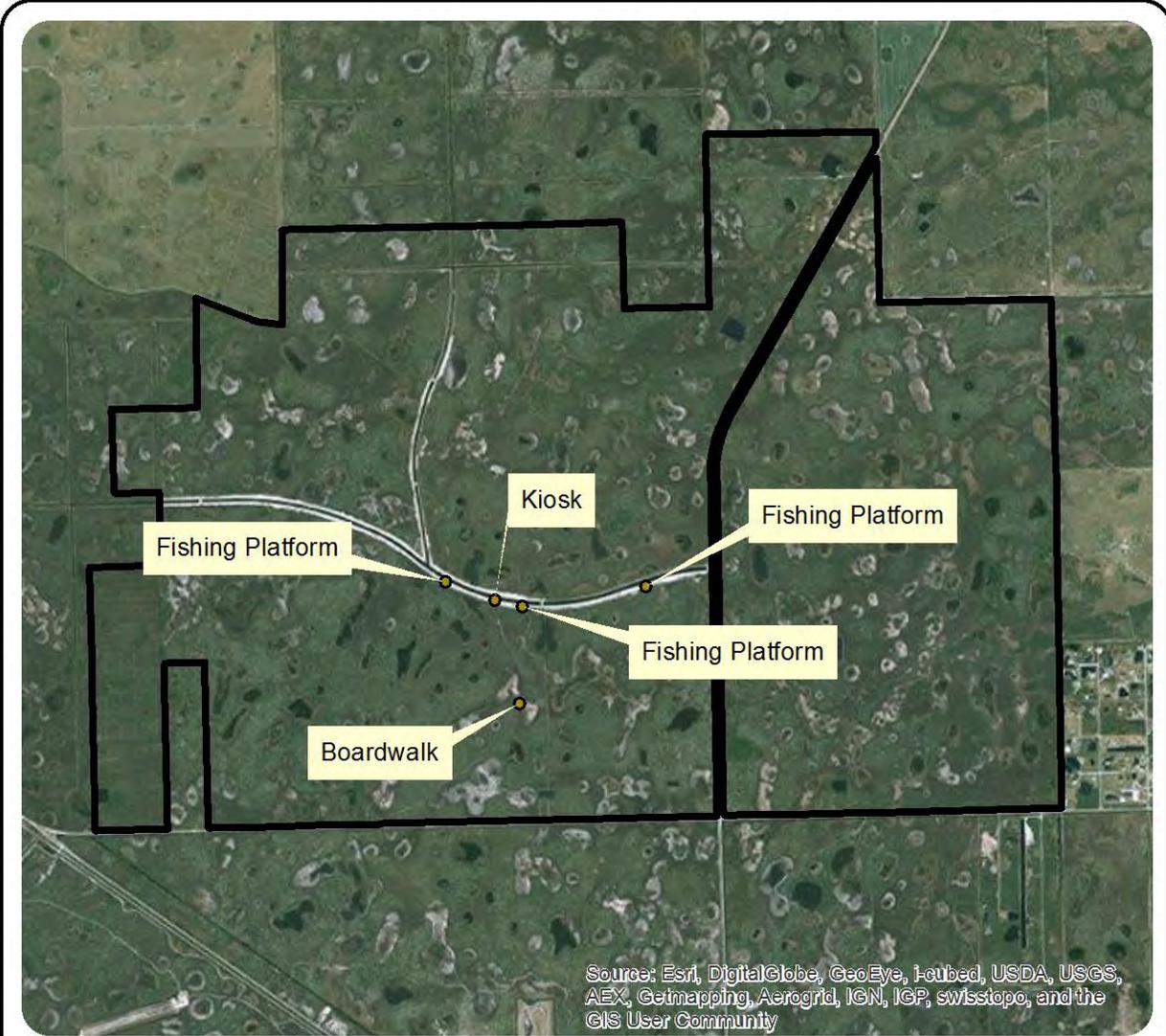
Climate Change
Goal: Develop appropriate adaptation strategies in response to projected climate change effects and their potential impacts on natural resources, including fish and wildlife, and the operational management of the NAME



Long-term

Wildlife Management Area
 Management Plan - Goals and Objectives - Timelines for Completion

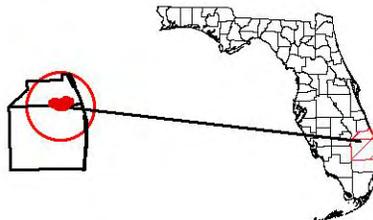




Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community



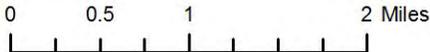
John C and Mariana Jones Hungryland WEA
Martin and Palm Beach Counties, Florida



John C and Mariana Jones/Hungryland WEA Future Improvements

Legend

-  John C and Mariana Jones/Hungryland WEA FWC Lead Managed Area
-  JCMJHWEA Improvements

Created in ArcGIS 9.3 by the Florida Fish and Wildlife Conservation Commission December, 2012.

Figure 11: JCMJHWEA Planned Recreational Facilities and Enhancements

8 Resource Management Challenges and Strategies

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

8.1 Challenge: A complete boundary survey of WEA is lacking.

8.1.1 Strategy: Request funding to contract for a boundary survey of the area.

8.2 Challenge: Currently, area staffing is below FWC's staffing standard.

8.2.1 Strategy: Explore the feasibility of increasing area staffing to FWC's staffing standard.

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

8.3.1 Strategy: Continue to provide area-wide security through FWC law enforcement patrols and cooperation with local and other law enforcement agencies.

8.4 Challenge: Currently, there is unclear delineation of management responsibilities among the public agencies that manage land within the overall JCMJHWEA/cooperative area boundary.

8.4.1 Strategy: Continue to coordinate with the SFWMD and Martin County to clarify and delineate management responsibilities and disseminate this information to public entities and user groups.

8.5 Challenge: Currently, areas acquired within the Pal-Mar Florida Forever mega-parcel units lack sufficient management oversight such as control of exotic invasive species and prescribed burning and may be adversely affecting management of JCMJHWEA.

8.5.1 Strategy: Cooperate with FFS, the SFWMD and Martin County to perform exotic invasive species control, prescribed burning and other management activities within the Pal-Mar mega-parcel unit adjacent to the JCMJHWEA.

8.6 Lack of public access to the Conservancy and Water Control Districts levees reduces potential public recreational opportunities within the JCMCJHWEA cooperative area.

8.6.1 Strategy: Coordinate with the Conservancy and Water Control Districts to explore and pursue potential public access opportunities.

- 8.7 Currently, the CERP restoration plan recommends removal of some of the levees to restore natural hydrology to areas of JCMJHWEA and the William H. Lee Unit which could impact existing recreational uses.**
- 8.7.1 Strategy: Continue to cooperate and coordinate with the SFWMD, Martin County, the Conservancy District, and recreational user groups to address and ameliorate as possible potential impacts as recommended in area's hydrological assessment as feasible.
- 8.8 Currently, there is no equipment storage facility on the JCMJHWEA which increases the cost and limits the overall management capabilities of the area due to the required logistics and movement of equipment from another area to JCMJHWEA.**
- 8.8.1 Strategy: Pursue funding to construct an equipment storage/shop/office facility on JCMJHWEA.
- 8.9 Currently, there is no sufficient facility to allow contractors to wash their equipment prior to entering and leaving area to prevent introduction of pests, pathogens, and exotic invasive species onto JCMJHWEA and other areas.**
- 8.9.1 Strategy: Pursue funding to construct an equipment storage/shop/office facility on JCMJHWEA, including a well and vehicle/equipment washing facility.
- 8.10 Currently, the Martin County land development regulations may not allow the development of infrastructure and operational facilities necessary to effectively manage JCMJHWEA.**
- 8.10.1 Strategy: Cooperate with Martin County to pursue a resolution of the issue to allow for necessary infrastructure and operational facilities at JCMJHWEA.
- 8.11 Currently, law enforcement and management staffing is at insufficient levels for optimal management of JCMJHWEA.**
- 8.11.1 Strategy: Pursue funding for increased law enforcement and management staffing.
- 8.11.2 Strategy: Explore the potential of using volunteer resources for assisting with management.
- 8.12 There are smoke management challenges during prescribed burns due to proximity to major roadways and residential areas.**
- 8.12.1 Strategy: Use available tools and resources to minimize smoke impact and increase outreach for areas of potential impact.
- 8.12.2 Strategy: Cooperate with other agencies such as the FWC Division of Law Enforcement, the Florida Highway Patrol, the Florida Department of Transportation, the FFS, and the Martin and Palm Beach counties Sheriffs' Offices.

8.13 Exotic invasive plants from adjacent private lands are spreading to JCMJHWEA.

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

8.13.2 Strategy: Coordinate with other governmental and private organizations to obtain the resources to control and manage exotic invasive species on adjacent properties.

8.14 Litter, dumping and vandalism continue to negatively impact the management, operations and public use of JCMJHWEA.

8.14.1 Strategy: Coordinate with FWC law enforcement, Martin and Palm Beach counties Sheriffs' Departments to assist with litter control, dumping and vandalism on JCMJHWEA.

8.15 Currently, FWC has insufficient resources to perform water monitoring, including water quality monitoring, on JCMJHWEA, therefore it cannot be determined if water quality is diminishing over time.

8.15.1 Strategy: Pursue funding for water quality assessment and ongoing monitoring

9 Cost Estimates and Funding Sources

The following represents the actual and unmet budgetary needs for managing the lands and resources of JCMJHWEA. 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 and used to supplement existing funding.

The cost estimate below, although exceeding what FWC typically receives through the appropriations process, is consistent with the direction taken by current operational and resource management planning for JCMJHWEA. Cost estimate categories are those currently recognized by FWC and the Land Management Uniform Accounting Council. More information on these categories, as well as the Fiscal Year 2014-2015 operational plan showing detailed cost estimates by activity and categories of expenditures, may be found in Appendix 13.13.

Table 13: JCMJHWEA One Year Expenditures

John C. and Mariana Jones/Hungryland WEA Management Plan Cost Estimate

Maximum expected one year expenditure

<u>Resource Management</u>	<u>Expenditure</u>	<u>Priority</u>	<u>Priority schedule:</u>
Exotic Species Control	\$177,589	(1)	(1) Immediate (annual)
Prescribed Burning	\$42,550	(1)	(2) Intermediate (3-4 years)
Cultural Resource Management	\$751	(1)	(3) Other (5+ years)
Timber Management	\$0	(1)	
Hydrological Management	\$35,761	(1)	
Other (Restoration, Enhancement, Surveys, Monitoring, etc.)	\$120,602	(1)	
Subtotal	\$377,252		
<u>Administration</u>			
General administration	\$13,517	(1)	
<u>Support</u>			
Land Management Planning	\$19,376	(1)	
Land Management Reviews	\$0	(3)	
Training/Staff Development	\$5,570	(1)	
Vehicle Purchase	\$0	(2)	
Vehicle Operation and Maintenance	\$19,707	(1)	
Other (Technical Reports, Data Management, etc.)	\$1,739	(1)	
Subtotal	\$46,393		
<u>Capital Improvements</u>			
New Facility Construction	\$241,371	(2)	
Facility Maintenance	\$82,058	(1)	
Subtotal	\$323,429		
<u>Visitor Services/Recreation</u>			
Info./Education/Operations	\$16,542	(1)	
<u>Law Enforcement</u>			
Resource protection	\$10,033	(1)	
<u>Total</u>	\$787,167 *		

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

Table 14: JCMJHWEA 10 year cost estimate

John C. and Mariana Jones/Hungryland WEA Management Plan Cost Estimate

Ten-year projection

<u>Resource Management</u>	<u>Expenditure</u>	<u>Priority</u>	<u>Priority schedule:</u>
Exotic Species Control	\$1,808,833	(1)	(1) Immediate (annual)
Prescribed Burning	\$433,392	(1)	(2) Intermediate (3-4 years)
Cultural Resource Management	\$7,650	(1)	(3) Other (5+ years)
Timber Management	\$0	(1)	
Hydrological Management	\$364,244	(1)	
Other (Restoration, Enhancement, Surveys, Monitoring, etc.)	\$1,228,388	(1)	
Subtotal	\$3,842,507		
<u>Administration</u>			
General administration	\$137,679	(1)	
<u>Support</u>			
Land Management Planning	\$197,358	(1)	
Land Management Reviews	\$5,235	(3)	
Training/Staff Development	\$56,732	(1)	
Vehicle Purchase	\$163,768	(2)	
Vehicle Operation and Maintenance	\$200,730	(1)	
Other (Technical Reports, Data Management, etc.)	\$17,710	(1)	
Subtotal	\$641,535		
<u>Capital Improvements</u>			
New Facility Construction	\$455,827	(2)	
Facility Maintenance	\$835,802	(1)	
Subtotal	\$1,291,628		
<u>Visitor Services/Recreation</u>			
Info./Education/Operations	\$168,492	(1)	
<u>Law Enforcement</u>			
Resource protection	\$102,195	(1)	
<u>Total</u>	\$6,184,035 *		

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

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

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

Approved Conditional Rejected

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

11 Compliance with Federal, State, and Local Governmental Requirements

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

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

Uses planned for JCMJHWEA 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 13.5). 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 379, 253, 259, 327, 370, 403, 870, 373, 375, 378, 487, and 597 FS.

The FWC has developed and utilizes an Arthropod Control Plan for JCMJHWEA in compliance with Chapter 388.4111 F.S. (Appendix 13.14). This plan was developed in cooperation with the local arthropod control agencies of Martin and Palm Beach Counties. This plan is also in conformance with the Local Government Comprehensive Plan as approved and adopted for Martin and Palm Beach counties, Florida, (13.15).

12 Endnotes

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- ¹⁵ Mann, M.E. and K.A. Emanuel. 2006. Atlantic Hurricane Trends Linked to Climate Change. *Eos Trans. AGU* 87: 233-244.
- ¹⁶ Stanton, E.A. and F. Ackerman. 2007. *Florida and Climate Change: The Costs of Inaction*. Tufts University Global Development and Environment Institute and Stockholm Environment Institute–US Center, Tufts University, Medford, MA.
- ¹⁷ Clough, J.S. 2008. Application of the Sea-Level Affecting Marshes Model (SLAMM 5.0) to Crystal River NWR. Warren Pinnacle Consulting, Inc. for U.S. Fish and Wildlife Service. 46 pp.