

A Management Plan for
Three Lakes
Wildlife Management Area
2012 - 2022



Osceola County, Florida

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

**A Management Plan
for
Three Lakes Wildlife Management Area**

Osceola County, Florida

Owned by the Board of Trustees of the Internal Improvement Trust Fund

Managed by the Florida Fish and Wildlife Conservation Commission



August 2012

Approved _____

Handwritten signature of Eric Sutton in blue ink.

Eric Sutton
Director, Division of Habitat and Species Conservation



**FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION**

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HEBERCHINE VINYARD JR.
SECRETARY

December 14, 2012

Mr. Gary Cochran
Marathon Building-Koger Center
2574 Seagate Drive, Suite 203
Tallahassee, Florida 32301

RE: Three Lakes Wildlife Management Area - Lease #: 2785

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 Three Lakes Wildlife Management Area land management plan. The next management plan update is due December 14, 2022.

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

LAND MANAGEMENT PLAN EXECUTIVE SUMMARY

Lead Agency: Florida Fish and Wildlife Conservation Commission (FWC)
 Common Name of Property: Three Lakes WMA (TLWMA) & Kissimmee River PUA (KRPUA)
 Location: Osceola County, Florida
 Acreage Total: ~ 63,487 acres (TLWMA) and ~1,846 acres (KRPUA); ~65,272 acres total
 Acreage Breakdown TLWMA and KRPUA BOT Parcels:

<u>Natural Community</u>	<u>Acres</u>	<u>Natural Community</u>	<u>Acres</u>
Basin marsh	3,000.1	Pasture - semi-improved	370.6
Basin swamp	4.5	Pine plantation	1,102.9
Baygall	812.1	Prairie/flatwoods lake	1,093.9
Blackwater stream	43.4	Restoration dry prairie	210.8
Depression marsh	2,284.1	Ruderal	1,112.1
Dome swamp	7,908.6	Sandhill	208.5
Dry prairie	16,031.2	Scrub	834.8
Floodplain marsh	457.4	Scrubby flatwoods	1,223.1
Hydric hammock	138.6	Successional hardwood forest	34.6
Mesic flatwoods	15,975.9	Wet flatwoods	208.4
Mesic hammock	3,175.8	Wet prairie	6,820.2
Pasture - improved	2,171.1	Xeric hammock	92.4

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

Lease/Management Agreement No.: 2785 (Appendix 13.1)

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

Designated Land Use: Wildlife Management Area

Sublease (s): None

Encumbrances: None

Type Acquisition: Environmentally Endangered Lands

Unique Features: Natural: Natural communities, prairie lake

Archaeological/Historical: Three structures, 22 sites (see Section 2.8).

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

Acquisition Needs/Acreage: 46,118 acres FWC Additions and Inholdings list; 27,023 acres remaining in the Osceola Pine Savannas Florida Forever Project.

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: _____

Management Plan Compliance Checklist - Natural Resource Lands	
Requirements	
	Page
18-2.021 Acquisition and Restoration Council.	
1. Executive Summary (Example #1) This should be included in the packet and should be the first page.	iii
Management Plans. Plans submitted to the division for ARC review under the requirements of Section 253.034 F.S. should be in a form and manner prescribed by rule by the board and in accordance with the provisions of S. 259.032 and should contain where applicable to the management of resources the following:	
2. The common name of the property.	1
3. A map showing the location and boundaries of the property plus any structures or improvements to the property. (Example #2)	2, 92
4. The legal description and acreage of the property.	1, 131
5. The degree of title interest held by the Board, including reservations and encumbrances such as leases.	6
6. The land acquisition program, if any, under which the property was acquired.	6
7. The designated single use or multiple use management for the property, including other managing agencies.	51
8. Proximity of property to other significant State/local/federal land or water resources. (Example #3) May be included in the map in item #2.	7-10
9. A statement as to whether the property is within an Aquatic Preserve or a designated Area of Critical State Concern or an area under study for such designation. If yes, make sure appropriate managing agencies are notified of the plan.	7
10. The location and description of known and reasonably identifiable renewable and non-renewable resources of the property including, but not limited to, the following:	
A. Brief description of soil types, using U. S. D. A. maps when available;	11-15, 241
B. Archaeological and historical resources*;	49, 330
C. Water resources including the water quality classification for each water body and the identification of any such water body that is designated as an Outstanding Florida Waters;	48
D. Fish and wildlife and their habitat;	26-48
E. State and federally listed endangered or threatened species and their habitat;	47-48
F. Beaches and dunes;	49
G. Swamps, marshes and other wetlands;	48
H. Mineral resources, such as oil, gas and phosphate;	49
I. Unique natural features, such as coral reefs, natural springs, caverns, large sinkholes, virgin timber stands, scenic vistas, and natural rivers and streams; and	48-49
J. Outstanding native landscapes containing relatively unaltered flora, fauna, and geological conditions.	48
11. A description of actions the agency plans, to locate and identify unknown resources such as surveys of unknown archeological and historical resources.	57-108
12. The identification of resources on the property that are listed in the Florida Natural Areas Inventory. <i>Include letter from FNAI or consultant, where appropriate.</i>	16,26-49
13. A description of past uses, including any unauthorized uses of the property. (Example #4)	49
14. A detailed description of existing and planned use(s) of the property. (Example #5)	50-52
15. A description of alternative or multiple uses of the property considered by the managing agency and an explanation of why such uses were not adopted.	50-52
16. A detailed assessment of the impact of planned uses on the renewable and non-renewable resources of the property and a detailed description of the specific actions that will be taken to protect, enhance and conserve these resources and to mitigate damage caused by such uses.	52, 57-126
17. A description of management needs and problems for the property.	125
18. Identification of adjacent land uses that conflict with the planned use of the property, if any.	7
19. A description of legislative or executive directives that constrain the use of such property.	6
20. A finding regarding whether each planned use complies with the State Lands Management Plan adopted by the Trustees on March 17, 1981, and incorporated herein by reference, particularly whether such uses represent "balanced public utilization", specific agency statutory authority, and other legislative or executive	130
21. An assessment as to whether the property, or any portion, should be declared surplus.	52
22. 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. Clearly defined map of parcels can be used.	93-95
23. A description of the management responsibilities of each agency and how such responsibilities will be coordinated, including a provision that requires that the managing agency consult with the Division of Historical Resources before taking actions that may adversely affect archaeological or historic resources. (Example #6)	96
24. A statement concerning the extent of public involvement and local government participation in the development of the plan, if any, including a summary of comments and concerns expressed. (Example #7)	7, 225
Additional Requirements—Per Trustees	
25. Letter of Compliance of the management plan with the Local Government Comprehensive Plan. Letter from local government saying that the plan is in compliance with local government's comprehensive plan.	344

Management Plan Compliance Checklist - Natural Resource Lands	
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253.034 State-Owned Lands; Uses. —Each entity managing conservation lands shall submit to the Division of State Lands a land management plan at least every 10 years in a form and manner prescribed by rule by the Board.	
26. All management plans, whether for single-use or multiple-use properties, shall specifically describe how the managing entity plans to identify, locate, protect and preserve, or otherwise use fragile nonrenewable resources, such as archaeological and historic sites, as well as other fragile resources, including endangered plant and animal species.	57-126
27. The management plan shall provide for the conservation of soil and water resources and for the control and prevention of soil erosion.	96
28. Land management plans submitted by an entity shall include reference to appropriate statutory authority for such use or uses and shall conform to the appropriate policies and guidelines of the state land management plan.	6, 130
29. All land management plans for parcels larger than 1,000 acres shall contain an analysis of the multiple-use potential of the parcel, which analysis shall include the potential of the parcel to generate revenues to enhance the management of the parcel.	51
30. Additionally, the land management plan shall contain an analysis of the potential use of private managers to facilitate the restoration or management of these lands.	129
31. A physical description of the land.	16-49
32. A desired outcome	57-126
33. A quantitative data description of the land which includes an inventory of forest and other natural resources; exotic and invasive plants; hydrological features; infrastructure, including recreational facilities; and other significant land, cultural, or historical features.	16-49, 90-92
34. A detailed description of each short-term and long-term land management goal, the associated measurable objectives, and the related activities that are to be performed to meet the land management objectives. Each land management objective must be addressed by the land management plan, and where practicable, no land management objective shall be performed to the detriment of the other land management activities.	96-124
35. A schedule of land management activities which contains short-term and long-term land management goals and the related measurable objectives and activities. The schedule shall include for each activity a timeline for completion, quantitative measures, and detailed expense and manpower budgets. The schedule shall provide a management tool that facilitates development of performance measures.	96-124
36. A summary budget for the scheduled land management activities of the land management plan. For state lands containing or anticipated to contain imperiled species habitat, the summary budget shall include any fees anticipated from public or private entities for projects to offset adverse impacts to imperiled species or such habitats, which fees shall be used solely to restore, manage, enhance, repopulate, or acquire imperiled species habitat. 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).	126-128, 336
37. Each management plan shall describe both short-term and long-term management goals, and include measurable objectives to achieve those goals. <i>Short-term and long-term management goals shall include measurable objectives for the following, as appropriate:</i>	
(A) Habitat restoration and improvement;	96
(B) Public access and recreational opportunities;	101
(C) Hydrological preservation and restoration;	103
(D) Sustainable forest management;	104
(E) Exotic and invasive species maintenance and control;	104
(F) Capital facilities and infrastructure;	105
(G) Cultural and historical resources;	105
(H) Imperiled species habitat maintenance, enhancement, restoration, or population restoration	99
253.036 Forest Management. —	
38. For all land management plans for parcels larger than 1,000 acres, the lead agency shall prepare the analysis, which shall contain a component or section prepared by a qualified professional forester which assesses the feasibility of managing timber resources on the parcel for resource conservation and revenue generation purposes through a stewardship ethic that embraces sustainable forest management practices if the lead management agency determines that the timber resource management is not in conflict with the primary management objectives of the parcel. (Example #8)	89, 319
259.032 Conservation And Recreation Lands Trust Fund; Purpose. —	
(10)(a) State, regional or local governmental agencies or private entities designated to manage lands under this section shall develop and adopt, with the approval of the Board of Trustees, an individual management plan for each project designed to conserve and protect such lands and their associated natural resources. Private sector involvement in management plan development may be used to expedite the planning process.	

Management Plan Compliance Checklist - Natural Resource Lands	
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39. Individual management plans required by s. 259.032(10)(b), for parcels over 160 acres, shall be developed with input from an advisory group - Management plan should list advisory group members and affiliations.	7, 225
40. The advisory group shall conduct at least one public hearing in each county in which the parcel or project is located. Managing agency should provide DSL/OES with documentation showing date and location of public hearing.	7, 225
41. 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. Managing agency should provide DSL/OES with copy of notice.	7, 225
42. The management prospectus required pursuant to 259.032 (9)(d) shall be available to the public for a period of 30 days prior to the public hearing.	7, 225
43. Summary of Advisory Group Meeting should be provided to DSL/OES.	225
44. Individual management plans shall conform to the appropriate policies and guidelines of the state land management plan and shall include, but not be limited to:	-
A. A statement of the purpose for which the lands were acquired, the projected use or uses as defined in s. 253.034, and the statutory authority for such use or	5
B. Key management activities necessary to achieve the desired outcomes, including, but not limited to, providing public access, preserving and protecting natural resources, protecting cultural and historical resources, restoring habitat, protecting threatened and endangered species, controlling the spread of nonnative plants and animals, performing prescribed fire activities, and other appropriate resource management activities.	96-124
C. A specific description of how the managing agency plans to identify, locate, protect, and preserve, or otherwise use fragile, nonrenewable natural and cultural resources.	96-124
D. A priority schedule for conducting management activities, based on the purposes for which the lands were acquired. (Example #10) The schedule must include a goal, an objective, and a time frame for completion.	96-124
E. A cost estimate for conducting priority management activities, to include recommendations for cost-effective methods of accomplishing those activities. <i>Using categories as adopted pursuant to 259.037, F.S., is suggested. These are: (1) Resource Management; (2) Administration; (3) Support; (4) Capital Improvements; (5) Visitor Services/Recreation; and (6) Law Enforcement.</i>	126, 283
F. A cost estimate for conducting other management activities which would enhance the natural resource value or public recreation value for which the lands were acquired. The cost estimate shall include recommendations for cost-effective methods of accomplishing those activities. <i>Using categories as adopted pursuant to 259.037, F.S., is suggested. These are: (1) Resource Management; (2) Administration; (3) Support; (4) Capital Improvements; (5) Visitor Services/Recreation; and (6) Law Enforcement. (Example #10) Include approximate monetary cost and cost effective methods. Can be placed in the appendix.</i>	126-128, 336
45. A determination of the public uses and public access that would be consistent with the purposes for which the lands were acquired.	86, 270
259.036 Management Review Teams.—	
46. The managing agency shall consider the findings and recommendations of the land management review team in finalizing the required 10-year update of its management plan. Can be addressed in the body of the plan or addressed in an appendix. If not in agreement, the managing agency should reply in a statement in the appendix.	57, 96
Other Requirements	
47. This checklist table at front of plan (pursuant to request of ARC and consensus agreement of managing agencies.)	iv-vi
48. Accomplishments (implementation) from last plan (format variable by agency)	53-56
49. FNAI-based natural community maps (may differ from FNAI in some cases)	17
50. Fire management plans (either by inclusion or reference)(259.032)	58
51. A statement regarding incompatible uses [ref. Ch. 253.034 (9)]	7
52. Cultural resources, including maps of all sites except Native American sites*	49, 330
53. Arthropod control plan	349

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1 Introduction and General Information

Located within an hour's drive of Disney World is the Kissimmee Prairie; one of the largest remaining expanses of dry prairie in the United States. A significant portion of the Kissimmee Prairie has been preserved within the Three Lakes Wildlife Management Area (TLWMA). In addition to dry prairie, TLWMA is a mosaic of wetlands, pine and hardwood uplands, providing quality habitat for numerous wildlife species, including many rare and imperiled species. Named for the three lakes that border the area, Lake Kissimmee, Lake Jackson, and Lake Marian, TLWMA offers ample opportunities for hiking, birding, nature study, hunting, horseback riding, bicycling, and fishing.

The following management plan for TLWMA and portions of the Kissimmee River Public Use Area (KRPUA) is submitted by the Florida Fish and Wildlife Conservation Commission (FWC) for review by the Acquisition Restoration Council (ARC) and the Board of Trustees of the Internal Improvement Trust Fund (BOT) of the State of Florida through the Florida Department of Environmental Protection's (DEP) Division of State Lands (DSL). Submission of this management plan complies with paragraph seven of Lease No. 2785 (Appendix 13.1) and is 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 DSL staff.

1.1 Location

The TLWMA consists of approximately 63,487 acres in Osceola County, Florida (Figure 1). Additional BOT parcels totaling approximately 1,846 acres within the KRPUA (Figure 2), located two miles southwest of the TLMWA, are also managed by FWC in cooperation with the South Florida Water Management District (SFWMD) under management authority pursuant to Lease 2785.

The TLWMA lies in the southern half of Osceola County, west of U.S. Highway 441 and north of State Road 60. Florida's Turnpike bisects TLWMA to the north and east of Lakes Kissimmee, Jackson and Marian. TLWMA comprises multiple sections in Townships 28, 29 and 30 South, in Ranges 31, 32 and 33 East, and in Township 31 South, Range 32 East (Figure 3). The TLWMA is located approximately one mile northwest of Kenansville, 8.5 miles south of Holopaw and 18 miles southeast of St. Cloud. Other cities near TLWMA include Lake Wales (22 miles west) in Polk County, Kissimmee (25 miles northwest) in Osceola County, Melbourne (26 miles northeast) in Brevard County, Sebring (27 miles southwest) in Highlands County and Orlando (39 miles northwest) in Orange County.

The TLWMA is bordered on the north by privately owned land, primarily ranch and agricultural land. The Whaley Conservation Easement, held by the State of Florida on approximately 3,710 acres of land, within the Big Bend Swamp/Holopaw Ranch Florida

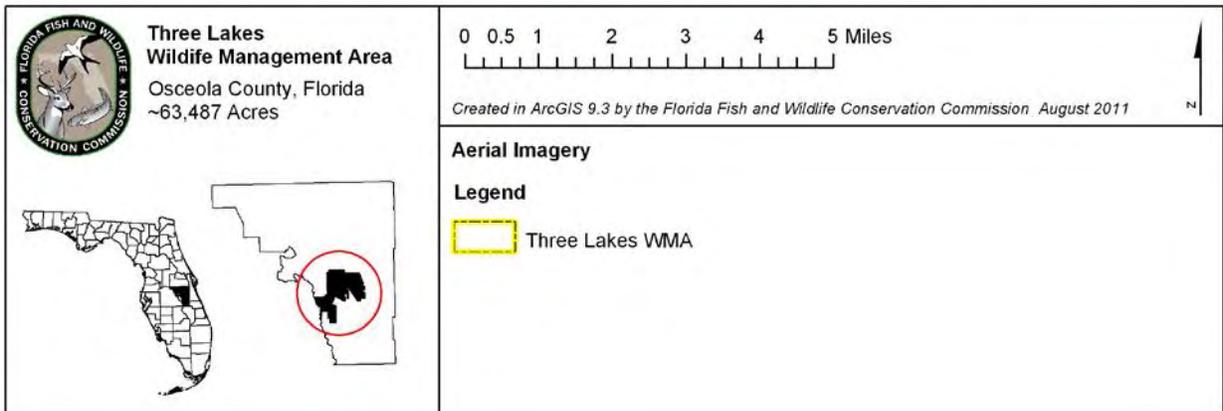
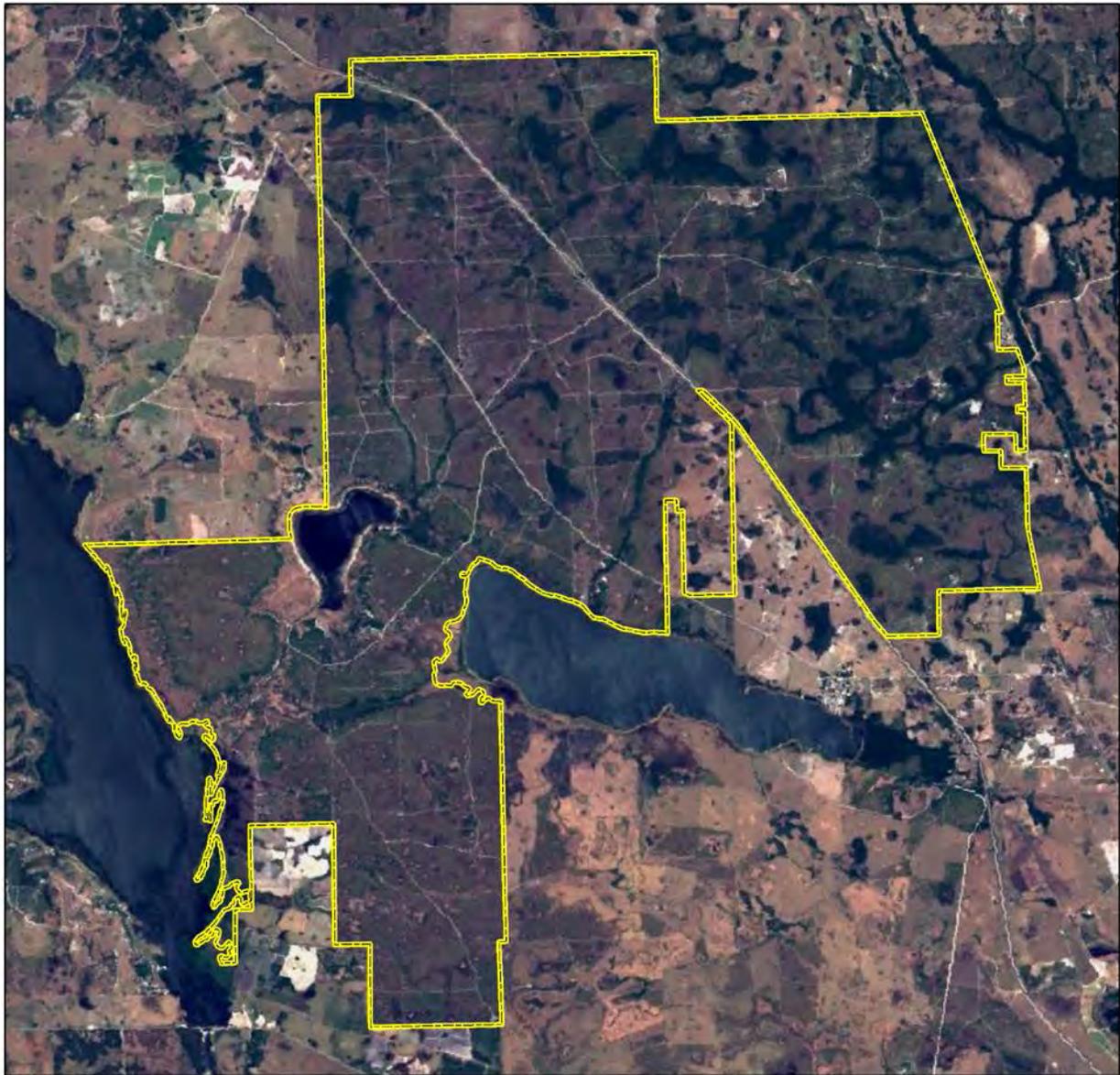


Figure 1: TLWMA Aerial Imagery 2011

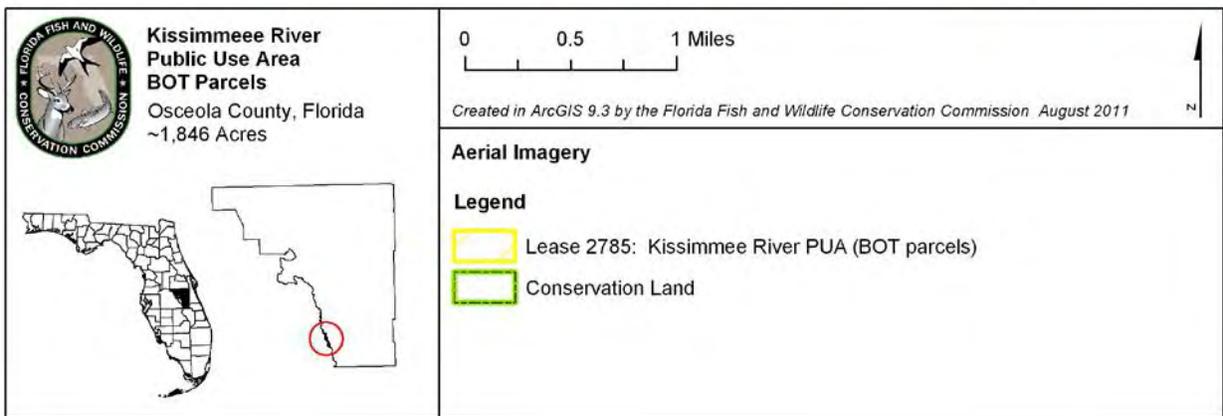
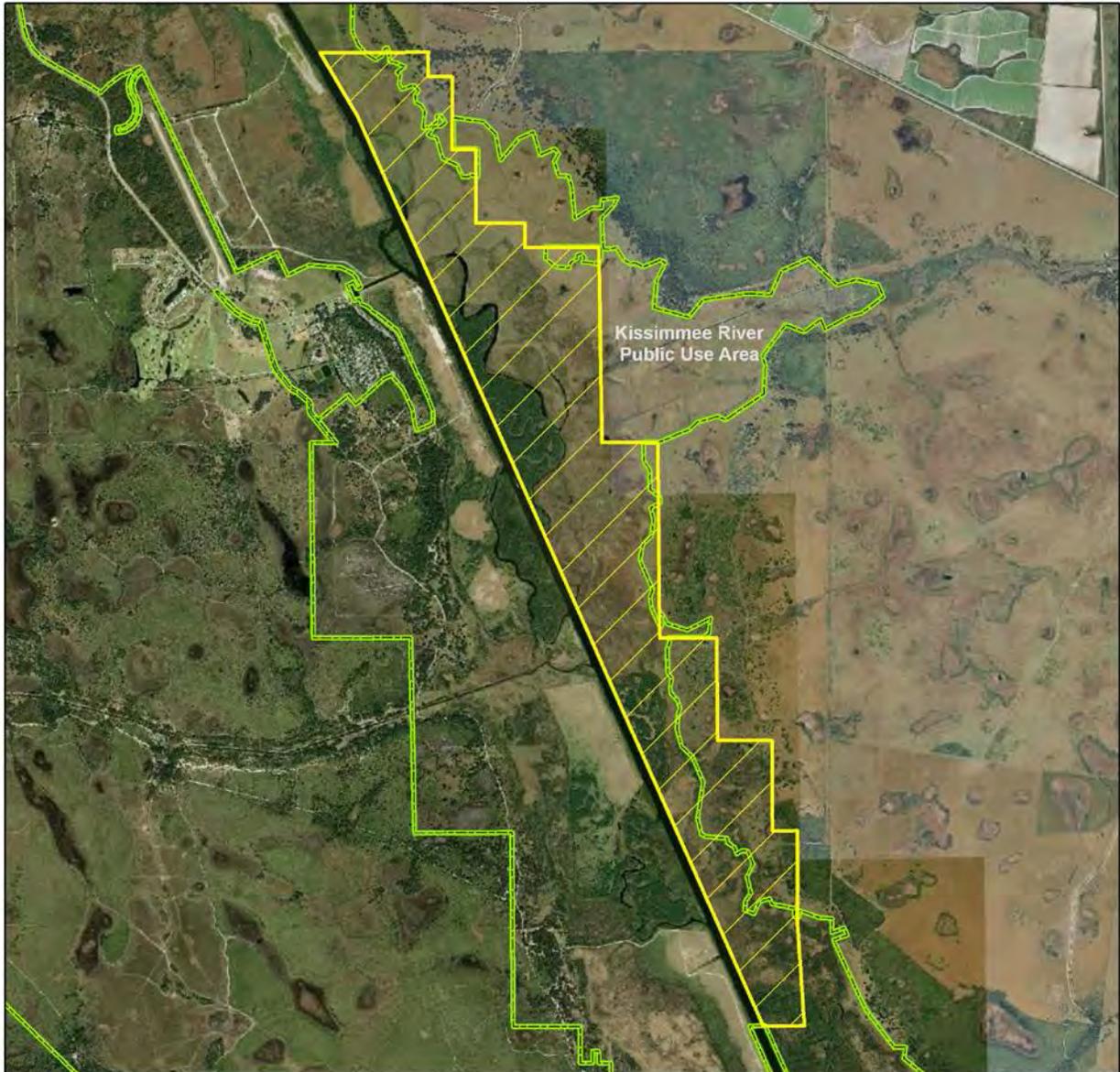


Figure 2: KRPUA PUA Aerial Imagery 2011

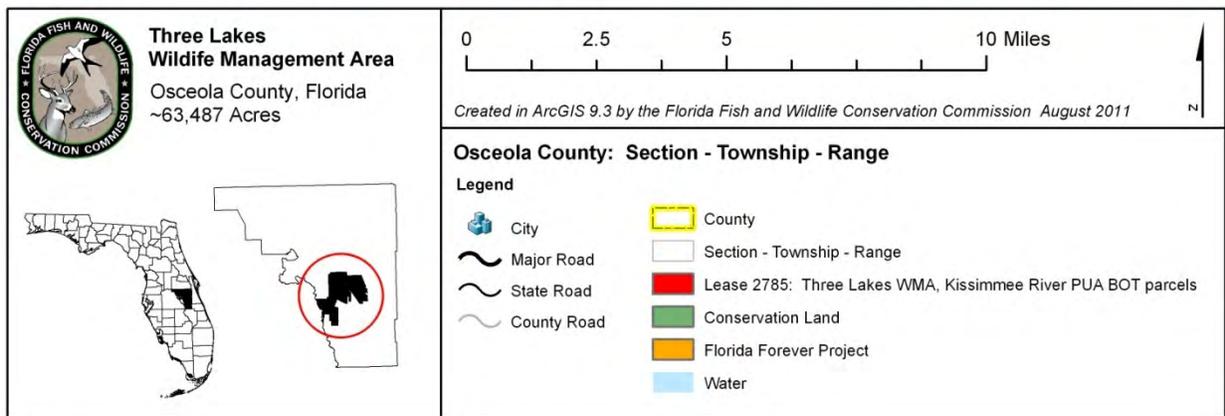
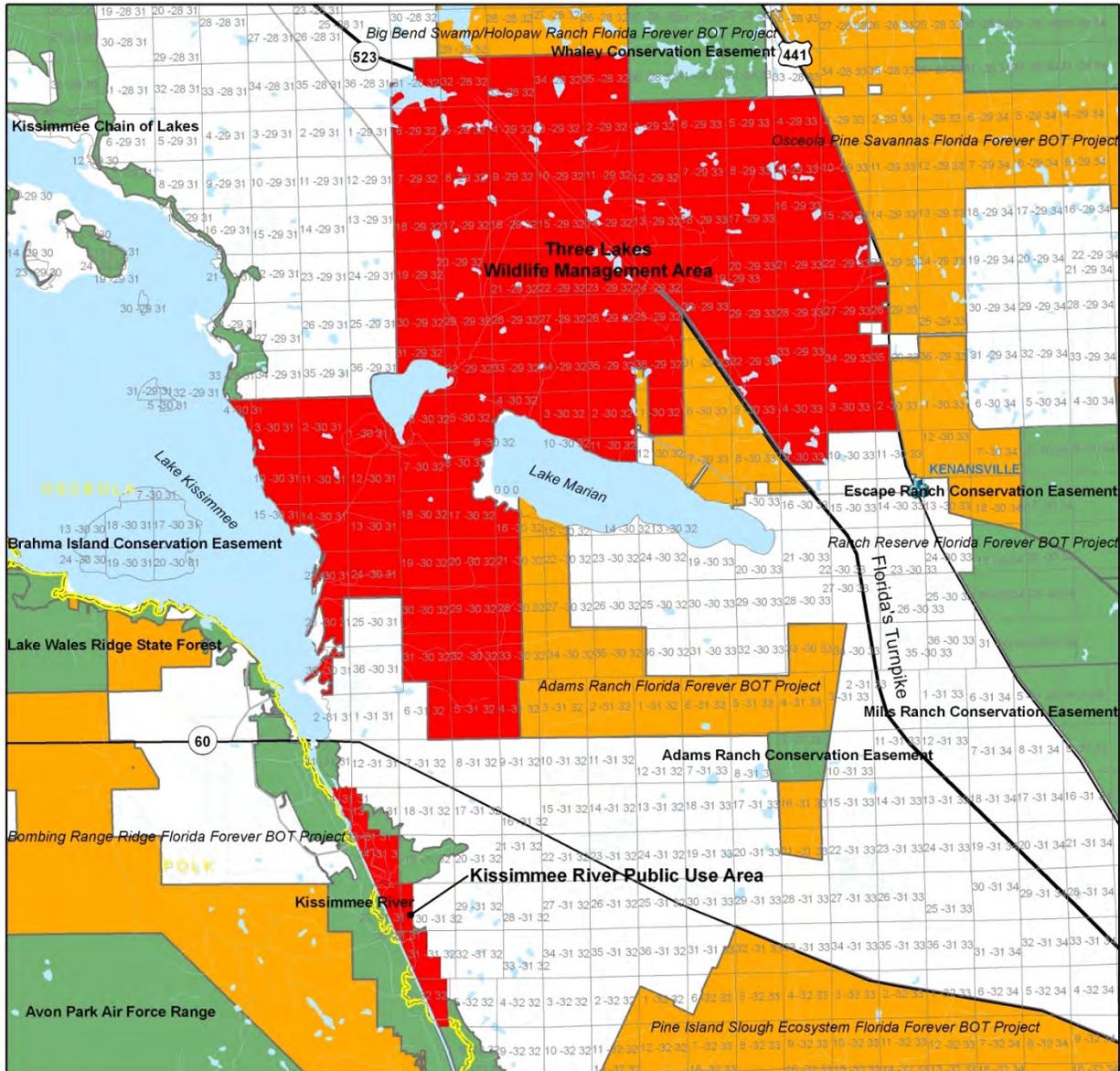


Figure 3: Osceola County Section - Township - Range

Forever Project, lies immediately north of TLWMA, and is monitored by the DEP. The TLWMA is bordered on the west by Lake Kissimmee. Extending northward from this area, along the Lake Kissimmee shoreline, is the Kissimmee Chain of Lakes which is managed by the SFWMD, as well as fish management areas managed by FWC. Areas to the northwest of the TLWMA boundary are primarily privately owned ranchland. Other areas to the southwest of TLWMA are primarily privately owned agricultural land. To the southeast of TLWMA lies Lake Marian and beyond that are privately owned ranchlands.

Approximately 2.5 miles southeast of TLWMA lies the Escape Ranch Conservation Easement, which is held and monitored by the St. Johns River Water Management District (SJRWMD). Within four miles northeast of the TLWMA lies two FWC-managed areas; the Triple N Ranch WMA (TNRWMA) and the Herky Huffman/Bull Creek WMA (HHBCWMA).

1.2 Acquisition

1.2.1 Purpose for Acquisition

Three Lakes Ranch, Inc., the original tract acquired under this project, was purchased under the auspices of the Environmentally Endangered Lands (EEL) Program. Through the EEL program, the State acquired endangered or environmentally unique natural lands for use as natural resource preserves and/or recreation areas. Since the majority of TLWMA was acquired under the EEL program, it is managed in accordance with the original EEL management objectives established for the Prairie Lakes EEL Project:

1. To protect and manage the wet prairies and marshes which absorb nutrients and filter pollutants, thereby improving water quality in Three Lakes, and in the Kissimmee River system,
2. To protect and manage exceptional or endangered natural plant communities, especially the Kissimmee (dry) prairie and longleaf pine communities,
3. To protect and manage native animals associated with these communities, with emphasis on the bald eagle, osprey, sandhill crane, wood stork, burrowing owl, Florida panther, caracara, and red-cockaded woodpecker,
4. To protect and manage the wildlife values and biological productivity of the property, especially the marshes, and
5. To provide a natural flood storage area.

The FWC's land management objectives for the TLWMA are consistent with the original EEL objectives and purpose. These objectives are also consistent with the acquisition purpose and management goals set forth under the Preservation 2000 Act and the Florida Forever Act, which established the purpose for lands the FWC has acquired within TLWMA and continues to manage under the guidance of both of these programs. The purpose, goals and objectives for all of the lands acquired and managed as TLWMA are more comprehensively expressed in this Management Plan, which is reviewed and approved by ARC.

1.2.2 Purchase

The acquisition history of TLWMA began in 1974 with the acquisition of Three Lakes Ranch, Inc. The original purchase of approximately 51,485 acres was made under the EEL program by DSL. Approximately 8,203 acres were leased to the Department of Natural Resources (DNR), now DEP, as Prairie Lakes State Preserve, and the remainder was leased to FWC to be managed as a wildlife management area. In 1989, by mutual agreement among FWC, DNR and the Board of Trustees, the Prairie Lakes portion was leased to FWC and became the Prairie Lakes Unit of TLWMA. In 1992, FWC acquired 767 acres using funds appropriated to the agency under the Preservation 2000 (P-2000) funding. In 1993, also utilizing P-2000 funds, FWC acquired a 5,286 acre portion of the Lucky L Ranch. In 1999, FWC acquired 2,087 acres as an addition to TLWMA known as the U. S. Justice tract. Several smaller properties have been acquired by FWC between 1993 and 2000 under the Conservation and Recreation Lands (CARL) and Preservation 2000 (P-2000) acquisition programs. An additional 1,650 acres within the Lucky L Ranch was acquired in 2008 using Florida Forever funds.

In May, 1998, several BOT parcels located within the KRPUA were amended to TLWMA (Lease 2785 Amendment 5, Appendix 13.1) subsequent to these lands having been released from a prior lease to the SFWMD. The SFWMD and the BOT originally purchased these parcels, as part of the original 51,485 acre Three Lakes acquisition.

1.3 Management Authority

The FWC is the designated lead managing agency for TLWMA under the authority granted by Lease Number 2785 from the DSL acting as an agent for the BOT. 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, 372, 373, 375, 378, 403, 487, 870, and 597 and of the Florida Statutes. These laws provide the authority of FWC with regard to protection and management of the State's fish and wildlife resources.

1.4 Management Directives

The 50-year BOT lease agreement with FWC directs FWC to “manage the leased premises only for the conservation and protection of natural and historical resources and resource-based, public outdoor recreation which is compatible with the conservation and protection of these public lands, as set forth in subsection 253.023(11), FS...” The lease agreement further directs FWC to “implement applicable Best Management Practices for all activities under this lease in compliance with paragraph 18-2.018(2)(h), FAC, which have been selected, developed, or approved by lessor, lessee, or other land managing agencies for the protection and enhancement of the leased premises.”

1.5 Title Interest and Encumbrances

As State-owned lands, title to TLWMA is held by the Governor and Cabinet, sitting as the BOT. In September 1974, DSL, as agent and staff to the BOT, entered into a lease agreement with the Florida Game and Fresh Water Fish Commission (now FWC) as lessee

and lead manager of TLWMA. The term of this lease is 50 years. There are no known encumbrances to the property.

1.6 Proximity to Other Public Properties

While not located within an Aquatic Preserve or designated as an Area of Critical State Concern (Chapter 380.05, Florida Statutes), the TLWMA is in the vicinity of a large number of conservation areas and Florida Forever projects (Figure 4, Table 1 - 2). These lands include areas managed by public and private entities to conserve cultural and natural resources within this region of central Florida. The configurations, locations, and proximities among habitats within and among these lands are important to conservation of the many rare and imperiled species within this region of Florida.

Most of the public conservation lands in the vicinity of TLWMA are owned in full-fee by a public entity. However, some of these conservation lands are protected by less-than-fee conservation easements consisting primarily of private owned and managed ranchlands with a public or private entity holding and monitoring the conservation easement. Conservation easements may be held by either public agencies or private entities, while the landowner who sells or otherwise grants the easement retains the remaining title interests.

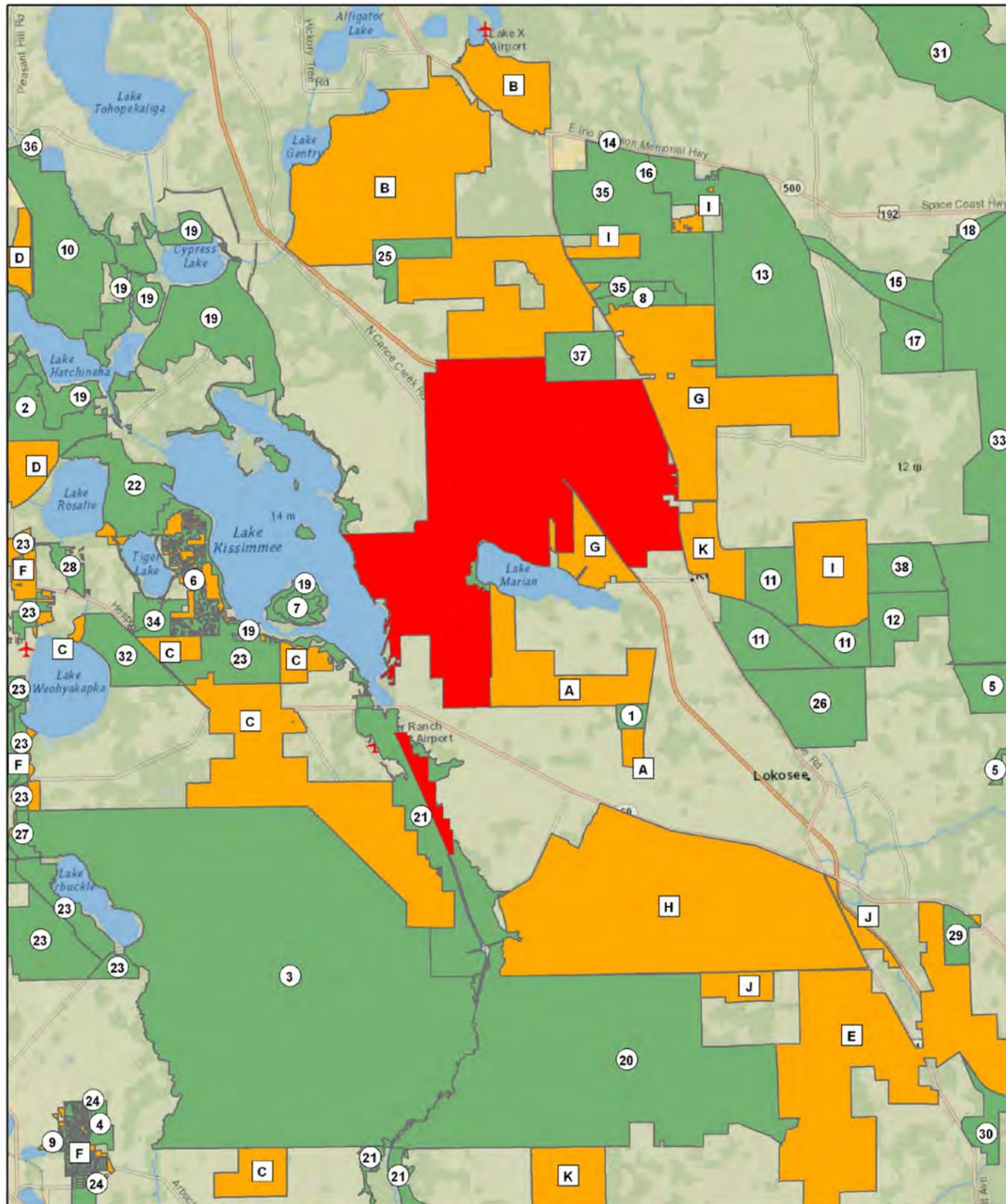
1.7 Adjacent Land Uses

Much of the private rural lands in the regional landscape of TLWMA are composed of working agricultural operations, with cattle ranching, citrus and sod farming being the more common commercial agricultural practices in the area at present. Others include timber harvesting and cypress mulching operations. Large private land holdings comprise most of the property on the east, west, south and north boundaries of TLWMA, with significant large undeveloped ownerships remaining. Only sparse residential development has occurred in the immediate vicinity of TLWMA. However, increased residential development has occurred within the region surrounding TLWMA, including the cities of Kissimmee, St. Cloud, Lake Wales, and Melbourne.

The majority of the area surrounding TLWMA currently has a future land use designation of Rural/Agricultural, which identifies a maximum residential density of one dwelling unit per five acres. The area in and around the community of Kenansville has a future land use designation of Rural Settlement. This designation is intended to preserve existing rural communities while allowing a maximum residential density of two dwelling units per acre.

1.8 Public Involvement

To obtain input from both public and private stakeholders regarding management of TLWMA, the FWC conducted a Management Advisory Group (MAG) consensus-building meeting in Kissimmee, Florida on February 22, 2011. The results of this meeting (Appendix 13.2) were used by the FWC to inform and guide the development of



Conservation Lands and Florida Forever Projects

Conservation Land	Map Label
Adams Ranch Conservation Easement	1
Allen David Broussard Catfish Creek Preserve State Park	2
Avon Park Air Force Range	3
Bass Ranch Conservation Easement	4
Blue Cypress Conservation Area	5
Bombing Range Ridge/TNC Conservation Easement	6
Brahma Island Conservation Easement	7
Broussard Conservation Easement	8
Carter Creek	9
Disney Wilderness Preserve	10
Escape Ranch Conservation Easement	11
Far Reach Ranch Conservation Easement	12
Herky Huffman/Bull Creek Wildlife Management Area	13
Holopaw State Forest	14
Jane Green Creek Less-than-fee Easement Additions	15
Kaschai Conservation Easement	16
Kempfer Property Conservation Easement	17
Kempfer Property Flowage Easement	18
Kissimmee Chain of Lakes	19
Kissimmee Prairie Preserve State Park	20
Kissimmee River	21
Lake Kissimmee State Park	22
Lake Wales Ridge State Forest	23
Lake Wales Ridge Wildlife and Environmental Area	24
Lonesome Camp Ranch Conservation Area	25
Mills Ranch Conservation Easement	26
Morgan Conservation Easement	27
North/Walk-in-Water Creek	28
Padgett Branch Conservation Easements	29
Red Bay Foundation Preserve	30
River Lakes Conservation Area	31
SUMICA	32
Three Forks Conservation Area	33
Tiger Lake Ranch Conservation Easement	34
Triple N Ranch Wildlife Management Area	35
Upper Lakes Basin Watershed	36
Whaley Conservation Easement	37
Wolf Creek Ranch Conservation Easement	38

Florida Forever Project	Map Label
Adams Ranch	A
Big Bend Swamp/Holopaw Ranch	B
Bombing Range Ridge	C
Catfish Creek	D
Kissimmee-St. Johns River Connector	E
Lake Wales Ridge Ecosystem	F
Osceola Pine Savannas	G
Pine Island Slough Ecosystem	H
Ranch Reserve	I
Tiger Cattle Company Ranch	J
Triple Diamond	K



Three Lakes Wildlife Management Area
Osceola County, Florida
~63,487 Acres



Legend

- Three Lakes WMA
- Kissimmee River PUA (BOT parcels)
- Conservation Land
- Florida Forever Project






Created in ArcGIS 9.3 by the Florida Fish and Wildlife Conservation Commission June 2012

Figure 4: Conservation Lands and Florida Forever Projects

Table 1. Conservation lands within a 20 mile radius of TLWMA

<u>United States</u>	<u>Managing Agency</u>
Avon Park Air Force Range	DOD-AF
Malabar Transmitter Annex	DOD-AF
<u>State of Florida</u>	<u>Managing Agency</u>
Allen David Broussard Catfish Creek Preserve State Park	DEP-DRP
Blue Cypress Conservation Area	SJWMD
Brahma Island Conservation Easement	DEP-DSL
Broussard Conservation Easement	DEP-DSL
Bull Creek Wildlife Management Area	FWC
Escape Ranch Conservation Easement	SJRWMD
Far Reach Ranch Conservation Easement	SJRWMD
Fellsmere Water Management Area	SJRWMD
Holopaw State Forest	DACS-FFS
Jane Green Creek Less-than-fee Easement Additions	SJRWMD
Kaschai Conservation Easement	SJRWMD
Kempfer Property Conservation Easement	SJRWMD
Kempfer Property Flowage Easement	SJRWMD
Kissimmee Chain of Lakes	SFWMD
Kissimmee Prairie Preserve State Park	DEP-DRP
Kissimmee River	SFWMD
Lake Kissimmee State Park	DEP-DRP
Lake Wales Ridge State Forest	DACS-FFS
Mills Ranch Conservation Easement	SJRWMD
Morgan Conservation Easement	DEP-DSL
River Lakes Conservation Area	SJRWMD
T. M. Goodwin Waterfowl Management Area	FWC
Three Forks Conservation Area	SJRWMD
Upper Lakes Basin Watershed	SFWMD
Whaley Conservation Easement	DEP-DSL
Willowbrook Conservation Easement	SJRWMD
Wolf Creek Ranch Conservation Easement	SJRWMD
<u>Local Government</u>	<u>Managing Agency</u>
Lake Lizzie Conservation Area	Osceola County
Lake Runnymede Conservation Area	Osceola County
Lonesome Camp Ranch Conservation Area	Osceola County
North/Walk-in-Water Creek	Polk County
Padgett Branch Conservation Easements	Indian River County

Table 1. Conservation lands within a 20 mile radius of TLWMA

<u>Local Government</u>		<u>Managing Agency</u>
SUMICA		Polk County
Private		Manager
Disney Wilderness Preserve		The Nature Conservancy
Hancock Commons Tract		The Nature Conservancy
Hatchineha Ranch		The Nature Conservancy
Mary Male Sanctuary		Florida Audubon Society, Inc.
Tiger Creek Preserve		The Nature Conservancy
TNC/Dellock		The Nature Conservancy
Acronym Key	Agency Name	
DACS-FFS	Florida Department of Agriculture and Consumer Services, Florida Forest Service	
DEP-DRP	Florida Department of Environmental Protection, Division of Recreation and Parks	
DEP-DSL	Florida Department of Environmental Protection, Division of State Lands	
DOD-AF	United States Department of Defense, Air Force	
FWC	Florida Fish and Wildlife Conservation Commission	
SFWMD	South Florida Water Management District	
SJRWMD	St. Johns River Water Management District	

Table 2. Florida Forever projects within a 20 mile radius of TLWMA

Project Name	Acres
Adams Ranch	11,038
Big Bend Swamp/Holopaw Ranch	56,729
Bombing Range Ridge	47,095
Brevard Coastal Scrub	7,277
Catfish Creek	19,479
Kissimmee-St Johns River Connector	36,178
Lake Hatchineha Watershed	6,524
Lake Wales Ridge Ecosystem (Hesperides unit)	3,954
Lake Wales Ridge Ecosystem (Lake Walk-in-the-Water unit)	10,105
Osceola Pine Savannas	47,210
Pine Island Slough Ecosystem	48,973
Ranch Reserve	36,410
Tiger Cattle Company Ranch	2,230
Triple Diamond	7,998

management goals and objectives and to identify challenges and strategies for inclusion in this Management Plan. In addition, a public hearing, as required by Chapter 259.032(10), FS, was held in Kissimmee on March 31, 2011. Notice of this public hearing was announced at the meeting of the Osceola County Board of County Commissioners held on March 21, 2011. Public comments and testimony received at the public hearing (Appendix 13.2) were also considered in the drafting of this Management Plan. Furthermore, a website is maintained for public review and comment:

<http://myfwc.com/conservation/terrestrial/management-plans/develop-mps/>

Additional comment and testimony may be received at a public hearing held by ARC. Input received from all public involvement efforts has been considered in the development of this Management Plan.

2 Natural and Cultural Resources

2.1 Physiography

2.1.1 Climate

The climate of Central Florida is humid subtropical. Between October and May, cold fronts regularly sweep through the state which keeps conditions dry, particularly over the peninsula. In winters where an El Niño climate cycle exists, rainfall increases while temperatures are cooler statewide. Beginning in the spring, towards the end of the dry season, lightning originated wild fires become more common. There is a defined rainy season from June through September, which are also the months most at risk of tropical cyclones making landfall in the region. Easterly winds off the warm waters of the Gulf Stream running through the Florida Straits keep temperatures moderate across the central peninsula year round.

Osceola County's January temperatures range between 72° Fahrenheit (F) for the average high and 48° F for the average low. July temperatures range between 92° F for the average high and 72° F for the average low. Annually, Osceola County experiences an average of 116 days of rain, and an average total rainfall of 53 inches.

2.1.2 Topography

The TLWMA is situated within the Osceola Plain, which is the largest physiographic region in Osceola County. The topographic features within the boundaries of TLWMA range along a relatively shallow gradient between 50 feet above mean sea level (MSL) and 82 feet above Mean Sea Level.

2.1.3 Soils

Natural Resource Conservation Service (NRCS) soils maps displaying TLWMA's soil series and soil depth to water table are presented as Figures 5 - 8. Soils series descriptions may be found in Appendix 13.3.

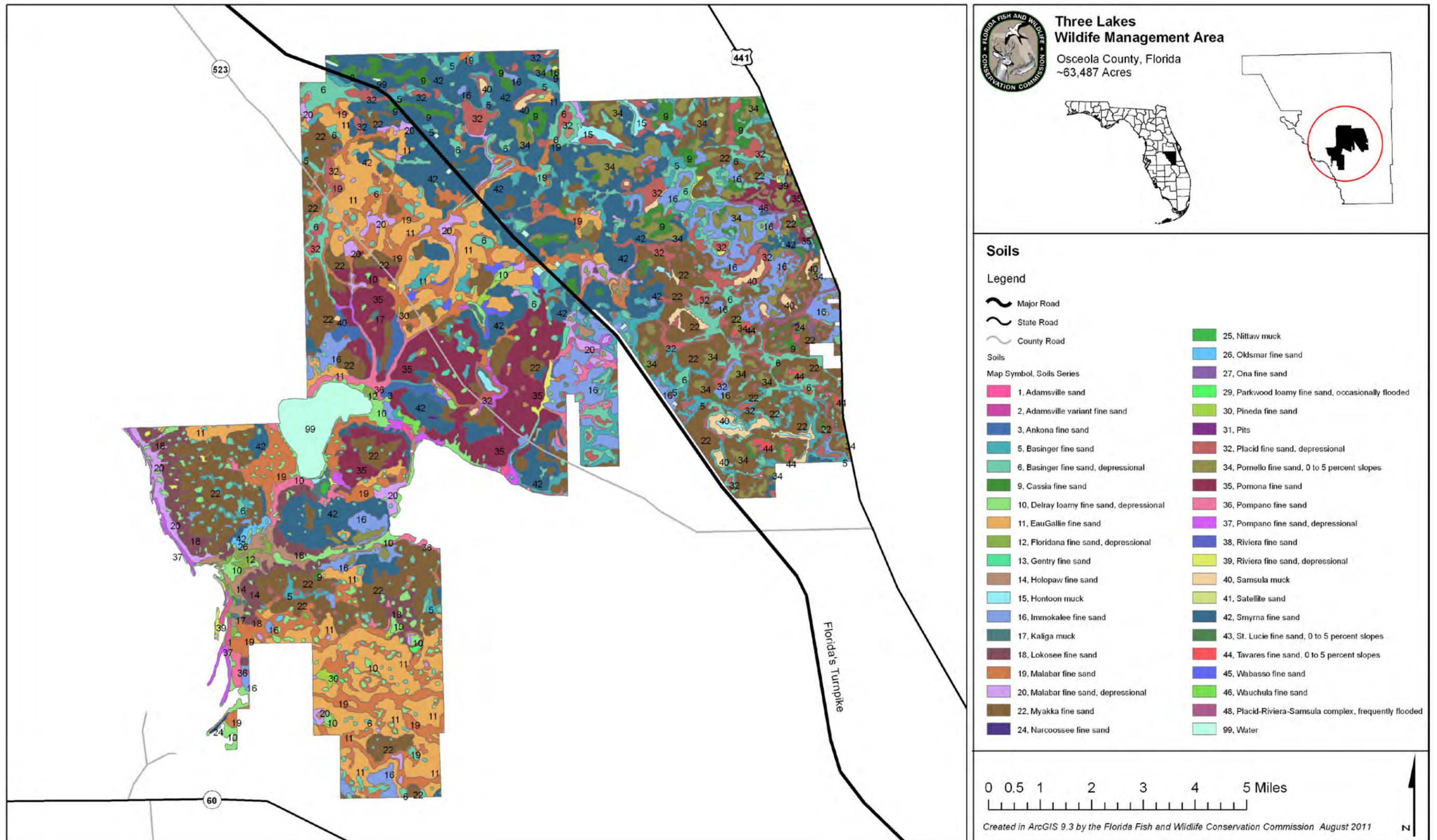


Figure 5: TLWMA – Soils

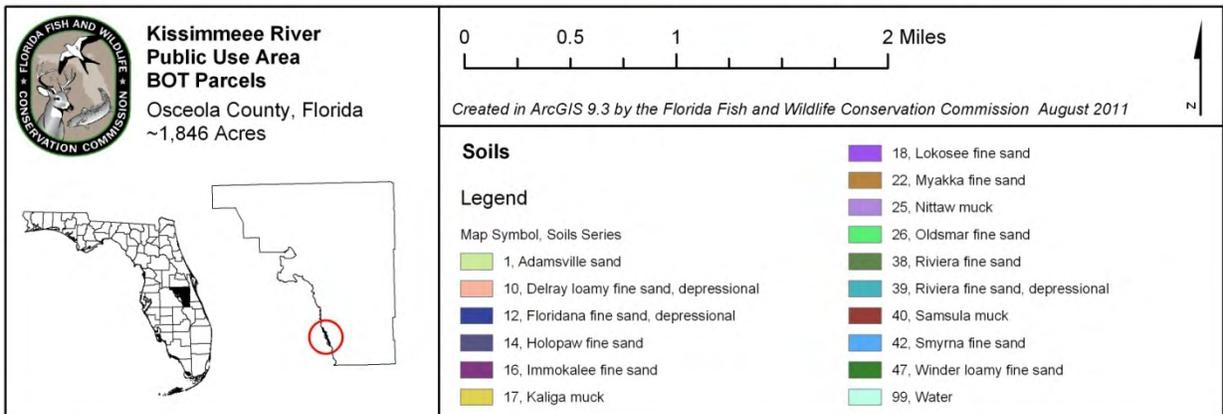
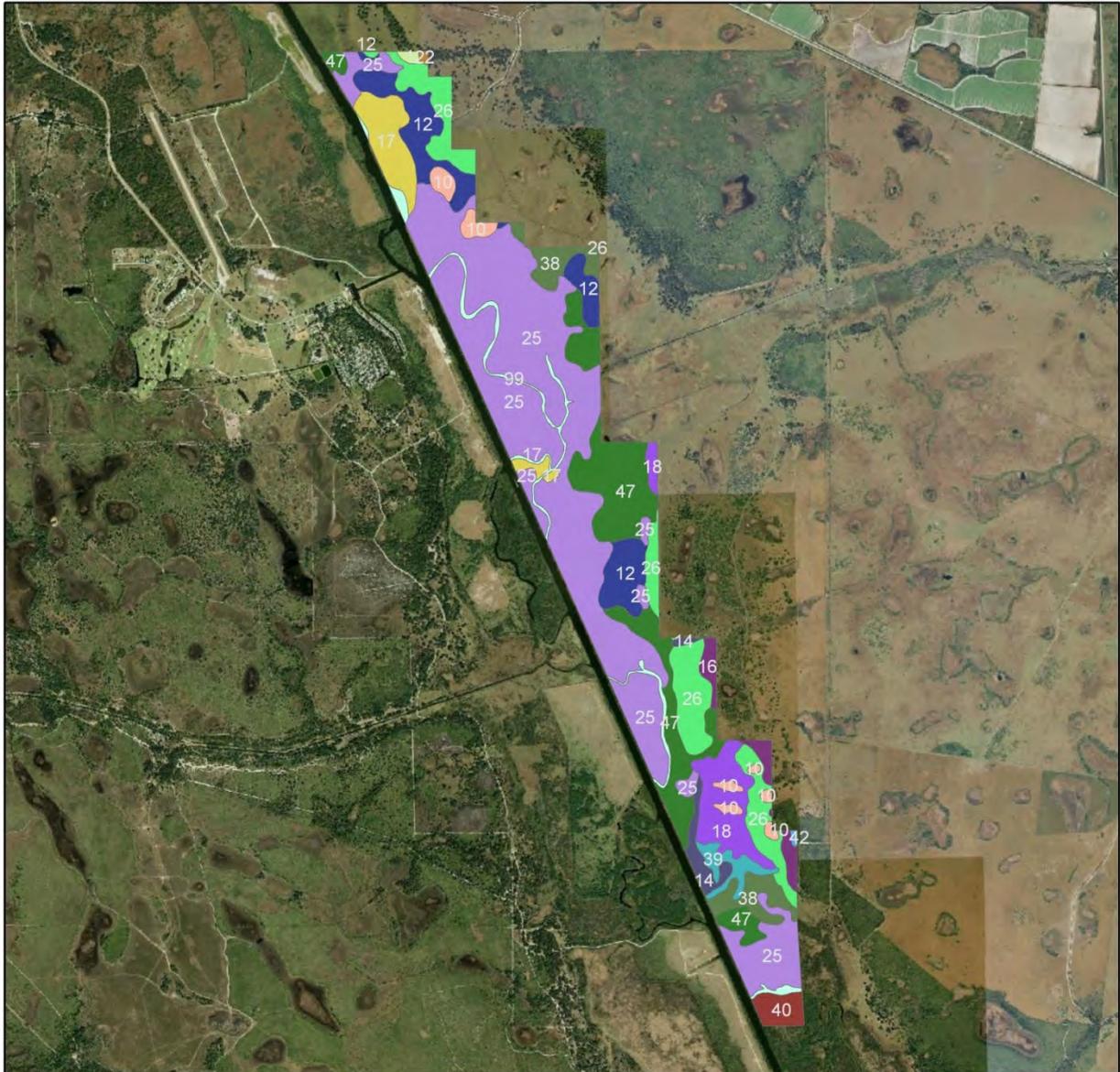


Figure 6: KRPUA BOT Parcels - Soils

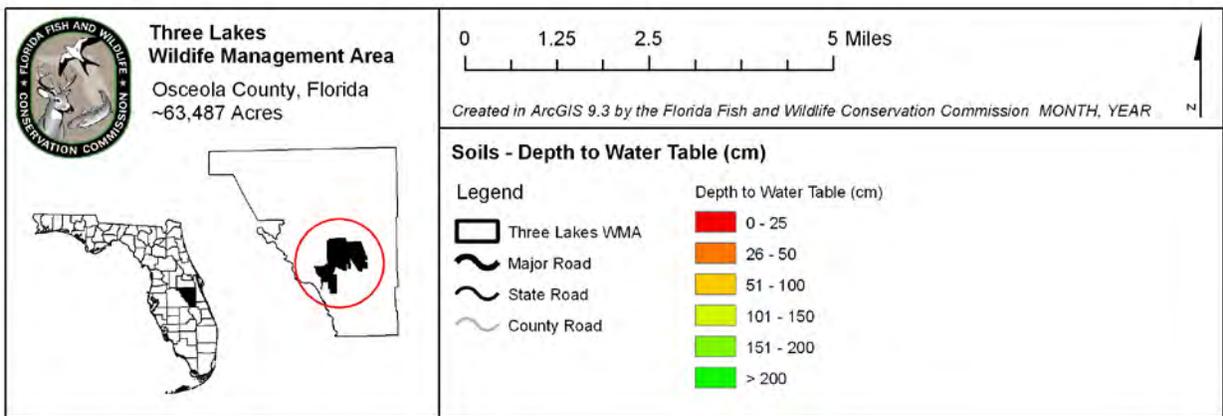
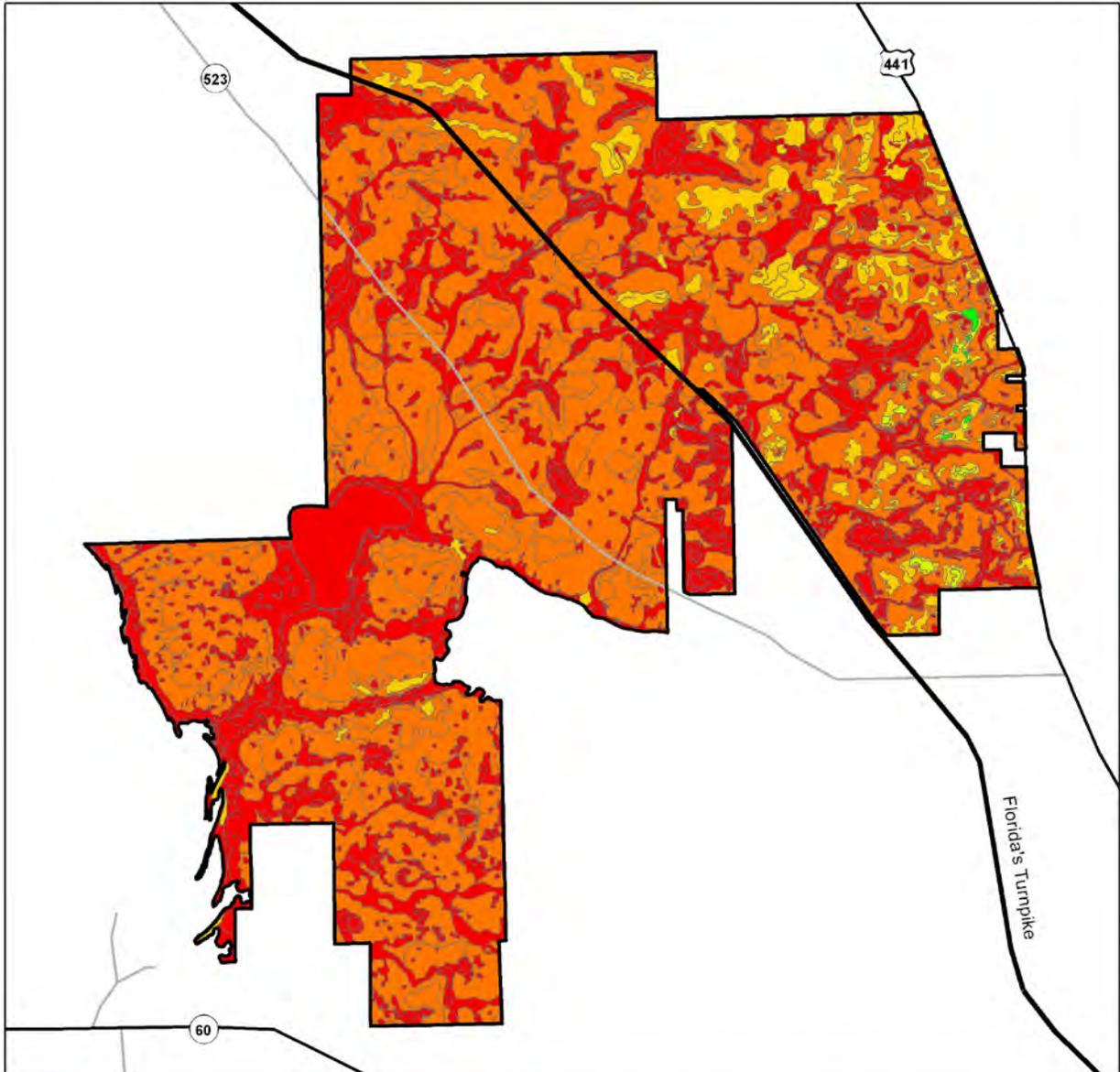


Figure 7: TLWMA - Depth to Water Table

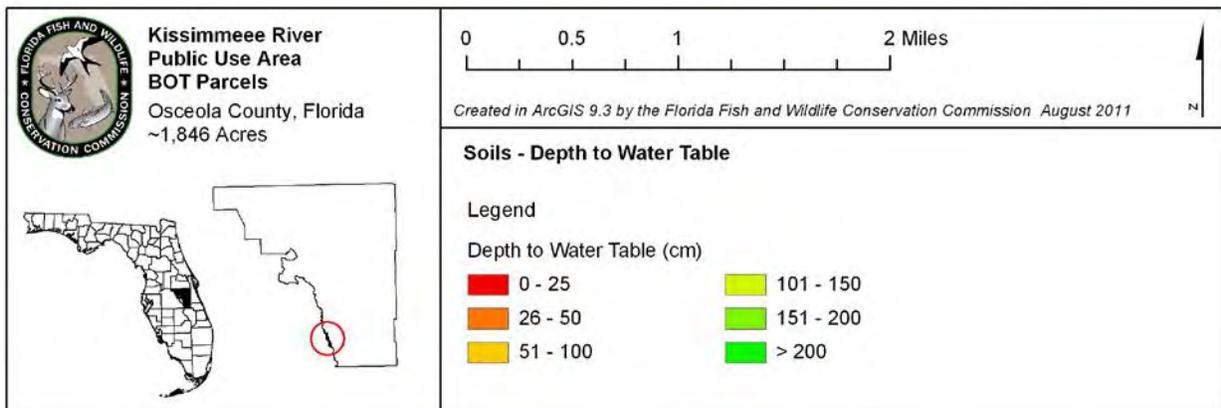
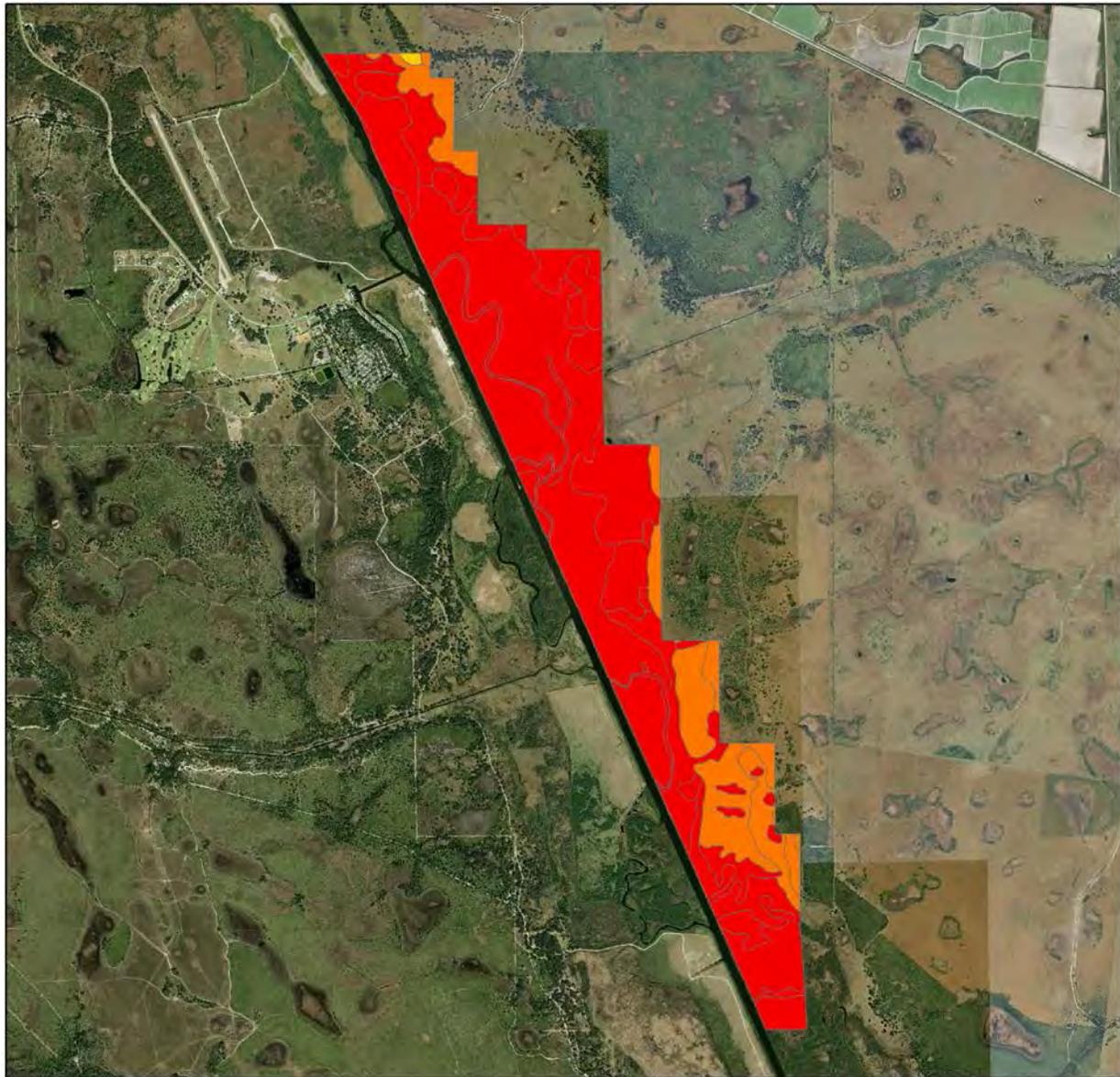


Figure 8: KRPUA BOT Parcels - Depth to Water Table

2.2 Vegetation

The TLWMA is composed of a mosaic of uplands and wetlands. Nineteen natural community and four anthropogenic community types occur in this mosaic. The Florida Natural Areas Inventory (FNAI) has completed the mapping of the current natural communities of TLWMA (Table 3, Figures 9 - 10) and has compiled a list of observed native plant species (Table 4).

Table 3. Natural and Anthropogenic Communities of TLWMA

<u>Natural Community</u>	<u>Acres</u>	<u>Percent of Area</u>
Dry prairie	16,031.2	24.5%
Mesic flatwoods	15,975.9	24.5%
Dome swamp	7,908.6	12.1%
Wet prairie	6,820.2	10.4%
Mesic hammock	3,175.8	4.9%
Basin marsh	3,000.1	4.6%
Depression marsh	2,284.1	3.5%
Pasture - improved	2,171.1	3.3%
Scrubby flatwoods	1,223.1	1.9%
Ruderal	1,112.1	1.7%
Pine plantation	1,102.9	1.7%
Prairie/flatwoods lake	1,093.9	1.7%
Scrub	834.8	1.3%
Baygall	812.1	1.2%
Floodplain marsh	457.4	0.7%
Pasture - semi-improved	370.6	0.6%
Restoration dry prairie	210.8	0.3%
Sandhill	208.5	0.3%
Wet flatwoods	208.4	0.3%
Hydric hammock	138.6	0.2%
Xeric hammock	92.4	0.1%
Blackwater stream	43.4	0.1%
Successional hardwood forest	34.6	0.1%
Basin swamp	4.5	0.0%

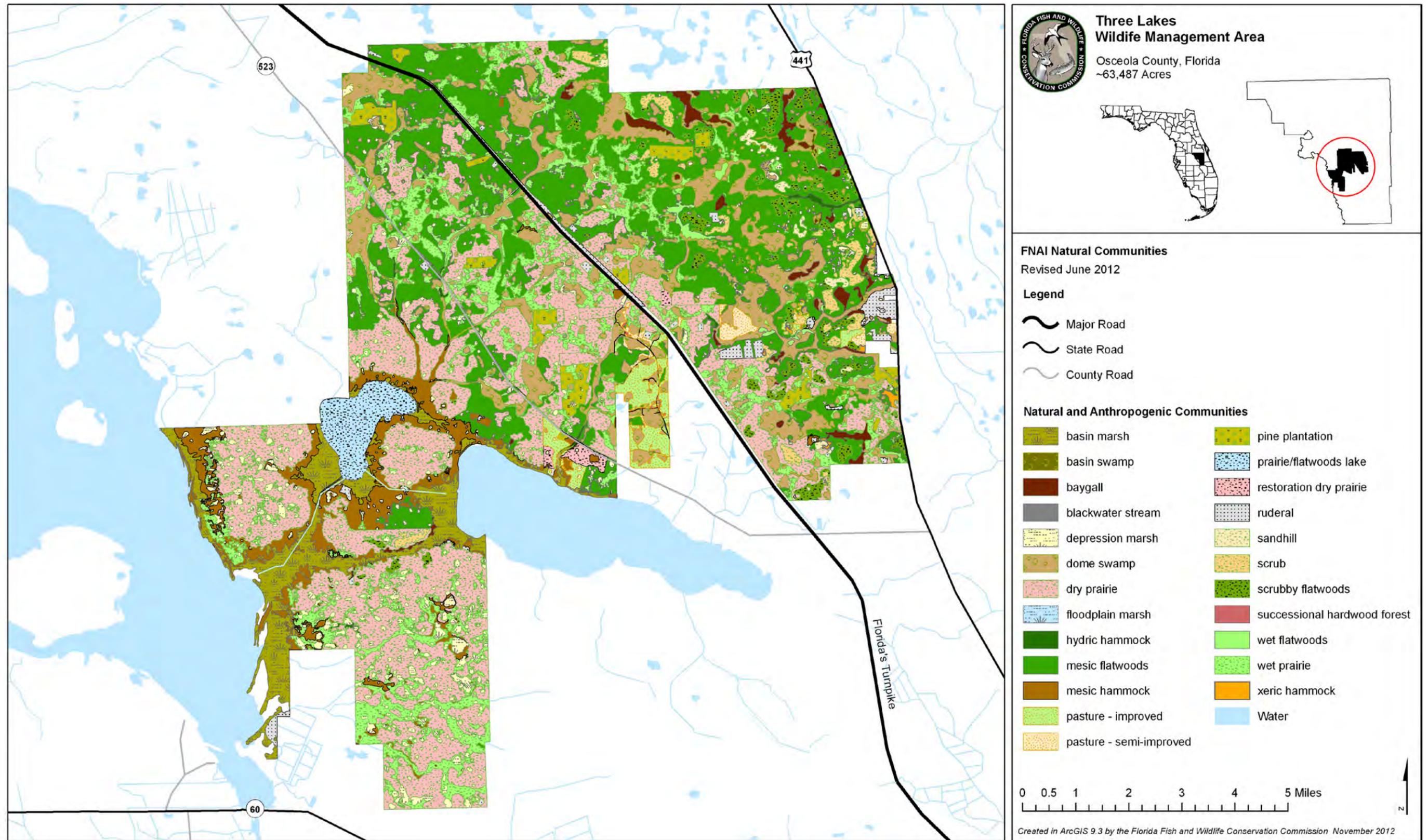


Figure 9: TLWMA – FNAI Natural Communities

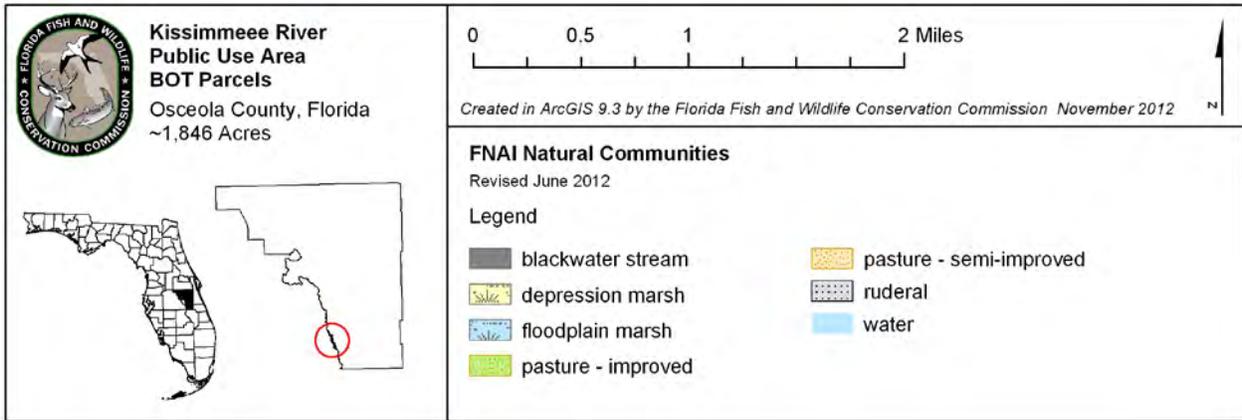


Figure 10: KRPUA BOT Parcels – FNAI Natural Communities

Table 4. Plant species observed at TLWMA

<u>Common name</u>	<u>Scientific name</u>
Airplant	<i>Tillandsia</i> sp.
Alligator weed	<i>Alternanthera philoxeroides</i>
American lotus	<i>Nelumbo lutea</i>
Arrowfeather threeawn	<i>Aristida purpurascens</i>
Aster	<i>Aster</i> sp.
Bahiagrass	<i>Paspalum notatum</i>
Bald cypress	<i>Taxodium distichum</i>
Baldwin's nutrush	<i>Scleria baldwinii</i>
Ball moss	<i>Tillandsia recurvata</i>
Beaked panicgrass	<i>Panicum anceps</i>
Beaksedge	<i>Rhynchospora</i> sp.
Bearded grass-pink	<i>Calopogon barbatus</i>
Beggarticks	<i>Bidens alba</i> var. <i>radiata</i>
Bermudagrass	<i>Cynodon dactylon</i>
Big carpetgrass	<i>Axonopus furcatus</i>
Blackberry	<i>Rubus</i> sp.
Blackroot	<i>Pterocaulon pycnostachyum</i>
Bladderpod	<i>Sesbania vesicaria</i>
Bladderwort	<i>Utricularia</i> sp.
Blaspheme vine	<i>Smilax laurifolia</i>
Blazing star	<i>Liatris</i> sp.
Blue butterwort	<i>Pinguicula caerulea</i>
Blue maidencane	<i>Amphicarpum muhlenbergianum</i>
Blue palm	<i>Sabal minor</i>
Blue waterhyssop	<i>Bacopa caroliniana</i>
Bluejack oak	<i>Quercus incana</i>
Bluestem	<i>Andropogon</i> sp.
Bog white violet	<i>Viola lancifolia</i>
Bog yellow-eyed grass	<i>Xyris difformis</i>
Bogbuttons	<i>Lachnocaulon</i> sp.
Bottlebrush threeawn	<i>Aristida spiciformis</i>
Bracken fern	<i>Pteridium aquilinum</i>
Brazilian pepper	<i>Schinus terebinthifolius</i>
Broadleaf cattail	<i>Typha latifolia</i>
Broomsedge bluestem	<i>Andropogon virginicus</i>
Buckthorn	<i>Sideroxylon</i> sp.
Bunched beaksedge	<i>Rhynchospora cephalantha</i>

Table 4. Plant species observed at TLWMA

<u>Common name</u>	<u>Scientific name</u>
Bush mint	<i>Hyptis alata</i>
Bushy bluestem	<i>Andropogon glomeratus</i>
Butterfly orchid	<i>Encyclia tampensis</i>
Buttonbush	<i>Cephalanthus occidentalis</i>
Cabbage palm	<i>Sabal palmetto</i>
Caesar's weed	<i>Urena lobata</i>
Camphorweed	<i>Pluchea sp.</i>
Cardinal airplant	<i>Tillandsia fasciculata</i>
Carolina fimbry	<i>Fimbristylis caroliniana</i>
Carolina holly	<i>Ilex ambigua</i>
Carolina willow	<i>Salix caroliniana</i>
Carpetgrass	<i>Axonopus sp.</i>
Catbrier	<i>Smilax auriculata</i>
Chaffhead	<i>Carphephorus sp.</i>
Chalky bluestem	<i>Andropogon virginicus</i> var. <i>glaucus</i>
Chapman oak	<i>Quercus chapmanii</i>
Chufa	<i>Cyperus esculenta</i>
Cinnamon fern	<i>Osmunda cinnamomea</i>
Climbing hempvine	<i>Mikania scandens</i>
Coastal plain St. John's-wort	<i>Hypericum brachyphyllum</i>
Coastalplain honeycomb-head	<i>Balduina angustifolia</i>
Coastalplain staggerbush	<i>Lyonia fruticosa</i>
Coastalplain yellow-eyed grass	<i>Xyris ambigua</i>
Cogon grass	<i>Imperata cylindrica</i>
Common ragweed	<i>Ambrosia artemisiifolia</i>
Corkscrew threeawn	<i>Aristida gyrans</i>
Crabgrass	<i>Digitaria sp.</i>
Creeping primrosewillow	<i>Ludwigia repens</i>
Creeping rush	<i>Juncus repens</i>
Crowpoison	<i>Zigadenus densus</i>
Cut-throat grass	<i>Panicum abscissum</i>
Cypress witchgrass	<i>Dichanthelium ensifolium</i>
Dahoon	<i>Ilex cassine</i>
Deerberry	<i>Vaccinium stamineum</i>
Denseflower knotweed	<i>Polygonum densiflorum</i>
Dog fennel	<i>Eupatorium capillifolium</i>
Dotted smartweed	<i>Polygonum punctatum</i>

Table 4. Plant species observed at TLWMA

<u>Common name</u>	<u>Scientific name</u>
Dwarf huckleberry	<i>Gaylussacia dumosa</i>
Dwarf live oak	<i>Quercus minima</i>
Dwarf wax myrtle	<i>Myrica cerifera</i> var. <i>pumila</i>
Early paspalum	<i>Paspalum praecox</i>
Early whitetop fleabane	<i>Erigeron vernus</i>
Eastern milkpea	<i>Galactia regularis</i>
Elderberry	<i>Sambucus nigra</i> ssp. <i>canadensis</i>
Elliot's milkpea	<i>Galactia elliotii</i>
Elliott's blueberry	<i>Vaccinium elliotii</i>
Elliott's yellow-eyed grass	<i>Xyris elliotii</i>
Erectleaf witchgrass	<i>Dichanthelium erectifolium</i>
False nettle	<i>Boehmeria cylindrica</i>
False rosemary	<i>Conradina grandiflora</i>
Fascicled beaksedge	<i>Rhynchospora fascicularis</i>
Fetterbush	<i>Lyonia</i> sp.
Fireflag	<i>Thalia geniculata</i>
Fireweed	<i>Erechtites hieraciifolius</i>
Flatsedge	<i>Cyperus</i> sp.
Flattop goldenrod	<i>Euthamia graminifolia</i>
Floating bladderwort	<i>Utricularia inflata</i>
Floating hearts	<i>Nymphoides aquatic</i>
Floating marshpennywort	<i>Hydrocotyle ranunculoides</i>
Florida Indian plantain	<i>Arnoglossum floridanum</i>
Florida rosemary	<i>Ceratiola ericoides</i>
Florida threeawn	<i>Aristida rhizomophora</i>
Florida tickseed	<i>Coreopsis floridanum</i>
Four-petal St. John's-wort	<i>Hypericum tetrapetalum</i>
Fragrant eryngo	<i>Eryngium aromaticum</i>
Fringed yellow-eyed grass	<i>Xyris fimbriata</i>
Gallberry	<i>Ilex glabra</i>
Golden polypody	<i>Phlebodium aureum</i>
Goldenrod	<i>Solidago</i> sp.
Gopher apple	<i>Licania michauxii</i>
Grapevine	<i>Vitis</i> sp.
Grassleaf flattop goldenrod	<i>Euthamia graminifolia</i>
Grass-pink	<i>Calopogon</i> sp.
Grassy arrowhead	<i>Sagittaria graminea</i>

Table 4. Plant species observed at TLWMA

<u>Common name</u>	<u>Scientific name</u>
Groundsel tree	<i>Baccharis halimifolia</i>
Guava	<i>Psidium guajava</i>
Hemlock witchgrass	<i>Dichanthelium portoricense</i>
Highbush blueberry	<i>Vaccinium corymbosum</i>
Hooded pitcherplant	<i>Sarracenia minor</i>
Horned bladderwort	<i>Utricularia cornuta</i>
Interrupted maidenfern	<i>Thelypteris interrupta</i>
Ladies'-tresses	<i>Spiranthes</i> sp.
Lance-leaved arrowhead	<i>Sagittaria lancifolia</i>
Large whitetop sedge	<i>Dichromena</i> sp.
Large-flower rose gentian	<i>Sabatia grandiflora</i>
Largefruit beaksedge	<i>Rhynchospora megalocarpa</i>
Leconte's flatsedge	<i>Cyperus lecontei</i>
Lichen	<i>Cladina evansii</i>
Lichen	<i>Cladina subtenuis</i>
Lichen	<i>Cladonia leporina</i>
Little bluestem	<i>Schizachyrium scoparium</i>
Live oak	<i>Quercus virginiana</i>
Lizard-tail	<i>Saururus cernuus</i>
Loblolly bay	<i>Gordonia lasianthus</i>
Longleaf maidencane	<i>Panicum longifolium</i>
Longleaf pine	<i>Pinus palustris</i>
Longleaf threeawn	<i>Aristida palustris</i>
Loose-headed beaksedge	<i>Rhynchospora chalarocephala</i>
Lopsided Indiangrass	<i>Sorghastrum secundum</i>
Lovegrass	<i>Eragrostis</i> sp.
Low pinebarren milkwort	<i>Polygala ramosa</i>
Maidencane	<i>Panicum hemitomom</i>
Many-flowered grasspink	<i>Calopogon multiflorus</i>
Many-flowered pennywort	<i>Hydrocotyle umbellata</i>
Meadowbeauty	<i>Rhexia</i> sp.
Mermaidweed	<i>Proserpinaca pectinata</i>
Millet beaksedge	<i>Rhynchospora miliacea</i>
Mohr's thoroughwort	<i>Eupatorium mohrii</i>
Morning glory	<i>Ipomoea</i> sp.
Muscadine	<i>Vitis rotundifolia</i>
Myrtle oak	<i>Quercus myrtifolia</i>

Table 4. Plant species observed at TLWMA

<u>Common name</u>	<u>Scientific name</u>
Myrtle-leaf St. John's-wort	<i>Hypericum myrtifolium</i>
Narrowfruit beaksedge	<i>Rhynchospora inundata</i>
Narrowleaf blue-eyed grass	<i>Sisyrinchium angustifolium</i>
Narrowleaf Elliott's bluestem	<i>Andropogon gyrans</i> var. <i>stenophyllus</i>
Narrowleaf sunflower	<i>Helianthus angustifolius</i>
Netted nutrush	<i>Scleria reticularis</i>
Netted pawpaw	<i>Asimina reticulata</i>
Nimblewill muhly	<i>Muhlenbergia schreberi</i>
Nutrush	<i>Scleria</i> sp.
Nuttall's meadowbeauty	<i>Rhexia nuttallii</i>
Nuttall's thistle	<i>Cirsium nuttallii</i>
Oakleaf fleabane	<i>Erigeron quercifolius</i>
October flower	<i>Polygonella polygama</i>
Orange milkwort	<i>Polygala lutea</i>
Pale meadowbeauty	<i>Rhexia mariana</i>
Panicgrass	<i>Panicum</i> sp.
Paragrass	<i>Urochloa mutica</i>
Paspalum grass	<i>Paspalum</i> sp.
Peelbark St. John's-wort	<i>Hypericum fasciculatum</i>
Peppervine	<i>Ampelopsis arborea</i>
Persimmon	<i>Diospyros virginiana</i>
Peruvian primrosewillow	<i>Ludwigia peruviana</i>
Pickerelweed	<i>Pontederia cordata</i>
Pinebarren goldenrod	<i>Solidago fistulosa</i>
Pineland chaffhead	<i>Carphephorus carnosus</i>
Pineland pimpernel	<i>Samolus valerandi</i> ssp. <i>parviflorus</i>
Pineland rayless goldenrod	<i>Bigelovia nudata</i>
Pineland vanilla leaf	<i>Carphephorus odoratissimus</i> var. <i>subtropicanus</i>
Pinewoods fingergrass	<i>Eustachys petraea</i>
Pineywoods dropseed	<i>Sporobolus junceus</i>
Pink sundew	<i>Drosera capillaris</i>
Pinweed	<i>Lechea</i> sp.
Plumed beaksedge	<i>Rhynchospora plumosa</i>
Poison ivy	<i>Toxicodendron radicans</i>
Pond cypress	<i>Taxodium ascendens</i>
Primrosewillow	<i>Ludwigia</i> sp.
Purple bladderwort	<i>Utricularia purpurea</i>

Table 4. Plant species observed at TLWMA

<u>Common name</u>	<u>Scientific name</u>
Purple bluestem	<i>Andropogon glomeratus</i> var. <i>glaucopsis</i>
Purple lovegrass	<i>Eragrostis spectabilis</i>
Purple thistle	<i>Cirsium horridulum</i>
Queen's delight	<i>Stillingia sylvatica</i>
Rattlesnake master	<i>Eryngium yuccifolium</i>
Red bay	<i>Persea borbonia</i>
Red maple	<i>Acer rubrum</i>
Redroot	<i>Lachnanthes caroliniana</i>
Redtop panicgrass	<i>Panicum rigidulum</i>
Resurrection fern	<i>Pleopeltis polypodioides</i>
Rose-rush	<i>Lygodesmia aphylla</i>
Rosy camphorweed	<i>Pluchea rosea</i>
Rouge plant	<i>Rivina humilis</i>
Rough witchgrass	<i>Dichantherium leucothrix</i>
Royal fern	<i>Osmunda regalis</i>
Runner oak	<i>Quercus pumila</i>
Rusty staggerbush	<i>Lyonia ferruginea</i>
Sand cordgrass	<i>Spartina bakeri</i>
Sand laurel oak	<i>Quercus hemisphaerica</i>
Sand live oak	<i>Quercus geminata</i>
Sand pine	<i>Pinus clausa</i>
Savannah milkweed	<i>Asclepias pedicellata</i>
Savannah panicum	<i>Phanopyrum gymnocarpon</i>
Saw grass	<i>Cladium jamaicense</i>
Saw palmetto	<i>Serenoa repens</i>
Sawtooth blackberry	<i>Rubus argutus</i>
Scrub oak	<i>Quercus inopina</i>
Scrubland goldenaster	<i>Chrysopsis subulata.</i>
Sedge	<i>Carex</i> sp.
Sensitive briar	<i>Mimosa quadrivalvis</i>
Shiny dwarf blueberry	<i>Vaccinium myrsinites</i>
Shiny fetterbush	<i>Lyonia lucida</i>
Shoestring fern	<i>Vittaria lineata</i>
Shortleaf blazing star	<i>Liatris tenuifolia</i>
Shortleaf rose gentian	<i>Sabatia brevifolia</i>
Shortleaf yellow-eyed grass	<i>Xyris brevifolia</i>
Shortspike bluestem	<i>Andropogon brachystachyus</i>

Table 4. Plant species observed at TLWMA

<u>Common name</u>	<u>Scientific name</u>
Slash pine	<i>Pinus elliottii</i>
Slender flattop goldenrod	<i>Euthamia caroliniana</i>
Small butterwort	<i>Pinguicula pumila</i>
Smallfruit beggarticks	<i>Bidens mitis</i>
Small-leaf climbing fern	<i>Lygodium microphyllum</i>
Smartweed	<i>Polygonum</i> sp.
Smooth beggarticks	<i>Bidens laevis</i>
Soft pipewort	<i>Eriocaulon compressum</i>
Soft rush	<i>Juncus effusus</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 scirpoides</i>
Spadeleaf	<i>Centella asiatica</i>
Spadeleaf	<i>Centella asiatica</i>
Spanish moss	<i>Tillandsia usneoides</i>
Sphagnum moss	<i>Sphagnum</i> sp.
Spikerush	<i>Eleocharis</i> sp.
Spotted water hemlock	<i>Cicuta maculata</i>
St. John's-wort	<i>Hypericum cistifolium</i>
Star-rush whitetop sedge	<i>Dichromena colorata</i>
Sugarcane plumegrass	<i>Erianthus giganteus</i>
Summer farewell	<i>Dalea pinnata</i>
Sunbonnets	<i>Chaptalia tomentosa</i>
Swallowwort	<i>Cynanchum</i> sp.
Swamp fern	<i>Blechnum serrulatum</i>
Swamp laurel oak	<i>Quercus laurifolia</i>
Swamp red bay	<i>Persea palustris</i>
Swamp smartweed	<i>Polygonum hydropiperoides</i>
Swamp tupelo	<i>Nyssa biflora</i>
Sweet bay	<i>Magnolia virginiana</i>
Sweet goldenrod	<i>Solidago odora</i>
Sweet gum	<i>Liquidambar styraciflua</i>
Sword fern	<i>Nephrolepis exaltata</i>
Tall elephant's foot	<i>Elephantopus elatus</i>
Tall pinebarren milkwort	<i>Polygala cymosa</i>

Table 4. Plant species observed at TLWMA

<u>Common name</u>	<u>Scientific name</u>
Tall yellow-eyed grass	<i>Xyris platylepis</i>
Tarflower	<i>Bejaria racemosa</i>
Tenangle pipewort	<i>Eriocaulon decangulare</i>
Thistle	<i>Cirsium</i> sp.
Thoroughwort	<i>Eupatorium</i> sp.
Threadleaf beaksedge	<i>Rhynchospora filifolia</i>
Threeawn	<i>Aristida</i> sp.
Threesquare bulrush	<i>Scirpus pungens</i>
Tickseed	<i>Coreopsis</i> sp.
Toadfruit	<i>Lippia nodiflora</i>
Toothache grass	<i>Ctenium aromaticum</i>
Torpedo grass	<i>Panicum repens</i>
Tracy's beaksedge	<i>Rhynchospora tracyi</i>
Tropical soda apple	<i>Solanum viarum</i>
Turkey oak	<i>Quercus laevis</i>
Vanilla leaf	<i>Carphephorus odoratissimus</i>
Variable witchgrass	<i>Dichanthelium commutatum</i>
Virginia buttonweed	<i>Diodia virginiana</i>
Virginia chain fern	<i>Woodwardia virginica</i>
Virginia creeper	<i>Parthenocissus quinquefolia</i>
Virginia marsh St. John's-wort	<i>Triadenum virginicum</i>
Water horehound	<i>Lycopus rubellus</i>
Water lettuce	<i>Pistia stratiotes</i>
Water oak	<i>Quercus nigra</i>
Waterhyssop	<i>Bacopa monnieri</i>
Wax myrtle	<i>Myrica cerifera</i>
West Indian meadowbeauty	<i>Rhexia cubensis</i>
White lobelia	<i>Lobelia paludosa</i>
Whitehead bogbutton	<i>Lachnocaulon anceps</i>
Whitetassels	<i>Dalea</i> sp.
Whitetop aster	<i>Aster tortifolius</i>
Wild coffee	<i>Psychotria nervosa</i>
Wild lime	<i>Zanthoxylum fagara</i>
Wild pennyroyal	<i>Piloblephis rigida</i>
Winged sumac	<i>Rhus copallinum</i>
Wiregrass	<i>Aristida stricta</i>
Witchgrass	<i>Dichanthelium</i> sp.

Table 4. Plant species observed at TLWMA

<u>Common name</u>	<u>Scientific name</u>
Woodsgrass	<i>Oplismenus hirtellus</i>
Woolly witchgrass	<i>Dichanthelium scabriusculum</i>
Wrinkled jointtail grass	<i>Coelorachis rugosa</i>
Yellow butterwort	<i>Pinguicula lutea</i>
Yellow colicroot	<i>Aletris lutea</i>
Yellow hatpins	<i>Syngonanthus flavidulus</i>
Yellow milkwort	<i>Polygala rugelii</i>
Yellow pondlily	<i>Nuphar advena</i>
Yellow stargrass	<i>Hypoxis juncea</i>
Yellow stargrass	<i>Hypoxis</i> sp.
Yellow-eyed grass	<i>Xyris</i> sp.
Zigzag bladderwort	<i>Utricularia subulata</i>

2.2.1 FNAI Natural Community Descriptions

The following natural community descriptions were originally provided by FNAI in 2004, with re-mapping revisions being made by FNAI in June, 2012. They have been modified by FWC to accommodate the format of this Management Plan.

Basin marsh (3,000.1 acres)

Basin marsh is a herbaceous or shrub-dominated community usually situated in large, irregularly shaped basins. At TLWMA, basin marshes are found in two locations: in shallow basins in dry prairies and on flats along the shores of the larger lakes and the drainage-ways connecting them. A small number of larger marshes (>10 acres) occur in the dry prairie matrix community.

Structure and species composition of the lakeshore basin marsh community at TLWMA is highly variable depending on water depth and perhaps on human manipulation of the lake levels. Zonation along the lakeshores consists of an innermost zone of floating plants, primarily American lotus and spatterdock; a zone of tall, coarse herbs including southern cattail, sawgrass and softstem bulrush; and a dense zone of shorter herbs consisting of maidencane, pickerelweed, burr marigold and bull tongue arrowhead. Maidencane dominates the outermost zone at the upland interface, with dotted smartweed, false nettle, blue maidencane and sand cordgrass and scattered woody species such as wax myrtle, buttonbush, Carolina willow and Peruvian primrose willow. In higher areas, dense thickets of wax myrtle may replace the herbaceous species. At TLWMA, lakeshore basin marshes

are found on Delray loamy fine sand, very poorly drained loamy sand with sandy clay loam subsoil.

Basin swamp (4.5 acres)

Basin swamp is an isolated, wetland community forested with hardwood and coniferous trees, occurring in large depressions and drainageways with extended hydroperiods. At TLWMA, basin swamps occur within a mesic flatwoods matrix. The open canopy is formed by pond cypress and the subcanopy is usually sparse, consisting of evergreen hardwoods such as dahoon holly and sweetbay. Long unburned basin swamps often have denser, more diverse tree canopies, with red maple, swamp tupelo and sweetbay joining pond cypress in the canopy layer. The shrub layer may be sparse or very dense and is usually dominated by shiny fetterbush and wax myrtle. Swamp fern is often abundant in the herbaceous layer. Open water in the center supports floating bladderwort and floating hearts. Pond cypress may support large numbers of airplants (bromeliads) such as cardinal airplant and Spanish moss. Pond cypress is resistant to fire and the shrubs can re-sprout after a fire. At TLWMA, basin swamps are found on placid fine sand, a very poorly drained sandy soil that may have up to 8 inches of organic muck on the surface.

Baygall (812.1 acres)

Baygall is a forested wetland community dominated by bay trees with high moisture levels maintained by seepage or high water tables. At TLWMA, baygalls are found primarily on the eastern side of the property in depressions, often within or on the edge of cypress-dominated basin swamps. The canopy consists of loblolly bay, sweetbay or a mixture of both. Slash pine and pond cypress may also be present, occasionally forming an emergent layer over the bays. The subcanopy consists of loblolly bay and sweetbay, plus swamp bay. Loblolly bay may also be present in the shrub layers, which are often so dense as to be impassable. Shrubs are primarily wax myrtle, shiny fetterbush and saw palmetto, laced together with laurel greenbriar. Virginia chain fern and sphagnum moss dominate the ground layer. Several baygalls occur on the edges of cypress-dominated basin swamps where the drainage has been altered by ditching which may have caused their development. Baygalls can withstand a moderate fire frequency since the bay trees re-sprout following fire; however fire during a drought can kill the trees by burning into the organic soils and killing their roots. At TLWMA, baygalls are found on both sandy (Basinger fine sand, Placid fine sand) and organic (Samsula and Hontoon mucks) soils.

Blackwater Stream (43.4 acres)

Blackwater streams are characterized as perennial or intermittent seasonal watercourses originating deep in sandy lowlands where extensive wetlands with organic soils function as reservoirs, collecting rainfall and discharging it slowly to the stream. At the KRPUA BOT parcels the historic course of the Kissimmee River is still present, although heavily altered since most water flow is directed into a large canal.

Vegetation in blackwater streams of the KRPUA BOT parcels occurs along edges and on floating mats, and includes water hemlock, flatsedge, floating marshpennywort, denseflower knotweed, dotted smartweed, pickerelweed, bulltongue arrowhead, and broadleaf cattail.

Depression marsh (2,284.1 acres)

Depression marsh is an herbaceous wetland community with concentric zones of vegetation found in circular depressions. At TLWMA, depression marshes occur in dry prairies, mesic flatwoods and mesic hammocks. Depression marsh vegetation is also found in zones surrounding dome and basin swamps in mesic flatwoods.

The outermost (driest) zone is usually composed of a sparse stand of grasses such as longleaf threeawn, sedges such as southern umbrellasedge and southern beaksedge, ten-angle pipewort and yellow-eyed grasses. Alternatively, the outer zone may be dominated by a relatively dense stand of sand cordgrass. The next zone inward is often dominated by sandweed St. John's-wort, followed by a zone of dense maidencane and, finally, a central zone of pickerelweed. In depression marshes bordering basin or dome swamps, the outer grass/sedge and sandweed St John's-wort- zones are similar, but the inner zones of maidencane and pickerelweed are replaced by young pond cypress bordering the forested portion of the swamp. In depression marshes within mesic hammocks, shrubs such as buttonbush and wax myrtle and deciduous trees such as swamp tupelo and red maple are often found on hummocks within the marsh. The outer zones of depression marshes are sparsely vegetated and subject to alternating inundation and desiccation. Fire in this community kills sandweed St. John's-wort, which can rapidly re-colonize from seed. At TLWMA, depression marshes occur primarily on poorly drained Basinger fine sand, depressional, which is sandy throughout the soil profile.

Dome swamp (7,908.6 acres)

Dome swamp is an isolated wetland community occurring in shallow basins and forested with conifers and deciduous trees. On TLWMA, dome swamps are found in depressions within a mesic flatwoods matrix. Trees in the center are taller than those on the edges, giving the stand a dome-shaped profile. At TLWMA, the open canopy is formed by pond cypress; the subcanopy is usually sparse, consisting of evergreen hardwoods such as dahoon holly and sweetbay. The shrub layer may be sparse or very dense and is usually dominated by shiny fetterbush and wax myrtle. Swamp fern is often abundant in the herbaceous layer. Open water in the center supports floating bladderwort and floating hearts. Pond cypress may support large numbers of bromeliads. At TLWMA, dome swamps are found on Placid fine sand, a very poorly drained sandy soil that may have up to eight inches of organic muck on the surface.

Dry prairie (16,031.2 acres)

Dry prairie is an upland community of short shrubs and grasses with few or no pines and many of the same species in the shrub and herbaceous layers as are found in mesic flatwoods. The shrubs often are the same height as the grasses and form alternating patches with them, rather than a separate vertical layer. At TLWMA, dry prairie is the matrix community on the southern half of the property, with mesic flatwoods replacing it as the matrix community on the northern portion. Only larger areas (>20 acres) with few or no trees within the mesic flatwoods portion were mapped as dry prairie.

Longleaf pines, if present, are widely scattered. Wiregrass and low shrubs, primarily stunted saw palmetto and dwarf live oak, form most of the cover, with taller shrubs such as gallberry and coastalplain staggerbush being infrequent. Other common dwarf shrubs include dwarf huckleberry, shiny blueberry, netted pawpaw and coastalplain St. Johnswort. Scattered among the wiregrass clumps are species of bluestem and low panic-grasses, plus a relatively high diversity of forbs, some of the more common being yellow hatpins, pineland chaffhead, yellow milkwort, short-leaf rose gentian, and Elliott's yelloweyed grass. Several populations of the rare many-flowered grasspink orchid were found in this community following recent burns. Frequent fires may prevent the establishment of longleaf pines or other trees in this community. The dry prairie that lies near the fire shadow of the three major lakes is being invaded by live oaks from the mesic hammocks ringing the lakes. At TLWMA, dry prairie occurs on the same poorly drained soil types as mesic flatwoods (Pomona, Smyrna, Immokalee and Myakka fine sand), all of which are sandy throughout their profiles; in addition it occurs on Eau Gallie fine sand, a poorly drained soil with a sandy surface soil and sandy clay loam subsoil.

Floodplain marsh (457.4 ACRES)

Floodplain marsh is a wetland community occurring in river floodplains and dominated by herbaceous vegetation and/or shrubs. Most of the KRPUA BOT parcels were primarily a large floodplain marsh through which the Kissimmee River meandered. Once the river was channelized, the marsh became highly disturbed by lowered water levels and reduced seasonal flooding. Much of the historic marsh was converted to pastures, and areas isolated from fire are now dominated by shrubs. Areas dominated by sand cordgrass likely burned periodically, reducing shrub cover in the historic marsh.

Floodplain marsh of the KRPUA BOT parcels is a mainly treeless community dominated by wetland shrub and herb species. Three separate types of floodplain marsh are present at this site. Emergent and aquatic bed plants form a deep water marsh vegetation subtype often containing water hemlock, floating marshpennywort, denseflower knotweed, dotted smartweed, pickerelweed, bulltongue arrowhead, yellow pondlily, water-lettuce, and Para grass. The second type of floodplain marsh, located on higher elevation areas of the floodplain, were likely historically dominated by sand cordgrass. This floodplain marsh sub-type is currently only present in small areas that have not been completely converted in pasture. Only one location of intact sand cordgrass was documented. The third type of

floodplain marsh present at the KRPUA BOT parcels is a shrub dominated community. These areas typically were not converted into pasture and many occur as isolated islands. Typical shrub species in these areas include groundsel tree, common buttonbush, wax myrtle, and coastalplain willow. Herbs are typically lacking due to the dense shrub cover.

Hydric hammock (138.6 acres)

Hydric hammock is a forested wetland community with a canopy of hardwoods, usually including swamp laurel oak and cabbage palm. At TLWMA, hydric hammock occupies a small total acreage and occurs along drainageways or as an included community in the mesic hammocks around the lakeshores. Other canopy species include red maple, bald cypress and pond cypress; the subcanopy and tall shrub strata include dahoon holly, swamp red bay and cabbage palm. The ground layer is patchy to sparse and may include redtop panicgrass, savannah panicum and lizard-tail, with occasional denser patches of interrupted maidenfern. At TLWMA, hydric hammocks are found on Basinger fine sand, depressional soils, a very poorly drained type that is sandy throughout the profile.

Mesic flatwoods (15,975.9 acres)

Mesic flatwoods is an upland forest community with an open pine canopy and understory composed of varying mixtures of shrubs and grasses. At TLWMA, this matrix community occurs on the northern half of the property with dry prairie replacing it as the matrix community on the southern half. Much of this community has an open, savannah-like aspect, formed by an open canopy of longleaf pines of varying density and an understory of wiregrass and low shrubs such as saw palmetto, gallberry, shiny fetterbush and coastalplain staggerbush. Common dwarf shrubs include dwarf live oak, dwarf huckleberry, shiny blueberry, dwarf wax myrtle and coastalplain St. Johns-wort. Besides the dominant wiregrass, other common grasses are species of bluestem, low panicgrasses, bottlebrush threeawn, pineywoods dropseed, and Florida threeawn. Bracken fern is common in the ground cover at a few sites. This community supports a high diversity of herbs, some of the more common being yellow hatpins, pineland chaffhead, yellow milkwort, Queen's delight and flattop goldenrod. Around the edges of swamps, mesic flatwoods may develop a denser pine canopy and a dense layer of tall shrubs composed primarily of saw palmetto with little to no herbaceous layer. At TLWMA, mesic flatwoods are found on Pomona fine sand and Smyrna fine sand west of the Florida turnpike and on Immokalee fine sand and Myakka fine sand east of the turnpike. All four types are very similar, poorly drained soils that are sandy throughout their profiles, with weakly cemented subsoils.

Mesic hammock (3,175.8 acres)

Mesic hammock is an upland forest community of evergreen broadleaved trees dominated by live oak in the canopy and cabbage palm in the subcanopy, occurring in naturally fire-protected areas. At TLWMA, this community occurs around the major lakes and on the borders of dome swamps and depression marshes. The understory is often very open with

the shrub layer consisting of scattered clumps of tall saw palmetto and grasses, such as redtop panicum forming clumps in the sparse ground layer. In better developed sites, cabbage palms form relatively dense cover in the subcanopy, tall shrub and short shrub layers and epiphytes are abundant, including resurrection fern, golden polypody and southern needleleaf; butterfly orchid was found in several stands near Lake Kissimmee. Dense patches of woodsgrass and panicgrass occur in canopy gaps in the better developed sites. On wetter sites, lizard-tail may be common in the understory. Along the lower portion of the lakeshores, live oaks become widely scattered in large grassy openings that support bluestems, blue maidencane, big carpetgrass, yellow hatpins, yellow-eyed grasses and beaksedge. The shady canopy and dry ground make mesic hammocks a favorite spot for humans and cattle to shelter from the sun and this disturbance may account for the open understory at many sites. At a few sites the exotic bahiagrass has been planted in the ground layer. Most mesic hammock sites did not have signs of fire, except along Lake Kissimmee where many oaks were killed in a wildfire several years ago. Closed canopy mesic hammocks are found on the somewhat poorly drained Adamsville fine sand that has patches of loamy sand in the subsoil and on the poorly drained Lokosee fine sand that has a sandy clay loam subsoil; hammocks with large grassy openings occur on the poorly drained Pompano fine sand, that is sandy throughout the soil profile.

Sandhill (208.4 acres)

Sandhill is an upland forested community characterized by a sparse canopy of longleaf pine, a subcanopy of turkey oak and ground layer of wiregrass. This community occupies a very limited area at TLWMA, usually adjacent to scrub on the eastern portion of the property. Other species found in the subcanopy include bluejack oak and sand live oak. The generally sparse shrub layer contains saw palmetto and Chapman's oak. In addition to wiregrass, gopher apple and beaksedge are found in the herbaceous layer, which is also sparse, with much bare sand exposed. Sandhills naturally have a frequent fire regime and when this is interrupted the oak canopy shades out the wiregrass which is the case in several of the stands at TLWMA. Sandhill communities occur on the moderately well-drained Pomello and Tavares fine sands, which are sandy throughout the soil profile.

Scrub (834.8 acres)

Scrub is a xeric upland community on dry sands dominated by scrub oaks and other shrubs, with or without a pine canopy. At TLWMA, this community occurs as isolated small stands on higher knolls within mesic flatwoods or dry prairies and is concentrated mostly on the eastern portion of the property. It consists of the three common scrub oaks, myrtle oak, sand live oak and Chapman's oak, which dominate the tall and short shrub layers. Saw palmetto and fetterbushes are also common. Two characteristic scrub species, Florida rosemary and Carolina holly, are present in one or two stands. The canopy may be absent or consist of widely scattered longleaf pines or of a denser stand of sand pine. The herbaceous layer is sparse and commonly includes wiregrass, species of lichen and October flower.

The largest scrub (approximately 100 acres) is near Lake Marion. This scrub is 9 miles distant from most of the other scrub patches on the eastern border of the property. At TLWMA, scrub occurs on the moderately well-drained Pomello and Tavares fine sands, which are sandy throughout the soil profile.

Scrubby flatwoods (1,223.1 acres)

Scrubby flatwoods is an upland community similar to mesic flatwoods in structure and species composition, with the addition of scattered clumps of scrub oaks in the tall and short shrub layers. At TLWMA, it occurs in the ecotone between mesic flatwoods and scrub communities and on slight rises within the mesic flatwoods and dry prairies. It is most commonly encountered along the eastern edge of the property near US Highway 441. Beneath a sparse canopy of longleaf pine, clumps of scrub oaks, including Chapman's oak, sand live oak and myrtle oak, are scattered in an understory of typical mesic flatwoods vegetation consisting of saw palmetto, wiregrass and dwarf live oak. Some of the scrub oaks appear to be hybrids, possibly between myrtle oak and either runner oak or bluejack oak. Herbaceous species found more often in this community than in mesic flatwoods are fragrant eryngo, scrubland goldenaster and wild pennyroyal. At TLWMA, scrubby flatwoods occur primarily on Pomello fine sand, a moderately well-drained soil that is sandy throughout its profile.

Wet flatwoods (208.4 acres)

Wet flatwoods is a wetland forest community usually with a slash pine canopy and an understory that often includes species characteristic of baygalls and dome swamps. At TLWMA, it makes up a small percentage of the total acreage and is usually found in the ecotone between mesic flatwoods and basin swamps. The closed canopy consists of slash pine, often intermingled with pond cypress. The subcanopy and tall shrub layers are composed of cabbage palm, dahoon holly, wax myrtle and swamp red bay; a variety of ferns such as Virginia chain fern, cinnamon fern and swamp fern, are often found in the herbaceous layer. Several stands are associated with ditching in the adjacent basin swamps suggesting that the slash pines may have come in following hydrological disturbance to the swamps or to the adjacent depression marshes and wet prairies. At TLWMA, wet flatwoods occur primarily on poorly drained Malabar fine sand, which has a sandy clay loam subsoil or Basinger fine sand, which is sandy throughout the soil profile.

Wet prairie (6,820.2 acres)

Wet prairie is a wetland herbaceous community characterized by a seasonally high water table and frequent fire with dense stands of grass species intermingled with wetland herbs. At TLWMA, wet prairie borders dome swamps and depression marshes. It may also form irregular patches, sometimes quite large, within the mesic flatwoods and dry prairie communities.

Typically, wet prairie on TLWMA contains few or no longleaf pines. Individual clumps of saw palmettos are rare but some wet prairies may have large, rounded “islands” of saw palmetto scattered throughout. At some sites, often those where the drainage has been disturbed by ditching, wiregrass may be replaced as the dominant species by blue maidencane. In addition to the grasses, a large number of herbs are found in wet prairies. Some of the more characteristic herbs are yellow hatpins, rayless goldenrod, soft pipewort, sunbonnets, bog white violet, early whitetop fleabane and low pinebarren milkwort. Graminoid species present include plumed beaksedge and toothache grass. Carnivorous species found in this community include the butterworts and hooded pitcher plant, which is often found on the border between wet prairies and depression marshes. Dwarf shrubs such as dwarf live oak and St. John’s-worts may also occur in wet prairies.

In the absence of fire, wet prairies are readily invaded by wax myrtle and the height and cover of the latter is a sensitive indicator of past fire history in any given stand. At TLWMA, wet prairies, like wet flatwoods, occur primarily on poorly drained Malabar fine sand, which has a sandy clay loam subsoil or Basinger fine sand, which is sandy throughout the soil profile.

Xeric hammock (92.4 acres)

Xeric hammock is an upland forest with a canopy of scrub oaks reaching tree stature (>20 feet), usually developing from scrub or sandhill in the absence of fire. At TLWMA, this community occupies a small total acreage and is found at scattered locations on the eastern side of the property. The canopy is dominated by sand live oak with an understory of saw palmetto. Herbaceous species are sparse, consisting primarily of wiregrass. Xeric hammock usually develops where scrub oaks are protected from fire. Two of the stands at TLWMA are classic examples of “oak domes” i.e., situations in which the clonal structure of sand live oak is obvious even after it has reached tree size. At TLWMA, xeric hammocks are found on moderately well-drained Pomello fine sand, a moderately well-drained soil that is sandy throughout its profile.

2.2.2 Forest Resources

As of the 2004 FNAI natural community mapping of TLWMA, approximately 2,427.2 acres were in pine plantation. Since 2004, approximately half of this acreage has been harvested, and natural community restoration has been initiated. Other forest resources include pines of the sandhill, scrubby flatwoods, mesic flatwoods and wet flatwoods, as well as cypress and other hardwoods within the forested wetlands of dome swamps.

2.3 Fish and Wildlife Resources

2.3.1 Occurrences

Geographic Information System (GIS) data maintained by FWC (Wildlife Observations) and FNAI (Element Occurrences) indicate that TLWMA and the BOT parcels of the KRPUA have numerous documented occurrences and a diverse assemblage of animal species (Tables 5 – 8; Figures 10 - 11). Also, FNAI has indicated that TLWMA, as well as HHBCWMA and TNRWMA offer important habitat for numerous butterfly species (Table 9; Appendix 13.4).



2.3.2 Integrated Wildlife Habitat Ranking System

The FWC has developed a GIS-based assessment tool, the Integrated Wildlife Habitat Ranking System (IWHRS), that incorporates a wide variety of land cover and wildlife species data. This tool 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 TLWMA has a very high mean wildlife value of 7.8 (Figures 10 - 11). Field surveys and assessments have corroborated the results of the IWHRS analysis.

Table 5. Bird species of TLWMA

<u>Common name</u>	<u>Scientific name</u>
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 pipit	<i>Anthus rubescens</i>
American redstart	<i>Setophaga ruticilla</i>
American robin	<i>Turdus migratorius</i>
American widgeon	<i>Anas americana</i>
American woodcock	<i>Scolopax minor</i>
Anhinga	<i>Anhinga anhinga</i>
Bachman's sparrow	<i>Peucaea aestivalis</i>
Bald eagle	<i>Haliaeetus leucocephalus</i>
Barn owl	<i>Tyto alba</i>
Barn swallow	<i>Hirundo rustica</i>
Barred owl	<i>Strix varia</i>
Belted kingfisher	<i>Ceryle alcyon</i>
Black vulture	<i>Coragyps atratus</i>
Black-and-white warbler	<i>Mniotilta varia</i>
Black-bellied plover	<i>Pluvialis squatarola</i>
Black-crowned night-heron	<i>Nycticorax nycticorax</i>
Blue jay	<i>Cyanocitta cristata</i>
Blue-gray gnatcatcher	<i>Polioptila caerulea</i>
Blue-headed vireo	<i>Vireo solitarius</i>
Blue-winged teal	<i>Anas discors</i>
Boat-tailed grackle	<i>Quiscalus major</i>
Bobolink	<i>Dolichonyx oryzivorus</i>
Brown thrasher	<i>Toxostoma rufum</i>
Brown-headed cowbird	<i>Molothrus ater</i>
Brown-headed nuthatch	<i>Sitta pusilla</i>
Bufflehead	<i>Bucephala albeola</i>
Canvasback	<i>Aythya valisineria</i>
Carolina wren	<i>Thryothorus ludovicianus</i>
Cattle egret	<i>Bubulcus ibis</i>
Chimney swift	<i>Chaetura pelagica</i>
Chuck-wills'-widow	<i>Caprimulgus carolinensis</i>
Common gallinule	<i>Gallinula galeata</i>
Common grackle	<i>Quiscalus quiscula</i>
Common ground dove	<i>Columbina passerina</i>
Common nighthawk	<i>Chordeiles minor</i>
Common snipe	<i>Gallinago gallinago</i>
Common yellowthroat	<i>Geothlypis trichas</i>

Table 5. Bird species of TLWMA

<u>Common name</u>	<u>Scientific name</u>
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>Sayornis phoebe</i>
Eastern screech-owl	<i>Otus asio</i>
Eastern towhee	<i>Pipilo erythrophthalmus</i>
Eurasian collared-dove	<i>Streptopelia decaocto</i>
European starling	<i>Sturnus vulgaris</i>
Fish crow	<i>Corus ossifragus</i>
Florida burrowing owl	<i>Athene cunicularia floridana</i>
Florida grasshopper sparrow	<i>Ammodramus savannarum floridanus</i>
Florida sandhill crane	<i>Grus canadensis pratensis</i>
Florida scrub-jay	<i>Aphelocoma coerulescens</i>
Gadwall	<i>Anas strepera</i>
Glossy ibis	<i>Plegadis falcinellus</i>
Gray catbird	<i>Dumetella carolinensis</i>
Great blue heron	<i>Ardea herodias</i>
Great egret	<i>Ardea alba</i>
Great horned owl	<i>Bubo virginianus</i>
Great-crested flycatcher	<i>Myiarchus crinitus</i>
Greater scaup	<i>Aythya marila</i>
Greater yellowlegs	<i>Tringa melanoleuca</i>
Green heron	<i>Butorides virescens</i>
Green-winged teal	<i>Anas crecca</i>
Hooded merganser	<i>Lophodytes cucullatus</i>
House sparrow	<i>Passer domesticus</i>
House wren	<i>Troglodytes aedon</i>
Killdeer	<i>Charadrius vociferus</i>
King rail	<i>Rallus elegans</i>
Laughing gull	<i>Larus atricilla</i>
Le Conte's sparrow	<i>Ammodramus leconteii</i>
Least bittern	<i>Ixobrychus exilis</i>
Least sandpiper	<i>Calidris minutilla</i>
Lesser scaup	<i>Aythya affinis</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>

Table 5. Bird species of TLWMA

<u>Common name</u>	<u>Scientific name</u>
Mallard	<i>Anas platyrhynchos</i>
Merlin	<i>Falco columbarius</i>
Mottled duck	<i>Anas fulvigula</i>
Mourning dove	<i>Zenaida macroura</i>
Northern bobwhite	<i>Colinus virginianus</i>
Northern cardinal	<i>Cardinalis cardinalis</i>
Northern flicker	<i>Colaptes auratus</i>
Northern harrier	<i>Circus cyaneus</i>
Northern mockingbird	<i>Mimus polyglottos</i>
Northern parula	<i>Parula americana</i>
Northern pintail	<i>Anas acuta</i>
Northern rough-winged swallow	<i>Stelgidopteryx serripennis</i>
Northern shoveler	<i>Anas clypeata</i>
Osprey	<i>Pandion haliaetus</i>
Palm warbler	<i>Setophaga palmarum</i>
Pied-billed grebe	<i>Podilymbus podiceps</i>
Pileated woodpecker	<i>Dryocopus pileatus</i>
Pine siskin	<i>Carduelis pinus</i>
Pine warbler	<i>Setophaga pinus</i>
Prairie warbler	<i>Setophaga discolor</i>
Purple martin	<i>Progne subis</i>
Red-bellied woodpecker	<i>Melanerpes carolinus</i>
Red-breasted merganser	<i>Mergus serrator</i>
Red-cockaded woodpecker	<i>Picoides borealis</i>
Redhead	<i>Aythya americana</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-billed gull	<i>Larus delawarensis</i>
Ring-necked duck	<i>Aythya collaris</i>
Rock dove	<i>Columba livia</i>
Roseate spoonbill	<i>Platalea ajaja</i>
Ruby-crowned kinglet	<i>Regulus calendula</i>
Ruby-throated hummingbird	<i>Archilochus colubris</i>
Ruddy duck	<i>Oxyura jamaicensis</i>
Sandhill crane	<i>Grus canadensis</i>
Savannah sparrow	<i>Passerculus sandwichensis</i>
Sharp-shinned hawk	<i>Accipiter striatus</i>
Short-tailed hawk	<i>Buteo brachyurus</i>
Snail kite	<i>Rostrhamus sociabilis</i>
Snowy egret	<i>Egretta thula</i>

Table 5. Bird species of TLWMA

<u>Common name</u>	<u>Scientific name</u>
Sora	<i>Porzana carolina</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>
Tree swallow	<i>Tachycineta bicolor</i>
Tricolored heron	<i>Egretta tricolor</i>
Tufted titmouse	<i>Baeolophus bicolor</i>
Turkey vulture	<i>Cathartes aura</i>
Virginia rail	<i>Rallus limicola</i>
Western sandpiper	<i>Calidris mauri</i>
White ibis	<i>Eudocimus albus</i>
White-crowned sparrow	<i>Zonotrichia leucophrys</i>
White-eyed vireo	<i>Vireo griseus</i>
White-tailed kite	<i>Elanus leucurus</i>
Whooping crane	<i>Grus americana</i>
Wild turkey	<i>Meleagris gallopavo</i>
Willet	<i>Catoptrophorus semipalmatus</i>
Wood duck	<i>Aix sponsa</i>
Wood stork	<i>Mycteria americana</i>
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>
Yellow-billed cuckoo	<i>Coccyzus americanus</i>
Yellow-crowned night-heron	<i>Nyctanassa violaceus</i>
Yellow-rumped warbler	<i>Setophaga coronata</i>
Yellow-throated warbler	<i>Setophaga dominica</i>

Table 6. Amphibian species of TLWMA

<u>Common name</u>	<u>Scientific name</u>
Barking treefrog	<i>Hyla gratiosa</i>
Eastern narrowmouth toad	<i>Gastrophryne carolinensis</i>
Florida chorus frog	<i>Pseudacris nigrita verrucosa</i>
Florida cricket frog	<i>Acris gryllus dorsalis</i>
Gopher frog	<i>Rana capito</i>
Greater siren	<i>Siren lacertina</i>
Green treefrog	<i>Hyla cinerea</i>
Greenhouse frog	<i>Eleutherodactylus planirostris</i>
Little grass frog	<i>Pseudacris ocularis</i>
Narrow-striped dwarf siren	<i>Psuedobranchus axanthus axanthus</i>
Oak toad	<i>Bufo quercicus</i>
Pig frog	<i>Rana grylio</i>
Pinewoods treefrog	<i>Hyla femoralis</i>
Southern cricket frog	<i>Acris gryllus gryllus</i>
Southern leopard frog	<i>Lithobates sphenoccephalus</i>
Southern toad	<i>Bufo terrestris</i>
Squirrel treefrog	<i>Hyla squirella</i>
Two-toed amphiuma	<i>Amphiuma means</i>

Table 7. Reptilian species of TLWMA

<u>Common name</u>	<u>Scientific name</u>
American alligator	<i>Alligator mississippiensis</i>
Broadhead skink	<i>Eumeces laticeps</i>
Brown anole	<i>Anolis sagrei</i>
Brown water snake	<i>Nerodia taxispilota</i>
Corn snake	<i>Pantherophis guttatus guttatus</i>
Dusky pigmy rattlesnake	<i>Sistrurus miliaris barbouri</i>
Eastern coachwhip	<i>Masticophis 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	<i>Heterodon platyrhinos</i>
Eastern indigo snake	<i>Drymarchon couperi</i>
Eastern mud snake	<i>Farancia abacura abacura</i>
Florida box turtle	<i>Terrapene carolina bauri</i>
Florida brown snake	<i>Storeria victa</i>
Florida chicken turtle	<i>Deirochelys reticularia chrysea</i>
Florida cottonmouth	<i>Agkistrodon piscivorous conanti</i>
Florida green water snake	<i>Nerodia floridana</i>
Florida pine snake	<i>Pituophis melanoleucus mugitus</i>
Florida snapping turtle	<i>Chelydra serpentina osceola</i>
Florida softshell turtle	<i>Apalone ferox</i>
Florida water snake	<i>Nerodia fasciata pictiventris</i>
Gopher tortoise	<i>Gopherus polyphemus</i>
Green anole	<i>Anolis carolinensis</i>
Ground skink	<i>Scincella lateralis</i>
Indo-Pacific gecko	<i>Hemidactylus garnotii</i>
Peninsula cooter	<i>Pseudemys peninsularis</i>
Peninsula ribbon snake	<i>Thamnophis sauritus sackeni</i>
Pine woods snake	<i>Rhadinaea flavilata</i>
Scarlet kingsnake	<i>Lampropeltis triangulum elapsoides</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>
Striped crayfish snake	<i>Regina alleni</i>
Striped mud turtle	<i>Kinosternon baurii</i>
Yellow rat snake	<i>Elaphe obsoleta quadrivittata</i>

Table 8. Mammalian species of TLWMA

<u>Common name</u>	<u>Scientific name</u>
Bobcat	<i>Lynx rufus</i>
Brazilian free-tailed bat	<i>Tadarida brasiliensis</i>
Conttontail rabbit	<i>Sylvilagus floridanus</i>
Cotton mouse	<i>Peromyscus gossypinus</i>
Coyote	<i>Canis latrans</i>
Eastern mole	<i>Scalopus aquaticus</i>
Evening bat	<i>Nycticeius humeralis</i>
Feral hog	<i>Sus scrofa</i>
Florida black bear	<i>Urus americanus floridanus</i>
Florida long-tailed weasel	<i>Mustela frenata peninsulae</i>
Gray fox	<i>Urocyon cinereoargenteus</i>
Gray squirrel	<i>Sciurus carolinensis</i>
Hispid cotton rat	<i>Sigmodon hispidus</i>
Marsh rabbit	<i>Sylvilagus palustris</i>
Marsh rice rat	<i>Oryzomys palustris</i>
Nine-banded armadillo	<i>Dasypus novemcinctus</i>
Northern yellow bat	<i>Lasiurus intermedius</i>
Opossum	<i>Didelphis virginiana</i>
Raccoon	<i>Procyon lotor</i>
River otter	<i>Lutra canadensis</i>
Round-tailed muskrat	<i>Neofiber alleni</i>
Seminole bat	<i>Lasiurus seminolus</i>
Sherman's fox squirrel	<i>Sciurus niger shermani</i>
Short-tailed shrew	<i>Blarina carolinensis</i>
Southern flying squirrel	<i>Glaucomys volans</i>
Spotted skunk	<i>Spilogale putorius</i>
Striped skunk	<i>Mephitis mephitis</i>
Tricolored bat	<i>Perimyotis subflavus</i>
White-tailed deer	<i>Odocoileus virginianus</i>

Table 9. Butterfly species of TLWMA

<u>Common name</u>	<u>Scientific name</u>
Aaron's skipper	<i>Poanes aaroni</i>
American lady	<i>Vanessa virginiensis</i>
Arogos skipper	<i>Atrytone arogos</i>
Barred yellow	<i>Eurema दौरा</i>
Berry's skipper	<i>Euphyes berryi</i>
Black swallowtail	<i>Papilio polyxenes</i>
Brazilian skipper	<i>Calpodēs ethlius</i>
Carolina satyr	<i>Hermeuptychia sosybius</i>
Ceraunus blue	<i>Hemiargus ceraunus</i>
Clouded skipper	<i>Lerema accius</i>
Cloudless sulphur	<i>Phoebis sennae</i>
Common buckeye	<i>Junonia coenia</i>
Confused cloudywing	<i>Thorbes confusis</i>
Dainty sulphur	<i>Nathalis iole</i>
Delaware skipper	<i>Anatrytone logan</i>
Dun skipper	<i>Euphyes vestris</i>
Eastern tiger swallowtail	<i>Papilio glaucus</i>
Eufala skipper	<i>Lerodea eufala</i>
Fiery skipper	<i>Hylephila phyleus</i>
Florida dusted skipper	<i>Atrytonopsis hianna loammi</i>
Georgia satyr	<i>Neonympha areolata</i>
Giant swallowtail	<i>Papilio cressphontes</i>
Gray hairsteak	<i>Strymon melinus</i>
Great purple hairstreak	<i>Atlides halesus</i>
Great southern white	<i>Ascia monuste</i>
Gulf fritillary	<i>Agraulis vanillae</i>
Horace's duskywing	<i>Erynnis horatius</i>
Juvenal's duskywing	<i>Erynnis juvenalis</i>
Least skipper	<i>Ancyloxypha numitor</i>
Little metalmark	<i>Calephelis virginiensis</i>
Little yellow	<i>Eurema lisa</i>
Long-tailed skipper	<i>Urbanus proteus</i>
Meske's skipper	<i>Hesperia meskei</i>
Monarch	<i>Danaus plexippus</i>
Monk skipper	<i>Asbolis capucinus</i>
Northern cloudywing	<i>Thorybes pylades</i>
Oak hairstreak	<i>Satyrium favonius</i>
Ocola skipper	<i>Panoquina ocola</i>
Palamedes swallowtail	<i>Papilio palamedes</i>
Palatka skipper	<i>Euphyes pilatka</i>
Palmetto skipper	<i>Euphyes arpa</i>
Pearl crescent	<i>Phyciodes tharos</i>

Table 9. Butterfly species of TLWMA

<u>Common name</u>	<u>Scientific name</u>
Phaon crescent	<i>Phyciodes phaon</i>
Queen	<i>Danaus gilippus</i>
Red admiral	<i>Vanessa atalanta</i>
Red-banded hairstreak	<i>Calycopis cecrops</i>
Sachem	<i>Atalopedes campestris</i>
Silver-spotted skipper	<i>Epargyreus clarus</i>
Sleepy orange	<i>Eurema nicippe</i>
Southern broken-dash	<i>Wallengrenia otho</i>
Southern skipperling	<i>Copaeodes minimus</i>
Spicebush swallowtail	<i>Papilio troilus</i>
Swarthy skipper	<i>Nastra lherminier</i>
Tawny-edged skipper	<i>Polites themistocles</i>
Tropical checkered-skipper	<i>Pyrgus oileus</i>
Twin-spot skipper	<i>Oligoria maculata</i>
Variiegated fritillary	<i>Euptoieta claudia</i>
Viceroy	<i>Limenitis archippus</i>
Whirlabout	<i>Polites vibex</i>
White M Hairstreak	<i>Parrhasius m-album</i>
White peacock	<i>Anartia jatrophae</i>
Zarucco duskywing	<i>Erynnis zarucco</i>
Zebra heliconian	<i>Heliconius charithonia</i>
Zebra swallowtail	<i>Eurytides marcellus</i>

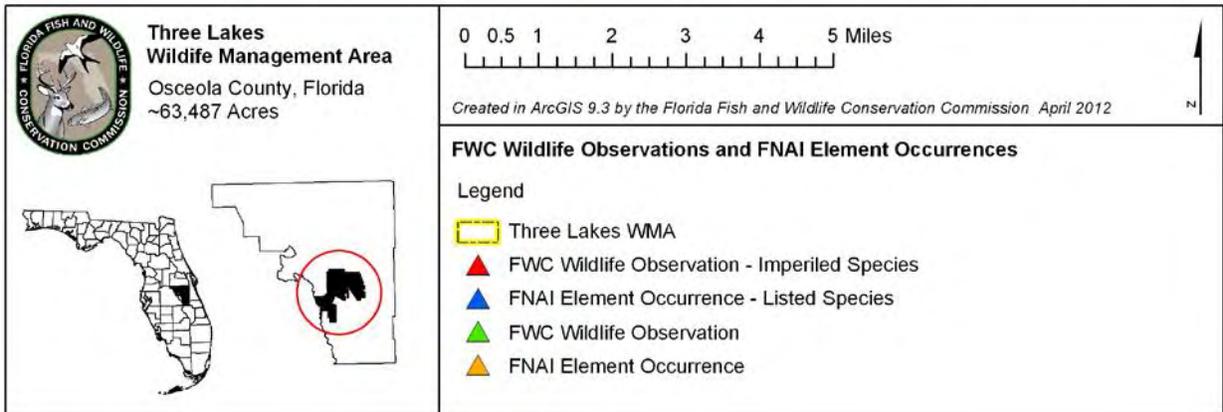
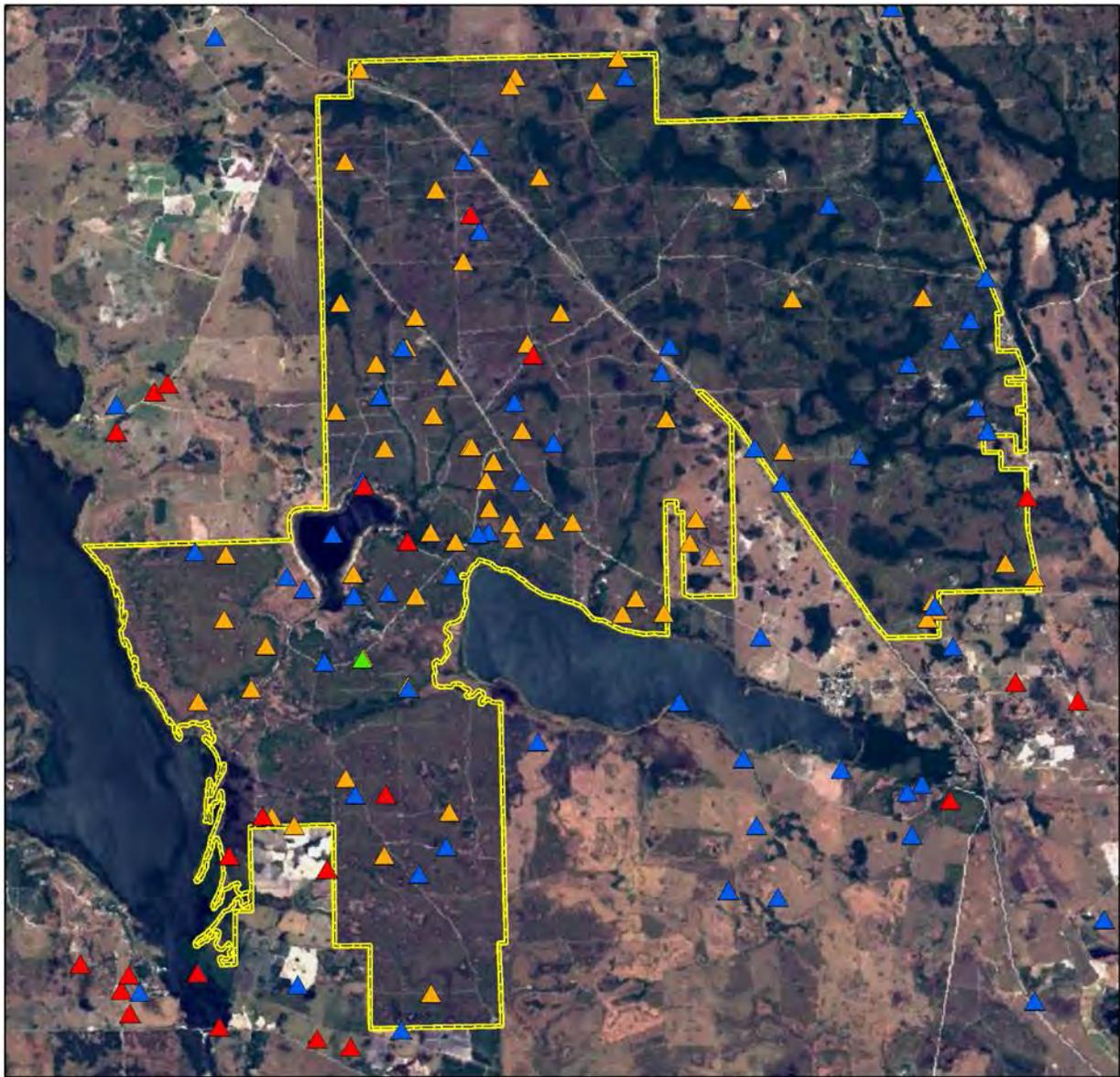


Figure 11: TLWMA - FWC Wildlife Observations and FNAI Element Occurrences

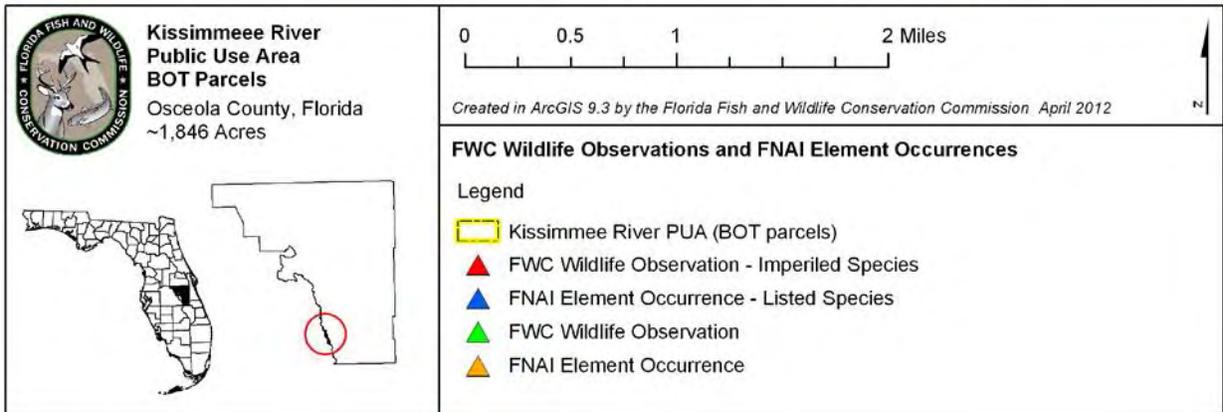
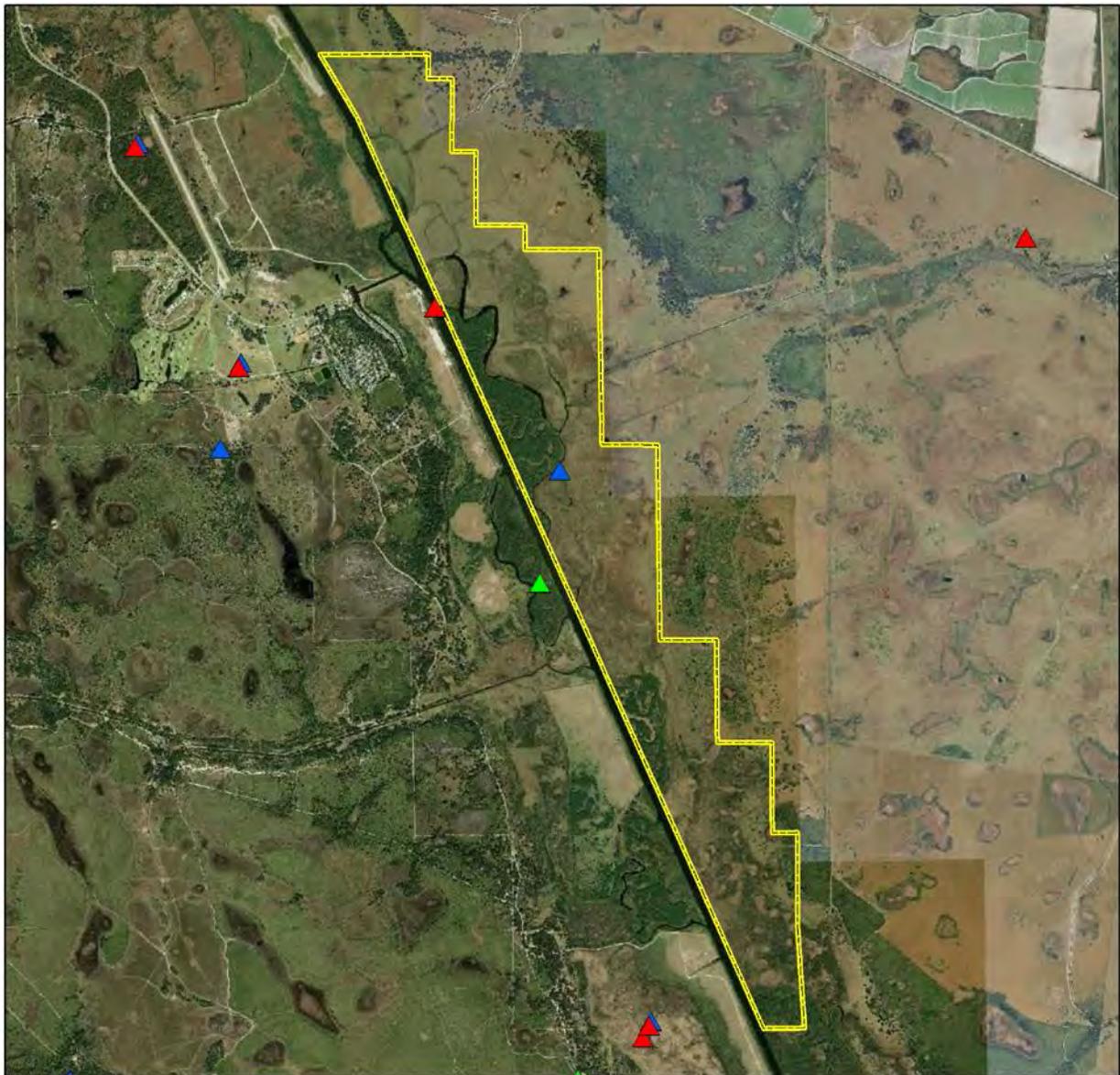


Figure 12: KRPUA - FWC Wildlife Observations and FNAI Element Occurrences

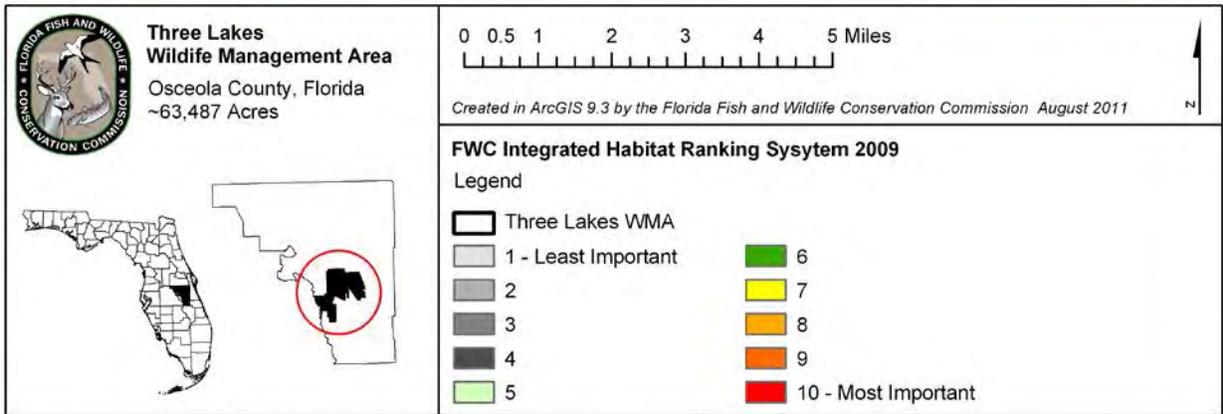
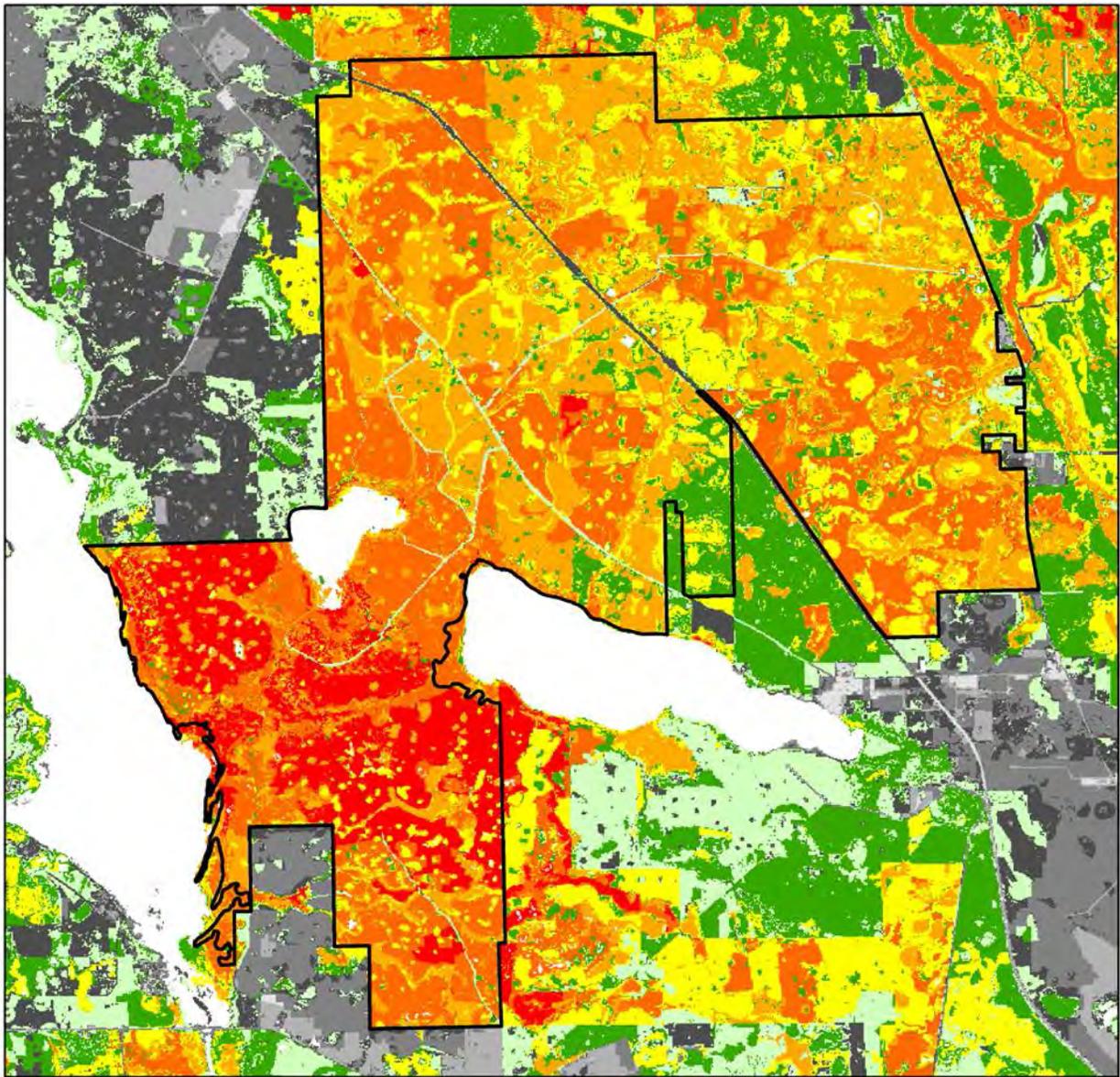


Figure 13: TLWMA - FWC Integrated Wildlife Ranking System 2009

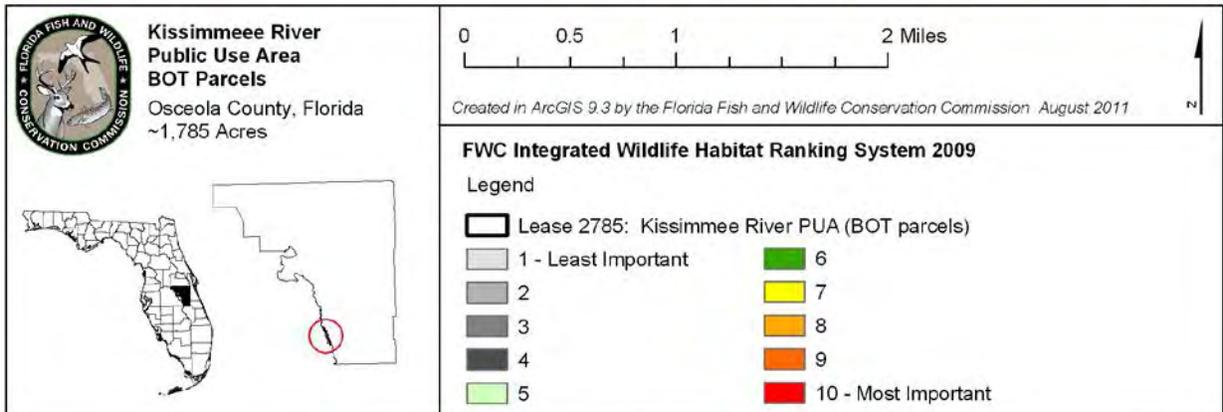
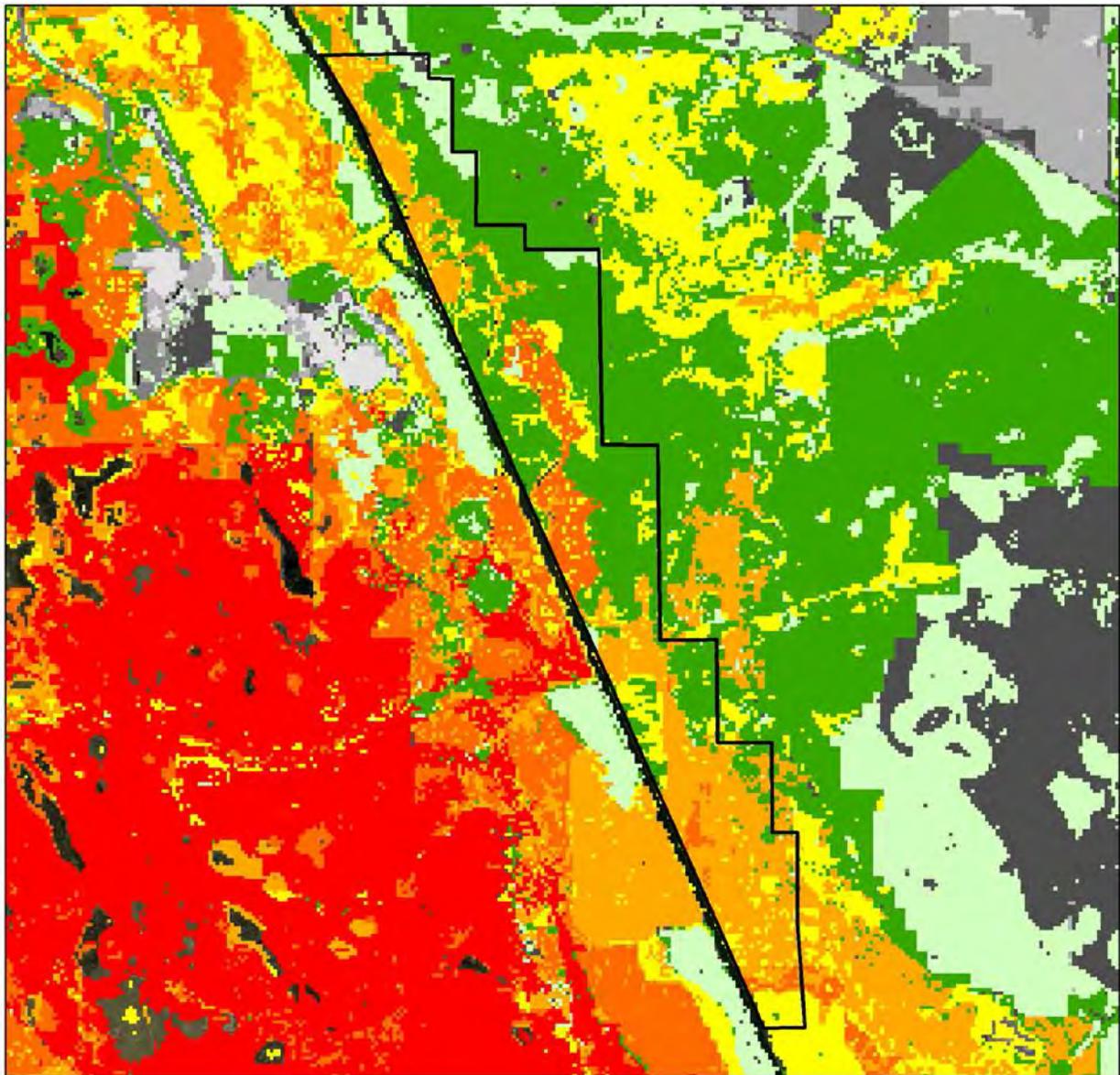


Figure 14: KRPUA BOT Parcels - FWC Integrated Wildlife Ranking System 2009

2.3.3 Imperiled Species

There are 23 imperiled animal (Table 10) and six imperiled plant species (Tables 11) known to occur within a one mile radius of TLWMA. For the purposes of this Management Plan, the term “Imperiled Species” refers to plant and animal species that are designated as Endangered, Threatened or Species of Special Concern by FWC or that are designated as Endangered or Threatened by the U.S. Fish and Wildlife Service. This designation is also commonly known as “listed species.”

On November 8, 2010, new threatened species rules approved by the FWC went into effect. 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.



Table 10. Imperiled wildlife species of TLWMA

<u>Common name</u>	<u>Scientific name</u>	<u>Status</u>	
		<u>FWC</u>	<u>USFWS</u>
American alligator	<i>Alligator mississippiensis</i>	SSC	T
Florida burrowing owl	<i>Athene cunicularia floridana</i>	SSC	
Crested caracara	<i>Caracara cheriway</i>	T	T
Eastern indigo snake	<i>Drymarchon couperi</i>	T	T
Florida black bear	<i>Urus americanus floridanus</i>	T	
Florida grasshopper sparrow	<i>Ammodramus savannarum floridanus</i>	E	E
Florida pine snake	<i>Pituophis melanoleucus mugitus</i>	SSC	
Florida sandhill crane	<i>Grus canadensis pratensis</i>	T	
Florida scrub-jay	<i>Aphelocoma coerulescens</i>	T	T
Gopher frog	<i>Rana capito</i>	SSC	
Gopher tortoise	<i>Gopherus polyphemus</i>	T	
Limpkin	<i>Aramus guarauna</i>	SSC	
Little blue heron	<i>Egretta caerulea</i>	SSC	
Osprey	<i>Pandion haliaetus</i>	SSC	
Red-cockaded woodpecker	<i>Picoides borealis</i>	SSC	E
Roseate spoonbill	<i>Platalea ajaja</i>	SSC	
Sherman's fox squirrel	<i>Sciurus niger shermani</i>	SSC	
Snail kite	<i>Rostrhamus sociabilis</i>	E	E
Snowy egret	<i>Egretta thula</i>	SSC	
Tricolored heron	<i>Egretta tricolor</i>	SSC	
White ibis	<i>Eudocimus albus</i>	SSC	
Whooping crane	<i>Grus americana</i>	E	E
Wood stork	<i>Mycteria americana</i>	E	E

Key:

E = Endangered

T = Threatened

SSC = Species of Special Concern

Table 11. Imperiled plant species of TLWMA

<u>Common name</u>	<u>Scientific name</u>	<u>Status</u>
Cardinal airplant	<i>Tillandsia fasciculata</i>	SE
Cut-throat grass	<i>Panicum abscissum</i>	SE
Hooded pitcherplant	<i>Sarracenia minor</i>	ST
Large-flowered rosemary	<i>Conradina grandiflora</i>	ST
Many-flowered grasspink	<i>Calopogon multiflorus</i>	SE
Nodding pinweed	<i>Lechea cernua</i>	ST

Key:

SE = State Endangered

ST = State Threatened

2.4 Native Landscapes

Native landscapes of TLWMA include nineteen identified natural communities within this central Florida savannahs landscape. Most predominant are vast low-density pinelands and dry prairies, allowing for extensive vistas of this Florida landscape. Other native landscapes include the forested wetlands, especially dome swamps and strand swamps, as well as the open water bodies of Lake Jackson, Lake Marian and Lake Kissimmee. The natural communities of TLWMA are regarded as being in excellent condition and represent benchmark examples of Florida native habitat. Complete descriptions of the natural communities found on TLWMA may be found in Section 2.2.1 of this Management Plan.

2.5 Water Resources

A watershed divide exists along the 80-foot contour line, separating drainage patterns into the St. Johns and Kissimmee River basins. Roughly 12,500 acres in northeastern TLWMA drain to the north through the Bull Creek watershed and thereby eventually into the St. Johns River. The remainder of the TLWMA acreage drains to the south through the Kissimmee River system into Lake Okeechobee.

Three major lakes, Lake Kissimmee, Lake Jackson and Lake Marian, are found in association with TLWMA, providing roughly 17 linear miles of lakeshore within the TLWMA boundary. Jurisdictional wetland areas contained within TLWMA include the wetlands and marshes associated with these lakes, with many additional dispersed isolated wetlands.

2.6 Beaches and Dunes

There are no beaches or dunes associated with TLWMA or the KRPUA.

2.7 Mineral Resources

There are no known mineral resources within TLWMA or the KRPUA.

2.8 Cultural Resources

The Department of State, Division of Historical Resources (DHR) provides to the FWC data on occurrences of Florida's cultural resources. A field survey was performed by DHR for the majority of TLWMA in 2002 and again for the Lucky L Ranch tract in 2008. Twenty-two sites were identified including prehistoric mounds and middens, Belle Glade era (700 BC – AD 1700) mounds and middens and nineteenth and twentieth century homesteads (Appendix 13.9). Three structures were also identified, one constructed in circa 1900 and two in circa 1945 (Appendix 13.9). The earliest structure may be eligible for listing on the National Register of Historic Places. Additional archaeological properties are likely to be found in the area.

2.9 Scenic Resources

Scenic resources of TLWMA include the views of the vast pine savannahs and dry prairies. The low-density of canopy tree species associated with these habitats allow for extensive vistas. Other scenic resources include the forested wetlands, especially dome swamps and dome strands, as well as the open water bodies of Lake Kissimmee, Lake Jackson and Lake Marian. The natural communities of TLWMA are regarded as being in excellent condition, and represent benchmark examples of Florida native habitat. Complete descriptions of the natural communities found on TLWMA may be found in Section 2.2.1 of this Management Plan.

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. 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, 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 through much of the central Florida peninsula throughout most of the European settlement era from the 16th through the 20th century. Use of these agricultural practices began an era of increased alteration of the natural landscape. However, it wasn't until the 19th and 20th century that major settlement and more extensive alteration of the landscape in the area began with the widespread use of agriculture and associated development.

Historical development associated with the early settlement of the TLWMA is similar to other early settlements in east-central Florida. Exploitation of timber resources and

agricultural development were the main factors that opened the area to settlers. One of the original settlers, George W. Hopkins, purchased approximately 104,000 acres in 1902. The nearby HHBCWMA represents a portion of the Hopkins' original tract. Construction of the Union Cypress Railroad began in 1902 and was followed by the development of a timber company of the same name. Completion of Flagler's east coast railroad to Melbourne provided the means to move timber to northern markets. Timber harvesting operations in the Bull Creek and Jane Green Swamp, immediately east of TLWMA, began in 1912 and was concluded by 1928.

The TLWMA was part of the last large open range cattle ranching in the United States, which persisted until 1949 when the Florida Legislature passed the Fence Law requiring all cattle to be fenced. The Seminoles first herded cattle here at the beginning of the 19th century. American colonists replaced them after the Second Seminole War (1842) when the surviving Indians sought refuge in the Everglades and Big Cypress. In the later part of the 19th century, it was not unusual for these early cowmen to see wolves and hear panthers as they moved their herds across the range from Kissimmee to Tampa.

The prairie was home to the Florida cow, a small, bony, long-horned descendant of Spanish cattle able to survive heat, drought, insects and poor forage, and the rugged, independent semi-nomadic Florida cow hunter who rounded up and herded cattle with the help of well-trained dogs.

Each year from February to the end of March, cattlemen burned the prairie to kill back pine saplings, oaks and palmetto and to encourage the growth of grass. Early in the 20th century lumbering and naval store industries followed the railroad south. At first large stands of pine were turpented, then the larger saw timber was cut and finally the pulpwood was removed.

3.2 Current Use of the Property

Currently, TLWMA and the BOT parcels of the KRPUA are managed for the conservation and protection of fish and wildlife habitat, and fish- and wildlife-based public outdoor recreation. Recreational opportunities on TLWMA and KRPUA include hunting, fishing, wildlife viewing, hiking, bicycling, and horseback riding.

FWC has established a communication tower to facilitate statewide program delivery of services. This communication tower is currently being used by the Florida Department of Agriculture and Consumer Services' Florida Forest Service (FFS) to facilitate statewide wildfire and other natural disaster response. The FFS use of this site is consistent with Chapter 589.011(6), FS.

3.3 Adjacent Current Land Uses and Zoning

The TLWMA is currently zoned for Agricultural Development and Conservation. This designation allows for agriculture and silviculture uses and related industries, natural resource conservation/preservation and low-density residential housing. Residential uses are allowed with a maximum density of one dwelling unit per five acres. The land in the

area surrounding TLWMA also has a zoning designation of Agricultural Development and Conservation.

Currently, the majority of TLWMA has a future land use designation of Conservation. The remainder of TLWMA and the majority of the surrounding area have a future land use designation of Rural/Agricultural, which identifies a maximum residential density of one dwelling unit per five acres. The area in and around the community of Kenansville has a future land use designation of Rural Settlement. This designation is intended to preserve existing rural communities while allowing a maximum residential density of two dwelling units per acre.

3.4 Single- or Multiple-use Management

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

3.4.1 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 TLWMA. 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 FWC 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 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	✓		
Fishing		✓	
Geocaching		✓	
Hiking		✓	

	<u>Approved</u>	<u>Conditional</u>	<u>Rejected</u>
Horseback riding		✓	
Hunting		✓	
Linear facilities			✓
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 viewing	✓		

3.4.2 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 TLWMA (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.

3.5 Acreage That Should Be Declared Surplus

On conservation lands where FWC is the lead manager, FWC evaluates and identifies areas for potential surplus. This evaluation consists of GIS modeling and analysis, aerial photography interpretation, and consideration of management and operational needs. 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).

The FWC has evaluated TLWMA and has determined that all portions of the area are being managed and operated for the original purposes of acquisition, remain integral to the continued conservation of important fish and wildlife resources, and continue to provide quality fish and wildlife-based recreational opportunities to the public. Therefore, no portion of the property should be considered or declared surplus.

4 Accomplishments: TLWMA Management Plan 2001 – 2011

The following Resource Management Goals and Objectives are from the TLWMA Management Plan 2001 – 2011. Planned activities for TLWMA 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: Protect, maintain, enhance and restore the unique ecosystems of Three Lakes WMA.

Objective 1: In cooperation with the FWC Division of Fisheries and the South Florida Water Management District and in accordance with the hydrologic study for the TLWMA, April 1977, establish and implement a water level management schedule to benefit upland and wetland habitats by 2001.	100%
Objective 2: Complete an area population assessment of red-cockaded woodpeckers by 2001.	100%
Objective 3: Complete a scrub habitat management plan by 2001.	100%
Objective 4: Contingent on approvals, trans-locate Florida grasshopper sparrows to appropriate habitats within the WMA by 2001.	100%
Objective 5: Consult with DOF to update the prescribed fire plan by 2001. <i>FWC is currently updating the prescribed fire plan for TLWMA.</i>	0%
Objective 6: By 2001, evaluate and document the impacts of motorized vehicle use during small game hunting season and provide recommendations to address any documented problems.	100%
Objective 7: By 2003, restore the native vegetative condition of uplands and wetlands on the south end of Lake Jackson using techniques such as mowing, prescribed fire, and roller-chopping. <i>Comment: restoration and maintenance activities are ongoing.</i>	70%
Objective 8: By 2003, in accordance with the hydrologic study for the TLWMA, April 1977, re-establish or improve water flow through Fodderstack Slough. <i>Comment: FWC is currently in Phase 3 of a long-term hydrological study. Flowage models have been developed. In planning stage of water control structure G113 with the goal of improving flow through Fodderstack.</i>	60%
Objective 9: By 2003, identify recent establishment of pine stands that are incompatible with management of rare habitats and/or listed species, and implement harvest strategies (This responds to the Management Review Team’s second recommendation.	100%

Resource Management Goals and Objectives:

**Percent
Accomplished**

Objective 10: In cooperation with the Division of Forestry, improve wildlife habitat by thinning a minimum of 100 acres of pine forest **by 2005**. 100%

Objective 11: Continue to use growing season and dormant season prescribed burns to maintain, enhance and restore native plant communities **(ongoing)**. 100%

Objective 12: Continue to monitor and improve habitats for listed species **(ongoing)**. 100%

Objective 13: Continue to use chemical and/or mechanical means to control exotic plants and to restore plant communities **(ongoing)**. 100%

Objective 14: Continue to monitor feral hog populations and document associated ecological impacts and minimize any documented negative impacts through appropriate management actions including hog hunting. **(ongoing)**. 100%

Objective 15: Continue to use prescribed fire, mechanical and chemical treatments, and cattle grazing to manage understory plant succession **(ongoing)**. 100%

Goal 2: Provide high quality recreational and educational opportunities consistent with protection and maintenance of ecosystems and cultural resources.

Objective 1: In order to improve the quality of the hunting experience, establish an additional hunter campground, or expand the existing designated hunter campground at the Highway 441 entrance **by 2001**. 100%

Objective 2: Establish a new primitive campground on the Prairie Lakes Unit **by 2001**. 100%

Objective 3: **By 2001**, request a comprehensive cultural resource survey by the Division of Historical Resources. 100%

Objective 4: **By 2001**, conduct a hunter survey to monitor hunter satisfaction levels and game population parameters to identify any need to improve the quality of the Three Lakes hunting experience and to develop appropriate recommendations to maintain quality hunting. 100%

Objective 5: Construct a 9000 sq. ft. equipment shed at a previously disturbed site, following a survey for cultural and listed species **by 2001**. 100%

Resource Management Goals and Objectives:

**Percent
Accomplished**

Objective 6: By 2002, submit a request for one additional staff position to perform educational and interpretive duties associated with the completion of Phase I of the FWC Nature-based Recreation Plan. *Comment: Staff position was requested; however, due to funding shortcomings, additional positions have not been established.* 100%

Objective 7: To improve recreational opportunities, maintain the 50 acres of current food plots and wildlife openings (**ongoing**) and create 25 acres of new openings and food plots on previously disturbed sites **by 2002**. 100%

Objective 8: By 2002, complete Phase I of the proposed FWC Nature-based Recreation Plan. 100%

Objective 9: Investigate the feasibility of establishing a dove field **by 2001**, and if feasible, establish public dove field **by 2003**. *Comment: FWC investigated the feasibility of establishing a dove field and determined that TLWMA was not an appropriate site for this activity.* 100%

Objective 10: In cooperation with the FWC Division of Fisheries, develop some or all of the area's 14 borrow pits for improved fisheries **by 2004**. 100%

Objective 11: By 2005, complete Phase II of the proposed Nature-based Recreational Plan. *Comment: FWC determined certain activities within Phase II were not feasible including interpretive signs for a secondary driving loop, secondary loop was not developed. Also, additional driving loop on the north side was not developed, and a canoe launch at south Lake Jackson was not established.* 70%

Objective 12: By 2005, upgrade 10 miles of existing roads. 100%

Objective 13: Coordinate with local equestrian clubs to develop a designated horse trail **by 2005**. *Comment: FWC contacted local equestrian groups; however, design and development of horse trails was not agreed upon or completed. Currently horses are allowed on designated roads. Coordination with local equestrian user groups is ongoing. FWC will reassess the feasibility of establishing designated horse trails in the update to the Recreation Master Plan.* 0%

Goal 3: Facilitate and conduct scientific research to optimally manage, conserve and protect ecosystems.

Objective 1: Establish photo plots in all managed ecological community types **by 2001**. 100%

Resource Management Goals and Objectives:

**Percent
Accomplished**

Objective 2: Continue to monitor the effects of cattle grazing on native plant communities. (ongoing)	100%
Objective 3: Develop additional research projects to address resource management problems or issues, and implement research results (e.g., management of scrub and flatwoods habitats). (ongoing)	100%
Goal 4: Assure an optimum WMA boundary by pursuing acquisition of additions and inholdings.	100%
Objective 1: Annually review the nomination status of prospective Three Lakes WMA acquisition(s) within the FWC Inholdings and Additions Program. (ongoing)	100%

5 Management Activities and Intent

The following section provides a description of agency plans to locate, identify, protect, preserve or otherwise use fragile natural resources and nonrenewable cultural resources. In general, the FWC management intent for TLWMA and the BOT parcels of the KRPUA is to restore and maintain natural communities in a condition that sustains ecological processes and conserves biological diversity especially fish and wildlife resources. In conjunction with this primary emphasis, it is FWC’s intent to provide quality fish and wildlife-based recreational opportunities on TLWMA and the KRPUA. 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. The recommendations of 2010 Land Management Review (Appendix 13.6) were considered and addressed in the development of this section. Furthermore, the management activities described in this section are in compliance with those of the Conceptual State Lands Management Plan.

5.1 Habitat Restoration and Improvement

On TLWMA and the BOT parcels of the KRPUA, FWC will focus on managing for native habitat, emphasizing maintenance of high-quality natural communities and restoration of disturbed areas. Exotic plant species will be monitored and chemical and mechanical measures will be used for eradication and control. The FFS will be consulted whenever disease or insect outbreaks make it necessary to consider timber salvage operations or when restoration objectives may involve silvicultural operations.

Vegetative community data for the majority of TLWMA originates from an analysis performed by FNAI in 2004. Natural communities represent approximately 93% of the total vegetative cover of TLWMA. The remainder of TLWMA comprises altered agricultural vegetation, ruderal or other land uses. The majorities of these areas of altered vegetation have a land cover of pine plantation/pinelands (about 4% of entire area of TLWMA) and pasture (approximately 2% of entire area). Approximately two-thirds (69%) of the area covered by natural communities are upland areas.

Mesic flatwoods accounts for the largest area of natural community type, covering approximately 28% of TLWMA. Dry prairie accounts for approximately 25% of the area of TLWMA with mesic hammock accounting for approximately 7% of TLWMA. Various other upland natural communities are also represented to a lesser extent, including scrubby flatwoods, scrub, xeric hammock and sandhill.

Wetland areas cover less area of TLWMA, with basin swamp (covering approximately 8% of the total area of TLWMA) and wet prairie (covering approximately 7%) comprising the majority of wetland communities on the area. Other wetland community types occurring on TLWMA include dome swamp, basin marsh, depression marsh, baygall, strand swamp, wet flatwoods, hydric hammock and slough.

5.1.1 Objective-Based Vegetative 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 Objective-based Vegetative Management (OBVM) to monitor how specific vegetative parameters are responding to FWC management. OBVM includes the delineation of management units and quantification of the desired future condition for the natural community.

The first step in implementing OBVM is to map the current and historic natural communities on the managed area using the FNAI Natural Community Classification. FWC contracts with FNAI to provide these mapping services. 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 predominate natural communities identified for management

units. Desired future conditions are defined by desirable ranges for vegetation structural attributes such as canopy cover, shrub height and cover, and ground cover.

Vegetation monitoring samples the selected parameters with the results being compared to the established desired future conditions. All monitoring performed under OBVM is completed using the program's Vegetation Monitoring Standard Operating Procedures (May 2007).

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 management unit'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.

5.1.2 Prescribed Fire and Fire Management

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

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

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

On some areas, prescribed burning is limited by the buildup of mid-story brush and a lack of pyrogenic groundcover fuels. This trend is distinctly negative for most wildlife species. Mechanical control of brush on upland sites by roller-chopping, or incidentally by logging

equipment during commercial thinning operations, can reduce shading and encourage the grasses and forbs that are necessary to sustain a prescribed fire program.

One-pass roller-chopping can be a valuable management tool, enabling the use of prescribed fires in areas heavily invaded by dense woody vegetation. However, roller chopping may damage the herbaceous ground cover, especially wiregrass. Therefore, its application will be limited to situations where burning can only be accomplished by first reducing woody vegetation by mechanical means or in areas of previous fire suppression where brushy and woody species, such as saw palmetto, are too dense or tall and burning alone is not sufficient to reduce these species to natural levels.

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 two to five years, preferably during the spring and early summer months.

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

5.1.3 Habitat Restoration

Habitat restoration, also referred to in this management plan as natural community restoration, will be conducted on over-stocked and off-site pine plantation areas, semi-improved and improved pasture and ruderal sites. Restoration activities will include removal of off-site species, planting of native groundcover species including wiregrass, longleaf pine reforestation, and planting of other appropriate native mid-story and canopy tree species. Upon successful restoration of these altered areas, they will be monitored and maintained.

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

5.2.1 Fish and Wildlife

Due to the variety and quality of natural communities, a diversity of associated wildlife, including rare and imperiled species, as well as common game and non-game species, are found on TLWMA. In managing for wildlife species, an emphasis will be placed on conservation, protection and management of natural communities.

Wildlife management emphasis is placed on documenting the occurrence and abundance of rare and imperiled species on the property. Following species inventory work, management practices are designed to restore, enhance, or maintain imperiled species and their habitats. Resident wildlife will be managed for optimum diversity and abundance. In addition to resident wildlife, TLWMA provides resources critical to many migratory birds including waterfowl, passerines, raptors, shorebirds and others. Habitats important to migratory species will be protected, maintained or enhanced. 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.

Rare and imperiled species and their habitats will be protected and restored by following approved Federal and FWC recovery plans, guidelines and other scientific recommendations. Land management activities, including prescribed burning and timber stand improvements, will take into account imperiled species requirements and habitat needs. Potential for negative impacts from recreational activities will also be considered and monitored.

5.2.2 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 FWC uses OBVM to monitor how specific vegetative parameters are responding to FWC management, and uses the Wildlife Conservation Prioritization and Recovery (WCPR) program to ensure management is having the desired effect on wildlife.

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

The WCPR program helps FWC take a proactive, science-based approach to species management on FWC-managed lands. This approach assesses information from statewide potential habitat models and Population Viability Analyses, 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. The FWC intends for the strategy to promote the presence of, and ensure the persistence of imperiled wildlife and select focal species on the area by providing FWC managers with information on actions they should take (provided the necessary resources are available).

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 TLWMA. In the long-term, by implementing these strategies on FWC-managed lands and continuing to assess wildlife species' needs, FWC will continue to play an integral role in aiding the recovery of imperiled species and preventing the future imperilment of declining wildlife species.

5.2.3 Species Profiles for Select Imperiled Species

Eastern Indigo Snake

Trend: Specific information about the population size of this species is unknown, although it was originally listed in the 1970s due to population decline during the 1960s-70s. The presumed population trend for this species is declining.

Threats: This species was listed as threatened because of population declines associated with loss of habitat and a lack of land management, over-collection by pet traders, and mortality associated with gassing gopher tortoise burrows to kill rattlesnakes. Currently, the most significant factor is thought to be habitat loss, degradation, and fragmentation. Conversion of suitable habitat to residential development, commercial development, and incompatible silviculture negatively impact this species. Its large home range compounds these problems. Predation



by domestic pets and highway mortality contribute to population reductions. Other factors, though probably less important than habitat loss, may still threaten indigo snake populations. Since becoming a federally threatened species, collecting indigo snakes for pets is less common, but still may be a factor. Pesticides, particularly rodenticides applied in silvicultural and agricultural settings may affect indigo snakes through bioaccumulation in their prey. Disease has been investigated as a factor in declines.

Life History: Eastern indigo snakes utilize a mosaic of natural communities throughout the year. They are most commonly associated with scrub, sandhill, and scrubby flatwoods where they occur in or near gopher tortoise burrows. Eastern indigo snake populations are less dependent on gopher tortoise burrows for refugia. Pine flatwoods, dry prairie, hardwood hammocks, marsh edges, agricultural fields, and even anthropogenic areas are also used by these snakes. In warm months, indigo snakes use a variety of natural areas and have large home ranges. Indigo snakes occupy larger home ranges in the summer than the winter. Home ranges in Georgia ranged from 4.8 ha in the winter to 42.9 ha in late spring/early summer and 97.4 ha in late summer and fall. Males have larger home ranges than females. In a recent study of indigo snakes in Georgia, female snakes had home ranges of 35 to 354 ha, while males had home ranges of 240 to 1,530 ha. Information on indigo snakes in Florida indicates adult males have home ranges as high as 224 ha in the summer. One indigo snake moved 1.7 km from its winter refuge during the month of March in Florida. Because it is such a wide-ranging species, the eastern indigo snake is especially vulnerable to habitat fragmentation that makes travel between suitable habitats difficult.

A habitat requirement of indigo snakes is sufficient refugia. They use these refugia to escape cold and desiccation. Gopher tortoise burrows are favorite refugia for indigo snakes. They are known to use burrows made by cotton rats, land crabs, hollows at bases of trees and stumps, ground litter, trash piles and rock piles lining banks of canals. Indigo snakes appear to be tied closely to sandhills and tortoise burrows in northern Florida. In central and south Florida, thermal stress is reduced and they can use other terrestrial habitats, if not heavily impacted by urban development. Indigo snakes commonly use hydric hammocks in central/south Florida, and pine flatwoods, pine rocklands, and tropical hardwood hammocks as important habitat in south Florida. Burrows and other below ground refugia will still be used by indigo snakes in central/south Florida.

Sexual maturity appears to occur around 3-4 years of age. In North Florida, breeding occurs November–April with females laying 4-12 eggs in May-June. Most hatching of eggs occurs August-September, with yearling activity peaking in April-May. Limited data on reproduction in south Florida indicate the breeding season is extended; breeding occurs from June-January, egg deposition is April-July, and hatchlings are born through early fall.

An active predator, indigo snakes will eat terrestrial and fossorial vertebrates. In rare cases, these snakes are also known to climb shrubs or trees to capture prey. Common food items include fish, frogs, toads, snakes, lizards, turtles, eggs, juvenile gopher tortoises, small alligators, birds, and small mammals. Juvenile snakes eat mostly invertebrates.

Preferred Habitat Parameters: No specific information is available, although habitat parameters for gopher tortoises in xeric communities likely are an appropriate indicator of suitable habitat for this species. No information exists on optimal habitat conditions for indigo snakes in other natural communities.

Minimum Habitat Requirement: Preserves of at least 4,000 ha. Assuming a home range of 75 ha for males and 19 ha for females, this allows for 53 males and 210 females.

Best Management Practices: Use of prescribed fire will create suitable habitat for this species. Winter burns are sometimes recommended over growing-season burns because individuals are actively moving during warm weather and could be exposed to higher mortality risks from prescribed fire. Winter burns, however, could potentially increase predation on smaller indigo snakes forced to use pine straw, logs, and other debris for shelter. Using prescribed fire in May-June is preferable since most snakes will have moved into low-lying areas around this time. Further, this species evolved with a habitat that historically burned, and therefore the benefits of habitat improvement via the burn likely overcome any loss of individuals caused by a burn. Frequency of fire should mimic natural fire return intervals for the natural community. Thinning of pine plantations or pine flatwoods is beneficial to indigo snakes because it opens the canopy to promote understory development. Timber management should shift towards longer rotations and the establishment of site-appropriate species. Low intensity site preparation (i.e., prescribed fire, light mechanical work) should be used over more intensive actions like root raking.

Stump removal may be damaging to indigo snakes as it removes an alternative refugia for smaller snakes and in areas without gopher tortoises.

Educate the public to avoid wanton destruction of large snakes.

Florida Black Bear

Trend: Historically more abundant/widespread than currently, however the recent trend is stable to increasing in most of Florida. Occurs widely but discontinuously throughout FL. The long-term future of black bears in Florida is uncertain because of their large spatial requirements, the fragmented nature of remaining populations, the small size of some populations, and increasing human development and activity leading to negative interactions with people.



Threats: Habitat loss and fragmentation have greatly impacted bears in Florida. Human development has increased through time and currently presents one of the greatest threats to bears. Other potentially important threats include human-caused mortality (e.g. bear/vehicle collisions, illegal kill, etc.) and

incompatible habitat management. Additionally, disease and parasites have been documented in bears, but none are known to pose a significant threat to Florida's bear population.

Notes: In 2005, after conducting genetic hair sampling and population modeling for six core bear populations, FWC produced a scientifically based population estimate of 2,625 bears statewide that also identified genetically different sub-populations. The FWC has developed a statewide management plan for the species.

Life History: The black bear ranges throughout the United States, northern Mexico and Canada. The Florida black bear subspecies is found only in Florida and southern Georgia and Alabama. This subspecies requires a variety of forested areas, and maintains large home ranges. There are currently 2500 to 3000 bears estimated in Florida.

The average female bear in Florida becomes sexually mature at 3 to 4 years of age. Breeding occurs from June through August. Reproductive females enter winter dens in mid to late December and emerge in early to mid-April after a denning period of 100 to 113 days. Actual gestation is 60 days, and cubs are born in late January to mid-February. Most studies in Florida found an average litter size of around two cubs, but one to three are not uncommon. Cubs stay with their mothers and may den with her the following year. Family dissolution usually occurs in May to July when cubs are 15 to 17 months old. Young females generally form a home range overlapping their natal range while young males disperse to new areas.

In fall, bears wander widely and forage extensively in order to accumulate enough energy in the form of fat to survive the winter. Adult bears may increase their body weight by 25-40% in fall. In winter the consumption of food by bears is greatly reduced and reproductive females may spend many weeks in the natal den with little or no additional nutrition. Bears are opportunistic foragers; taking advantage of seasonally abundant/available fruits, mast, insects, and increasingly, anthropogenic (produced by humans) foods. Approximately 70% of the natural bear foods in Florida are plant material with colonial insects and beetles representing the largest portion of the animal material consumed. Although food items vary by season and location, the fruits and fiber of saw palmetto are important throughout the state and throughout the year.

The Florida black bear thrives in habitats that provide an annual supply of seasonally available foods, secluded areas for denning, and some degree of protection from humans. Optimal bear habitat in Florida has been described as "a mixture of flatwoods, swamps, scrub oak ridges, bayheads, and hammock habitats, thoroughly interspersed." Self-sustaining and secure populations of bears in Florida are found within large contiguous forested tracts that contain understories of mast or berry-producing shrubs or trees; characteristics more commonly found on publicly-owned lands and commercial forests.

Variation in home range size and shape is influenced by the abundance of nutritional resources, population density, reproductive status, and anthropogenic influences such as

habitat fragmentation and human produced foods which act as an attractant. Female black bears select a home range based on availability of resources with smaller home ranges found in more optimal habitat. Male black bears establish a home range in relation to the presence of females and are usually three to eight times larger than those of females. Bears in Florida exhibit a breadth of home range sizes indicative of the variety of habitats and habitat quality found in the state. Female bears with cubs have smaller summer home ranges than females without cubs but much larger fall home ranges than females without cubs. The larger fall home range is a response to the nutritional needs of rapidly growing cubs. Black bears may move great distances, occasionally dispersing > 87 mi (140 km). However, < 30% of the dispersal events recorded for black bears are > 37 mi (60 km) and fewer than 2% are > 62 mi (100 km).

Preferred Habitat Parameters: Not available, though the species needs a mosaic of micro habitats to provide the variety of foods needed throughout the year, including some areas of dense underbrush for use as den sites.

Best Management Practices: Preserve large unbroken tracts of habitat, and restore connectivity when habitat has been fragmented. Successful management prescriptions must consider highly variable food habits as well as the effects of fire, timber management, and expanding development. Reduce bear/vehicle collisions through construction of over/underpasses if necessary. Managers should consider extending the time between prescribed fires in occupied bear range. Short fire rotations (2–3 years) in upland sites may be insufficient to allow important mast-producing species to recover peak fruiting performance (flowering does not equal fruiting). However, burns that leave a mosaic of conditions would likely benefit this species. Do not take measures to burn patches that originally went unburned. When possible in occupied bear habitat, fire should be excluded from dense (denning) vegetation during January to April. Consider prohibiting palmetto fruit harvesting. See Bear Management Plan, FWC 2011.

Florida Burrowing Owl

Trend: The estimated the statewide population at 3,000-10,000 pairs in 1987. A 1999 survey recorded 1,757 adults and 752 young at 946 territories in a census of 62 counties. Many locally dense concentrations are found across the range of the species, but this does not necessarily indicate stability in the population. The status of the species appears to be a function of the relative rates of establishment and collapse of metapopulations in the state.

Threats: Cultivation (citrus and agriculture) and development are primary threats to the species in Florida. Also of concern is the fact that a growing number of local populations are dependent on non-native habitat in residential, industrial, or ruderal areas. Vehicle collisions, domestic animal predation, and harassment from humans also contribute directly to mortality in this species. Fire ants have also been known to cause mortality in young burrowing owls.

Life History: The Florida burrowing owl is a resident, non-migratory owl found in southwest and southeast Florida. Small, populations with patchy distribution can be found in the Florida Keys and along the ridges of central Florida from Highlands to Madison counties. A single population can also be found at Eglin Air Force Base in Okaloosa County. Historically, this species occupied the dry prairies in the central part of the state. It is thought that burrowing owls were at one time nomadic, following short-term disturbances in the landscape, such as fires or floods. Drainage of wetlands and land clearing for development and agriculture has greatly expanded the historic range of the species in Florida. Burrowing owls are still found in dry prairie at Kissimmee Prairie Preserve State Park, but are not known to use dry prairie elsewhere. They appear to prefer modified features in the landscape, such as berms or canal banks. Greater concentrations of burrowing owls are now found in non-native habitats, such as neighborhoods, airports, athletic fields, and industrial areas. It is thought that burrowing owl populations in urban areas increase greatly for a period, but then crash when some unknown critical threshold is reached.

Burrowing owls require open, treeless areas with sandy soils for excavating burrows. Ground cover should be low; this can be accomplished by mowing or grazing in ruderal areas and the use of prescribed fire in native habitats. Unlike many other owl species, the burrowing owl is active during daylight hours. The diet of burrowing owls includes a variety of insects, and small reptiles and amphibians. In the Cape Coral populations, burrowing owls have been observed feeding on road kill and small songbirds that have collided with glass windows. Other prey includes small rodents.

Burrowing owls derive their name from their extensive use of underground burrows. Outside of Florida, other species of burrowing owls tend to utilize burrows that have already been excavated by mammals. In Florida, burrowing owls often excavate their own burrows, and some have been documented using gopher tortoise burrows. Excavation of a burrow can be completed in a matter of days, and digging is done primarily with the feet. Burrows consist of a mound of soil at the entrance, an entrance tunnel that twists for approximately 1.5-2.5 meters, and a nest chamber that has been enlarged at the end of the tunnel. Burrowing owls decorate the entrance to the tunnel with small items such as shells, cigarette butts, and plastic prior to the breeding season. Burrows are used during the spring for nesting and during the winter for protection from avian predators. In summer, burrow use decreases, possibly due to increased flooding risk.

Burrowing owls are semi-colonial. They form loose colonies, within which pairs may exhibit territoriality, though little is known about the size of defended areas. In some areas in Florida a study found densities of 17.6 pairs/km² or 0.176 pairs/ha. Adults breed at one year of age, with one-year intervals between subsequent breeding. Pair bond and territory are established at roughly the same time, and pairs stay together throughout the year in the Florida subspecies. On average, 68% of adults exhibit territory fidelity in Florida.

In Florida, most (95%) egg laying occurs from February through May, with the peak occurring in mid-March. Egg laying has been documented as early as October. Clutch size is 2-6 eggs. Double brooding appears to be rare, with 5 documented occurrences in one calendar year to date. Incubation is done primarily by the female, and lasts for 28-30 days. Young emerge from the burrows after approximately 2 weeks and wait for adults to bring food. In the Florida subspecies, males have never been observed feeding young. If the female dies, the young will starve to death. Young can fly well by six weeks of age, but still remain near burrow for protection. Burrowing owls may prefer nest sites with a few extra unoccupied burrows nearby for young to escape to if necessary or for caching food items for later consumption. At seven to eight weeks of age, young begin chasing insects and using satellite burrows. Young females disperse an average of 1,116 m and males 414m from the natal territory.

Weather appears to be a factor in reproductive success in Florida. Sudden thunderstorms in the springtime can collapse burrows, trapping birds inside to drown. A study conducted in 1987 indicated 27% of nests with eggs and young failed because of weather. Reproductive success can also be impacted by mammalian predators in local populations, specifically domestic and feral cats.

Best Management Practices:

Land management activities such as mowing or prescribed burning will reduce vegetation height to a level that is beneficial for burrowing owls. Care should be taken to avoid using heavy equipment around burrows so as not to collapse burrows and trap owls inside. Avoid prescribed burning in the vicinity of active burrows during the nesting season to reduce disturbance to breeding birds. Avoid activity within 10 m of the burrow from February 15 through July 10.

Cattle grazing will reduce vegetation height to a level that is beneficial for burrowing owls, but cattle may also degrade/destroy burrows by trampling or wallowing in them. Consider excluding cattle from immediate vicinity of known active burrows. Conversion of pasture to more intensive uses could decrease habitat suitability for burrowing owls and is discouraged.

Burrowing owls may be attracted to construct burrows in a given area by providing a starter burrow. Remove a circular plug of soil 0.3 meters in diameter and pile loose soil near the hole. Simply disturbing a patch of suitable habitat by mechanically clearing vegetation may attract burrowing owls if they are in the vicinity.

Artificial perches provide hunting and observation sites for burrowing owls. Wooden fence posts or other perches placed in immediate vicinity of burrows will provide a suitable perch. Use caution to avoid disturbance to burrow during breeding season, and to avoid digging immediately on top of burrows to avoid collapse of the burrow.

Signage can be used to educate the public about burrowing owls, and to provide protection from harassment.

There have been experimental translocations of Florida burrowing owls that have met with mixed success.

Florida Grasshopper Sparrow

Trend: The Florida grasshopper sparrow was federally listed as endangered in 1986 after Florida Game and Fresh Water Commission (now FWC) surveys documented population declines throughout its range. Surveys from the early 1980s found 182 individuals on nine sites in Glades, Highlands, Okeechobee, Osceola, and Polk counties; surveys after federal protection (1989-1993) found 424 individuals on seven breeding sites. Despite the increase in overall numbers, only 3 of the original 9 sites still had birds. Surveys from 1997 indicated fewer than 800 individuals scattered across three publicly-owned parcels and one private ranch. A survey in 2004 found 278 male sparrows at seven sub-populations, and documented a considerable contraction in range. Three formerly large sub-population on Avon Park Air Force Range have declined to alarmingly low numbers.



Photo Credit: Audubon of Florida

Threats: The primary reason for listing this species was due to the loss and degradation of dry prairie communities to improved pasture and agriculture. The loss of native vegetation through intensive agricultural practices can eliminate the plant species necessary for foraging and nesting habitat. While the species can tolerate some grazing, levels greater than one animal per eight acres are detrimental. Hydrological actions that keep prairie too wet during the breeding season will prevent nesting, and if continued for extended periods, will alter vegetative communities. Other threats to this species include predation of nests and young, nest parasitism by brown-headed cowbirds, and the lack of prescribed fire in dry prairie communities.

Notes: This non-migratory subspecies is endemic to central and southern Florida.

Life History: Dry prairie habitat for this species contains large (> 50 acres), treeless, grasslands that are maintained with frequent fire. Suitable prairie is dominated by saw palmetto and dwarf oaks 30 to 70 cm in height. Grasses like bluestem, wiregrass, and St. John's wort also can be found in good sparrow habitat. Tree densities of >1 tree per acre are not well-tolerated. As ground-dwelling birds, they require bare ground (at least 20%) for ease of movement and foraging. Cover (i.e., bunchgrasses and low shrubs) however, is important for providing nesting habitat.

Nesting usually begins in early April and can continue through June. Nests are placed on the ground in shallow cavities. Nests are dome-shaped and constructed from grasses like wiregrass, bluestem, and yellow-eyed grass. Second nest attempts appear to be common when summer burns are completed early in the breeding season (i.e., May – June). Females are known to create a new nest within 10 -12 days after one is destroyed. Most nests contain 3-5 eggs and females will incubate for 11-12 days. When chicks are hatched, both parents become more defensive around humans and to other intrusions. Success rates for nesting are low. Nest predation by snakes and mammals are believed to be the main reason for this low success.

Most foraging activity by grasshopper sparrows occurs on the ground. Diet is largely grasshoppers, crickets, beetles, weevils, moths, flies, and seeds. There is some evidence that birds might switch to a diet dominated by seeds during the winter. Territories are heavily defended by males from time of creation through incubation; defensive behavior is reduced once the young are hatched. Territory size on Avon Park Air Force Range was 1.8 – 4.8 ha (4.4 – 11.9 ac) in size, with no significant difference in size between mated and unmated males. During the non-breeding season males and females overlap and home ranges increase with a mean size of 29.0 ha (71.6 ac).

Preferred Habitat Parameters:

Habitat feature	Mean	Standard Deviation	Range
Grass cover (%)	25.5	18.2	5.1 – 69.3
Shrub cover (%)	19.2	7.8	0.0 – 33.9
Forb cover (%)	4.5	4.5	0.5 – 21.0
Litter cover (%)	14.4	8.9	2.4 – 34.4
Bare ground (%)	36.2	19.5	4.9 – 67.7
<i>N</i> stems/m ²	30.7	23.5	0.0 – 87.0
Litter depth (cm)	0.7	0.6	0.0 – 2.7
Palmetto height (cm)	57.3	10.9	37.1 – 80.1
Vertical density; contacts/transect	66.9	35.1	10.0 – 145.0
Mean vegetation height (cm)	27.8	6.8	9.0 – 39.0

Best Management Practices:

The use of frequent prescribed fire is needed to maintain open habitat and prevent the encroachment of pines and hardwoods into dry prairies. Sparrow populations decline on sites that have a burn frequency of greater than 2 years.

Growing season fires, as opposed to winter burns, may benefit sparrow populations by increasing the length of breeding activities and possibly reproductive success.

Roller-chopping may be used, in addition to fire, to alter vegetation in dry prairies. Winter chopping can provide a quick reduction in shrubs and improve herbaceous growth but will still leave a large amount of biomass. Burns completed after the chop will help to remove this biomass and trigger more herbaceous growth depending on seasonality of the burn.

Grazing activities on dry prairies should be considered carefully. Sparrow populations decline greatly or disappear on sites that are heavily grazed.

Unnatural water impoundment during the breeding season will reduce or eliminate breeding by sparrows.

Florida Scrub-jay

Trend: The population has declined by an estimated 90% since pre-settlement times and is experiencing a continued decline.

Threats: Habitat loss, degradation and fragmentation are predominant threats to this species. Urban development and conversion of scrub habitat to citrus has contributed significantly to the decline of the species. Other threats include loss/reduction in suitable scrub habitat due to fire suppression, as well as mortality from vehicles and feral cats.



Notes: Currently, a number of working groups have been formed to aid in recovery of this species. The Nature Conservancy has developed Jay Watch which makes use of volunteers to aid in monitoring this species. The FWC currently has a scrub-jay coordinator in the Species Conservation Planning Section.

Life History: The Florida scrub-jay is a habitat specialist that can be found in scrub and scrubby flatwoods. In some cases they are found in urban areas with remnant scrub or vegetation that mimics the vegetative structure of scrub (e.g., unmanaged citrus groves). Florida scrub-jays are found in both coastal and ancient scrub habitats in peninsular

Florida, and rely heavily on fire to maintain optimal scrub conditions for foraging and breeding. Florida scrub-jays are non-migratory and tend to be relatively sedentary.

Florida scrub-jays live in groups, in which non-breeders assist with feeding young and predator detection. Groups consist of the breeding pair and up to 8 adults and 1-4 juveniles. Large groups are rare; average group size is 3. Average territory size per group is approximately 25 acres. Eggs are laid from March to June into a small nest located at low to mid height in a dense shrub. Clutch size is 3-4 eggs. Incubation lasts for 18 days, after which nestlings are cared for by the parents and group members. Young fledge at 18 days (range 12-25 days) and typically remain concealed until confident enough to fly and follow parents.

Diet of Florida scrub-jays includes small invertebrates, arthropods, and acorns. Acorns comprise the majority of the diet during certain times of the year. Florida scrub-jays cache acorns by hammering them into sand, or stuffing them into tufts of pine needles or palmetto fronds. From August to December, each Florida scrub-jay caches 6,500-8,000 acorns within its territory. Open patches of sand within the territory are important for this behavior.

Ideal scrub-jay habitat consists of mostly treeless open expanses of low shrubs interspersed with bare sandy patches. Oaks and other shrubs are generally low enough that a person approximately 6 feet tall can see over most of the landscape. The vegetation characteristics outlined in the Habitat Parameters Table (below) benefit the maximum number of scrub-endemic plant and animal species, as well as many widespread species. Increased pine densities will decrease habitat suitability for scrub-jays by providing cover and perches for predators, as will a shorter distance to forest edges. Small patches of taller scrub (6-9 feet) cumulatively comprising no more than an acre per territory provide habitat heterogeneity. Large patches of open sand are important for Florida scrub-jays, and for other scrub species, such as the sand skink and some endemic scrub plants.

Fire is an important component of the natural history of the Florida scrub-jay and should be used as a management tool as needed to achieve the desired habitat structure. In general, scrub should burn at a fire frequency of 7-20 years and scrubby flatwoods at a frequency of 5-10 years. Shorter fire frequencies (2-3 years) in scrub will prevent acorn production in oaks and longer fire frequencies will allow overgrowth of sand patches and invasion of pine species that are detrimental to survival of Florida scrub-jays.

Habitat Parameters:

Vegetation height	At least 10% of each potential scrub-jay territory (25 acre unit) should have shrubs that average 4 to 5.5 feet high to provide cover and produce acorns. The rest of the vegetation should be shorter, with no more 1 acre of vegetation taller than 5.5 feet per
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	unit.
Tree (>15 foot tall) overstory	If present at all, less than 1 tree per acre.
Distance to forest edge	Maintain a 1,000 foot non-forested (<1 tree per acre) buffer between a scrub-jay territory and forest
Open ground	10-50% bare sand or sparse herbaceous vegetation

Best Management Practices:

Manage land following the FWC’s Scrub Management Guidelines. Suitable habitat can be restored / maintained through use of prescribed fire on a return interval of 5-20 years, depending on type of scrub. Growing season burning is recommended whenever possible. Care should be taken when burning during the nesting season. It is recommended that scrub burns be smaller in size to promote a mosaic of habitat across the landscape, and to avoid burning all acreage within a given jay territory. Florida scrub-jays will re-nest throughout the breeding season if fire destroys a nest site, and it is thought that the long-term benefit of burning for the species outweighs the loss of an individual nest.

Mechanical treatment prior to fire can be used to reduce vegetation heights. Fossorial lizards, such as the sand skink, as well as many plant species are sensitive to disturbance by heavy equipment, so care should be taken in type of mechanical treatment applied to scrub habitat, particularly ancient scrub. Mechanical treatment alone is not enough, and should be followed with prescribed fire to create optimal scrub-jay habitat. When possible, apply a “sloppy chop” that will leave some heterogeneity to the stand post-treatment. The goal should be to improve the stand to a point that fire alone maintains the stand without a need for mechanical assistance.

High densities of pine trees makes habitat unsuitable for Florida scrub-jays. Prescribed fire can be an effective means of removing these trees, but will likely create additional perches for predators. If fire is used to reduce pine densities, it may need to be followed with chainsaw work to bring down standing dead trees. Timber harvest can also be an effective means of reducing pine overstory in scrubby habitats, but only if followed with prescribed fire to remove logging slash. Equipment and practices should be used that minimize soil disturbance and associated impacts.

Where possible, habitat management activities should avoid manipulation of about one quarter of any occupied territory. These unmanaged portions of territories will provide refuge and food resources as the remainder of the habitat within the territory recovers from management applications. This is particularly important in areas where suitable, unoccupied habitat does not exist adjacent to territories to be managed.

Gopher Frog

Trend: Gopher frogs are restricted to the Coastal Plain of the southeastern United States and are considered rare throughout their range. Currently two subspecies are recognized in Florida, the Florida gopher frog (*Rana capito aesopus*) and the dusky gopher frog (*Rana capito sevosa*). The boundary of these two sub species is the Apalachicola River. The Dusky gopher frog is found west of it. Specific information on the population trend is not available but the species is believed to be declining and at risk for extinction throughout its range.



Threats: Habitat loss is the greatest threat to gopher frogs as longleaf pine ecosystems are clearcut and/or converted to plantations of off-site pines (i.e., slash, loblolly, and sand pine) or developed. Other threats to this species include habitat fragmentation, fire suppression, the introduction of fish to breeding ponds, and mortality along roadways. Ditching of breeding ponds and off-road vehicle (ORV) use in these areas also may reduce reproductive success. Gopher frogs are extirpated in Louisiana and only one breeding population can be found in Mississippi. In Florida, gopher frogs are believed to be declining as suitable habitat is lost through lack of management and conversion to agriculture and development.

Life History: Gopher frogs in Florida use gopher tortoise burrows as refuges and are considered a gopher tortoise commensal species. Because of this fact, their range is a subset of the gopher tortoise range. Gopher frogs do not occupy tortoise habitat lacking sufficient wetlands for breeding. Gopher frogs spend much of their time in refuges such as gopher tortoise burrows, rodent burrows and crayfish holes. Their preferred habitat is Longleaf Pine- Turkey Oak sandhills, but they also are found in pine flatwoods, sand pine scrub, and xeric hammocks. They are rarely found more than a mile away from breeding habitat.

Gopher frogs prefer to breed in seasonally flooded grassy ponds and cypress heads that lack fish. They are most often heard calling after heavy rains. This species breeds in large groups of many individuals (explosive breeding) triggered by heavy rains. Fish prey on the early life stages of gopher frogs, which may account for their preference for fishless breeding habitats such as temporary ponds. While southern populations call, and probably breed year long, northern populations in Florida breed from February through April. Females may not breed every year, but lay between 3,000 and 7,000 eggs when they do. Tadpoles take three to five months to metamorphose. Gopher frogs reach sexual maturity in their first-second year.

Gopher frogs are largely nocturnal, but may be seen at the mouths of tortoise burrows on dark damp days. Their diet consists of invertebrates and anurans, including toads. Tadpoles feed on plant matter and detritus.

Preferred Habitat Parameters: Management parameters for gopher tortoise will provide habitat for gopher frog. Parameters for gopher tortoise are included below. Freshwater marsh and wet prairie parameters assume a frequent fire regime, an important factor in providing grassy ecotones and quality gopher frog habitat in these communities.

Natural Community	Fire Regime	Basal Area	Max % Canopy Cover	Max % Shrub Cover	Min % Ground Cover
Xeric Oak Scrub	7 - 12 yrs	N/A	< 20 %	< 60 %	> 15 %
Sand Pine Scrub	20 - 80 yrs	20 – 40	< 40 %	< 60 %	> 30 %
Sandhill / Upland Pine Forest	2 - 5 yrs	20 – 80	< 50 %	< 30 %	> 40 %
Pine Flatwoods	3 -5 yrs	20 - 80	< 40 %	< 50 %	> 50 %
Freshwater Marsh/ Wet Prairie	1-3 yrs	N/A	< 10 %	< 10 %	> 50 %

Best Management Practices: Management of sandhill and upland habitats to improve populations of gopher tortoise will also provide benefits to gopher frogs as they show strong site fidelity to tortoise burrows. Continue to use prescribed fire in these upland communities whenever possible.

Do not place firebreaks along wetland ecotones (e.g., cypress/tupelo ponds occurring in upland ecosystems). Firebreaks here can alter pond hydro-periods, provide connections with other wetland systems allowing introduction of predatory fish, and alter/destroy the herbaceous component of the pond margins.

Prohibit ORV use within 50 m of upland wetland depressions, particularly in known breeding sites. ORV use in ponds can damage the hardpan and result in a shorter

hydroperiod, making some wetlands unsuitable for gopher frog reproduction. Loss of herbaceous vegetation from ORV usage could also discourage gopher frog reproduction, since egg masses are attached to stems of herbaceous vegetation.

Allow prescribed fire to burn into upland depressions whenever possible, but particularly during the growing season. Burning reduces woody vegetation and maintains an open, grassy pond edge more typical of gopher frog breeding sites.

Silvicultural practices should focus on selective thinnings and natural regeneration enhanced by prescribed burning. An effort should be made to manage a 2 km buffer zone around known breeding sites to provide quality upland habitat and reduce threats to water quality.

Gopher Tortoise

Trend: In 2007 the Gopher Tortoise was reclassified by FWC from a Species of Special Concern to Threatened. This reclassification was based on an estimated population reduction of ca. 50-60% in Florida. This reduction has taken place in the past three gopher tortoise generations (60–93 years) due to the following: a 50–60% reduction in the area of occupancy, decreased habitat quality, increased accidental mortality, human



exploitation, and the effects of pathogens. The effects of human exploitation, accidental mortality, and pathogens remain unquantified, and these threats are in addition to documented declines in the area and quality of gopher tortoise habitat.

Threats: The primary threat to gopher tortoises in Florida is habitat destruction, fragmentation, and degradation, particularly from urbanization and development, agriculture, and phosphate/heavy metals mining. Tortoise populations in the Florida Panhandle have been depleted by human predation and by habitat degradation resulting from fire suppression and planting dense stands of sand pine in sandhill habitat. Formerly large tortoise populations in the northern peninsula have been depleted by agriculture, human predation, and increasing development. In central Florida, urban growth and development, phosphate mining, and citrus production are the primary threats. In south Florida, tortoise habitat has been destroyed or degraded by urbanization, intensive agriculture, and invasive exotic plant species. Habitat fragmentation of rural areas by roads and increased vehicular traffic due to development result in increased road mortality of gopher tortoises, which are often drawn to roadsides because of available forage.

Notes: The FWC has an approved management plan for this species which specifies a role for public lands in the conservation of the species.

Life History: The gopher tortoise is a management responsive species that when present can be an indicator of properly managed upland pine or grassland habitats. This species is often considered a keystone species because many other species make use of the burrows dug by gopher tortoises. Tortoise grazing and mound building also alter the surrounding habitat making it suitable for other species. Gopher tortoise habitat management requires frequent controlled burns and maintenance of an open tree canopy. Fire can be useful in maintaining a diverse grass and legume dominated groundcover at a height where it is suitable for tortoise foraging. This management regime also benefits a large suite of species including several common and imperiled species.

The gopher tortoise is slow to reach sexual maturity, has low fecundity and has a long life span. Females are sexually mature between 10-21 years of age, depending on local resource abundance and latitude; males mature at a slightly younger age. The breeding season is generally March-October. Nests are excavated from mid-May to mid-June and only 1 clutch is produced annually. Nests are often excavated in burrow mounds and are frequently depredated. Clutch size is between 1 to 25 eggs, with an average of 5-9. Incubation period is approximately 80-100 days, depending on latitude.

A wide variety of plants make up the gopher tortoise diet. Broadleaf grasses, sedges, grass-like asters, legumes, and various fruits are consumed. Preferred foraging areas are relatively open and have low-growing, diverse herbaceous vegetation that is readily accessible

Home range varies widely based on habitat quality, season, and sex of the tortoise, and generally ranges from 0.25 to 5 acres (0.10-2 hectares). Gopher tortoises generally use several burrows during the year and can move a mile (1.6 kilometers) or more to occupy a new burrow. Adults have been documented as moving up to 200m from burrows to forage. These tortoises are also capable of long movements such as the 0.74km movement of one sub-adult.

Management activities that benefit gopher tortoises are prescribed fire and silvicultural practices that open the forest canopy and provide a diverse herbaceous ground cover and limited shrub cover. Translocation is frequently used to conserve populations threatened by development activities and can be used to restock unoccupied, restored habitats. In the future, temporary enclosures will be required on the recipient site to prevent dispersal. Upper respiratory tract disease and other diseases are a concern when relocating gopher tortoises into areas with an existing population.

Preferred Habitat Parameters:

Plant Community	Fire Regime	Max. % Canopy Cover	Max. % Shrub Cover	Min. % Ground Cover
Dry Prairie	1-3 yrs	< 10	< 10	> 50
Sandhill/Upland Pine Forest	2-5 yrs	< 50	< 30	> 40
Flatwoods	2-5 yrs	< 60	< 50	> 50
Scrubby Flatwoods	3-7 yrs	< 40	< 60	> 30
Oak Scrub	7-12 yrs	< 40	< 60	> 15

Best management Practices: See the Gopher Tortoise Management Plan, FWC 2007, Habitat Management and Population management section.

Limpkin

Trend: In the late 19th and early 20th centuries, limpkins were heavily hunted and greatly reduced in numbers except in more remote locations. Furthermore, wetland drainage reduced usable habitat, especially in the northern Everglades, upper St. Johns River Valley, and the Kissimmee River Valley. Breeding Bird Survey data indicate a decline from 1966 through 1993, although recent years are relatively stable.

Threats: Major threats include changes in water quantity or quality that affect apple-snail abundance or availability. These include hydrology alteration, invasive exotic aquatic plants, pollution, siltation, etc. There are also concerns that the timing of aquatic plant control may affect apple-snail populations in regards to eliminating cover and oviposition sites.

Life History: The limpkin is a rail-like wading bird that is highly dependent on the apple snail. This species inhabits freshwater marshes, swamps, springs and spring runs, and pond and river margins. Northern breeding populations are found along spring-fed rivers with lush, submerged aquatic vegetation. Throughout its range, limpkins are locally common where apple snails are abundant. The Florida population is considered to be non-migratory, and because of the limpkin’s dispersal capabilities it could be considered a single population.

This species is monogamous, or serially polyandrous, with males and females establishing a territory for reproduction. The majority of information on this species comes from a

handful of natural history studies, and there are many gaps in our knowledge of their demography. Females and males both breed successfully in their first year. Limpkins mature quickly, reaching flight stage at about 7 weeks of age. Survival to this flight stage was 28.4%. Adult survival has not been reported. Average clutch size is 5.5 (2.75 females, assuming a 1:1 sex ratio), with younger individuals probably having smaller clutch sizes than older females.

Territory size at Wakulla Springs (Wakulla County, Florida) averaged 5.7 ac \pm 3.7 ac (2.3 ha \pm 1.5 ha) while territory size at Alexander Springs (Lake County, Florida) averaged 5.2 ac \pm 1.7 ac (2.1 ha \pm 0.7 ha). Territory size may vary greatly from year to year in relation to prey abundance and availability and social phenomena. Territory size in more open and scattered wetlands (e.g., south Florida prairies and marshes) may be very different from those found at springs.

Best Management Practices: Since this species is capable of significant dispersal, emphasis should be placed on protecting/maintaining as much habitat as possible. The sensitivity to changes in survival suggests that management and field surveys target these parameters. The conservation of limpkin habitat can be accomplished by identifying important wetland areas where wetland regulations may offer some degree of habitat protection. Due to limpkins reliance on apple snails, healthy apple snail populations are important, therefore, healthy eel grass and good water quality are also important.

Red-cockaded Woodpecker

Trend: This species has likely experienced a 97% reduction in numbers and amount of potential habitat with most of this loss occurring during the mid 1900s. The declining trend possibly continues despite some local increases on public lands. Intensive management actions have allowed for population expansions and even limited reintroductions.



Threats: Loss and degradation of habitat is the primary threat. The vast majority of red-cockaded woodpecker (RCW) habitat has been subject to pine harvest which removed the old growth pine, and has been converted via development, agriculture or silviculture. RCWs require open, mature (>60 years) pine stands. Fire suppression allows hardwood and shrub encroachment into these pine stands making them unsuitable to RCWs. Most public lands are years away from having optimal RCW habitat, even where RCWs currently occur. The isolation of small fragmented populations caused by habitat loss has resulted in genetic and demographic threats, as well as the potential for catastrophic events to cause threats. Even large, relatively secure populations may be at risk to a large catastrophic event, such as a major hurricane (i.e. the RCW population on the Francis Marion NF declined by 80% after hurricane Hugo).

Inbreeding has the potential to impact populations of < 40 potential breeding groups (PBG) and may impact populations of 40 – 100 PBGs; however, immigration of 2 or more individuals per year can likely reduce inbreeding, and this can be facilitated by translocation. Populations of at least 20 PBGs (with a clumped distribution) are likely to persist 20 or more years (longer with active management); populations of 40 – 100 are reasonably secure; but populations of >350 PBG may be necessary for long-term stability.

Notes: Florida contains approximately 25% of the world population of RCWs. Likely 75% of Florida’s population occurs in the panhandle. Translocation and the use of artificial cavities in combination with good land management that includes appropriate prescribed fire and silvicultural practices have been instrumental in perpetuating small isolated populations. Reintroduction has proven effective. All state or federal properties that contain RCWs have a role outlined in either the federal recovery plan or the state management plan.

Life History: The RCW is a management responsive species that can be an indicator of properly managed pine stands. This species is often considered an umbrella species as many other species benefit from management designed for this species.

RCWs are cooperative breeders, with small groups composed of the breeding male and female and 0 – 4 “helpers” (usually 0-2, though up to 9 have been documented). While most helpers are young males, female helpers do occur. Each individual usually has its own cavity, and the breeder males’ cavity typically becomes the nest tree. Suitable cavities are often a limiting factor. As cavity trees and old pines tend to be limiting, protection of current and potential future cavity trees should be an important management consideration. Making use of artificial cavities has proven effective as a tool in increasing local populations when combined with appropriate land management.

Nesting typically occurs April – May, with a typical nest having 3-4 eggs. Re-nesting attempts may result in eggs in the nest as late as June. Incubation is about 10 days and chicks fledge at about 27 days post hatching. Pairs with helpers tend to fledge more young than pairs without helpers. Young that do not become helpers typically disperse in the fall/winter.

Arthropods are the primary food item, though fruits and seeds are also eaten. Males tend to forage in the tree crown; females commonly forage on the trunk and lower branches.

Fire is an important aspect in RCW ecology. Fire decreases the hardwood component; and increased hardwoods favor RCW predators and competitors. Further, fire has been shown to increase the abundance of RCW prey, and may increase the nutritional value of prey.

Home range for PBG can be from 100 to 400 acres, with PBG in south FL tending to have larger home ranges. Territory size is likely influenced by the quality of the habitat, as well as the density of RCWs in the area. High quality habitat tends to have older pines stocked

at an intermediate density (40-80 BA) with an open stand structure that is typically maintained by regular fire.

Preferred Habitat Parameters:

Canopy hardwoods < 10% of canopy trees

Hardwood midstory <10% cover, and < 7' (2.1 m) high

Native grass/forbs groundcover > 40%

Older pines (typically > 60 years)

Pine BA 40-80 ft²/acre

Best management Practices: See USFWS Recovery Plan¹ and FWC Management Plan Red Cockaded Woodpecker².

Despite the challenges, fortunately there are several proven techniques to aid in RCW recovery. Prescribed fire and silvicultural practices that move the forest structure to an open structure with healthy ground cover, limited hardwoods, and a number of old pines will benefit RCWs. The use of artificial cavities allows managers to place recruitment clusters in demographically favorable locations even when the pines may not be old enough for natural cavities. Translocation can be used to move birds within or between populations, and has been very important in bolstering local demographic connectivity.

Recovery foundations: population size and trend typically are more influenced by the number of potential breeding groups rather than annual survival or reproduction; maintaining close aggregations of territories is extremely important; unoccupied habitat typically will remain unoccupied without management assistance.

Sherman's Fox Squirrel

Trend: This species is in severe decline; Sherman's fox squirrel has likely experienced an 85 percent decline in last 100 years. Although present at several conservation areas, Sherman's fox squirrel has been eliminated from much of its former habitat.

Threats: Habitat destruction, alteration and degradation and associated fragmentation. Declines have been attributed to habitat being converted to pine plantations, row crop agriculture, or development. Habitat degradation due to a lack of fire further complicates the issue. Many individuals of this subspecies no longer reside in prime habitat and are relegated to less suitable secondary habitat.



Life History: The Sherman’s fox squirrel range was originally defined as running from the Aucilla River east to Nassau County and south to the Caloosahatchee River in southwestern Florida and to Miami-Dade County along the east coast. Some researchers extend the range westward to the Apalachicola River. This subspecies occupies longleaf pine sandhills and flatwoods. The best habitat often contains both pines and oaks, such as along the edges of longleaf pine savannas and live oak forests, especially where there are large, mature trees and fires occur at intermediate frequency. Fox squirrels contribute to the dispersal of spores of hypogeous mycorrhizal fungi which aid longleaf pine in nutrient absorption.

Compared to other rodents, this subspecies requires a large home range and historically occurred in low densities in a patchy habitat. They are basically solitary and are widely dispersed compared to gray squirrels. The average home range over one year in Florida was 106 ac (43 ha) for males and 42 ac (17 ha) for females. In Georgia the average home range was about 49 ac (20 ha). Densities have been estimated at 98 squirrels/sq mi (38 squirrels/sq km) and 20-39 squirrels/sq mi (8-15 squirrels/sq km).

Sherman’s fox squirrel diet varies seasonally, consisting primarily of pine seeds and acorns, but they may also consume various nuts, fruits, fungi, bulbs, buds and insects. Acorns of the live oak may be a major component of the diet. Predation probably is not a limiting factor, but food supply probably limits fox squirrel populations in some areas. Populations may decline if pinecone and acorn crops fail.

Females may produce 2 litters per year, though 1 is more common. Most litters are born in either Jan-Feb or June-Aug. Gestation lasts 44 days, with litter sizes ranging from 1 - 4, with 2 - 3 being the norm. Young remain in the nest for up to 2.5 months and are weaned at 90 days, reaching sexual maturity at 9 months. This animal is relatively long-lived, with a low reproductive potential.

Preferred Habitat Parameters:

	Fire	Canopy	Shrub
Natural Community	Regime	Cover	Cover
Sandhill	1-3 years	Low	Low
Mesic flatwoods	2-5 years	Low	Low
Upland hardwood forest	2-5 years	Low	Low

Best Management Practices: Preserve longleaf pine/wiregrass communities, particularly sandhills. Habitats should burn every 2-5 years (April - July if possible) to control shrubby vegetation and maintain park-like conditions. It may be necessary to plant longleaf in appropriate sites where this species is under-represented. Both mature pine and mixed pine–hardwood habitats are preferred by fox squirrels. Retain the largest pines and import mast-producing hardwoods. Within stands of mature, open-canopy pines it is important to retain patches of mast-producing hardwood trees (mast crops represent a high proportion of the foods eaten by fox squirrels), especially hickories and white oaks, which are believed to be preferred foods. Good fox squirrel habitat should include a broad diversity of mast-producing tree species for forage and because large, mature hardwood trees are preferred as refuge sites by fox squirrels. Avoid management activities that may lead to extreme variation in food availability, which can reduce survivorship of the squirrels. Continued fragmentation may necessitate the need to translocate individuals to retain smaller populations on public lands if successful protocol can be developed.

Snail Kite

Trend: The snail kite (formerly called the Everglade kite) experienced a significant decline during the 1900s that is continuing. Recent population declines are cause for concern. This species was formerly found in freshwater marshes throughout peninsular Florida, but is currently restricted to south and central Florida. Six large freshwater systems are located within the current range of the snail kite: Upper St. Johns River, the Kissimmee River Valley, Lake Okeechobee, Loxahatchee Slough, the Everglades, and the Big Cypress basin.

Listed as endangered in 1967, the snail kite was considered to be at an extremely low population level. Reports from the early 1900's indicate the snail kite was numerous in central Florida, found in groups of 50 – 100 birds. The snail kite reportedly plummeted to its lowest population between 1950 and 1965. In 1954 the estimated population no more than 50 to 75 birds. Limited resources were available at that time for researchers to reach potential snail kite habitats, and the resulting low level of survey effort may have biased these low snail kite population estimates. However, there is no doubt that the snail kite was severely endangered at that time and that its range had been dramatically reduced.

A 2007 study provided an estimate of population trend from 1997 – 2005, showing that the population of snail kites in Florida declined sharply between 2000 and 2002 (from an average of 3157 to 1407 birds) and juvenile survival has appeared to decline sharply since 1999. Estimates were slightly higher for 2004 and 2005; however there was no evidence of a substantial recovery and the persistence of the species is still precarious.

Perceived Threats: The snail kite is greatly affected by water management, especially in south Florida. Its range is restricted to the watersheds of the Everglades, Lake Okeechobee, the Kissimmee River, Loxahatchee Slough, and the Upper St. Johns River. These habitats exhibit considerable variation in their physiographic and vegetative characteristics, and include graminoid marshes (wet prairies, sloughs), lake littoral shorelines, cypress swamps, and even some highly disturbed areas such as retention ponds

and agricultural ditches. Each of these watersheds has experienced, and continues to experience, pervasive degradation due to urban development and agricultural activities. Because this species is so dependant on the apple snail, anything that has a negative impact on the apple snail has a negative impact on this species.

The kite's survival is directly dependent on the hydrology and water quality of the watersheds in its range and the availability of the apple snail. Water availability has thus far been identified as one of the most critical factors affecting snail kite population dynamics. Frequent flooding has been documented to shift vegetation communities away from those favorable to snail kites. These shifts impact the snail kite in 2 important ways: availability of its main food, the apple snail, and the availability of suitable nesting substrate.

Introduction of nonnative aquatic vegetation and water levels have contributed to the decreased amount of suitable foraging area for the snail kite. Water level stabilization combined with nutrient loading and urban and agricultural runoff has caused eutrophication of Central Florida Lakes and occasional snail die-offs, which negatively impacts snail kites. Nonnative aquatic plants may replace native forage plants for the apple snail, and herbiciding to kill vegetation may affect snail populations, as well as contributing to nest collapse in non-woody nesting substrates. In addition to management, nests on the lakes are subject to direct wave and wind action and are more prone to collapse than nests located in woody nesting substrates.

Notes: Water Conservation Area 3A has consistently been the area to produce the largest proportion of snail kite offspring since the mid 1990s. From 1993 to 2005, most primary kite habitats in Florida experienced a high frequency of flooding events and unusually prolonged hydroperiods in the fall, and an extensive drought occurred in 2001. The increase in flooding frequency resulted from an increase in precipitation as well as from the regulation of control structures, particularly in Everglades Water Conservation Area 3A. Habitat suitability has changed in response to new water management regimes in south Florida, and this habitat no longer appears to support a healthy population of apple snails or snail kites..

The snail kite is a wetland specialist whose diet consists almost exclusively of freshwater apple snails. As such, snail kites are dependant on healthy populations of apple snails.

The USFWS 2006 Five-year review is an excellent source of information for this species. The snail kite is monitored year round by the Florida Cooperative Fish and Wildlife Research Unit COOP UNIT. The snail kite-research program is located on the University of Florida campus.

Life History: The snail kite is an endangered raptor whose distribution in the United States is restricted to the south Florida ecosystem. The snail kite is considered a wetland-dependent species as they feed primarily on Florida apple snails that are present in the upper 5 cm of the water column, typically attached to emergent vegetation. Non-native

species of apple snails may provide forage for snail kites. However, initial evidence suggests that these species are not consistent with maintaining sustainable wetland communities. Maintaining a healthy population of Florida's native apple snail, and working to control non-native snail species is a more sustainable management strategy.

Typical foraging habitat for kites consists of large expanses of spikerush, eleocharis, or maidencane interspersed with open water. The snail kite uses two visual foraging methods: course-hunting, while flying 1.5 to 10 m above the water surface, or still-hunting from a perch. While course-hunting, the flight is characterized by slow wing beats, alternating with gliding; the flight path is usually into the wind, with the head oriented downward to search for prey. Snails are captured with the feet at or below the surface, to a maximum reach of approximately 16 cm below the surface. Kites prefer to forage in more open marsh areas, as they can not take prey by penetrating tall dense vegetation (i.e. stands of sawgrass).

Nesting occurs primarily from January through August, and almost always occurs over water. Egg-laying takes place from January to July and young are typically fledged from March to September. Snail kites nest in flooded vegetation, of either woody or non-woody species. They may nest more than once per year, and produce 1-3 chicks per nest. From the time that they begin nest-building, it takes approximately 80-90 days (three months) for them to hatch and fledge young. During this time, they are closely tied to the nest site, and are particularly vulnerable to disturbance and habitat impacts. Hatching success is variable from year to year and between areas.

Snail kites nest in wide range of habitats within inland flooded freshwater marshes and other freshwater wetlands. Nests are almost always built over water, which deters predators, and nests are generally most successful in low woody species such as willow, buttonbush, pond apple, and other wetland shrubs that remain inundated for the entire nesting period. Typical nesting habitat has surrounding low physiographic landscape near foraging areas. Nests are open or hidden, but with aerial access from above. Nesting substrates over water include small trees, generally < 10 m in height. Nesting substrates may be alive, dead, or a combination. During periods of low water, snail kites frequently build nests in weak non-woody substrates. Nesting in non-woody substrates, such as cattail or bulrush, increases the probability that the nest will either collapse during windy or wavy conditions or fall over when the stem buoyancy is lost, resulting in high rate of failure. This is common on the lakes as often times no other substrate is available. Nests in herbaceous substrates are subject to collapse from wind or waves and settling from weight of nests and birds.

Low water levels impact snail kites directly (via impacts to nesting substrate) and indirectly (via access to snails). Low water levels reduce access to snails by either causing the snail to burrow in the bottom sediments or matting down the emergent vegetation and reducing the visual location of snails by the kites. A 1997 study found that reproductive (adult) snails were less likely to survive a prolonged dry-down. Finally, lack of water or

lower lake levels may provide predators (snakes and raccoons) access to the nests, which might be reduced by either deeper water or the presence of alligators (in deeper water). High water has both positive and negative effects on kites. Higher water levels encourage nesting in flooded woody nesting substrates, such as willow, buttonbush and cypress. However, very high water levels can be detrimental to kites. Submersion of apple snail eggs has been found to delay development and decrease embryo survival, reducing the amount of available food for kites. Apple snail eggs are more plentiful and successful during years of steady or slightly falling water levels.

Snail kites are highly mobile, and may travel through most of the south Florida wetland systems during their lifetime. Kites will generally stay in one area as long as they can find food, but will seek another wetland that has food available if foraging conditions decline. Recent studies suggest that bird movements are strongly influenced by habitat fragmentation, with snail kites moving extensively among contiguous wetlands but less so among isolated wetlands.

Preferred Habitat Parameters: The required habitats for snail kites in Florida have been well documented. Birds typically nest over open water where depth is greater than 20 cm deep. They select areas to increase their proximity to their prey (Apple Snails) and to minimize exposure to predators.

In Florida, preferred habitat includes large inland freshwater marshes, edges of shallow lakes, and other flat water courses with marsh edge where apple snails can be found. Nearly continuous flooding of wetlands for ≥ 1 yr is needed to sustain large apple-snail populations and to enable snails to remain active and available as food for snail kites. Shallow wetlands with emergent vegetation such as spike rush, bulrush, and other native emergent wetland plant species interspersed with open water provide good snail kite foraging habitat as long as the vegetation is not so dense that kites would have difficulty locating apple snails. Marsh vegetation is usually low profile (≤ 3 m), often dense, dominated by sawgrass with a mosaic of shallow, open-water areas (depth 0.2–1.3 m), with or without sparse emergent vegetation, and with relatively clear and calm water.

Typical nesting habitat has surrounding low physiographic landscape near foraging areas. Nesting substrates over water include small trees, generally < 10 m in height (e.g., coastal-plain willow, bald cypress, pond cypress, punk-tree, sweetbay, red bay, pond apple, dahoon holly), shrubs (e.g., wax myrtle, cocoplum, buttonbush, elderberry, sawgrass, cattails, bulrush, and reed). Nesting substrates may be alive, dead, or a combination. During periods of low water, Kites frequently build nests in weak nonwoody substrates (e.g., cattails, sawgrass, bulrush, or reed).

Best Management Practices: The USFWS is currently developing an updated best management practices document for this species. In the meantime, see Snail kite management guidelines. Continue year-round monitoring and identify new and historical nesting locations. Preserve extensive freshwater wetlands, including suitable refuges for kites during droughts. Interagency coordination of management activities throughout the

range of the snail kite is necessary to avoid disturbance of snail kites during the nesting season and to ensure there is potential habitat available for nesting. Maintaining Florida apple snail populations, and the vegetation types that support healthy Florida apple snail populations is critically important to maintaining snail kite habitat: control exotic and invasive plant species such as water hyacinth and water lettuce; maintain a healthy population of Florida's native apple snail and work to control non-native snail species.

5.3 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 and II plants on TLWMA. 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 (BMPs) for their application.

5.4 Public Access and Recreational Opportunities

5.4.1 Americans with Disabilities Act

When public facilities are developed on areas managed by FWC, the agency ensures these facilities comply with the Americans with Disabilities Act (ADA, 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 ADA³ 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.

5.4.2 Recreation Master Plan

FWC has adopted a comprehensive approach to the planning and administration of fish and wildlife-based recreational opportunities for TLWMA. To accomplish this, FWC has worked with recreational stakeholders and the general public to develop a Recreation Master Plan (Appendix 13.7) 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, boating access, trail design and area resource interpretation.

5.4.3 Recreation Carrying Capacity

Baseline carrying capacities for 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 recreation opportunities. Based on an analysis of the overall approved uses and supported recreational opportunities, and the anticipated proportional visitation levels of the various user groups, FWC has determined that the TLWMA can support 1,563 visitors per day. This recreation carrying capacity will be periodically reevaluated, and additional capacity may be contemplated as part of the Recreational Master Plan development and implementation process.

5.4.4 Wildlife Observation

The TLWMA affords a wide variety of native wildlife species, both resident and seasonally migratory, that are available for visitors’ enjoyment for observation and photography. The quality and diversity of habitats found on TLWMA attract an equally diverse suite of wildlife species including many waterfowl and wading bird species in the wetlands, passerine bird species in the uplands, and various mammalian, reptilian and amphibian wildlife throughout TLWMA.

5.4.5 Hunting

TLWMA currently offers an archery, muzzleloading gun, general gun mobility-impaired, general gun, general gun-dog, small game, raccoon, quail, migratory bird, youth spring turkey and spring turkey hunting seasons. An evaluation of the hunting opportunities offered on TLWMA is performed by FWC annually.

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. Due to the popularity of TLWMA and the limited size of the Prairie Lakes Unit, some hunting opportunities are regulated through a limited entry hunt program to ensure the persistence of viable game species populations as well as hunter safety and satisfaction.

5.4.6 Fishing

The TLWMA offers year round fishing opportunities at several borrow pits, Lake Jackson, Parker Slough, the Jackson Canal, via canoe/kayak access from the Jackson Canal to Lake Kissimmee and via canoe/kayak access from Parker Slough to Lake Marion. Gamefish species feature largemouth bass (*Micropterus salmoides*), black crappie (*Pomoxis nigromaculatus*), pickerel (*Esox reticulatus*), catfish (*Siluriformes*), and various sunfish (*Lepomis* spp.) species.

5.4.7 Boating

Boating access is provided for motorized and paddling opportunities at the boat ramp at Lake Jackson, and canoe/kayak access to Lake Marian via Parker Slough and to Lake Kissimmee via the Jackson Canal.

5.4.8 Trails

Currently, there are 39 miles of multi-use trails on TLWMA. FWC will determine the feasibility of adding additional trails through development of a Recreation Master Plan. FWC will continue to periodically reevaluate the potential for trail connectivity to other conservation areas and will monitor trails for user impacts to natural communities.

5.4.9 Equestrian

Currently, horses may be ridden on named or numbered roads, except that horses may be ridden on firelanes during the general gun-dog season in that portion of the area east of the Florida Turnpike by hunters participating in the hunt. During the small game season, persons hunting from horseback are not restricted to named or numbered roads. FWC will investigate the feasibility of incorporating horseback riding into the multi-use trail system during the development of the Recreation Master Plan.

5.4.10 Camping

Camping is allowed at designated campsites on the Florida Trail year-round, and at designated hunter campsites during hunting periods. Six primitive campsites, including four family sized campsites, a walk-in campsite and a group campsite are also available year-round within the Prairie Lakes Unit upon issuance of a special use permit by FWC. Only tents, trailers and self-propelled camping vehicles may be used for camping.

5.4.11 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 .

5.4.12 Interpretation

Interpretive signage, resource interpretation materials, trail guides and area regulation information are provided within kiosks located at the public access points for TLWMA.

5.5 Hydrological Preservation and Restoration

5.5.1 Hydrological Assessment

A hydrological assessment for TLWMA has been completed. FWC will continue to implement Phase III and IV of this hydrological assessment, including replacement of water control structure G113.

5.5.2 Water Resource Monitoring

The FWC will cooperate with the St. Johns River and South Florida Water Management Districts (WMDS) and DEP to develop and implement appropriate surface and groundwater quality and quantity monitoring protocols for TLWMA. In this capacity, FWC will primarily rely on the expertise and staff support of the WMDs and DEP to conduct these monitoring activities.

5.6 Forest Resource Management

An assessment of the timber resources of TLWMA has been conducted by the FFS. The management of timber resources will be considered in the context of this Timber Assessment (Appendix 13.8) and the overall land management goals and activities.

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

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

5.7 Cultural and Historical Resources

Twenty-five archaeological or historic sites were identified within the boundary of TLWMA according to the DHR Florida Master Site File GIS data layer (Appendix 13.9).

Management activities will be planned to minimize disturbance to existing historic and archaeological sites and sites with a high potential for archaeological site presence. Procedures outlined by DHR will be followed to preserve such sites. The FWC will continue to consult with DHR in an attempt to locate other features on the area. As appropriate and

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

The FWC will monitor the known recorded sites on an annual basis, and submit updates of additional located sites to DHR for inclusion in their Master Site file. In addition, FWC will ensure management staff has DHR Archaeological Resources Monitoring training. Furthermore, FWC will refer to and follow DHR’s Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Properties for management of these resources, and prior to any facility development, ground disturbing activities.

5.8 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-based recreation. For these reasons, planned capital facilities and infrastructure will focus on improving access, recreational potential, hydrology, or other resource and operational management objectives.

The TLWMA contains numerous facilities that perform an integral role in providing a quality visitor experience and important support for FWC management efforts (Table 12, Figure 14).

Table 32. Facilities of TLWMA

<u>Signage</u>	
1	Primary Entrance Sign
4	Secondary Entrance Signs
17	Interpretive Signs
2	Entrance Kiosks (US441 and Prairie Lakes)
3	Kiosks (Canoe Creek Rd, Sunset Ranch and Lake Jackson Boat Ramp)
1	Trail Kiosk
<u>Visitor Facilities</u>	
3	Check Stations (US441, Canoe Creek Rd, SR60)
4	Game Cleaning Stations (US441, Canoe Creek Rd, SR60)
5	Iron Rangers (US441, Canoe Creek Rd, SR60, Prairie Lakes and Sunset Ranch)
3	Entrance Campgrounds (US441, Canoe Creek Rd, SR60)
3	Interior Primitive Camping Areas (Lake Jackson, Parker Hammock, Prairie Lakes Road)
1	Primitive Walk-in Campsite
1	Group Campsite

Table 32. Facilities of TLWMA

1	Picnic Shelter
1	Boat Ramp (Lake Jackson)
	Vault Toilets (US441, Canoe Creek Rd, Group Campsite and Lake Jackson)
4	Boat Ramp)
2	Portable Toilet Areas (Highway 441 and SR60)

Wildlife Viewing and Trails

1	Observation Tower
2	Observation Platforms
1	Viewing Blind
1	Boardwalk
1	Segment Florida National Scenic Trail
1	Palm Hammock Trail
1	Sunset Ranch Trail (Interpretive)
1	Driving Tour (Interpretive)

FWC Management Facilities

1	Office
3	Check Station Sheds
7	Equipment Maintenance and Storage Buildings
1	Barn
1	Pole Barn
2	Staff Residences
4	Storage Sheds
2	Water Control Structures

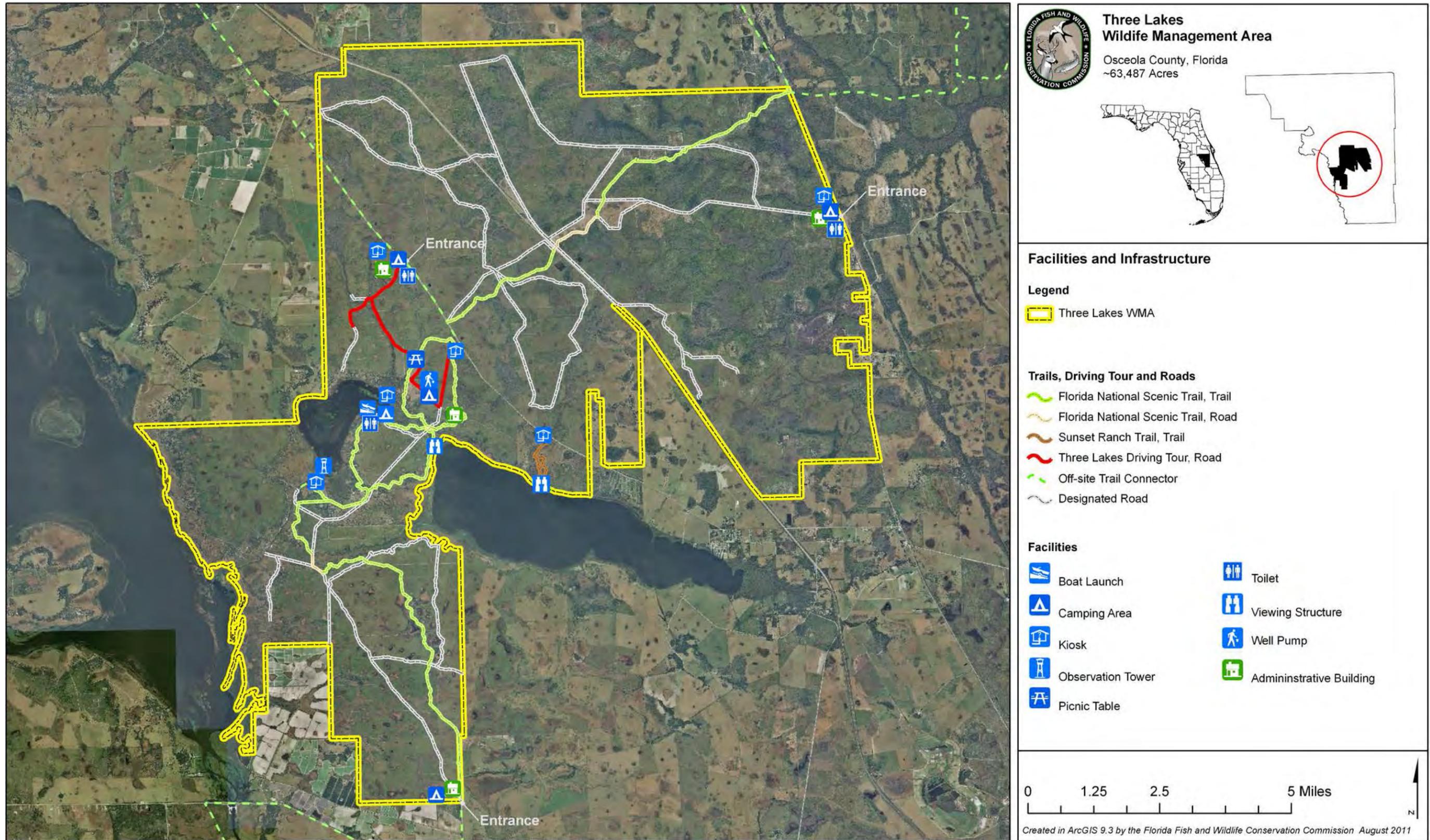


Figure 15: TLWMA - Facilities and Infrastructure

5.9 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 comprehensive cooperative approach towards conservation.

5.9.1 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 a FWC managed area is contained while eliminating urban areas or lands that have already been conserved or protected.

5.9.2 Optimal Conservation Planning Boundary

The second tier is known as the OCPB (Figure 13) and 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 TLWMA. Although the OCPB provides the basis for potential future voluntary, willing-seller conservation acquisitions, it is designed to function primarily as a conservation planning boundary. The OCPB identifies surrounding lands and natural resources that may be important to the continued viability of fish and wildlife populations in the region. As they are currently managed, these lands appear to contribute to regional conservation and may support conservation landscape linkages.

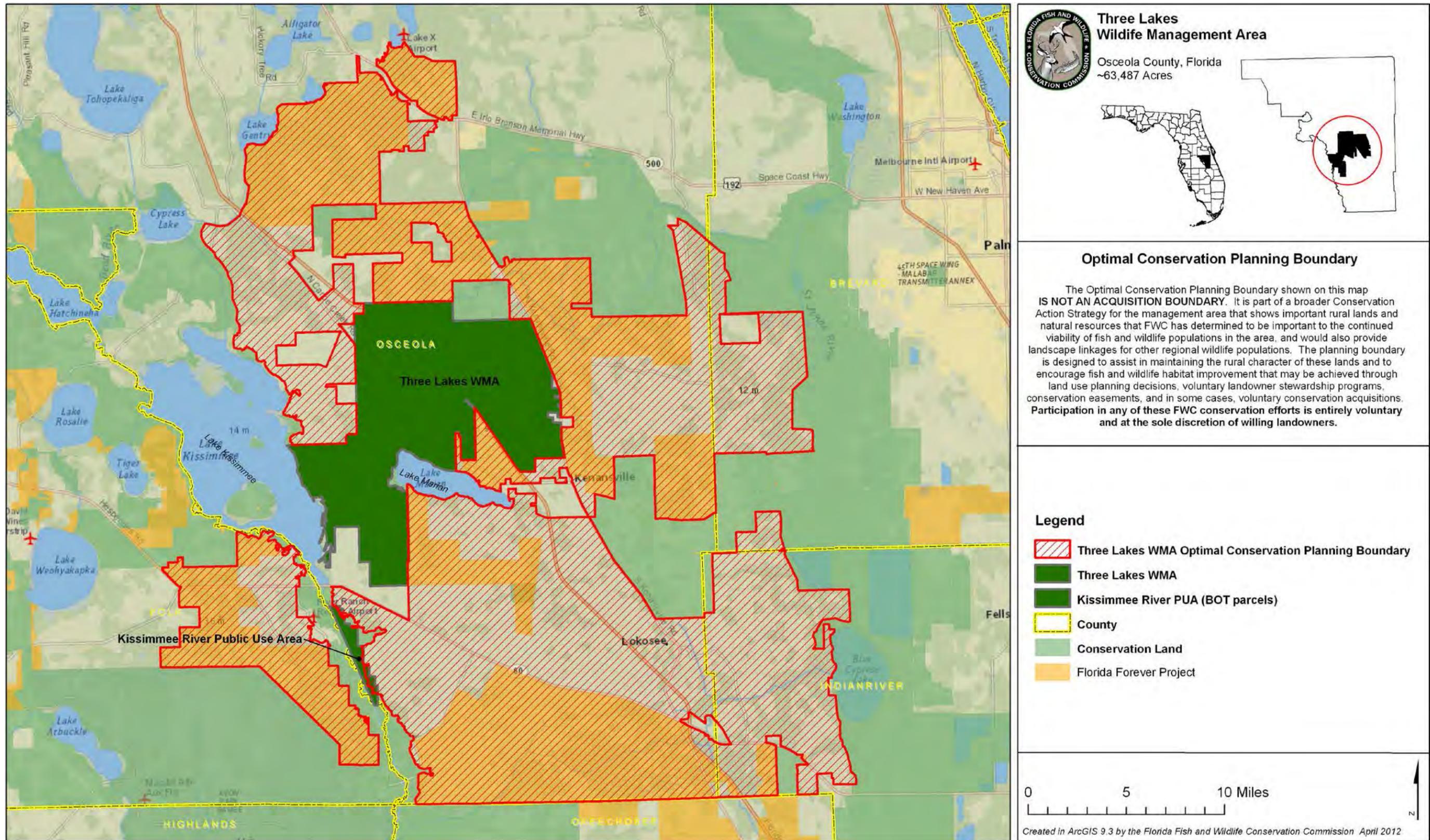


Figure 16: Optimal Conservation Planning Boundary

5.9.3 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 include:

- FWC Landowner Assistance Program
- FWC conservation planning
- FWC Additions and Inholdings Program Land Conservations Work Plan
- Forest Stewardship Program proposals
- Florida Forever acquisition project proposals and boundary modifications
- Conservation easements
- Federal or State grant proposals
- Regional or local acquisition proposals
- Local, state, and federal planning proposals
- Non-governmental organization acquisition proposals

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

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

5.9.4 FWC Florida Forever Additions and Inholdings Acquisition List

Currently, FWC has identified 46,118 acres of potential additions or privately held inholdings for TLWMA. Also, 27,023 acres of the Osceola Pine Savannas Florida Forever project remain to be acquired.

5.10 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.

5.11 Cooperating Agencies

The FWC is responsible for the management and operation of TLWMA as a provision in the lease agreement with the BOT. All requirements of the Management Procedures Guidelines - Management of Archaeological and Historical Resources document (Appendix 13.9) from DHR are followed with regard to any ground-disturbing activities. The FFS is a designated cooperating agency and assists FWC by providing technical assistance on forest resource management. The FWC cooperates and consults with SJRWMD and SFWMD for the monitoring and management of both ground and surface water resources.

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 TLWMA and the BOT parcels of the KRPUA. 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. The following management plan goals and associated objectives are sorted by management activity category and by **short-term (2012 – 2014)** and **long-term (2015 – 2022)** timelines for completion. The recommendations of the 2010 Land Management Review (Appendix 13.6) were considered and addressed in the development of this section.

6.1 Habitat Restoration and Improvement

Goal: Improve extant habitat and restore disturbed areas.

Short-term

- 6.1.1 Conduct prescribed burning on approximately 20,000 acres per year of fire-adapted natural communities.
- 6.1.2 Maintain 20,000 acres (31.5%) per year within 1 - 4 year target fire return interval.
- 6.1.3 Contract for mapping of historic natural communities on the U.S. Justice, Sunset Ranch, and Lucky L Ranch tracts, and other altered areas as necessary (Figure 16).

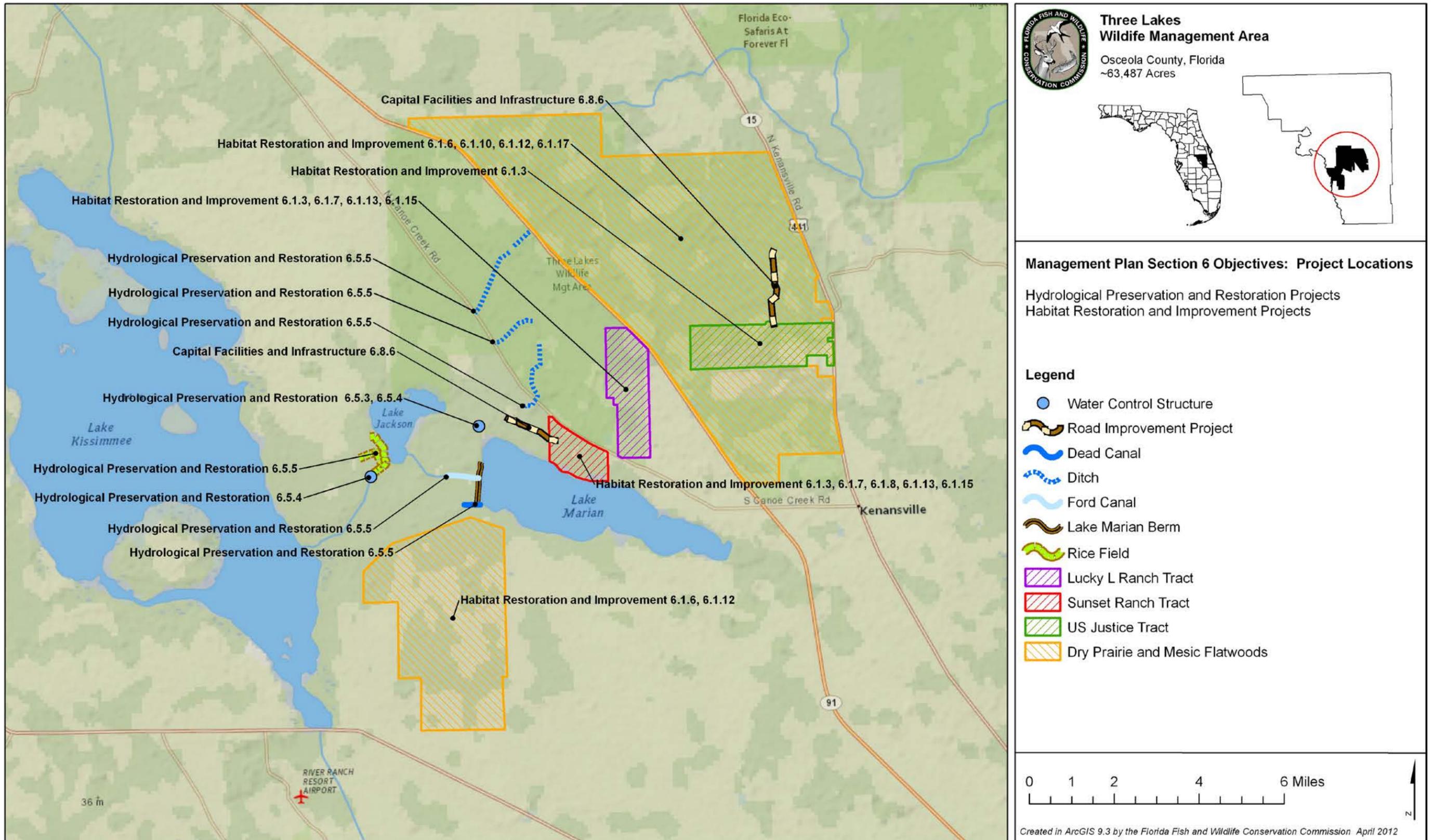


Figure 17: Project Locations

- 6.1.4 Contract for mapping of historic and current natural communities mapping for the Kissimmee River PUA.
- 6.1.5 Develop and implement an updated prescribed burn plan.
- 6.1.6 Conduct habitat/natural community improvement on 100 acres per year (dry prairie and mesic flatwoods habitat in management unit 60; Figure 16).
- 6.1.7 Conduct habitat/natural community restoration activities including 100 acres of ground cover restoration (50 acres annually) on Sunset Ranch and Lucky L Ranch tracts (Figure 16).
- 6.1.8 Continue to plant longleaf pine seedlings in completed ground cover restoration areas (~50 acres annually) as appropriate (Figure 16).
- 6.1.9 Continue to monitor vegetation parameters within natural communities to ensure management efforts are achieving OBVM established desired future conditions.
- 6.1.10 Continue to implement OBVM for natural communities.
- 6.1.11 Continue to utilize low intensity cattle grazing as a vegetative management tool within the existing cattle lease area (Figure 16).

Long-term

- 6.1.12 Continue to conduct prescribed burning on approximately 20,000 acres per year of fire-adapted natural communities.
- 6.1.13 Continue to conduct habitat/natural community improvement on 100 acres per year (dry prairie and mesic flatwoods habitat in management unit 60; Figure 16).
- 6.1.14 Continue to conduct habitat/natural community restoration activities on 300 acres of ground cover restoration (37.5 average acres annually) on Sunset Ranch and Lucky L Ranch (Figure 16).
- 6.1.15 For the purposes of habitat restoration, conduct a timber harvest of offsite slash pine on ~700 acres.
- 6.1.16 Continue to plant longleaf pine seedlings in completed ground cover restoration areas (~50 acres annually) as appropriate (Figure 16).
- 6.1.17 Continue to monitor vegetation parameters within natural communities to ensure management efforts are achieving OBVM established desired future conditions.

6.1.18 Continue to utilize low intensity cattle grazing as a vegetative management tool within the existing cattle lease area (Figure 16).

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 Develop and implement a WCPR strategy for imperiled and focal species to include monitoring of six species; Florida grasshopper sparrow, RCW, snail kite, whooping crane, bald eagle, and Florida scrub-jay.
- 6.2.2 Continue to monitor extant RCW clusters.
- 6.2.3 Continue to conduct annual point-count surveys for Florida scrub-jay in designated scrub-jay monitoring areas; look for expansion of scrub-jays into suitable scrub habitat.
- 6.2.4 To coordinate timing of land management activities, continue to monitor up to 25 bald eagle nests.
- 6.2.5 To augment RCW nesting, install artificial tree cavities as necessary and where appropriate.
- 6.2.6 Continue to conduct annual point-count surveys for Florida grasshopper sparrow on the Highway 60 unit and the Prairie Lakes Island Unit; monitor for expansion of sparrows into suitable habitat.
- 6.2.7 Coordinate with the University of Florida to monitor snail kite nesting activity.
- 6.2.8 Continue to monitor whooping crane nesting activity.
- 6.2.9 Continue to collect opportunistic wildlife species occurrence data.

Long-term

- 6.2.10 Continue to implement WCPR strategy by managing identified habitats and monitoring identified species.

- 6.2.11 If determined to be necessary by the WCPR strategy, conduct a gopher tortoise population density survey and assessment at least once every five years.
- 6.2.12 Continue to monitor extant RCW clusters.
- 6.2.13 To augment RCW nesting, continue to install artificial tree cavities as necessary and where appropriate.
- 6.2.14 Continue to conduct annual point-count surveys for Florida grasshopper sparrow on the Highway 60 unit and the Prairie Lakes Island Unit; look for expansion of sparrows into suitable habitat.
- 6.2.15 Pursuant to development of the WCPR strategy, investigate the feasibility of expanding population through translocation of Florida grasshopper sparrow.
- 6.2.16 Continue to coordinate with the University of Florida to monitor snail kite nesting activity.
- 6.2.17 Continue to monitor whooping crane nesting activity.
- 6.2.18 Continue to collect opportunistic wildlife species occurrence data.

6.3 Other Game and Non-game Wildlife Habitat Maintenance, Enhancement, Restoration, or Population Restoration.

Goal: Maintain, improve, or restore game and non-game species populations and habitats.

Short-term

- 6.3.1 Continue to conduct annual spring and fall point-count surveys for Northern bobwhite.
- 6.3.2 Continue to collect biological harvest data at check station for species including white-tailed deer, wild turkey, wild hogs and Northern bobwhite.
- 6.3.3 Continue to collect opportunistic wildlife occurrence data.
- 6.3.4 In cooperation with the USFWS, continue to trap and band mourning doves annually
- 6.3.5 Continue to monitor 55 bluebird nesting boxes annually.

- 6.3.6 Continue to monitor 5 bat houses.
- 6.3.7 Continue to monitor 34 wood duck nesting boxes.
- 6.3.8 Continue to monitor 8 American kestrel boxes.
- 6.3.9 Initiate a small mammal inventory.
- 6.3.10 Continue to inventory amphibian and reptiles.

Long-term

- 6.3.11 Continue to conduct annual spring and fall point-count surveys for Northern bobwhite.
- 6.3.12 Continue to collect biological harvest data at check station for species including white-tailed deer, wild turkey, wild hogs and Northern bobwhite.
- 6.3.13 Continue to collect opportunistic wildlife occurrence data.
- 6.3.14 In cooperation with the USFWS, continue to trap and band mourning doves annually.
- 6.3.15 Continue to monitor 55 bluebird nesting boxes annually.
- 6.3.16 Continue to monitor 5 bat houses.
- 6.3.17 Continue to monitor 34 wood duck nesting boxes.
- 6.3.18 Continue to monitor 8 American kestrel boxes.
- 6.3.19 Continue to conduct a small mammal inventory.
- 6.3.20 Continue to inventory amphibian and reptiles.

6.4 Public Access and Recreational Opportunities

Goal: Provide public access and recreational opportunities.

Short-term

- 6.4.1 Maintain public access and recreational opportunities to allow for a recreational carrying capacity of 1,563 visitors per day.

- 6.4.2 Continue to provide 14 interpretive signs, website, three two panel kiosks, trail brochure for Sunset Ranch, bird list, recreation guide for the Prairie Lakes Unit, and driving tour guide for interpretation and education.
- 6.4.3 Continue to provide hunting opportunities for deer, turkey, small game, waterfowl, and wild hogs.
- 6.4.4 Continue to provide fishing opportunities on appropriate water bodies including borrow pits, Lake Jackson, Parker Slough, and Lake Marian via canoe/kayak access from Parker Slough.
- 6.4.5 Continue to provide paddling opportunities including boat ramp at Lake Jackson, Jackson Canal canoe and kayak access to Lake Kissimmee, and Parker Slough canoe and kayak access to Lake Marian.
- 6.4.6 Implement a Recreational Master Plan (Appendix 13.7) in coordination with Triple N Ranch and Herky Huffman/Bull Creek WMAs.
- 6.4.7 Continue to participate in interpretive/education programs.
- 6.4.8 Continue to coordinate with U.S. Forest Service, DEP, and Florida Trail Association (FTA) to improve connectivity of the Florida National Scenic Trail
- 6.4.9 Continue to coordinate with FTA to maintain 39 miles of trails within TLWMA.
- 6.4.10 Monitor trails biannually for visitor impacts.
- 6.4.11 Investigate feasibility of designating TLWMA portion of the Florida National Scenic Trail as a multi-use trail.

Long-term

- 6.4.12 Continue to maintain public access and recreational opportunities to allow for a recreational carrying capacity of 1,563 visitors per day.
- 6.4.13 Cooperate with other agencies, Osceola County, stakeholders, and regional landowners to investigate regional recreational opportunities including linking hiking and multi-use trail systems between adjacent public areas.
- 6.4.14 Continue to monitor trails biannually for visitor impacts.

- 6.4.15 Reassess recreational opportunities every three years.
- 6.4.16 Continue to provide hunting opportunities for deer, turkey, small game, waterfowl, and wild hogs.
- 6.4.17 Continue to provide paddling opportunities including boat ramp at Lake Jackson, Jackson Canal canoe and kayak access to Lake Kissimmee, and Parker Slough canoe and kayak access to Lake Marian.
- 6.4.18 Continue to coordinate with U.S. Forest Service, DEP, and FTA to improve connectivity of the Florida National Scenic Trail.
- 6.4.19 Continue to participate in interpretive and education programs.
- 6.4.20 Continue to identify partnerships that could provide for environmental educational programs and outreach.

6.5 Hydrological Preservation and Restoration

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

Short-term

- 6.5.1 Complete Phase III of the ongoing hydrological assessment to identify potential hydrology restoration needs, including Fodderstack Slough, and other hydrological systems within the Kissimmee River basin.
- 6.5.2 To maintain and enhance natural hydrological functions, install and maintain low-water crossings and culverts as appropriate.
- 6.5.3 Replace the G113 water structure to provide a more natural flow regime through Fodderstack Slough (Figure 16).
- 6.5.4 Continue to maintain 2 water control structures (G113 and G111; Figure 16).

Long-term

- 6.5.5 Within the Kissimmee River basin of TLWMA, implement Phase IV of the ongoing hydrological assessment including restoring natural hydrology to former rice fields and Fodderstack Slough, plugging or backfilling ditches north of Canoe Creek Road, and potential plugging of the Ford and Dead canals (Figure 16).
- 6.5.6 To enhance natural hydrological functions, continue to install and maintain low-water crossings and culverts as appropriate.

6.6 Forest Resource Management

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

Short-term

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

Long-term

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

6.7 Exotic and Invasive Species Maintenance and Control

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

Short-term

6.7.1 Continue to annually treat ~600 acres of EPPC Category I and Category II invasive exotic plant species including pasture areas of Lucky L Ranch, Sunset Ranch, and U.S. Justice tracts.

6.7.2 Continue to implement control measures on one exotic and nuisance animal species (wild hog).

6.7.3 Continue to implement control hydrilla methods on Lake Jackson.

6.7.4 Continue to coordinate with EPPC Working Group to fund and schedule control measures for exotic plant species.

Long-term

6.7.5 Continue to annually treat ~600 acres of EPPC Category I and Category II invasive exotic plant species including pasture areas of Lucky L Ranch, Sunset Ranch, and U.S. Justice tracts.

6.7.6 Periodically survey dome swamps and strand swamps for the occurrence of exotic plant species including lygodium.

6.7.7 Continue to implement control hydrilla methods on Lake Jackson.

- 6.7.8 Continue to coordinate with EPPC Working Group to fund and schedule control measures for exotic plant species.

6.8 Capital Facilities and Infrastructure

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

Short-term

- 6.8.1 Continue to maintain 28 facilities.
- 6.8.2 Maintain 75.4 miles of public access roads.
- 6.8.3 Continue to coordinate with FTA to maintain 39 miles of trails existing on site.
- 6.8.4 Improve or repair 14 (50%) facilities.
- 6.8.5 Improve or repair ~6 miles of roads.
- 6.8.6 Improve ~1.8 miles of existing service road to the north of the U.S. Justice tract, and ~1.2 miles of road to the west of the Sunset Ranch Tract to allow for all season management and public access (Figure 16).

Long-term

- 6.8.7 Monitor trails and infrastructure biannually for visitor impacts.
- 6.8.8 Continue to maintain 28 facilities.
- 6.8.9 Continue to maintain 75.4 miles of public access roads.
- 6.8.10 Continue to maintain 39 miles of trails within TLWMA.
- 6.8.11 Continue to improve or repair all 28 (100%) facilities.
- 6.8.12 Improve or repair ~25 miles of roads.

6.9 Cultural and Historical Resources

Goal: Protect, preserve, and maintain the cultural resources of the TLWMA.

Short-term

- 6.9.1 Pursuant to recommendations by the DHR, monitor, protect, and preserve as necessary up to 25 identified sites.
- 6.9.2 If determined to be necessary by DHR, contract for a cultural and archaeological resources survey.
- 6.9.3 Monitor the 25 known recorded sites and submit updates of additional sites to DHR for inclusion in their Master Site file.
- 6.9.4 Ensure management staff has DHR Archaeological Resources Monitoring training.
- 6.9.5 Follow DHR's Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Properties for the management of cultural and historic resources.

Long-term

- 6.9.6 Cooperate with DHR or trained FWC staff in designing site plans for development of infrastructure.
- 6.9.7 Pursuant to recommendations by DHR, continue to monitor, protect, and preserve as necessary all identified sites.
- 6.9.8 Continue to monitor the 25 known recorded sites and submit updates of additional sites to DHR for inclusion in their Master Site file.
- 6.9.9 Continue to coordinate with DHR for cultural resource management guideline training for new FWC staff.
- 6.9.10 Continue to follow DHR's Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Properties for the management of cultural and historic resources.

6.10 Research Opportunities

Goal: Explore and pursue cooperative research opportunities.

Short-term

- 6.10.1 Develop a baseline knowledge base and data inventory; coordinate with cooperators and partners to identify information gaps.

- 6.10.2 Continue to cooperate with the University of Florida (UF) to monitor snail kite nesting activity.
- 6.10.3 Continue to cooperate with UF's vegetative chopping/burning avian study.
- 6.10.4 As appropriate, continue to participate in the Tall Timbers Upland Ecosystem Restoration Project.
- 6.10.5 Investigate the feasibility of partnering with UF to assist with research pertaining to their \$20 million climate change grant.

Long-term

- 6.10.6 As appropriate, explore and pursue additional cooperative research opportunities with universities and other research entities.
- 6.10.7 Continue to cooperate with the UF to monitor snail kite nesting activity.
- 6.10.8 Continue to cooperate with UF's vegetative chopping/burning avian study.
- 6.10.9 As appropriate, continue to participate in the Tall Timbers Upland Ecosystem Restoration Project.

6.11 Land Conservation and Stewardship Partnerships

Goal: Enhance wildlife conservation, resource and operational management through development of an Optimal Conservation Planning Boundary and a Conservation Action Strategy.

Short-term

- 6.11.1 Identify potential important wildlife habitat, landscape-scale linkages, wildlife corridors and operational/resource management.
- 6.11.2 Continue to identify and pursue acquisition needs and conservation stewardship partnerships.
- 6.11.3 Develop and maintain a GIS shapefile and other necessary data to facilitate nominations from the FWC optimal boundary for FWC's Landowner Assistance and Land Acquisition Programs.
- 6.11.4 Develop a Conservation Action Strategy.

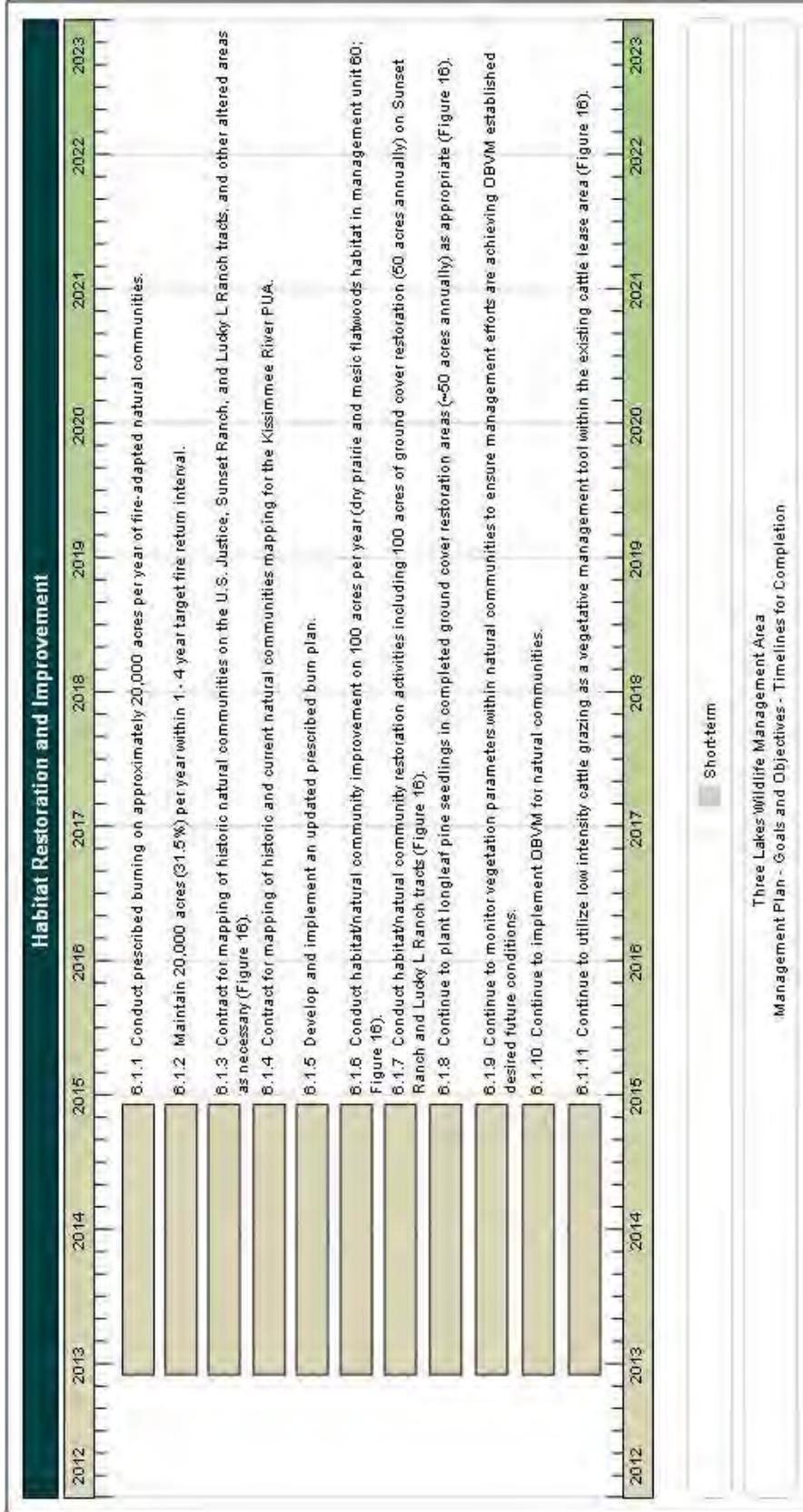
- 6.11.5 Contact and inform adjoining landowners about the FWC Landowners Assistance Program to pursue non-acquisition conservation stewardship partnerships.
- 6.11.6 Determine which parcels should be nominated for addition to the FWC acquisition list.
- 6.11.7 Identify potential non-governmental organization partnerships and grant program opportunities.
- 6.11.8 Determine efficacy of conducting an adjacent landowner's assistance/conservation stewardship partnership workshop.

Long-term

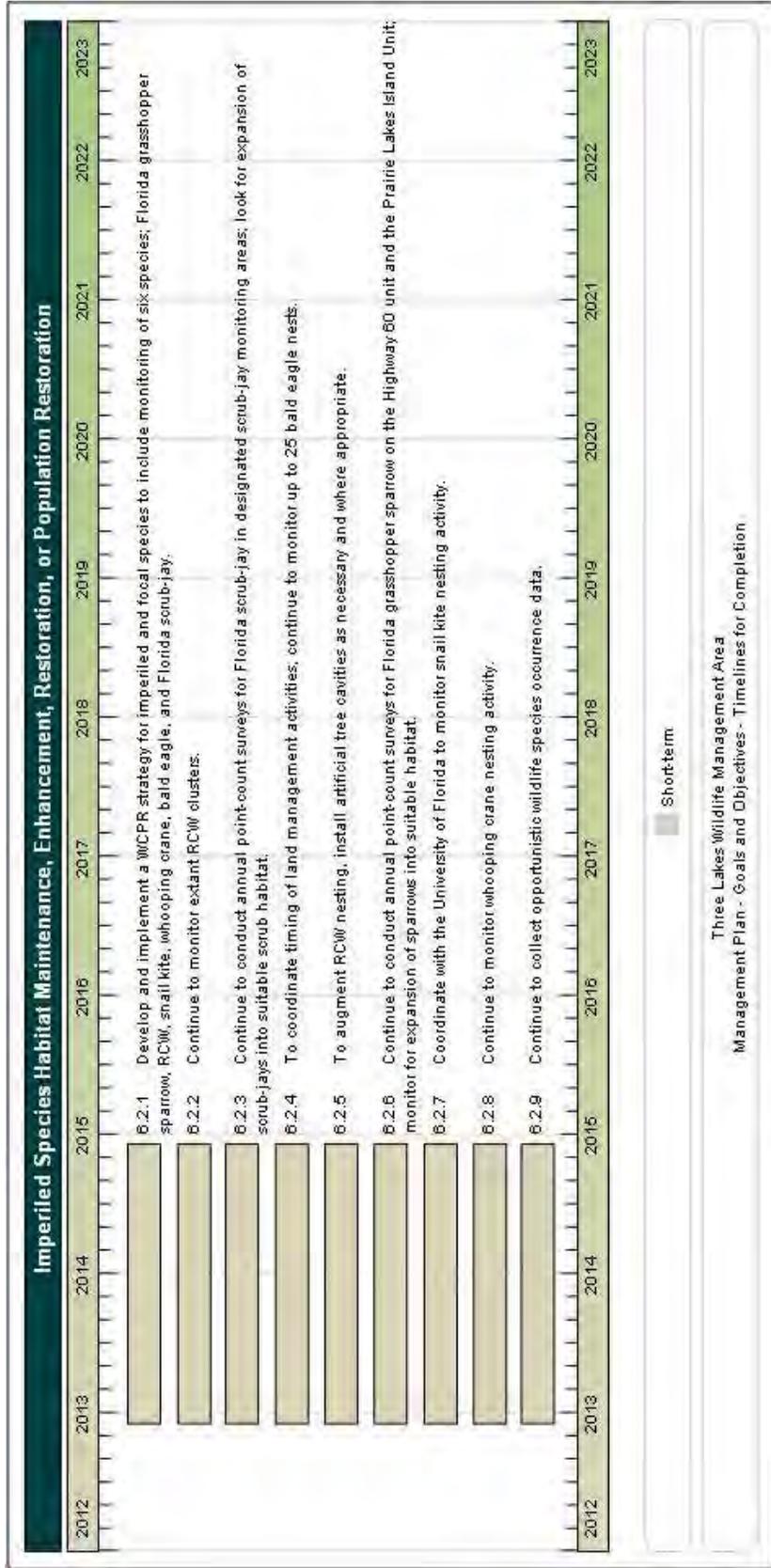
- 6.11.9 To minimize fragmentation of the area, continue to identify strategic parcels to revise the completed optimal boundary for TLWMA as deemed necessary.
- 6.11.10 Continue to maintain a GIS shapefile and other necessary data to facilitate nominations from the FWC optimal boundary for the FWC Landowner Assistance Program and for the Land Acquisition Program.
- 6.11.11 Continue to determine which nominated parcels should be added to the FWC acquisition list.
- 6.11.12 Propose nominations of selected properties as additions to the FWC acquisition list. Pursue acquisition of parcels added to the FWC acquisition list as acquisition work plan priorities and funding allow.
- 6.11.13 Pursue acquisition of parcels added to the FWC acquisition list as acquisition work plan priorities and funding allow.
- 6.11.14 Periodically (at least every three to five years) continue to contact and meet with adjacent landowners for willingness to participate in the Conservation Action Strategy. Coordinate landowner assistance/ conservation stewardship partnership workshop as deemed appropriate.
- 6.11.15 Coordinate landowner assistance/ conservation stewardship partnership workshop as deemed appropriate.

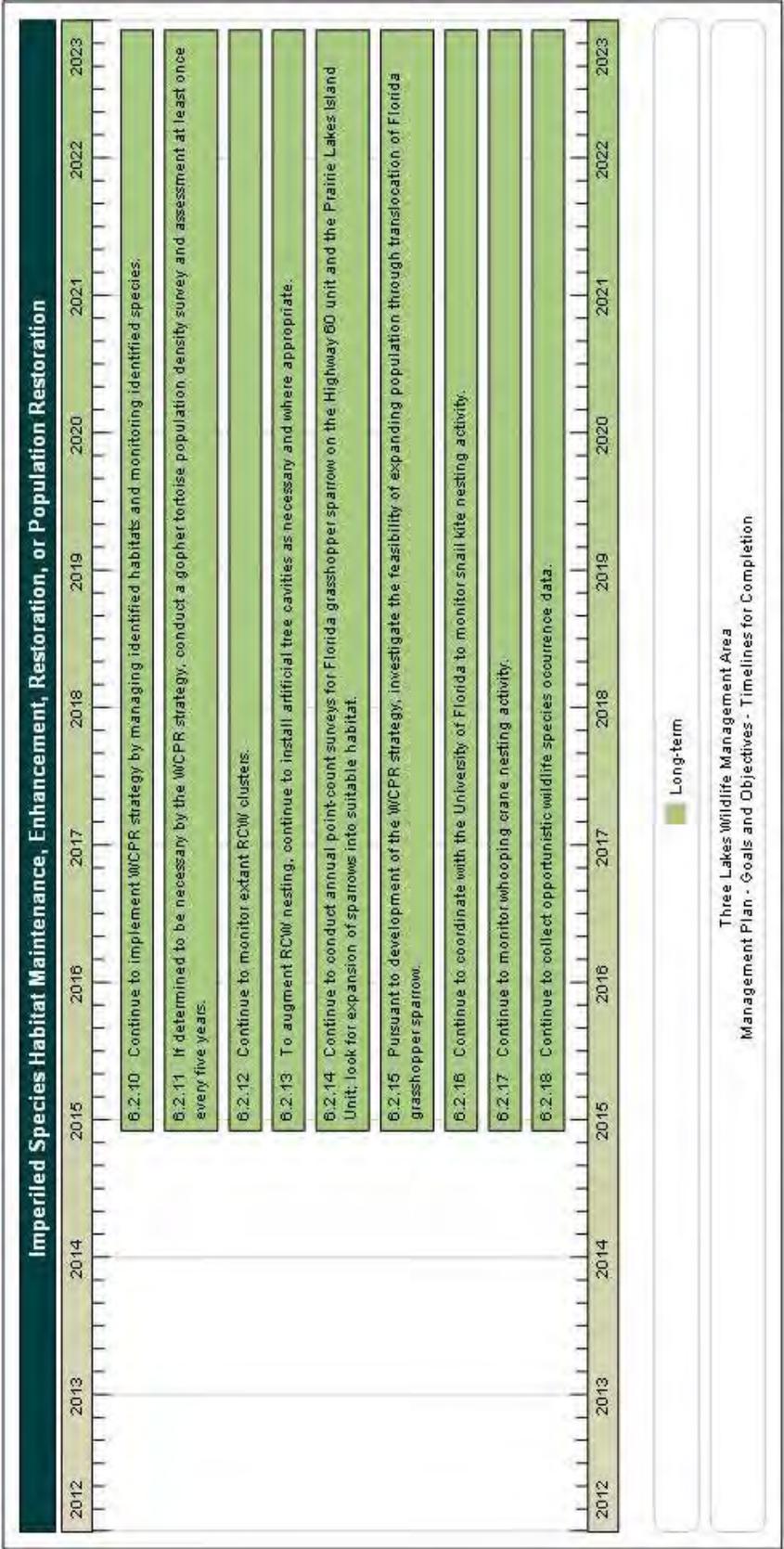
7 Schedule: Timelines for Completion of Resource Management Goals and Objectives

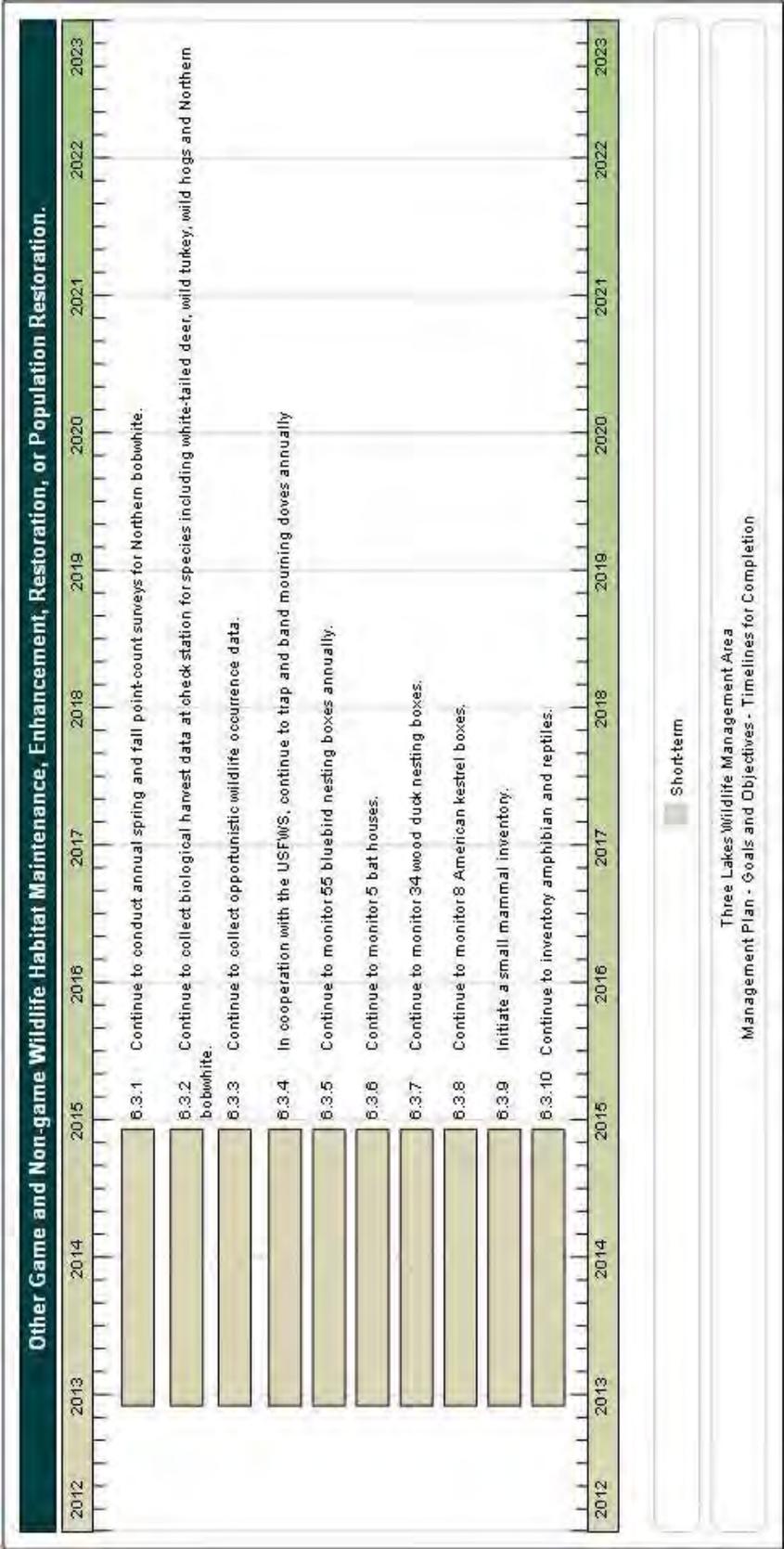
The following section presents the goals and associated short- and long-term objectives for the management of TLWMA graphically in a timeline format. These timelines directly reflect the short- and long-term objectives presented above in Section 6.

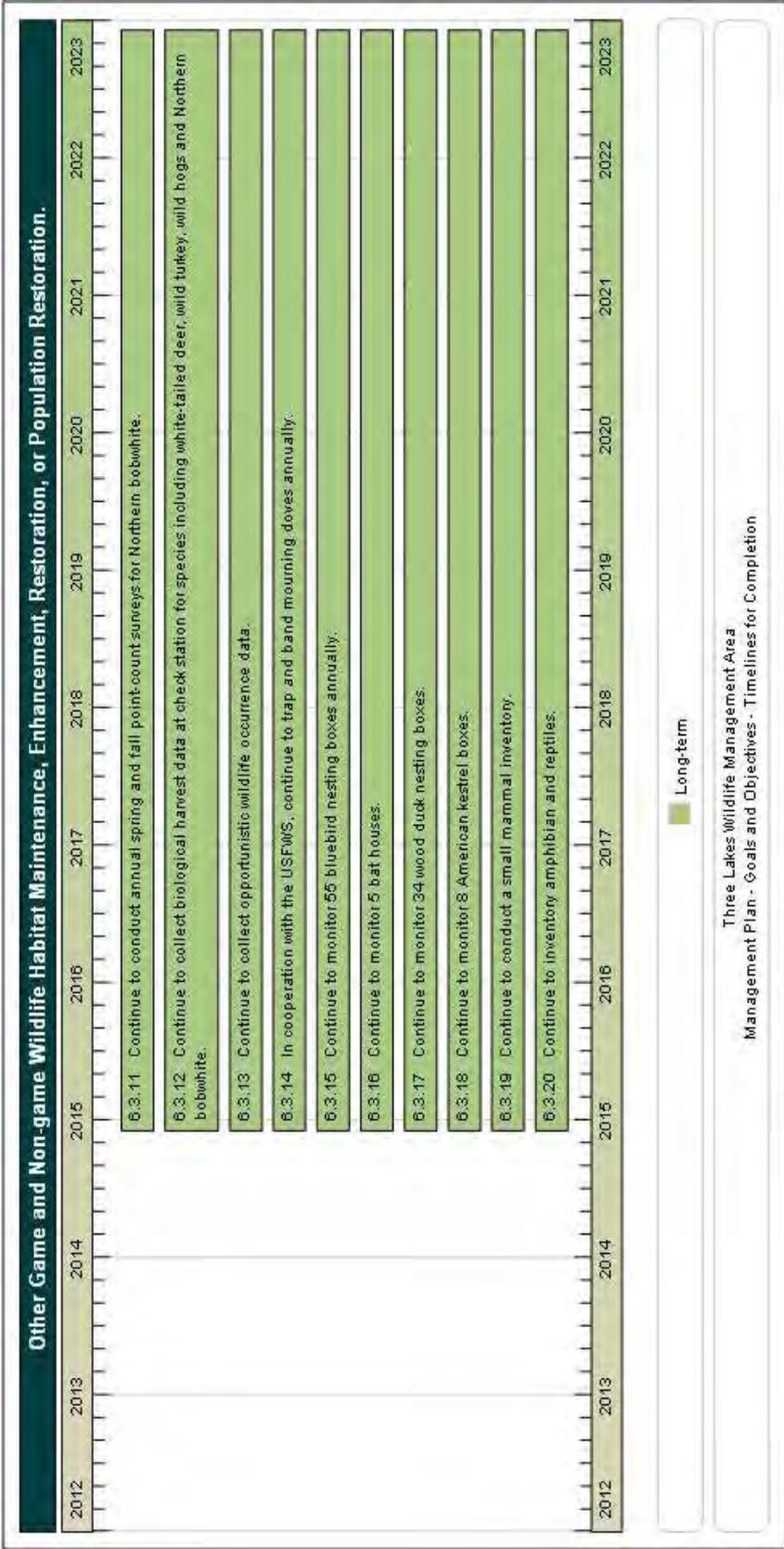




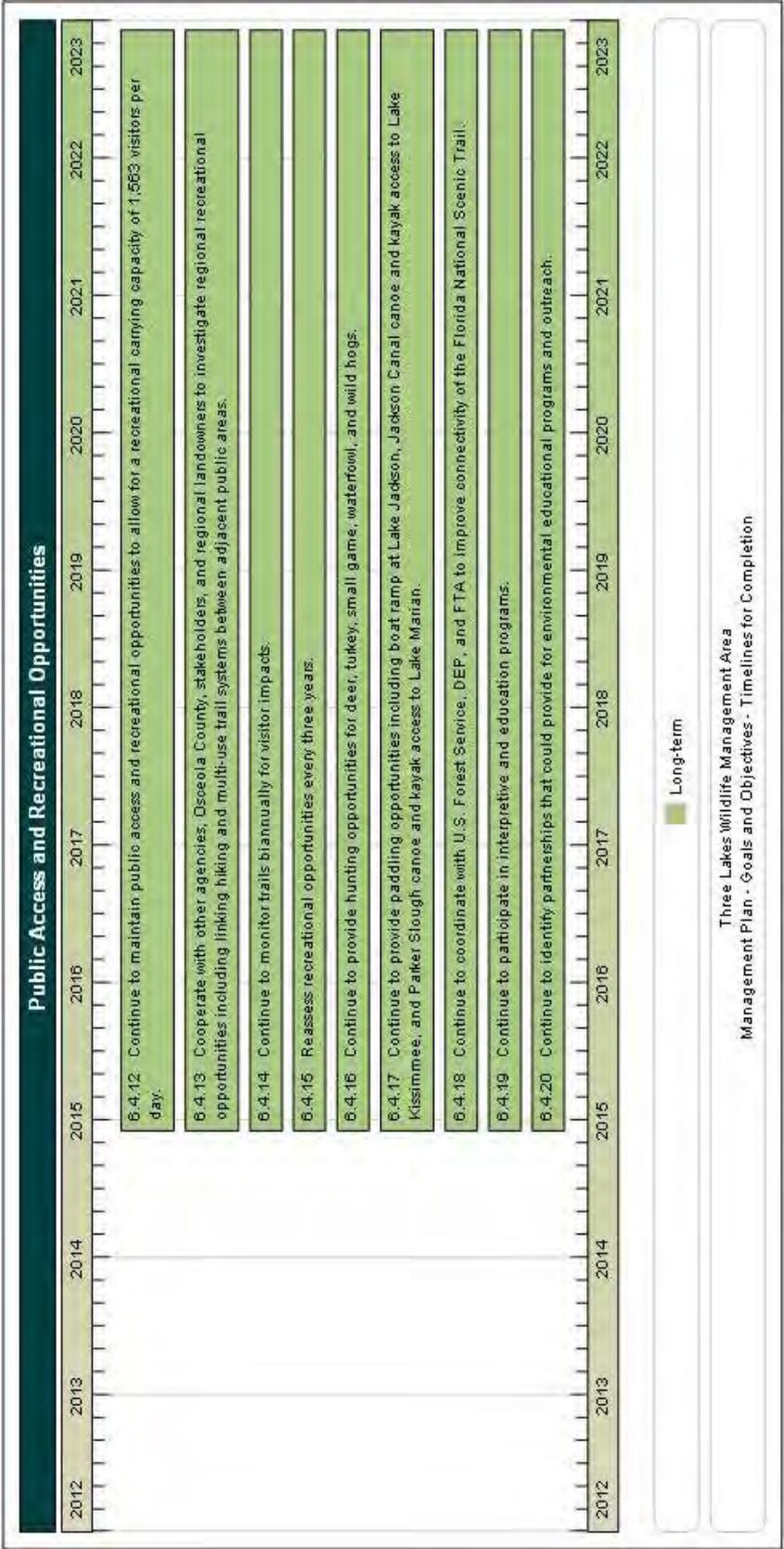


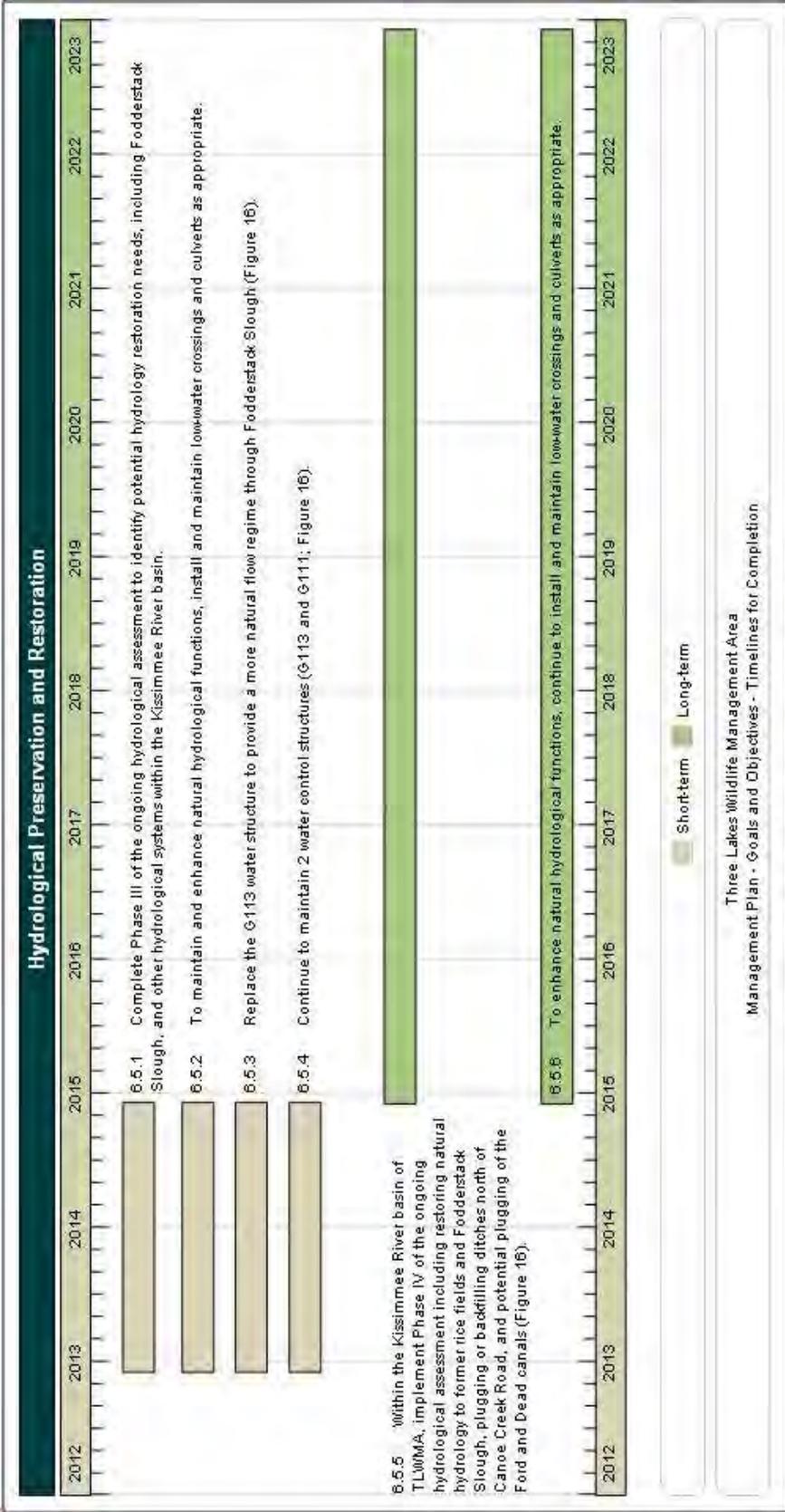


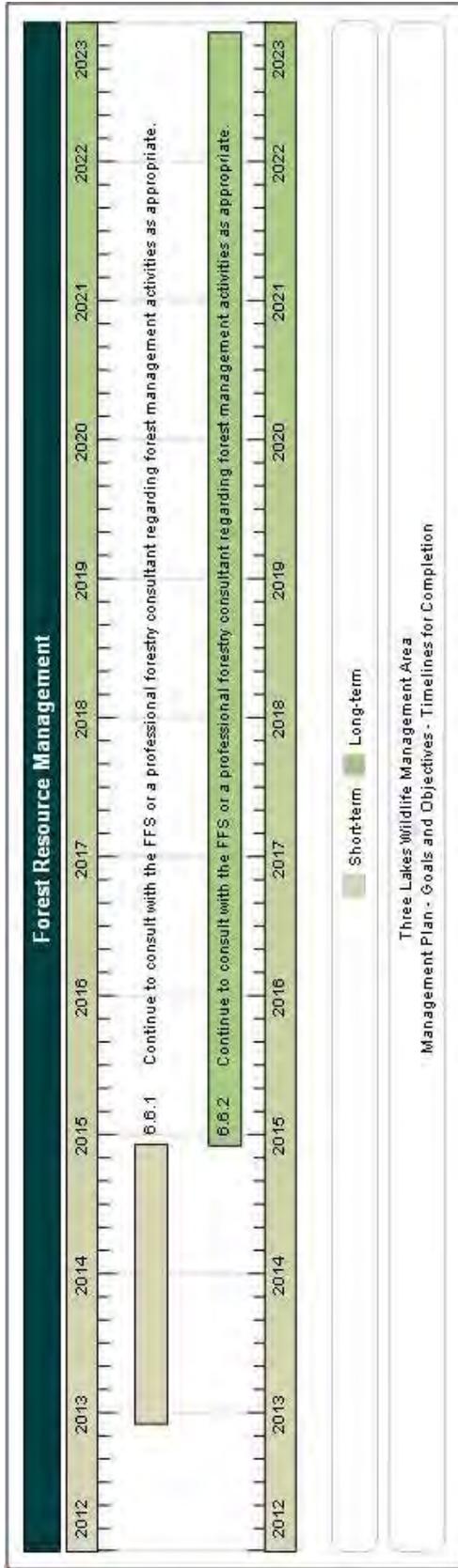


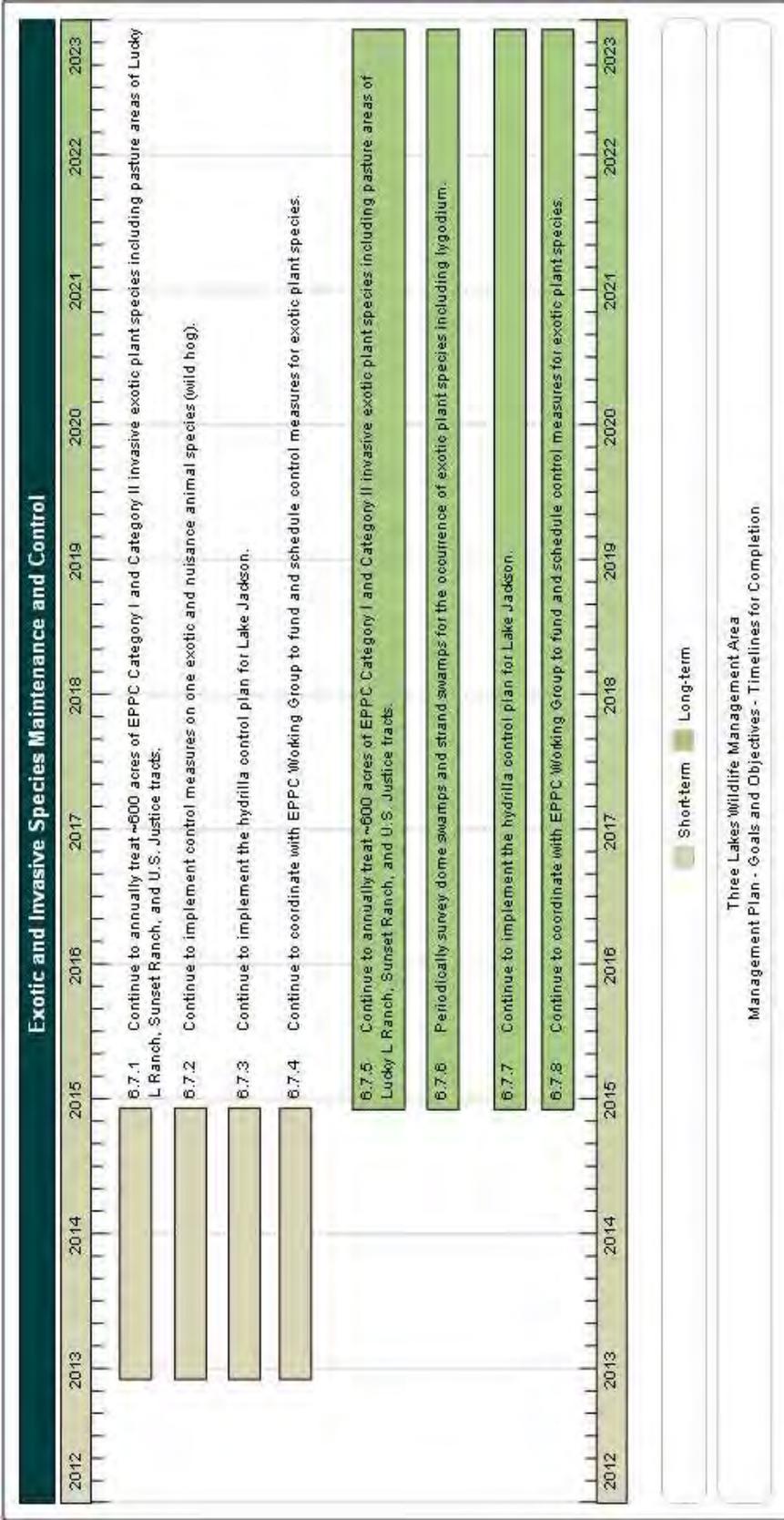


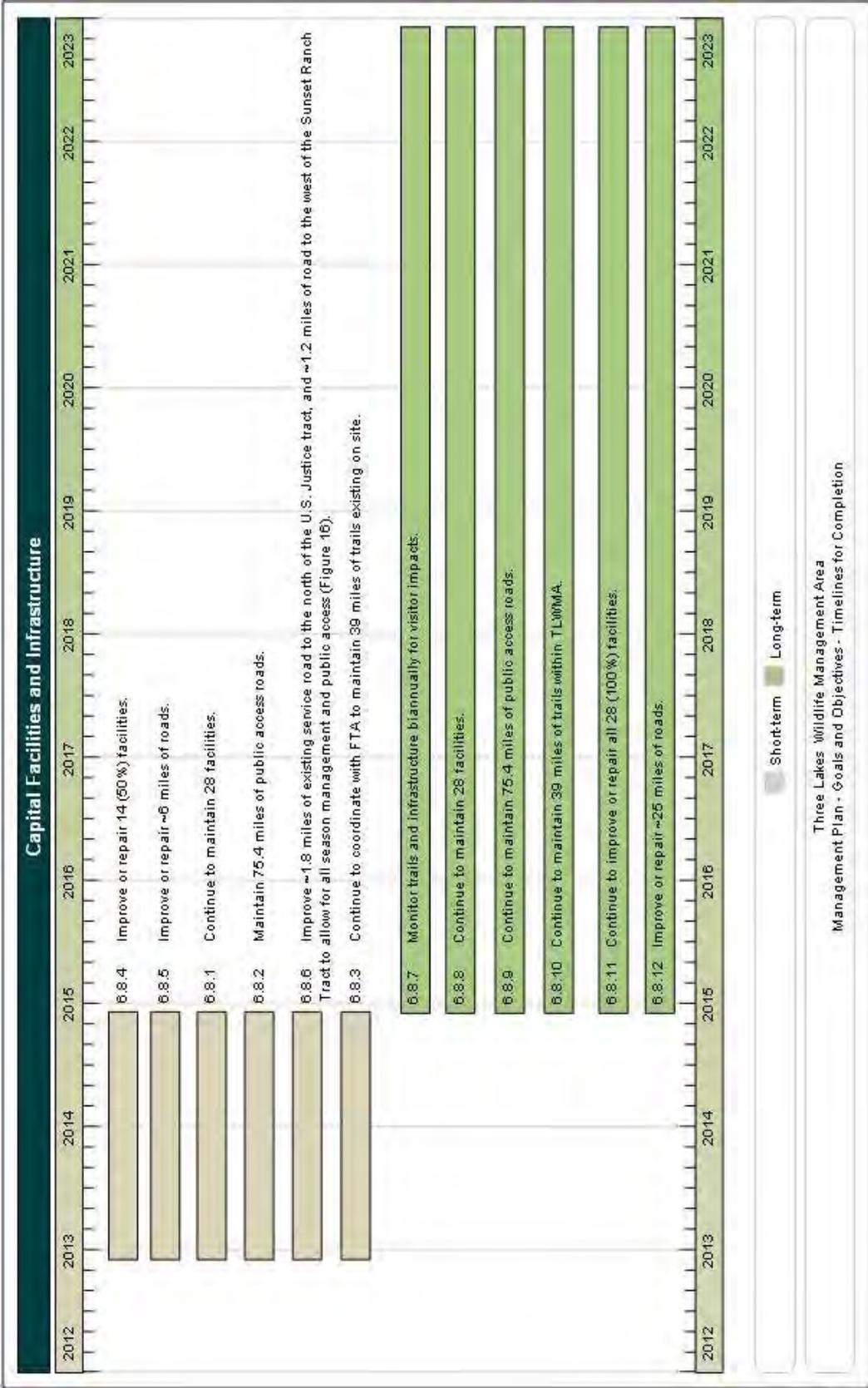


















8 Resource Management Challenges and Strategies

8.1 **Challenge: A complete boundary survey of TLWMA is lacking.**

8.1.1 Strategy: Explore the feasibility of contracting for boundary survey.

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

8.2.1 Strategy: Explore feasibility for increasing area staffing to FWC's staffing standard (13 FTEs).

8.3 **Challenge: While currently at minimal levels, unauthorized access, illegal dumping, vandalism, poaching and unauthorized 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.

8.4 **Challenge: Northern bobwhite populations are declining in Florida and appear to be declining on TLWMA.**

8.4.1 Strategy: Investigate the feasibility and efficacy of cooperating with Northern Bobwhite Conservation Initiative for Northern bobwhite management and population restoration.

8.4.2 Strategy: Refer to the FWC's Strategic Plan for Northern Bobwhite Restoration In Florida for management guidelines.

8.5 **Challenge: Currently a lease to the sovereign submerged lands of Lake Jackson is lacking, presenting possible regulation continuity and enforcement issues.**

8.5.1 Strategy: Investigate the feasibility and efficacy of obtaining a sovereign submerged lands lease for Lake Jackson.

8.6 **Challenge: Cool season equestrian, hiking and bicycling opportunities outside of established hunting seasons are currently limited.**

8.6.1 Strategy: Investigate the feasibility of providing additional cool season hiking, equestrian, and bicycling opportunities within the Prairie Lakes Unit.

- 8.6.2 **Strategy:** In conjunction with the development of the updated Recreation Master Plan, explore the feasibility of designating new multi-use trail routes in addition to the Prairie Lakes Unit trail system.
- 8.7 **Challenge: The value of TLWMA to the community and marketing as an ecotourism destinations is insufficient.**
- 8.7.1 **Strategy:** Explore opportunities and partnerships to market TLWMA as an ecotourism destination.
- 8.8 **Challenge: Active management on the Kissimmee River Unit is currently inadequate.**
- 8.8.1 **Strategy:** Explore cattle lease opportunity on Kissimmee River Unit.
- 8.9 **Challenge: Safety and trespass issues associated with adjacent private property landowners exist.**
- 8.9.1 **Strategy:** Upon completion, implement the recommendations of the FWC statewide boundary buffer zone issue team.

9 Cost Estimates and Funding Sources

The following represents the actual and unmet budgetary needs for managing the lands and resources of TLWMA. 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 CARL and from Florida State Legislative appropriations. However, private conservation organizations may be cooperators with the agency for funding of specific projects. Alternative funding sources, such as monies available through mitigation, may be sought to supplement existing funding.

The cost estimate below, although exceeding what FWC typically receives through the appropriations process, is consistent with the direction taken by current operational planning for TLWMA. 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 2010 – 2011 operational plan showing detailed cost estimates by activity and categories of expenditures, may be found in Appendix 13.10.

Based on FWC's current staffing ratio of approximately one full time employee (FTE) per 5,000 acres of managed area, 13 FTE positions would be optimal to fully manage TLWMA

as described in this Management Plan. All land management funding is dependent upon annual legislative appropriations.

Table 13.

Management Plan Cost Estimate

Maximum expected one year expenditure

<u>Resource Management</u>		Priority schedule:
Exotic Species Control	\$43,447	Immediate (annual)
Prescribed Burning	\$82,001	Intermediate (3-4 years)
Cultural Resource Management	\$1,051	<i>Other (5+ years)</i>
Timber Management	\$2,353	
Hydrological Management	\$2,944	
Other	\$219,123	
Subtotal	\$350,918	
 <u>Administration</u>		
General Administration	\$8,410	
 <u>Support</u>		
Land Management Planning	\$28,731	
<i>Land Management Reviews</i>	\$1,262	
<i>Training/Staff Development</i>	\$65,279	
Vehicle Purchase	\$225,000	
Vehicle Operation and Maintenance	\$86,776	
Other	\$4,205	
Subtotal	\$411,252	
 <u>Capital Improvements</u>		
<i>New Facility Construction</i>	\$30,000	
Facility Maintenance	\$169,852	
Subtotal	\$199,852	
 <u>Visitor Services/Recreation</u>		
Info./Education/Operations	\$40,815	
 <u>Law Enforcement</u>		
Resource Protection	\$44,441	
 <u>Total</u>	 \$1,055,689	

Table 4.

Management Plan Cost Estimate

Ten-year projection

Resource Management

Exotic Species Control	\$498,066
Prescribed Burning	\$940,054
Cultural Resource Management	\$3,565
Timber Management	\$26,970
Hydrological Management	\$33,746
Other	\$2,511,998
Subtotal	\$4,014,399

Priority schedule:
Immediate (annual)
 Intermediate (3-4 years)
 Other (5+ years)

Administration

General Administration	\$96,416
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Support

Land Management Planning	\$329,369
<i>Land Management Reviews</i>	\$4,370
<i>Training/Staff Development</i>	\$226,129
Vehicle Purchase	\$1,033,099
Vehicle Operation and Maintenance	\$994,784
Other	\$48,208
Subtotal	\$2,635,959

Capital Improvements

<i>New Facility Construction</i>	\$102,908
Facility Maintenance	\$1,947,161
Subtotal	\$2,050,070

Visitor Services/Recreation

Info./Education/Operations	\$467,904
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Law Enforcement

Resource Protection	\$509,465
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<u>Total</u>	\$9,774,212
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10 Analysis of Potential for Contracting Private Vendors for Restoration and Management Activities

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

Approved Conditional Rejected

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

11 Compliance with Federal, State, and Local Governmental Requirements

The operational functions of FWC personnel are governed by the agency’s Internal Management Policies and Procedures (IMPP) Manual. The IMPP Manual provides internal guidance regarding many subjects affecting the responsibilities of agency personnel including personnel management, safety issues, uniforms and personal appearance and 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 TLWMA 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 FWC 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 372, 253, 259, 327, 370, 403, 870, 373, 375, 378, 487 and 597 FS. This plan is also in conformance with the Local Government Comprehensive Plan for Osceola County, Florida, as approved and adopted (Appendix 13.11).

The FWC has developed and utilizes an Arthropod Control Plan for TLWMA in compliance with Chapter 388.4111 F.S. (Appendix 13.12). This plan was developed in cooperation with the local Osceola County arthropod control agency.

12 Endnotes

- ¹ Recovery Plan for the Red-cockaded Woodpecker, Second Revision (2003).
<http://www.fws.gov/rcwrecovery/files/RecoveryPlan/finalrecoveryplan.pdf>
- ² Management Plan Red-cockaded Woodpecker (2003).
<http://myfwc.com/media/214360/RCW.pdf>
- ³ Regulatory Negotiation Committee on Accessibility Guidelines for Outdoor Developed Areas, Final Report (1999).