



# FLORIDA DEPARTMENT OF Environmental Protection

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

Rick Scott  
Governor

Carlos Lopez-Cantera  
Lt. Governor

Noah Valenstein  
Secretary

August 30, 2018

Mr. Alan Davis  
Florida Forest Service  
Department of Agriculture and Consumer Services  
3125 Conner Boulevard, Room 236  
Tallahassee, Florida 32399-1650

**RE: Lake Wales Ridge State Forest - Lease No. 3563**

Dear Mr. Davis:

On **August 24, 2018**, the Acquisition and Restoration Council (ARC) recommended approval of the **Lake Wales Ridge State Forest** management plan. Therefore, 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 **Lake Wales Ridge State Forest** management plan. The next management plan update is due August 24, 2028.

Pursuant to s. 253.034(5)(a), F.S., each management plan is required to “describe both short-term and long-term management goals, and include measurable objectives to achieve those goals. Short-term goals shall be achievable within a 2-year planning period, and long-term goals shall be achievable within a 10-year planning period.” Upon completion of short-term goals, please submit a signed letter identifying categories, goals, and results with attached methodology to the Division of State Lands, Office of Environmental Services.

Pursuant to s. 259.032(8)(g), F.S., by July 1 of each year, each governmental agency and each private entity designated to manage lands shall report to the Secretary of Environmental Protection, via the Division of State Lands, on the progress of funding, staffing, and resource management of every project for which the agency or entity is responsible.

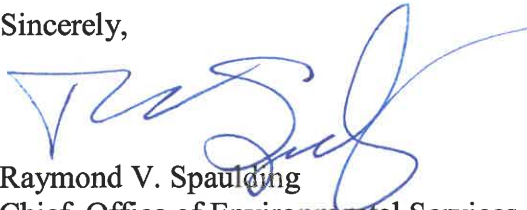
Pursuant to s. 259.036(2), F.S., management areas that exceed 1,000 acres in size, shall be scheduled for a land management review at least every 5 years.

Pursuant to s. 259.032, F.S., and Chapter 18-2.021, F.A.C., management plans for areas less than 160 acres may be handled in accordance with the negative response process. This process requires small management plans and management plan amendments be submitted to the Division of State Lands for review, and the Acquisition and Restoration

Council (ARC) for public notification. The Division of State Lands will approve these plans or plan amendments submitted for review through delegated authority unless three or more ARC members request the division place the item on a future council meeting agenda for review. To create better efficiency, improve customer service, and assist members of the ARC, the Division of State Lands will notice negative response items on Thursdays except for weeks that have State or Federal holidays that fall on Thursday or Friday. The Division of State Lands will contact you on the appropriate Friday to inform you if the item is approved via delegated authority or if it will be placed on a future ARC agenda by request of the ARC members.

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

Sincerely,

A handwritten signature in blue ink, appearing to read 'Ray Spaulding', is written over the typed name.

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

**TEN-YEAR LAND MANAGEMENT PLAN**  
FOR THE  
**LAKE WALES RIDGE STATE FOREST**  
POLK COUNTY



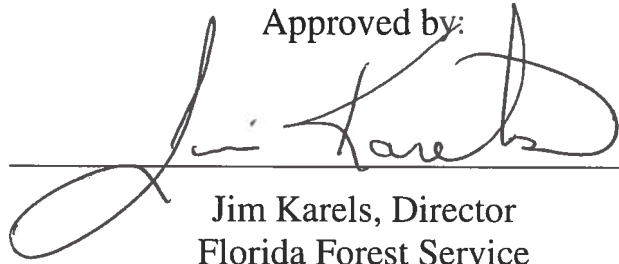
PREPARED BY THE  
FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES  
FLORIDA FOREST SERVICE

APPROVED ON

TEN-YEAR LAND MANAGEMENT PLAN  
FOR THE  
LAKE WALES RIDGE STATE FOREST



Approved by:

  
\_\_\_\_\_

Jim Karels, Director  
Florida Forest Service

9/7/18  
Date

  
\_\_\_\_\_

John Sabo, Chief  
Field Operations

9/7/18  
Date

**TEN-YEAR LAND MANAGEMENT PLAN  
LAKE WALES RIDGE STATE FOREST  
TABLE OF CONTENTS**

Land Management Plan Executive Summary ..... 8

I. Introduction ..... 10

    A. General Mission and Management Plan Direction ..... 10

    B. Past Accomplishments ..... 11

    C. Goals / Objectives for the Next Ten-Year Period ..... 13

II. Administration Section..... 20

    A. Descriptive Information ..... 20

        1. Common Name of Property ..... 20

        2. Legal Description and Acreage..... 20

        3. Proximity to Other Public Resource ..... 21

        4. Property Acquisition and Land Use Considerations ..... 23

    B. Management Authority, Purpose, and Constraints ..... 24

        1. Purpose for Acquisition / Management Prospectus ..... 24

        2. Degree of Title Interest Held by the Board..... 25

        3. Designated Single or Multiple-Use Management..... 25

        4. Revenue Producing Activities..... 25

        5. Conformation to State Lands Management Plan ..... 26

        6. Legislative or Executive Constraints ..... 26

        7. Aquatic Preserve/Area of Critical State Concern ..... 27

    C. Capital Facilities and Infrastructure ..... 27

        1. Property Boundaries Establishment and Preservation ..... 27

        2. Improvements ..... 27

        3. On-Site Housing..... 33

        4. Operations Infrastructure ..... 33

    D. Additional Acquisitions and Land Use Considerations ..... 35

        1. Alternate Uses Considered..... 35

        2. Additional Land Needs ..... 35

        3. Surplus Land Assessment ..... 36

        4. Adjacent Conflicting Uses ..... 36

        5. Compliance with Comprehensive Plan ..... 37

        6. Utility Corridors and Easements ..... 37

    E. Agency & Public Involvement ..... 38

        1. Responsibilities of Managing Agencies..... 38

        2. Law Enforcement..... 39

        3. Public and Local Government Involvement ..... 39

        4. Volunteers ..... 39

        5. Friends of Florida State Forests ..... 39

III. Archaeological / Cultural Resources and Protection .....	40
A. Past Uses .....	40
B. Archaeological and Historical Resources .....	41
C. Ground Disturbing Activities .....	41
D. Survey and Monitoring .....	41
IV. Natural Resources and Protection.....	42
A. Soils and Geologic Resources.....	42
1. Resources .....	42
2. Descriptions .....	42
3. Soil Protection.....	44
B. Water Resources.....	45
1. Resources .....	46
2. Water Classification.....	48
3. Water Protection .....	48
4. Swamps, Marshes, and Other Wetlands .....	48
5. Wetlands Restoration.....	48
6. Basin Management Action Plan.....	48
C. Wildlife Resources .....	50
1. Threatened and Endangered Species .....	50
2. Florida Natural Areas Inventory .....	55
3. Florida Fish and Wildlife Conservation Commission .....	56
4. Game Species and Other Wildlife.....	57
5. Survey and Monitoring .....	57
D. Sustainable Forest Resources.....	61
E. Beaches and Dune Resources .....	61
F. Mineral Resources .....	61
G. Unique Natural Features and Outstanding Native Landscapes.....	62
H. Research Projects / Specimen Collection.....	62
I. Ground Disturbing Activities .....	62
V. Public Access and Recreation .....	62
A. Existing .....	65
B. Planned.....	67
C. Hunter Access .....	69
D. Education .....	70
VI. Forest Management Practices .....	70
A. Prescribed Fire .....	70
B. Wildfires, Prevention, Fire / Prescribed Fire Strategies.....	72
1. Suppression Strategies .....	73
2. Smoke Management.....	73
3. Firebreaks and Firelines.....	73
4. Sensitive Areas.....	74
5. Firewise Communities .....	74
6. Adjacent Neighbor Contacts .....	74

7. Post-Burn Evaluations .....	74
C. Sustainable Forestry & Silviculture .....	74
1. Strategies .....	74
2. Silvicultural Operations .....	75
3. Forest Inventory .....	76
4. Timber Sales .....	77
D. Non-Native Invasive Species Control.....	77
E. Insects, Disease, and Forest Health .....	79
F. Use of Private Land Contractors.....	79
G. Habitat Restoration .....	80
VII. Proposed Management Activities for Natural Communities .....	87
A. Basin Marsh .....	91
B. Basin Swamp .....	92
C. Baygall .....	94
D. Blackwater Stream .....	96
E. Depression Marsh .....	97
F. Dome Swamp.....	98
G. Flatwoods Lake.....	99
H. Floodplain Marsh.....	100
I. Floodplain Swamp .....	101
J. Hydric Hammock.....	102
K. Mesic Flatwoods .....	104
L. Mesic Hammock .....	106
M. Pasture - Improved.....	107
N. Pasture – Semi-Improved.....	108
O. Pine Plantation .....	109
P. Sandhill .....	110
Q. Sandhill Upland Lake .....	113
R. Scrub.....	114
S. Scrubby Flatwoods.....	119
T. Wet Flatwoods.....	121
U. Wet Prairie.....	123
V. Xeric Hammock.....	123
W. Other Altered Landcover Types.....	125
VIII. Literature Cited .....	126
IX. Glossary of Abbreviations .....	129

## **TABLES**

Table 1. LWRSF Acreage by Funding Source .....	Page 21
Table 2. Nearby Public Conservation Land and Easements .....	Page 23
Table 3. Parcel Acquisition.....	Page 24
Table 4. Archaeological and Historical Sites on LWRSF .....	Page 41
Table 5. Endangered or Threatened Species on LWRSF .....	Page 51
Table 6. Non-Native Invasive Species Found on LWRSF .....	Page 78
Table 7. Natural Community Types Found on LWRSF.....	Page 88
Table 8. Altered Landcover Types Found on LWRSF.....	Page 89
Table 9. Prescribed Fire Interval Guide on LWRSF.....	Page 90



**TEN-YEAR LAND MANAGEMENT PLAN  
LAKE WALES RIDGE STATE FOREST  
EXHIBITS**

LWRSF Ten-Year Management Accomplishment Summary .....	Exhibit A
Location/Boundary Maps.....	Exhibit B
Optimal Management Boundary Map .....	Exhibit C
Road Map.....	Exhibit D
LWRSF Facilities, Recreation, and Improvements .....	Exhibit E
Tract Maps .....	Exhibit F
Proximity to Significant Managed Lands .....	Exhibit G
Florida Forever Projects at LWRSF .....	Exhibit H
Archaeological and Cultural Sites .....	Exhibit I
Management Procedures for Archaeological and Historical Sites and Properties on State Owned or Controlled Lands .....	Exhibit J
Soil Maps and Descriptions .....	Exhibit K
DEP Outstanding Florida Waters.....	Exhibit L
Water Resources Map & BMAP Map .....	Exhibit M
FNAI Response.....	Exhibit N
FWC Response.....	Exhibit O
LWRSF Fire History.....	Exhibit P
Non-Native Invasive Species.....	Exhibit Q
Current Natural Communities and Cover Type Map.....	Exhibit R
Historic Natural Communities Map.....	Exhibit S
Management Prospectus .....	Exhibit T
Land Management Reviews.....	Exhibit U
Compliance with Local Comprehensive Plan .....	Exhibit V
State Forest Management Plan Advisory Group Summary .....	Exhibit W
State Forest Summary Budget .....	Exhibit X
Arthropod Control Plans.....	Exhibit Y
Florida Scrub-jay Location Maps / FWC Recommendations for Florida Scrub-jay Habitat Enhancement.....	Exhibit Z

LAND MANAGEMENT PLAN EXECUTIVE SUMMARY

LEAD AGENCY: Florida Department of Agriculture and Consumer Services, Florida Forest Service  
 COMMON NAME: Lake Wales Ridge State Forest  
 LOCATION: Polk County  
 ACREAGE TOTAL: 26,579.49 acres (more or less)

Historical Natural Communities	Approximate Acreage
Basin Marsh	923
Basin Swamp	189
Baygall	2,771
Blackwater Stream	35
Depression Marsh	1,533
Mesic Flatwoods	6,060
Sandhill	3,806
Scrub	3,201
Wet Flatwoods	4,531

Historical Natural Communities	Approximate Acreage
Dome Swamp	35
Flatwoods Lake	28
Floodplain Marsh	450
Floodplain Swamp	201
Hydric Hammock	810
Mesic Hammock	195
Sandhill Upland Lake	3
Scrubby Flatwoods	1,694
Wet Prairie	231

TIITF LEASE AGREEMENT NUMBER: 3563

USE: Single  Multiple

MANAGEMENT AGENCY

Florida DACS, Florida Forest Service  
 Florida Fish and Wildlife Conservation Commission  
 South Florida Water Management District  
 Southwest Florida Water Management District  
 Department of State, Division of Historical Resources

RESPONSIBILITY

General Forest Resource Management  
 Wildlife Resources & Laws  
 Water Resource Protection & Restoration  
 Water Resource Protection & Restoration  
 Historical & Archaeological Resource Management

DESIGNATED LAND USE: Multiple-Use State Forest

SUBLEASES: Cattle (3), Citrus (1)

ENCUMBRANCES: None

TYPE ACQUISITION: Conservation and Recreation Lands, Preservation 2000, and Florida Forever programs

UNIQUE FEATURES: Located on the Lake Wales Ridge, Scrub, Cutthroat grass flatwoods, Sandhills, Mesic Flatwoods

ARCHAEOLOGICAL / HISTORICAL: Twelve (12) known sites

MANAGEMENT NEEDS: Restoration of native ecosystems, Prescribed burning, Non-native invasive control, Florida Natural Area Inventory (FNAI) survey for updated historical/current natural communities, Property boundary surveys/maintenance, Other Personnel Services, District Biologist, Wildlife/animal monitoring, Law Enforcement

ACQUISITION NEEDS: Remainder of Lake Wales Ridge CARL Project and Bombing Range Ridge projects

SURPLUS ACREAGE: None

PUBLIC INVOLVEMENT: 2012 & 2017 Land Management Reviews, Management Plan Advisory Group and Public Hearing, Polk County Planning Division, Lake Wales Ridge Ecosystem Working Group, Heartland Cooperative Invasive Species Management Area (CISMA), Lake Wale Ridge Liaison Committee

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

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

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

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

## **I. Introduction**

The Lake Wales Ridge State Forest (LWRSF) is in four separate tracts on or near the ancient Lake Wales Ridge in southeastern Polk County. This 26,579-acre state forest is part of the largest undeveloped piece of land on the Lake Wales Ridge and occupies a keystone position in the network of protected sites along the Lake Wales Ridge. The Lake Wales Ridge is a major geomorphological feature of central peninsular Florida, a series of elevated sandy ridges that comprise a relictual shoreline and beach dune system dating back to the Pleistocene (White, 1970, Webb, 1990). The forest contains outstanding examples of naturally functioning ecosystems that include flatwoods, freshwater ponds and marshes, cutthroat grass systems, wet prairie, undeveloped lakes, and characteristic xeric upland sandhill, scrub, and scrubby flatwoods. The xeric, dry upland habitats of the Lake Wales Ridge support a unique set of plants and animals that have adapted to xeric conditions over millions of years (Christman and Judd, 1990, Turner 2006a). The Lake Wales Ridge is a global hotspot for rare plants and biodiversity. The scrub and sandhill ecosystems harbor one of the highest concentrations of imperiled species in the United States, many of which are found nowhere else on Earth (U.S. Fish and Wildlife, 1999). LWRSF is rich in the number of endemic plants and animals. Of the 19 federally listed scrub and sandhill plants, 16 occur at LWRSF. There are over 30 species of wildlife that are either state or federally listed as threatened, endangered, or given a global rank by Florida Natural Areas Inventory (FNAI).

### **A. General Mission and Management Plan Direction**

The primary mission of the Florida Forest Service (FFS) is to “protect Florida and its people from the dangers of wildland fire and manage the forest resources through a stewardship ethic to assure they are available for future generations”.

Management strategies for LWRSF center on the multiple-use concept, as defined in sections 589.04(3) and 253.034(2)(a) F.S. Implementation of this concept will utilize and conserve state forest resources in a harmonious and coordinated combination that will best serve the people of the state of Florida, and that is consistent with the purpose for which the forest was acquired. Multiple-use management for LWRSF will be accomplished with the following strategies:

- Practice sustainable forest management for the efficient generation of revenue and in support of state forest management objectives;
- Provide for resource-based outdoor recreation opportunities for multiple interests;
- Restore and manage healthy forests and native ecosystems ensuring the long-term viability of populations and species listed as endangered, threatened, or rare, and other components of biological diversity including game and non-game wildlife and plants;
- Protect known archaeological, historical, and cultural resources;
- Restore, maintain, and protect hydrological functions related water resources and the health of associated wetland and aquatic communities.
- Provide research and educational opportunities related to natural resource management.

This management plan is provided according to requirements of Sections 253.034, 259.032 and 373, Florida Statutes, and was prepared utilizing guidelines outlined in Section 18-2.021 of the Florida Administrative Code. It is not an annual work plan or detailed operational plan but provides general guidance for the management of LWRSF for the next

ten-year period and outlines the major concepts that will guide management activities on the forest.

## **B. Past Accomplishments**

A compilation of management activities and public use on LWRSF has been completed monthly and is available from the LWRSF Resource Administrator. A table has been prepared for this plan that summarizes the accomplishments for each of the past ten (10) years [Exhibit A]. The table does not attempt to account for all activities on the forest, but summarizes major activities. It does not list the multitude of daily activities and public interactions involved in managing the forest.

Since the approval of the previous management plan in 2006, there have been many accomplishments. Among the most noteworthy have been the following:

- Since 2006, the following pine trees were planted in landings for flatwoods restoration: 500 containerized Avon Park longleaf pine (*Pinus palustris*) on 10 acres; 5,000 containerized South Florida slash pine (*Pinus elliottii* var. *densa*) on 25-30 acres.
- Over 99,500 visitors have come to LWRSF in the past ten (10) years.
- Over 6,000 visitors have used primitive camping facilities on Arbuckle and Walk-in-the Water (WIW) Tracts.
- Over 12,520 volunteer hours at LWRSF.
- A total of 131 day-use passes sold to the public.
- A total of over 2,500 acres treated for non-native invasive species on LWRSF.
- Creation of LWRSF Forest Data Model shapefiles updated annually for state forest attributes.
- The Dinner Lake recreation site was opened on the Babson parcel.
- Pipe gates installed on Arbuckle Tract at north-south School Bus Road and at Tram Road/SR 64 entrance.
- Installations of a well-pump and pump house were completed on the Arbuckle Tract.
- The installation of a pump house was completed at the shop building located at LWRSF Headquarters site.
- Two (2) key-lock safes at LWRSF Headquarters and Shop.
- FFS staff improved Tram Road with shell rock on an additional 1.5 miles of roadway.
- Completed the Anne Malatesta Memorial Garden at LWRSF Headquarters.
- Over 35,000 acres were managed with prescribed fire.
- Currently, 53% of the historic natural communities are within intact or desired conditions.
- A sand pine (*Pinus clausa*) hurricane salvage timber harvest was completed in scrub/sandhill areas on Arbuckle, WIW, Hesperides Tracts for a total acreage of 647 acres (2005-2006).
- Continued the sandhill restoration/monitoring project on the Arbuckle Tract.
- Continued the sandhill restoration project on the WIW Tract.
- Continued Florida Scrub-jay (*Aphelocoma coerulescens*; FSJ) census and habitat monitoring.
- Forest Inventory – LWRSF Inventoried at least 10% of forested land acreage each year between 2007-2016. This included new inventory of previously un-inventoried stands and re-inventoried stands; Total acres – 32,958 acres inventoried.

- 2009 State Lands Inventory - LWRSF – 100% of all remaining un-inventoried forested land acreage at LWRSF completed = 14,436 acres. This involved a forest inventory of all stands that had not been inventoried in previous years.
- FFS completed restoration of 2,500 acres of flatwoods on the Arbuckle Tract, as indicated in the 2009 Flatwoods Restoration Plan.
- Over 2,300 acres of timber have been harvested on the Arbuckle Tract; predominately thinning of slash pine (*Pinus elliottii*) and leaving all longleaf pine (*Pinus palustris*) with dominant/codominant South Florida slash pine (*Pinus elliottii* var. *densa*).
- Seven (7) timber sales completed on the Arbuckle Tract for a total of 62,506.4 tons of slash pine harvested for flatwoods restoration; Total Revenue – \$608,934.23.
- Continued leases for citrus grove and cattle operations on Prairie Tract.
- Completed two (2) citrus grove inventories on the Prairie Tract – 2007-2008 and 2010-2011.
- The Otter Slough Wetland Restoration Project (450+ acres) was implemented by FFS through funds from Natural Resources Conservation Service (NRCS) on the Prairie Tract.
- FFS staff completed the construction of an Operation Outdoor Freedom (OOF), Camp Prairie, on the Prairie Tract.
- FFS staff has maintained six (6) miles of trails, 1-2 times annually for trail maintenance.
- FFS staff mowed 250 miles of interior roads.
- FFS staff graded 359 miles of roads.
- FFS staff repaired 53 miles of roads.
- FFS staff constructed one (1) mile of new road.
- FFS staff built two (2) new bridges and repaired three (3) existing bridges.
- FFS staff installed/replaced 25 culverts.
- FFS staff installed two (2) low water crossings.
- FFS staff has maintained 502 miles of state forest boundaries.
- FFS staff completed the removal of Amber Sweets orange on the Prairie Tract and an abandoned grove on Boy Scout parcel.
- FFS staff installed Reedy Creek Walking Bridge on the Arbuckle Tract.
- The McLean Cabin on the Arbuckle Tract, and four (4) graves on the Prairie Tract were officially listed as historical/archeological sites.
- Florida Fish and Wildlife Conservation Commission (FWC) continues to run check station and hunts at McLean Cabin on Arbuckle Tract.
- Implemented camping enhancements to Reedy Creek I Primitive Campground, Walk-In-Water Primitive Campground, and an addition of Reedy Creek II Primitive Hunt Camp on the Arbuckle Tract.
- In 2017, FNAI completed an inventory and natural community mapping project on the entire state forest and updated the natural community descriptions for LWRSF.
- FFS plant conservation program recorded 3,265 Global Positioning System (GPS) points representing 16 federally listed plant or lichen species, with an estimated 20,049 individuals added to the LWRSF 2004-2017 dataset.
- FFS established and continued Level I, II, and III monitoring intensity programs for 16 federally endangered or threatened plant or lichen species on LWRSF to maintain knowledge of the long-term trends and the local status of federally listed species on the forest.

- FFS plant conservation biologist established monitoring projects for nine of the most vulnerable federally listed plant/lichen species. Species are studied at the demographic level using marked individuals to assess survival, growth, fecundity and recruitment within selected populations on the forest. Several of the monitoring projects are in collaboration with Archbold Biological Station and the University of Central Florida.
- A long-term monitoring program was established by FFS in collaboration with Archbold Biological Station for federally listed perforate reindeer lichen (*Cladonia perforata*) designed to detect changes in cover over time.
- FFS staff completed a long-term monitoring project to track the success of prescribed fire in sandhill habitat of the Arbuckle Tract.
- FFS completed a Walk in Water Restoration Pilot Study to evaluate the effectiveness of restoration techniques; prescribed fire, herbicide, chopping, and seeding wiregrass in restoring sandhill on the WIW Tract.
- FFS completed the Sand Pine Harvest Monitoring Project to monitor the community level effect of logging sand pine from scrub and sandhill on the WIW and Arbuckle Tracts.
- FFS completed the Walk in Water Plateau study to evaluate the use of chain-sawing oaks, the application of herbicide to Bahia grass, and application of prescribed fire as restoration methods to improve habitat quality on the WIW Tract.
- FFS completed a Groundcover Restoration Pilot Study in sandhill habitat of WIW Tract to assess methods for establishing wiregrass and eradication of Bahia grass. FFS established a wiregrass plug-out planting project in collaboration with the University of Central Florida.
- FFS established the Newell Old-Growth Longleaf Pine monitoring and habitat improvement project on the Newell Parcel of the WIW Tract, where 22 acres have been treated for restoration using outside volunteers and staff.

### **C. Goals / Objectives for the Next Ten-Year Period**

The following goals and objectives provide direction and focus management resources for the next ten-year planning period. Funding, agency program priorities, and the potential for wildfire during the planning period will determine the degree to which these objectives can be met. Management activities on LWRSF during this management period must serve to conserve, protect, utilize, and enhance the natural and historical resources, and manage resource-based public outdoor recreation, which is compatible with the conservation and protection of this forest. The majority of the management operations will be conducted by the FFS, however appropriate activities will be contracted to private sector vendors or completed with the cooperation of other agencies. All activities will enhance the property's natural resource or public recreational value.

The management activities listed below will be addressed within the ten-year management period and are defined as short-term goals, long-term goals, or ongoing goals. Short-term goals are goals that are achievable within a two-year planning period, and long-term goals are achievable within a ten-year planning period. Objectives are listed in priority order for each goal. Costs for some activities cannot be estimated at this time. Other activities will be completed with minimal overhead expense and existing staff. For further budget information, please see the LWRSF Budget Summary [Exhibit X].

➤ **GOAL 1: Sustainable Forest Management**

**Objective 1:** Continue to update and implement the Five-Year Silviculture Management Plan including reforestation, harvesting, prescribed burning, restoration, and timber stand improvement activities and goals. (Ongoing Objective)

**Performance Measures:**

- Annual updates of the Five-Year Silviculture Management Plan completed.
- Continued implementation of the Five-Year Silviculture Management Plan (acres treated).
- Assessment of natural pine stands in need of a timber harvest on all tracts.

**Objective 2:** Continue to implement the FFS process for conducting stand descriptions and forest inventory including a Geographic Information Systems (GIS) database containing forest stands, roads, and other attributes including but not limited to: rare, threatened, and endangered species, historical and archaeological resources and non-native invasive species locations. (Ongoing Objective)

**Performance Measures:**

- Complete GIS database and re-inventory all attributes as required by FFS procedures.
- Number of acres inventoried.

**Objective 3:** Conduct forest inventory updates each year according to established criteria in the State Forest Handbook. (Ongoing Objective)

**Performance Measure:** Number of acres inventoried annually.

**Objective 4:** Continue efforts to remove off-site planted pine species from flatwoods natural community types and replant with native pines. (Ongoing Objective)

**Performance Measures:**

- Number of acres of off-site pines harvested through clear-cut or selective harvests.
- Number of acres native pines established.

➤ **GOAL 2: Public Access and Recreational Opportunities**

**Objective 1:** Maintain public access and recreational opportunities to allow for all recreational users, year-round, on Arbuckle and WIW Tracts. (Ongoing Objective)

**Performance Measure:** Number of visitor opportunities per day.

**Objective 2:** Develop additional public access and recreational opportunities to allow for all recreational users per day for typical recreational opportunities, on the Arbuckle and WIW Tracts. (Long-Term Objective)

**Performance Measure:** Number of additional visitor opportunities per day.

**Objective 3:** In order to continue to safely integrate human use into LWRSF, follow the Five-Year Outdoor Recreation Plan and update annually. (Ongoing Objective)

**Performance Measures:**

- Continued implementation of the Five-Year Outdoor Recreation Plan.
- Annual updates of the Five-Year Outdoor Recreation Plan completed.



**Objective 4:** Continue to invite and meet with the liaison panel. The panel consists of a mix of local residents, community leaders and special interest group representatives (canoe vendors, hunters, trail hikers, military, organized equestrian groups, etc.), environmental groups, and other public / private entities to establish communication and seek constructive feedback regarding the management of LWRSF. (Ongoing Objective)

**Performance Measures:**

- Liaison group remains organized.
- Meetings; two (2) times each year.

**Objective 5:** Maintain cooperation with FWC to provide guidance on specific hunting season quotas for Arbuckle and WIW Tracts; Communicate with FWC about bag limits and hunting issues at annual cooperator meeting. (Ongoing Objective)

**Performance Measures:**

- Annual letter on agreed hunting issues.
- Updated WMA rules posted and displayed in all kiosks on LWRSF.
- Updated WMA rules posted and displayed on FFS website for LWRSF.

**Objective 6:** Enlist additional volunteers and volunteer organizations to assist with recreation and/or resource management. (Ongoing Objective)

**Performance Measures:**

- Number of volunteers and organizations that assist with projects.
- Number of hours provided by volunteers.

**Objective 7:** Maintain hiking/equestrian trails on WIW Tract and assist Florida Trail Association (FTA) volunteers with trail maintenance on the Arbuckle Tract. (Ongoing Objective)

**Performance Measures:**

- Coordinate with FTA volunteers and members annually for miles of trails on the Arbuckle Tract that require trail maintenance.
- Miles of hiking/equestrian trails maintained.

**Objective 8:** Evaluate possible recreational opportunities on the Hesperides Tract.

**Performance Measures:**

- Opportunities evaluated. (Short-Term Objective)
- Recreation increased. (Long-Term Objective)

➤ **GOAL 3: Habitat Restoration and Improvement**

**Objective 1:** Utilize prescribed fire to enhance restoration of native groundcover. Evaluate areas where native groundcover has been eliminated or heavily impacted from historical land use on a case-by-case basis for alternative methods to address the reestablishment of native groundcover plants. Restore native groundcover where it has been eliminated or heavily impacted from historical land use. (Long-Term Objective)

**Performance Measure:** Number of acres restored.

**Objective 2:** Continue efforts of sand pine harvesting on overgrown scrub sites to enhance restoration efforts through prescribed fire. Harvest sand pines from areas where fire has

been excluded, provided no long-term negative environmental effects are discovered. (Ongoing Objective)

**Performance Measures:**

- Threatened and endangered species surveys conducted within overgrown sand pine scrub.
- Monitoring of threatened and endangered plant/animal species within overgrown sand pine scrub.
- Number of acres of sand pine removed for restoration and maintained by prescribed fire.

**Objective 3.** Sandhill/scrub restoration for enhancing FSJ habitat and continued mechanical/herbicide treatments applied where necessary to enhance prescribed fire applications. As recommended in the 2017 Land Management Review. (Ongoing Objective)

**Performance Measures:**

- Monitoring of FSJ families in cooperation with FWC Biologist.
- Number of acres restored.
- Number of acres burned within desired fire intervals.

**Objective 4.** Use photo plots and routine observation to compare sites over time. (Ongoing Objective)

**Performance Measures:**

- Number of new photo plots established.
- Percentage of photo plots revisited annually.
- Number of photos taken biannually.
- Comparative photos taken from photo plots.

➤ **GOAL 4: Fire Management**

**Objective 1:** The LWRSF currently contains approximately 24,308 acres of fire dependent communities. LWRSF staff will conduct habitat/natural community improvement on the forest annually. To achieve an appropriate fire return interval across the state forest, approximately 5,000 to 8,000 acres will be prescribed burned annually. Currently, FFS staff estimates 19,689 acres at LWRSF are within the desired fire rotation. (Ongoing Objective)

**Performance Measures:**

- Number of acres burned during the dormant and growing seasons, and number of acres burned within target fire return interval.
- Number of acres with restoration, including prescribed fire, underway.

**Objective 2:** Continue to annually update and implement the Five-Year Prescribed Burning Management Plan and the associated prescribed burning goals. (Ongoing Objective)

**Performance Measures:**

- Annual updates of the Five-Year Fire Management Plan completed.
- Continued implementation of the Five-Year Fire Management Plan (acres treated).

**Objective 3:** Reduce the threat of wildfire within the Wildland Urban Interface on LWRSF and the surrounding community through a comprehensive mitigation strategy that includes evaluating vegetative fuels near residential areas and identifying potential fuel reduction projects. (Long-Term Objective)

**Performance Measures:**

- Evaluation complete.
- Number of projects underway, should the evaluation determine that fuel reduction is necessary.
- Percent of projects completed.

➤ **GOAL 5: Listed and Rare Species Habitat Maintenance, Enhancement, Restoration, or Population Restoration**

**Objective 1:** In cooperation with FWC, develop a Wildlife Management Strategy that addresses fish and wildlife species on LWRSF, with emphasis on imperiled species and associated management prescriptions for their habitats. (Long-Term Objective)

**Performance Measures:**

- Wildlife Management Strategy completed.
- Baseline listed and rare species list completed for LWRSF.

**Objective 2:** In consultation with FWC, implement survey and monitoring protocols where feasible, for listed and rare species. (Long-Term Objective)

**Performance Measure:** Number of species for which monitoring is ongoing.

**Objective 3:** Monitor mapped populations of 15 federally listed plant species and one (1) federally listed lichen species and conduct searches throughout appropriate habitat within LWRSF for new occurrences. (Ongoing Objective)

**Performance Measures:**

- Number of new occurrences.
- Updated shapes/coverages of listed populations using GPS and GIS.

**Objective 4:** Continue Level 1, 2, and 3 monitoring programs for federally listed plant and lichen species (Menges and Gordon 1996) to determine population trends, and demographic parameters for selected species using Levels 2 and 3 monitoring programs. This will include evaluating the effects of management activities on federally listed species. (Ongoing Objective)

**Performance Measure:** Production of an annual report detailing all monitoring results.

**Objective 5:** Plan and implement xeric habitat restoration projects where federally listed plants occur or have the potential to occur to restore natural fire regimes and improve habitat quality for federally listed species. (Ongoing Objective)

**Performance Measures:**

- Restoration projects planned.
- Number of acres treated and restored.
- Monitoring reports of restoration sites produced.

**Objective 6:** FFS will pursue collaboration with area-wide researchers and partners, and

use existing plant inventories to develop a wide-ranging plant species list for LWRSF, per 2017 LMR team recommendation. Efforts will be made to conduct more vegetation inventories in un-sampled areas, as recommended in the 2017 Land Management Review. (Ongoing Objective)

**Performance Measures:**

- Partners contacted.
- Vegetation inventoried in un-sampled areas.
- Area-wide plant list developed.

➤ **GOAL 6: Non-Native Invasive Species Maintenance and Control**

**Objective 1:** Continue to follow and annually update the Five-Year Ecological Plan for LWRSF, specifically to locate, identify, and control non-native invasive species. (Ongoing Objective)

**Performance Measures:**

- Total number of acres identified and successfully treated.
- Annual updates of the Five-Year Ecological Plan completed.
- Continue to maintain and annually update LWRSF invasive species database for maintaining and updating invasive species information.

**Objective 2:** Continue to maintain funding to provide for Other Personnel Services (OPS) staff to locate, identify, and control non-native invasive species that exist on all tracts at LWRSF. (Ongoing Objective)

**Performance Measures:**

- Total number of acres identified and successfully treated by FFS staff.
- Funding approved to support 2-3 OPS staff annually.

**Objective 3:** Continue to apply for contractual services project proposals for invasive species treatments on all tracts through internal FFS funds, FWC Uplands Invasives Treatment Program, or other grant programs. (Ongoing Objective)

**Performance Measures:**

- Contractual services applications completed.
- Total number of acres identified and successfully treated.
- Contractual services funding treated acres annually.

**Objective 4:** Continue to maintain relationships with licensed/permitted hog trappers and FWC for locating, identifying, and controlling non-native feral hogs that exist on all tracts at LWRSF. (Ongoing Objective)

**Performance Measures:**

- Total number of hogs removed annually.
- Total number of hogs removed on Prairie Tract performed by cattle and citrus grove lessee hog trappers.
- Hog hunts performed annually on Arbuckle, WIW, and OOF hunts on the Prairie Tract.

➤ **GOAL 7: Cultural and Historical Resources**

**Objective 1:** Ensure all known sites are recorded in the Department of State, Division of Historical Resources (DHR) Florida Master Site File. (Ongoing Objective)

**Performance Measure:** Number of recorded sites.

**Objective 2:** Monitor recorded sites annually and send site monitor forms to the DHR Florida Master Site File as needed. (Ongoing Objective)

**Performance Measure:**

- Number of sites monitored annually.
- Number of site monitor forms submitted to DHR annually.

**Objective 3:** Maintain at least one qualified staff member as an Archaeological Site Monitor. (Ongoing Objective)

**Performance Measure:** Number of local staff that have undergone DHR's Archaeological Resource Monitor (ARM) training.

**Objective 4:** Increase the number of staff trained by DHR as Archaeological Site Monitors. (Ongoing Objective)

**Performance Measure:** Additional number of ARM-trained staff.

**Objective 5:** Request a site visit from the DHR to evaluate Hesperides and Prairie Tracts. (Short-Term Objective)

**Performance Measure:** Site visit requested.

➤ **GOAL 8: Hydrological Preservation and Restoration**

**Objective 1:** Conduct or obtain a site assessment/study to identify potential hydrological restoration needs. (Long-Term Objective)

**Performance Measures:**

- Assessment/study conducted.
- List of hydrological restoration needs.

**Objective 2:** Protect water resources during management activities through the implementation of Silviculture Best Management Practices (BMPs) that are applicable to LWRSF and may include, but not limited to forest roads, construction of pre-suppression firelines, sinkholes, etc. (Ongoing Objective)

**Performance Measure:** Percent compliance with Silvicultural BMPs.

**Objective 3:** Close, rehabilitate, or restore those roads, firelines, and trails that have evidence of erosion which impact surrounding water bodies causing alterations to the hydrology and/or water quality. (Ongoing Objective)

**Performance Measures:**

- Total number of roads, firelines, and trails closed, rehabilitated, and/or restored.
- Total number of culverts replaced.

➤ **GOAL 9: Capital Facilities and Infrastructure**

**Objective 1:** LWRSF staff, along with help from volunteers and/or user groups, will continue maintenance of 28 parking areas, 10 trailheads, 41 miles of trails, and 178 miles of primary, secondary, and tertiary roads. (Ongoing Objective)

**Performance Measure:** The number of existing facilities, miles of roads, and miles of trails maintained.

**Objective 2:** Continue to follow the Five-Year Roads and Bridges Management Plan and update annually. (Ongoing Objective)

**Performance Measures:**

- Continued implementation of the Five-Year Roads and Bridges Management Plan.
- Annual updates of the Five-Year Roads and Bridges Management Plan completed.

**Objective 3:** Continue to implement the Five-Year Boundary Survey and Maintenance Management Plan and update annually. The entire boundary will be reworked, at minimum, every five (5) years including harrowing, reposting signage, and repainting boundary trees. (Ongoing Objective)

**Performance Measures:**

- Continued implementation of the Five-Year Boundary Survey and Maintenance Management Plan.
- Percentage of forest boundary maintained each year.
- Annual updates of the Five-Year Boundary Survey and Maintenance Management Plan completed.
- Percentage of forest boundary following Silvicultural BMPs.

## **II. Administration Section**

### **A. Descriptive Information**

#### **1. Common Name of Property**

The common name of the property is the Lake Wales Ridge State Forest (LWRSF).

#### **2. Legal Description and Acreage**

The LWRSF is comprised 26,579 acres, more or less.

Lake Wales Ridge State Forest is located in southeastern Polk County, Florida. It is comprised of four (4) tracts: the Arbuckle Tract (13,531 acres), the Walk-in-the-Water (WIW) Tract (6,918 acres), the Hesperides Tract (1,267 acres), and the Prairie Tract (4,863 acres) totaling 26,579 acres. A complete legal description of LWRSF lands owned by the Board of Trustees of the Internal Improvement Trust Fund (TIITF) is on file at the LWRSF Headquarters Office, FFS State Office, and Florida Department of Environmental Protection (DEP) state office, and a general location shown in [Exhibit F].

The boundaries and the major parcels are identified in [Exhibit B]. The LWRSF is located in Section 5, 16, 17, 20, 31, and 32 Township 30 South, Range 29 East; Sections 22, 23, 25, 26, 27, 28, 32, 33, 34, 35, and 36 Township 30 South, Range 30 East;

Sections 1, 12, 13, 14, 23, 24, 25, and 26 Township 31 South, Range 28 East; Sections 5, 6, 7, 8, 17, 18, 19, 20, 29, and 30 Township 31 South, Range 29 East; Sections 11, 13, 14, 23, 24, and 26 Township 32 South, Range 28 East; Sections 7, 8, 9, 16, 15, 17, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, and 36 Township 32 South, Range 29 East in Polk County, Florida.

**Table 1. LWRSF Acreage by Funding Source**

	<b>FUNDING SOURCE</b>	<b>ACRES</b>
CARL	Conservation and Recreation Lands	21,220.86
P2000	Preservation 2000	19.68
FF	Florida Forever	5,338.95

**3. Proximity to Other Public Resources**

Lands managed by state, federal, or local government for conservation of natural or cultural resources that are located within approximately 15 miles of the LWRSF are included in [Exhibit G], as well as the table below:

**A. Arbuckle Tract - 13,531 acres:**

The Arbuckle Tract is bordered on the east by Lake Arbuckle, a 4,300-acre lake, approximately 4.5 miles long and 1.5 miles wide. Lake Arbuckle is almost entirely surrounded by publicly owned land. Public access to the lake is available on the north end of the lake. Fishermen are the dominant users of this lake.

A seven-acre county park, Lake Arbuckle Park and Campground, is located at the end of Lake Arbuckle Road on the north end of the lake. Park facilities include picnic areas, overnight campsites with electric and water hook-ups, public restrooms and showers, a boat ramp, and an RV dump station.

The Avon Park Air Force Range (APAFR), owned and operated by the U.S. Department of Defense (DOD), borders the east side of Lake Arbuckle. The natural resources on this 106,210-acre Range are actively managed and include public recreation opportunities ranging from hunting to hiking.

The Avon Park Correctional Institution, a medium/minimum security state prison, is located within the Range. This facility provides inmate work crews on a regular basis to support state forest operations.

A paved road, State Road 64, leading to the Range, divides the southeast portion of the tract. Two other paved roads, Old Avon Park Road and Lake Arbuckle Road, border the tract on the west and the north, respectively. Polk County maintains a road easement of approximately one (1) mile on the north end of the property. This paved road, Rucks Dairy Road, provides access to a 640-acre inholding currently utilized as a nursery, pasture, and citrus grove.

**B. Walk-in-the-Water Tract – 6,918 acres:**

The northeast corner of the WIW Tract borders Lake Weohyakapka, also known as Lake Walk-in-the-Water (7,200 acres), for approximately one (1) mile. A county maintained public boat ramp is located adjacent to this area. A small picnic area is located next to the boat ramp.

Walk-in-Water Road runs north and south, bisecting the tract. County Road 630 borders the south end of the tract. Both roads are paved, county maintained roads. Sullivan Road and King Trail, both county maintained graded roads, cross a portion of the state forest and intersect Walk-in-Water Road in the northeast portion of the tract.

The Tiger Creek Preserve (4,778 acres), owned and managed by The Nature Conservancy (TNC), adjoins the tract on the northwest corner.

**C. Hesperides Tract – 1,267 acres:**

The Hesperides Tract is comprised of two (2) parcels; Babson and Boy Scout. State Road 60 bisects the tract running east/west. Walk-in-Water Road (which becomes Boy Scout Road as it continues north of State Road 60) runs along the western end of the tract. Lake Walk-in-the-Water is near the southeast corner of the Babson Parcel. Flaming Arrow Boy Scout Camp is located to the west of the Boy Scout Parcel. Lake Kissimmee State Park is located about seven (7) miles northeast of the Boy Scout Parcel along Camp Mack Road.

**D. Prairie Tract – 4,863 acres:**

State Road 60 runs along the west and continues to the south of the property at the Prairie Tract. The county-owned Sumica property is located just west of the tract on Lake Walk-in-the-Water. Lake Kissimmee State Park is located seven (7) miles northwest of the tract and Lake Kissimmee borders the tract to the northeast. The Otter Slough Parcel, managed by South Florida Water Management District (SFWMD), borders the Prairie Tract to the northeast, and itself borders Lake Kissimmee.



**Table 2. Nearby Public Conservation Land and Easements**

<b>TRACT</b>	<b>AGENCY</b>	<b>DISTANCE</b>
Avon Park Air Force Range	DOD	Adjacent to the East
Avon Park Correctional Institute	DOC	Adjacent to the East
Flaming Arrow Boy Scout Camp	BSA	Adjacent to the West
Kissimmee Chain of Lakes-Otter Slough subunit of Lightsey Management Unit	SFWMD	Adjacent to the Northeast
Tiger Creek Preserve	TNC	Adjacent to the Northwest
Sumica	Polk County	Adjacent to the West
Lake Arbuckle County Park and Campground	Polk County	0.5 miles East
Bombing Range Ridge	TNC	Adjacent to the Northwest
Brahma Island Conservation Easement	DEP/DSL	Adjacent to the East
North/Walk-In-Water Creek	Polk County	5 miles West
Morgan Conservation Easement	Private/DEP	Adjacent to the North
Tiger Lake Ranch Conservation Easement	Private/FFS	2 miles North
K-Rocker Conservation Easement	Private/FFS	15 miles North
Hickory Lake Scrub County Park	Polk County	3 miles West
Lake Kissimmee State Park	DEP/DRP	7 miles Northwest
Lake Wales Ridge Wildlife and Environmental Area	FWC	8 miles South
Three Lakes Wildlife Management Area	FWC	12 miles East
Allen David Broussard Catfish Creek Preserve State Park	DEP/DRP	15 miles North

DRP – Florida Department of Environmental Protection, Division of Recreation and Parks

FFS – Florida Forest Service

FWC – Florida Fish and Wildlife Conservation Commission

SFWMD – South Florida Water Management District

DOD – Department of Defense

BSA – Boy Scouts of America

DSL – Division of State Lands

TNC – The Nature Conservancy

DOC – Department of Corrections

DEP – Department of Environmental Protection

**4. Property Acquisition and Land Use Considerations**

The primary purpose of the LWRSF acquisition by the State of Florida was to protect the threatened and endangered ecosystems such as scrub, southern ridge sandhill, mesic flatwoods, and cutthroat grass systems that are unique to the Lake Wales Ridge, Bombing Range Ridge, and the Kissimmee Valley. The LWRSF was acquired through several different purchases. The majority of the Arbuckle Tract (13,531 acres) was purchased under the Conservation and Recreation Lands (CARL) program (in the Other Lands category) between 1984 and July 1986. In July 1994, Preservation 2000 funds were used to purchase an adjacent 20 acres containing the endangered plant, Florida

ziziphus (*Ziziphus celata*). The WIW Tract was purchased under the CARL program (in the Environmentally Endangered Lands category) in June 1995 and November 1996. The Boy Scout, Underwood, and Dawson Parcels were all purchased in 2002 under the Florida Forever program. The Prairie Tract was also recently added in the fall of 2003 under the Florida Forever program. These parcels are assigned to the FFS for management under Lease Agreement #3563.

**Table 3. Parcel Acquisition**

<b>Parcel Name</b>	<b>Deed Date</b>	<b>Lease Date</b>	<b>Acres</b>
Arbuckle	7/25/1984	2/22/1985	10,697.00
Arbuckle	7/25/1984	5/6/1999	2,814.00
Arbuckle	7/29/1994	3/28/1995	19.68
Hesperides	4/1/2002	3/25/2003	913.00
Hesperides	6/13/2002	3/24/2003	354.59
Prairie	10/14/2003	5/18/2004	4,410.64
Prairie	10/14/2003	5/18/2004	452.70
Walk-In-Water	1/5/1999	3/28/2000	294.99
Walk-In-Water	7/25/1995	8/20/1996	5,801.31
Walk-In-Water	8/9/2000	4/8/2002	39.45
Walk-In-Water	8/9/2000	4/8/2002	11.04
Walk-In-Water	6/13/2001	4/8/2002	10.12
Walk-In-Water	12/15/1998	10/20/1999	38.50
Walk-In-Water	5/15/2000	4/8/2002	7.70
Walk-In-Water	3/4/2002	9/11/2002	16.58
Walk-In-Water	12/13/1996	8/18/1997	157.80
Walk-In-Water	2/5/2001	4/8/2002	7.73
Walk-In-Water	3/23/1999	3/28/2000	356.51
Walk-In-Water	1/5/1999	3/28/2000	55.13
Walk-In-Water	10/30/2002	7/8/2004	8.54
Walk-In-Water	11/13/2002	7/8/2004	20.60
Walk-In-Water	3/30/2005	4/2/2007	75.67
Walk-In-Water	4/4/2011	7/28/2016	16.21

**B. Management Authority, Purpose and Constraints**

**1. Purpose for Acquisition / Management Prospectus**

Management is conducted by The Florida Department of Agriculture and Consumer Services, FFS, with assistance, as warranted, from other agencies. FFS is the manager

of forest resources, recreation, water resource protection, watershed protection, and land use planning on LWRSF.

Revenue derived from timber sales is used to offset incurred expenses, capital improvements, and OPS employees.

Multiple-use management for LWRSF will be accomplished through the integration of the following strategies:

- Practice sustainable forest management for the efficient generation of revenue and in support of state forest management objectives;
- Provide for resource-based outdoor recreation opportunities for multiple interests;
- Restore and manage healthy forests and native ecosystems ensuring the long-term viability of populations and species listed as endangered, threatened, or rare, and other components of biological diversity including game and non-game wildlife and plants;
- Protect known archaeological, historical, and cultural resources;
- Restore, maintain, and protect hydrological functions related to water resources and the health of associated wetland and aquatic communities;
- Provide research and educational opportunities related to natural resource management.

## **2. Degree of Title Interest Held by the Board**

The Board of Trustees of the Internal Improvement Trust Fund (TIITF) holds fee simple title.

## **3. Designated Single or Multiple-Use Management**

LWRSF is managed under a multiple-use concept by the FFS, under the authority of Chapters 253 and 589, Florida Statutes. The FFS is the lead managing agency as stated in TIITF Management Lease Number 3563.

Multiple-use is the harmonious and coordinated management of timber, recreation, conservation of fish and wildlife, forage, archaeological and historic sites, habitat and other biological resources, or water resources so that they are utilized in the combination that will best serve the people of the state, making the most judicious use of the land for some or all of these resources and giving consideration to the relative values of the various resources. Local demands, acquisition objectives, and other factors influence the array of uses that are compatible with and allowed on any specific area of the forest. This management approach is believed to provide for the greatest public benefit, by allowing compatible uses while protecting overall forest health, native ecosystems and the functions and values associated with them.

## **4. Revenue Producing Activities**

Numerous activities on LWRSF provide for multiple-use as well as generate revenue to offset management costs. Revenue producing activities will be considered when they have been determined to be financially feasible and will not adversely impact

management of the forest. Current and potential revenue producing activities for the LWRSF include, but are not limited to:

- The 378-acre citrus grove on the Prairie Tract is currently under a ten-year lease with an optional five-year extension, but may be considered for restoration in the future. Due to the highly disturbed nature of the grove area and the large investment in equipment and infrastructure on the site, returning the grove area to a natural state would be cost prohibitive and is not being considered at this time.
- Cattle Leases – There are currently three (3) separate cattle-leased portions on the Prairie Tract that generate revenue annually through contracts with two (2) lessees. The total acreage leased for cattle operations on the Prairie Tract is 4,286 acres.
- Timber Harvests – Timber harvests on LWRSF will be conducted where needed to improve forest health, promote wildlife habitat, restore plant communities, and provide other benefits. Revenue will be based on total tonnage harvested from primarily pine timber resources.
- Recreation Fees – Fees are currently collected for day-use activities. Annual day use pass fees are also currently collected both through Friends of Florida State Forests and to forest user walk-ins at the state forest office.
- Camping Fees – Fees are currently collected according to the fees schedule as outlined with Forest Management Bureau for all camping facilities. In addition to these fees, the implementation of the Campground Reservation System was introduced online in (June 14, 2017) through a private vendor.
- Sand pine Christmas tree sales – Since 2010, sand pines have been offered to the public on Arbuckle for Christmas tree sales. Fees are charged for each sand pine accordingly, via miscellaneous fees. If it is determined by state forest staff there are enough sand pines available in designated areas on LWRSF, similar sales will continue in the future.
- Apiary – Fees are currently collected for all apiary users on the Prairie Tract as outlined in the State Lands Handbook.

**5. Conformation to State Lands Management Plan**

Management of the forest under the multiple-use concept complies with the State Lands Management Plan and provides optimum balanced public utilization of the property. Specific authority for the FFS's management of public land is derived from Chapters 589, 259, and 253, Florida Statutes.

**6. Legislative or Executive Constraints**

There are no Florida Statutes specifically directed toward LWRSF. FFS makes every effort to comply with applicable statutes, rules, and ordinances when managing the forest. For example, when public facilities are developed on state forests, 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).

## **7. Aquatic Preserve / Area of Critical State Concern**

This area is not within an aquatic preserve or an area of critical state concern, nor is it in an area under study for such designation.

## **C. Capital Facilities and Infrastructure**

### **1. Property Boundaries Establishment and Preservation**

LWRSF boundary lines, 119 miles total, are managed by state forest personnel in accordance with the guidelines of the State Forest Handbook. There are 103 gates on LWRSF that require periodic maintenance.

#### **Arbuckle Tract**

Boundaries on the Arbuckle Tract are identified by state forest boundary signs and wildlife management area (WMA) boundary signs. There are several areas on the Arbuckle Tract that have disputed or unknown boundaries. These areas will be planned for survey based on funding over the next ten (10) years.

Approximately 398 acres that are contiguous to the northwest corner of the Arbuckle Tract have been purchased by USFWS. This property is now named the Everglades Headwaters Management Area. This area consists of a large natural basin marsh, which is surrounded by uplands. This property contains the federally endangered Florida ziziphus and several other listed plants. During the 2017-2018 FY, Arbuckle WMA will add this property to the hunting options through FWC with hunt dates.

#### **Walk-in-the-Water Tract**

Most of the boundaries of the WIW Tract were marked, according to DEP-DSL requirements, by the surveyor, subsequent to final acquisition of the tract. Boundary lines that border parcels adjacent to WIW will need boundary survey if acquired. State forest boundary signs have been placed on this tract. Boundary markings will be maintained by state forest staff.

#### **Hesperides Tract**

Most of the boundaries on the Hesperides Tract have been marked. Several areas on the Babson Parcel were not clearly indicated by the survey and will need to be re-surveyed before accurate boundaries can be accurately determined and marked. The Boy Scout parcel also has boundaries in need of surveys. Both parcels in this tract have been posted for no hunting and are therefore not included in the WMA.

#### **Prairie Tract**

Most of the boundary of the Prairie Tract has been marked. “No hunting” signs have also been posted on this tract except for OOF hunts coordinated through FFS. The decision of whether to add this tract to the WMA is not being considered at this time.

### **2. Improvements**

During the past ten (10) years at LWRSF, there have been many improvements completed at LWRSF. These improvements included projects to enhance public use

and internal FFS operations for continued multiple-use management. The items listed below are the current facilities and improvements that exist at LWRSF.

Current buildings/facilities present on the LWRSF include:

- Arbuckle Tract:
  - Temporary office compound area that includes office/storage shed, restroom/storage facility, two (2) storage sheds
  - Five (5) kiosk/trailhead locations; repainted and replaced brochure boxes
  - Three (3) iron ranger/pay station locations
  - Three (3) pipe gates located north/south School Bus Road and Tram Road by SR 64
  - One (1) new pole barn located at old Arbuckle office
  - One (1) new picnic pavilion located at Reedy Creek II Primitive Hunt Camp
  - Small portable equipment shed
  - Reedy Creek I Primitive Campground; eight (8) campsites with picnic tables and fire rings at each site; two (2) portable toilets; and one (1) dumpster
  - Reedy Creek II Primitive Hunt Camp; ten (10) campsites with picnic tables and fire rings at each site; two (2) portable toilets; and one (1) dumpster during hunt dates
  - Five (5) hike-in-only primitive campsites off Florida Trail System Loop Trail
  - Cow camp cabin, “McLean Cabin”
  - One (1) FWC Check Station with FWC storage shed and electrical lines
  - Machine shed
  - One (1) non-potable water well with pump house located at Reedy Creek II Primitive Hunt Camp
  - 14 new (recently relocated) parking areas along School Bus Road; includes recent installation of broken tile and additional new wood posts
  - Four (4) hiking bridge locations on FL Trail; includes recently replaced existing bridge or new wood bridge at each designated location
  
- Walk-in-the-Water Tract:
  - Eight (8)-acre forest headquarters site and associated shop
  - WIW Primitive Campground – ten (10) campsites, each with new picnic tables and fire rings; two (2) portable toilets; and one (1) dumpster
  - Black Bear and Wood Duck hike-in-only primitive campsites off Big Bay Loop Trail; each site includes a picnic table and fire ring
  - Five (5) kiosk/trailhead locations; includes repainted and replaced brochure boxes
  - Two (2) iron ranger/pay station locations, one (1) was added at the Big Bay Loop Trail kiosk
  - Two (2) new pole barns at shop site
  - Chemical shed at shop
  
- Hesperides Tract – Babson parcel:
  - Three (3) picnic areas and campsites for day use

- Picnic tables and fire rings at three (3) designated sites
  - ¼ mile shell rock access road to Dinner Lake
  - One (1) parking area
- Prairie Tract:
- 378-acre citrus grove containing six (6) pump stations and one (1) pole barn
  - Improved and semi-improved pasture throughout cattle-leased areas
  - Electric gate at entrance of Kissimmee Shores Road
  - Three (3) low water crossings and one (1) control structure located near the Otter Slough restoration site
  - Canal/Ditch drainage system with three (3) overflow structures
  - Otter Slough contains three (3) low water crossings along access road
  - Approximately six (6) miles of additional road maintenance to Kissimmee Shores Road
  - Three (3) overflow structures along canal system
  - Interior/exterior fence maintenance along portions of cattle leased areas
  - Abandoned home site
  - OOF “Camp Prairie”: Two (2) bunkhouses, one (1) summer kitchen, one (1) pavilion, one (1) bathhouse
  - Eight (8) access gates along the south and west boundaries of the 50’ Florida Southeast Connection Gasoline Pipeline Easement
  - Cow pens in west unit cattle lease area near Kissimmee Shores Road and SR 60
- A review of facilities and improvements on the forest that provide infrastructure support for staff and equipment include:
- A 3,082 ft<sup>2</sup> LWRSF Headquarters office/visitor center
  - A 450 ft<sup>2</sup> community room with seating for 18
  - Two (2) 140 ft<sup>2</sup> public restrooms (women’s and men’s)
  - A 5,500 ft<sup>2</sup> LWRSF Shop building
  - A 420 ft<sup>2</sup> office shed on the Arbuckle Tract
  - A 420 ft<sup>2</sup> work shop on the Arbuckle Tract
  - A 1,536 ft<sup>2</sup> new pole barn on the Arbuckle Tract
  - Two (2) new 1,536 ft<sup>2</sup> pole barns at LWRSF Shop
  - A 10’ x 12’ x 8’ chemical shed located at LWRSF Shop
  - Two (2) generators at LWRSF Headquarters (400 amp) and shop (200 amp); each include wood posts and an aluminum cover
  - Two (2) key-lock safes at LWRSF Headquarters and Shop
  - 24 feet of six (6)-ft. tall, nine (9)-gauge chain-link fence, located on the east side of the LWRSF Shop
  - Two (2) pump houses with a potable well, located at the LWRSF Shop
- a. Utilities serving the public and forest staff are as follows:
- A well for potable water located 150 feet west of the LWRSF Shop

- One (1) septic tank/drain field located at the LWRSF Headquarters office and one (1) located at the LWRSF Shop
- One (1) well for potable water located 100 feet north of Arbuckle office building
- One (1) septic tank/drain field system at Arbuckle office site
- Central air conditioning added to LWRSF Shop
- Two (2) programmable thermostats for air/heat at LWRSF Headquarters
- New water heater added in kitchen at LWRSF Headquarters
- New phones and associated system; 15 telephone lines (11 for headquarters/administration; four (4) at the shop, one (1) fax line)
- Electric service provided by Peace River Electric

### **Planned Improvements:**

During the next ten-year period, there are planned improvements at designated locations on all tracts at LWRSF. All planned improvements may be completed as staff and funding permits. These improvements include projects to enhance public use and internal FFS operations for continued multiple-use management. The projects proposed below relate to the following: structures/facilities, signage, roads, bridges, recreation, archeological sites, and boundary survey/maintenance.

Planned buildings/facilities present on the LWRSF include:

#### ➤ Arbuckle Tract:

##### Recreation:

- Evaluate the check station at Arbuckle for possible replacement
- One (1) additional pole barn on Arbuckle at the old office location
- One (1) new kiosk/iron ranger located at the Reedy Creek II Primitive Hunt Camp
- Install or replace existing hiking bridges along the Florida Trail System Loop Trail, as needed
- Plant potted native pines and hardwoods at the Reedy Creek II Hunt Camp
- Install broken tile and shell rock on ten (10) campsites at the Reedy Creek II Primitive Hunt Camp
- Install a 30' x 60' parking area, including applying shell rock/broken tile material and 6" x 6" wood posts, at the Reedy Creek II Hunt Camp Pavilion
- One (1) new pavilion/pole barn with concrete pad and picnic tables at the Reedy Creek I Campground
- Install/maintenance of existing bridge on the western portion of the Arbuckle Tract, near Livingston Creek
- Install one (1) new 25' x 60' parking area, including broken tile and 6" x 6" wood posts, off Ruck Dairy Road
- Apply broken tile and 6" x 6" wood posts to maintain six (6) older parking areas on Lake Arbuckle Road and SR 64
- Apply broken tile and 6" x 6" wood posts to Paula Dockery parking area off Rucks Dairy Road



- Install one (1) pedestal barbeque grill with concrete pad at Reedy Creek II Hunt Camp pavilion
- Maintain and apply wood replacements as appropriate at “McLean Cabin”
- Install new picnic tables and fire rings at campsites located near trails and primitive campground
- Replace and maintain kiosks as appropriate

Roads/Bridges:

- Maintain and improve  $\frac{3}{4}$  mile of Tram Road and Isabel Creek with shell rock
- Apply clay/sand material to School Bus Road - Road maintenance
- Add road millings or pavement at designated culvert/adjacent wetlands locations along School Bus Road to reduce the amount of clay/road material runoff to adjacent wetlands and natural communities
- Install broken tile and 6” x 6” wood posts along Tram North/South road (1/4 mile), and at associated parking area
- Apply broken tile on interior access roads
- Apply shell rock on 1.25 miles of the interior service road west of Isabel Creek
- Install a 24’ x 60’ bridge or culvert across the creek on Tram Road and perform road maintenance
- Install a low water crossing at RC 09 interior service road between RC 09 and LC 05 with broken tile. Additionally, Geo web approximately 100 feet of the road, and perform road maintenance
- Apply broken tile to a  $\frac{1}{4}$  mile section of service road between RC 08 and RC 09 and perform road maintenance
- Install a low water crossing between BC 01 and BC 09; apply broken tile and Geo web approximately 50 feet of the road
- Install a low water crossing between BC 01 and BC 04; apply broken tile to the road, Geo web approximately 15 feet of the road, and perform road maintenance

➤ WIW Tract:

Recreation:

- Review installing one (1) FWC Check Station on WIW for WIW Wildlife Management Area (WMA), as FWC allows
- Add a camping facility for licensed, quota-permitted or exempt hunters at the WIW Hunt Camp, located on the WMA, on the east side of Walk In The Water Road and off of Old Vero Beach Road. This hunt camp would allow camping for hunters like Reedy Creek II Hunt Camp on Arbuckle, WIW WMA licensed quota permitted or exempt hunters would be allowed to camp at this new hunt camp by paying camping fees at the iron ranger/pay station.
- Install two (2) additional pole barns for LWRFSF equipment at the LWRFSF Shop
- Install crushed tile to four (4) parking areas along WIW Road and CR 630 East
- Install an automatic, 25 foot LWRFSF Headquarters entrance gate with key pad
- Apply crushed tile to the WIW Primitive Campground entrance road and drive loop
- Install a 12-foot-high post street light at the LWRFSF Headquarters entrance gate

- Install one (1) new picnic pavilion/pole barn with concrete pad and new picnic tables at the WIW Campground
- Install one (1) pedestal barbeque grill with concrete pad at the new picnic pavilion at the WIW Campground
- Install new trail signs on the Big Bay Loop and FSJ Loop trails
- Install new picnic tables and fire rings at campsites located near trails and the primitive campground
- Replace and maintain kiosks, as appropriate

Roads/Bridges:

- Perform maintenance on the exterior/interior service road off Old Vero Beach Road, on the east side of WIW Road. Install 14 new low water crossings on the east portion of WIW Tract. Materials used will include broken tile, round cloth, Geo Web and culvert.
- Install one (1) low water crossing on the southwest portion of WIW near the Standard Sand Property
- Apply shell rock and maintain the WIW Campground entrance road and associated parking area
- Apply broken tile to the Old Vero Beach interior service/entrance road

➤ Hesperides Tract:

Babson Parcel Recreation:

- Install new picnic tables and fire rings at the picnic areas by Dinner Lake
- Road maintenance to ¼ mile access/service road and loop road around Dinner lake

Roads/Bridges:

- Perform interior road maintenance and improvement east of Babson 4 Burn Unit; includes applying crushed tile on the roundabout drive entrance to extend it by 300 yards, and installing one (1) new plastic culvert

➤ Prairie Tract:

- A long arm excavator will be rented to perform maintenance and invasive plant removal regarding the ditches/canal drainage system
- Replace culverts and perform maintenance at existing culvert locations
- Replace existing citrus grove pump station equipment and continue maintenance
- Perform fencing maintenance at the cattle lease area
- Maintain OOF Hunt Camp facilities at Camp Prairie
- Apply shell rock to six (6) miles of Kissimmee Shores Road
- Apply broken tile to two (2) miles of the exterior service road on Otter Slough

➤ All other Tracts:

- Perform maintenance at the parking areas on Arbuckle, WIW, and Hesperides Tracts new installations.

- Install concrete and brick LWRSF entrance/exit signs and replace recreational signs (Category 3, 4) on the Arbuckle and WIW Tracts, as well as the, Babson parcel and in front of the Prairie Tract. Replace and perform maintenance to the Category 1 sign in front of the LWRSF Headquarters.
- Boundary Survey, Marking, and Security – Request updated boundary surveys for portions of Arbuckle, WIW, and Hesperides Tracts. Mark boundary with state forest boundary signage and initiate replacement of designated miles (where it serves to protect against trespass and provide for needed protection of natural resources from adjacent land use) of boundary fence in poor condition. (annual/as needed).
- Install and maintain gates/locks and cable gaps at designated access points on all tracts.
- Perform road maintenance on all tracts, to include designated major and public roads and interior service roads. Major roads include School Bus Road (Arbuckle), Tram Road (Arbuckle), Lake Godwin Road (Arbuckle), Cow Pen Road (Arbuckle), and Kissimmee Shores Road (Prairie).

### **3. On-Site Housing**

FFS may establish further on-site housing (mobile / manufactured home) on LWRSF if deemed necessary to alleviate security and management issues. The need and feasibility specific for the state forest will be evaluated and established if considered appropriate by the District Manager and approved by the FFS Director. Prior to the occurrence of any ground disturbing activity for the purpose of establishing on-site housing, a notification will be sent to the DHR and FNAI for review and recommendations. This type of housing will not exceed two homes per location with the possibility of more than one on-site housing location occurring if considered necessary by the District Manager and approved by the Director.

### **4. Operations Infrastructure**

#### **a. Operations Budget**

For Fiscal Year 2015-2016, the total annual budget for LWRSF was \$741,325.00. This amount includes salaries, expenses, contractual services, and OPS. A summary budget for LWRSF is contained in [Exhibit X]. Implementation of any of the activities within this management plan is contingent on availability of accessible funding, other resources, and other statewide priorities.

#### **b. Equipment**

Equipment assigned or immediately available for work on the LWRSF to support resource management work, and maintain improvements such as trails, roads, and facilities, include the following:

- Four (4) – 4x4 diesel pickup trucks
- Two (2) – 4x4 Ford Explorers
- One (1) – 4x4 Ford F-250 pickup truck
- One (1) - 4x4 Ford F-150 pickup
- Two (2) - Type 6 brush trucks

- One (1) - type III military 6x6 engine
- Two (2) - type II tractor/plow units with transports
- One (1) - type II overhead tractor
- Three (3) - farm tractors
- One (1) - dump truck
- One (1) - Champion road grader
- Two (2) - four-wheel drive all-terrain vehicle (ATVs)
- Two (2) - riding lawn mowers
- One (1) - Brown tree cutter
- Two (2) - farm tractor mowing deck
- One (1) - hay rake
- One (1) - ATV mowing deck
- Three (3) - fireline disks
- One (1) - small fuel trailer (100 gallons)
- One (1) - 24' gooseneck trailer
- One (1) - dump trailer
- Two (2) - utility trailers
- One (1) - bobcat skid steer
- One (1) - rehab disk
- One (1) - forklift
- One (1) - 4x4 Polaris ranger (UTV)
- One (1) - overhead plow
- One (1) - 8ft rototiller

A John Deer 750 tractor is stationed at Brooker Creek Forestry Station and is not directly assigned to LWRSF, but is available for resource management activities when not engaged in wildfire suppression or private landowner assistance.

### **c. Staffing**

A Resource Administrator, Forester, Plant Conservation Biologist, Staff Assistant, one (1) OPS Park Ranger and one (1) OPS Agricultural Technician are the staff assigned to LWRSF, with an office at the Lake Wales Ridge State Forest Headquarters. Additionally, a Forest Area Supervisor, two (2) Senior Rangers, five (5) Forest Rangers, one full-time mechanic and one OPS mechanic have offices at the Lake Wales Ridge State Forest Headquarters and assist with management activities at LWRSF. In the upcoming years, funding for the addition of a full-time District Biologist position will be pursued by FFS to assist in monitoring of listed animal species at LWRSF. In the upcoming years, funding for the addition of an OPS Park Ranger will be pursued by FFS to assist in invasive control at LWRSF.

The Resource Section will work to achieve the goals outlined in this management plan. Resource management activities, such as timber cruising, planning, and sale administration, are the responsibility of the Resource Section under the direction of the Resource Administrator and District Manager. Forest operations, such as road maintenance, prescribed burning, etc., are the responsibility of the FFS Lakeland Forestry District fire control personnel under the direction of the respective Forest Area Supervisors.

In order to supplement the staff assigned to LWRSF, the Resource Administrator is responsible for recruiting interested volunteers that can bring needed experience and skills to assist with the management of the forest recreation program as well as resource management activities. Volunteers have been used for trail maintenance, restoration projects, invasive species control, native pine plantings, vegetative inventories, and educational events.

Additional volunteer recruitment will be encouraged to assist with other activities to further FFS's mission.

#### **D. Additional Acquisitions and Land Use Considerations**

##### **1. Alternate Uses Considered**

No alternate uses are being considered at this time. Alternate uses will be considered as requests are made and will be accommodated as appropriate if they are determined to be compatible with existing uses and with the management goals and objectives of the forest. Uses determined as incompatible include, but are not limited to: water resource development projects, water supply projects, storm-water management projects, sewage treatment facilities, linear facilities, off highway vehicle use, communication towers and antennas, dumping, mining, and oil well stimulation (e.g. hydraulic fracturing/fracking), or as determined by law, regulation, or other incompatible uses as described elsewhere in the management plan.

##### **2. Additional Land Needs**

Purchasing of additional land within the optimal management boundary would aid managers in the following ways: facilitate restoration, protection of the natural resources including threatened and endangered ecosystems such as scrub, southern ridge sandhill, mesic flatwoods, and cutthroat grass systems that are unique to the Lake Wales Ridge, Bombing Range Ridge, and the Kissimmee Valley, as well as maintenance and management of the resources on LWRSF. [Exhibit C]

The land adjacent to LWRSF on the eastern, northern, southern, and western borders should be considered for acquisition [Exhibit C]. In addition to the remainder of this CARL project, six (6) parcels have been identified as desirable for acquisition as additions to this state forest. Each parcel is described below:

- A 28-acre parcel adjacent to the south of the WIW Tract is a natural area similar to the surrounding state forest. County Road 630 borders one side of the parcel and the state forest borders all other sides. The primary access for the western side of the WIW Tract is through this property.

- A 640-acre in-holding of the Arbuckle Tract with a private ranch, nursery, and citrus grove.
- A 240-acre parcel adjacent to the west of the Arbuckle Tract is comprised of an active citrus grove surrounded by natural area. This parcel is bordered on three sides by the state forest and on the fourth side by the Old Avon Park Road. A major management access road crosses this property.
- A 37-acre, county-owned parcel sits adjacent to the west of the Arbuckle Tract and contains natural communities similar to the surrounding state forest. This parcel is bordered on two sides by the state forest and one side by the Old Avon Park Road. The primary access to this parcel is through LWRSF.
- A combined 608 acres of privately-owned parcels is located adjacent to the northwest, northeast and southeast of the Babson Parcel and contains natural communities similar to the surrounding state forest. These parcels are bordered by Walk-In-Water Road, State Road 60 and Doherty Drive.
- A combined 710.13 acres of privately-owned parcels lies adjacent to the south of the Boy Scout Parcel and contains natural communities similar to the surrounding state forest. This parcel is bordered on one side by state forest, one side by SR 60 and one side by Boy Scout Road.

### **3. Surplus Land Assessment**

FFS conducted an internal evaluation of the state-owned land holdings, to assess which, if any, acreage within the property may be designated as surplus. The surplus assessment performed by FFS involved property evaluation and communications among FFS district and land administration staff. Analyses of aerial photography and various applicable maps; an examination of surrounding land use, accessibility potential, onsite ranch, revenue-producing and forestry resources; and contemplation of compatible public recreational uses and educational opportunities, as well as site-specific management needs, were performed during the assessment. Additionally, potential future or pending nearby or adjacent land exchanges and known applicable county land use exchanges were considered by staff.

FFS has completed an assessment to determine which, if any, may be designated as surplus. All lands have been deemed necessary for management purposes at this time. Therefore, no state-owned lands on LWRSF are recommended as having current surplus potential. FFS reserves the right to conduct additional assessments for surplus potential at a later date.

### **4. Adjacent Conflicting Uses**

During the development of this management plan, FFS staff identified and evaluated adjacent land uses, reviewed current comprehensive plans, and future land use maps in determining conflicting adjacent land uses. Additionally, FFS staff have met with adjacent land owners and maintains liaison with those land owners to ensure that any conflicting future land uses may be readily identified and addressed.

- A 640-acre in-holding exists on the Arbuckle Tract and contains a private ranch, nursery, and citrus grove. The inholding contains several areas infested with non-

native, invasive plant species which are spreading onto the portions of the state forest. Combating the spread of these invasive plants on the forest is an ongoing battle. The non-native plant species include: cogon grass, star grass, Brazilian pepper, and Old World climbing fern.

- Non-native, aquatic invasive plant species are spreading from Lake Kissimmee through the wetlands and canals in the Prairie Tract. The main non-native aquatic plant species include: water lettuce, burhead sedge, primrose willow, and water hyacinth.
- A private landowner in Highlands County (south of Arbuckle) pumps water from their dairy/peat mine into Bonnet Creek. Bonnet Creek flows through the south end of the Arbuckle Tract. The increased flow of water has resulted in flooding and tree mortality within natural communities. The sites affected on LWRSF are in both natural baygall and wet flatwoods.
- A culvert exists on a closed county road east of Old Avon Park Road. When the culvert is not maintained, water backs up on the west side of the Arbuckle Tract. The increased flow of water has resulted in flooding and tree mortality on the state forest.
- A private plant nursery adjacent to the southeast portion of the Arbuckle Tract has been dumping nursery materials in locations on the state forest along the south property boundary.
- Residential developments on adjacent property and adjoining state roads may hinder prescribed burning due to smoke management concerns.

Per the 2017 LMR team recommendations [Exhibit U], FFS will cooperate with adjacent property owners, prospective owners, or prospective developers to discuss methods to minimize negative impacts on LWRSF, including but not limited to, management, resources, facilities, roads, and recreation, and discuss ways to minimize encroachment onto the forest.

##### **5. Compliance with Comprehensive Plan**

This plan was submitted to the Board of County Commissioners in Polk County for review and compliance with their local comprehensive plans [Exhibit V].

##### **6. Utility Corridors and Easements**

The following are reservations or easements on LWRSF:

- a. A powerline easement was granted to Meredith L. Scott, Arnold Grove and Ranch Ltd., Lake Kissimmee Groves, Jimmy Neal Oliver and Judith Anne Oliver, William H. Swanson and Dorothy Swanson, George Conley Thornhill Jr. and Jenifer Lee Thornhill, Bryon E. Johnson and Charlee A. Johnson and Larry O. Deal and Joan M. Deal on the Prairie Tract on May 15, 1989.

- b. Progress Energy Cooperation has a right-of-way on the WIW Tract. The easement was granted on December 4, 2003.
- c. A non-exclusive drainage and access easement was granted to Meredith L. Scott and successors on the Prairie Tract. The easement was granted on October 14, 2003
- d. An ingress-egress easement was granted to Myra V. Zilahy and Alexandra Z. Comer on the Arbuckle Tract on March 30, 2005.
- e. Florida Southeast Connection has a natural gas pipeline on the Prairie Tract. The easement was granted on September 22, 2014.

FFS does not favor the fragmentation of natural communities with linear facilities. Consequently, easements for such uses will be discouraged to the greatest extent practical. FFS does not consider LWRSF suitable for any new linear facilities.

When such encroachments are unavoidable, previously disturbed sites will be the preferred location. The objectives, when identifying possible locations for new linear facilities, will be to minimize damage to sensitive resources (e.g., listed species and archaeological sites), to minimize habitat fragmentation, to limit disruption of management activities, including prescribed burns, and to limit disruption of resource-based multiple-use activities such as recreation.

Collocation of new linear facilities with existing corridors will be considered, but will be used only where expansion of existing corridors does not increase the level of habitat fragmentation and disruption of management and multiple-use activities. FFS will further encourage the use of underground cable where scenic considerations are desirable. Easements for such utilities are subject to the review and approval of the TIITF, the South Florida Water Management District (SFWMD), and Southwest Florida Water Management District (SWFWMD). Requests for linear facility uses will be handled according to the Governor and the Cabinet's linear facilities policy.

## **E. Agency & Public Involvement**

### **1. Responsibilities of Managing Agencies**

FFS is the lead managing agency, responsible for overall forest management and public recreation activities, as stated in TIITF Management Lease #3563. Pursuant to the management lease, the lead managing agency may enter into further agreements or subleases on any part of the forest.

FWC has law enforcement responsibilities, including to enforce hunting regulations, cooperatively set hunting season dates with FFS, and conduct other wildlife management activities with input from FFS.

FFS will cooperate with the DHR regarding appropriate management practices on historical or archaeological sites on the property as stated in Section 267.061, Florida Statutes. DHR will be notified prior to the initiation of any ground disturbing activities by the FFS or any other agency involved with the forest.



The South Florida Water Management District and Southwest Water Management District will be consulted and involved in matters relating to water resources as appropriate.

**2. Law Enforcement**

Primary law enforcement responsibilities will be handled by law enforcement officers from FWC. Rules governing the use of LWRSF are stated in Chapter 5I-4 of the Florida Administrative Code (F.A.C.). FWC will enforce fish and wildlife regulations and provide assistance in enforcing state forest rules. Per the 2017 LMR Team recommendations [Exhibit U], the FWC has an officer dedicated to the patrol of, and enforcement on, the LWRSF.

The Office of Agricultural Law Enforcement (OALE) will assist with open burning and wildfire investigations, as needed. Additional assistance is provided by the Polk County Sheriff's Offices, as needed. In light of the current statewide budget limitations, law enforcement is adequate on LWRSF.

Special rules under Chapter 5I-4, F.A.C., were promulgated for Florida Department of Agriculture and Consumer Services (DACS)/FFS, to manage the use of state lands and better control traffic, camping, and other uses on LWRSF.

**3. Public and Local Government Involvement**

This plan has been prepared by FFS and will be carried out primarily by that agency. FFS responds to public involvement through liaison panels, management plan advisory groups, public hearings, and through ongoing direct contact with user groups. Land Management Review Teams, as coordinated by the Division of State Lands (DSL), have conducted two (2) reviews of management plan implementation, occurring in 2012 and 2017 [Exhibit U]. The review teams' recommendations have been addressed in this plan.

The plan was developed with input from the LWRSF Management Plan Advisory Group and was reviewed at a public hearing on January 17, 2018. A summary of the advisory group's meetings and discussions, as well as written comments received on the plan, are included in [Exhibit W]. The Acquisition and Restoration Council (ARC) public hearing and meeting serve as an additional forum for public input and review of the plan.

**4. Volunteers**

Volunteers are important assets to LWRSF. Depending upon the type of volunteer service needed, volunteer activities may be one-time events or long-term recurring projects and/or routine maintenance. Additional volunteer recruitment will be encouraged to assist with other activities to further the FFS's mission.

**5. Friends of Florida State Forest**

Friends of Florida State Forests Inc. (FFSF) is a Direct Support Organization (DSO) of the Florida Forest Service. FFSF supports management activities and projects on Florida's state forests. FFSF is an organization established by Florida statute that

supports programs within Florida's state forests and is governed by a board of directors representing all areas of the state. Through community support, FFSF assists the Florida Forest Service to expand opportunities for recreation, environmental education, fire prevention, and forest management within Florida's state forests.

The FFSF program is referenced in Chapter 589.012, Florida Statutes (FS). For more information visit: [www.floridastateforests.org](http://www.floridastateforests.org).

### **III. Archaeological/Cultural Resources and Protection**

#### **A. Past Uses**

- 1) On the Arbuckle Tract, cattle have grazed the property since 1913. The first official cattle leases were authorized by Atlantic Land and Improvement Company (ALICO) in the 1930's. The land remained under cattle lease until purchased by the state in 1984.

The first major timber harvesting began in 1940 and was completed by 1945. One other harvest of seed trees and swamp pines occurred from 1949-1950. In 1952, approximately 3,500 acres were planted in slash pine. Many of those trees remain today. A few pine stumps with turpentine cat faces have been located, indicating that naval stores were active on the site in the past.

A raised-bed railroad was constructed in 1944 to connect the Avon Park Air Force Range with the existing rail line at Frostproof. This line was discontinued in 1948 and has since been dismantled. The raised bed, with adjacent ditches, remains onsite. A large portion of it has been designated as a primary road (Tram Road). Approximately 100 acres (located in Section 14, Township 32 South, Range 28 East) was cleared in 1963 but never planted to citrus. This site has been allowed to revegetate naturally.

A more detailed history of the Arbuckle Tract has been compiled through a study conducted by The Nature Conservancy (TNC 1989). This study is available for review at the LWRSF Office, the FFS's Lakeland District Office, and the Tallahassee State Office.

- 2) Much of the WIW Tract has been historically under a cattle lease. A majority of the west side of the tract was chopped and seeded with Bahia grass for range management purposes prior to state ownership, exact date unknown. Estimated dates range from the late 1980's to the early 1990's. Two blocks totaling 86 acres were planted with slash pine approximately 50 years ago. Cattle lessees utilized prescribed fire for range management for several generations.
- 3) The primary past use of the Babson Parcel on the Hesperides Tract was for cattle. The landowners and cattle lessees fished at the small pond located on the western side of the parcel. The Boy Scout Parcel contains approximately 40 acres of abandoned citrus grove.
- 4) The Prairie Tract was historically, and is currently, used for cattle grazing. There are also three (3) old home sites and several graves on the property. The citrus grove is still active.

**B. Archaeological and Historical Resources**

A review of information contained in the Florida Department of State, DHR Florida Master Site file has determined there are nine (9) previously recorded archeological sites, one (1) resource group, one (1) historic cemetery, and one (1) standing historic structure on LWRSF. DHR’s Public Lands Archeology section (formerly CARL Archaeological Survey) conducted a reconnaissance survey for archaeological and historical resources in the late 1990s. Additional surveys have been conducted on the LWRSF as well, but none have assessed the Hesperides and Prairie tracts.

**Table 4. Archaeological & Historical Sites on LWRSF**

<b>SITE ID</b>	<b>SITE NAME</b>	<b>SITE TYPE</b>
HG01064	OLD GOVERNMENT RAILROAD	RG
PO00010	ARBUCKLE MOUNDS	AR
PO03863	KEEN'S RANCH	SS
PO04697	MEYER'S MIDDEN	AR
PO05320	WPS STANDARD	AR
PO05321	LAKE GODWIN DIPPING VAT	AR
PO05322	CABIN SCRUB	AR
PO05323	MCLEAN CABIN SITE	AR
PO05324	ARBUCKLE ROAD DIPPING VAT	AR
PO05325	SULLIVAN DAIRY	AR
PO05446	BUZZARD ROOST MIDDEN SITE	AR
PO07295	LAKE WALES RIDGE ST. FOREST PRAIRIE TRACT	CM

See [Exhibit I] for a complete list of all archeological sites on LWRSF.

**C. Ground Disturbing Activities**

Representatives of DHR and FNAI will be consulted prior to the initiation of any proposed significant ground disturbing activity by FFS or any other public agency. FFS will make every effort to protect known archaeological and historical resources. FFS will follow the “Management Procedures for Archaeological and Historical Sites and Properties on State Owned or Controlled Lands” [Exhibit J], and will comply with all appropriate provisions of Section 267.061(2), FS. Ground disturbing activities not specifically covered by this plan will be conducted under the parameters of the “List of ARC / Division of State Lands Approved Interim Management Activities.”

**D. Survey and Monitoring**

Currently, five (5) local district FFS staff are trained by DHR as archaeological resource monitors. FFS will pursue opportunities for getting additional personnel trained. FFS will consult with DHR’s public lands archaeologists as necessary to determine an appropriate priority and frequency of monitoring at each of the listed sites, as well as any protection

measures that might be required. All archaeological and historical sites within the state forest will be monitored at least annually. FFS field staff will monitor the listed sites to note condition and any existing or potential threats.

As information becomes available, and as staffing allows, any known archaeological and historical sites will be identified on maps to aid state forest and law enforcement personnel in patrolling and protecting sites. Applicable surveys will be conducted by FFS staff or others during the process of planning and implementing multiple-use management activities. FFS personnel will remain alert for any significant resources, and protective actions will be taken as necessary. In addition, FFS will seek the advice and recommendations of DHR regarding any additional archaeological survey needs. Trained monitors may oversee limited types of ground disturbing activities in which DHR recommends monitoring. FFS will utilize the services of DHR Public Lands archaeologists, when available, to locate and evaluate unknown resources, and to make recommendations in the management of known resources.

#### **IV. Natural Resources and Protection**

The primary reason for the purchase and establishment of LWRSF was to protect the threatened and endangered ecosystems such as scrub, southern ridge sandhill, mesic flatwoods, and cutthroat grass systems that are unique to the Lake Wales Ridge, Bombing Range Ridge, and the Kissimmee Valley. Currently, there are no known soil or erosion problems present on LWRSF. Management activities will be executed in a manner to minimize soil erosion. If problems arise, corrective action will be implemented by FFS staff under the direction of FFS's Forest Hydrology Section.

Efforts will be made to monitor and protect LWRSF's waterbodies and their associated water quality, discharge, and native plants and animals. All forest management activities relating to timber harvesting practices will comply with the BMP's for public lands. Copies of this publication are available upon request from FFS.

LWRSF falls within the jurisdiction of the SFWMD and SWFWMD. FFS will coordinate with the WMDs, and/or DEP, as necessary, on activities pertaining to water resource protection and management. Any activities requiring water management district permits will be handled accordingly. FFS will work with the WMDs to ensure levels and quality of ground and surface water resources are appropriately monitored.

##### **A. Soils and Geologic Resources**

###### **1. Resources:**

Soil information for LWRSF was obtained from the United States Department of Agriculture Natural Resources Conservation Service (NRCS). LWRSF contains 42 different types of soils. The predominant soils listed by the NRCS include: Smyrna and Myakka fine sand, Astatula sand, Hontoon muck, Pompano fine sand, Basinger fine sand-Bassing Mucky Fine Sand, Samsula muck, Immokalee sand, Archbold sand, Satellite sand, and Tavares fine sand. Detailed information on all soils present on the state forest may be found in [Exhibit K].

## 2. Descriptions:

- a. **Smyrna and Myakka fine sands.** Nearly level to gently sloping, this poorly drained soil is found on flatwoods on marine terraces. Smyrna soils are poorly to very poorly drained. Organic matter and natural fertility are low. Permeability is rapid to moderately rapid in the surface layer. The water table is at depths of less than 18 inches for 1 to 4 months in most years and between 12 and 40 inches for more than 6 months. In rainy seasons, the water table rises above the surface briefly. In depressions, water stands above the surface for 6 to 9 months or more in most years. Natural vegetation consists of longleaf pines (*Pinus palustris*) and slash pines (*Pinus elliottii*) with an undergrowth of saw palmetto (*Sereona repens*), running oak (*Quercus pumila*), gallberry (*Ilex coriacea*), wax myrtle (*Morella cerifera*), and wiregrass (*Aristida stricta*).
- b. **Archbold sand, 0-5% slopes.** Deep, well drained, very rapidly permeable sandy soils, located on low ridges in central Florida. Organic matter and natural fertility are very low. Depth to seasonal high-water table ranges from 42 to 60 inches during the months of June through November in most years. The water table is at 60 to 80 inches for most of the remainder of the year. Most of this soil is in native scrub forest of sand pine (*Pinus clausa*), bluejack oak (*Quercus incana*), saw palmetto, pricklypear cactus (*Opuntia spp.*) and scattered stands of wiregrass.
- c. **Astatula Sands 0 to 20 percent slopes.** Nearly level to moderately steep sloped, very deep, excessively drained, very rapidly permeable soils on uplands of the South-Central Florida Ridge. Organic matter and natural fertility are very low. The depth to water table is greater than 80 inches. Natural vegetation consists of bluejack oak, blackjack oak (*Quercus marilandica*), turkey oak (*Quercus laevis*), longleaf pine, sand pine, and an understory of rosemary (*Ceratiola and Conradina spp.*), wiregrass, bluestem (*Andropogon gerardii*), Bahiagrass (*Paspalum notatum*), lopsided indiagrass (*Sorghastrum secundum*), and various panicgrass species (*Panicum spp.*).
- d. **Basinger fine sand, Basinger mucky fine sand depressional.** Very deep, very poorly and poorly drained, rapidly permeable soil in low flats, sloughs, depressions, and poorly defined drainageways. Organic matter and natural fertility are moderate. The water table is at depths of less than 12 inches for 2 to 6 months annually and at depths of 12 to 30 inches for periods of more than 6 months in most years. Depressions are covered with standing water for periods of 6 to 9 months or more in most years. Areas in poorly defined drainageways and flood plains are flooded for long periods. The natural vegetation consists of scattered slash pine, longleaf pine, South Florida slash pine (*Pinus elliottii var. densa*), and scattered cypress (*Taxodium spp.*) with an understory dominated by gallberry, wiregrass, cabbage palm (*Sabal palmetto*), scattered saw palmetto, St. John's wort (*Hypericum perforatum*), cutthroat grass (*Panicum abscissum*), blue maidencane (*Amphicarpum muhlenbergianum*), various panic grass species, wax-myrtle and sand cordgrass (*Spartina bakeri*).
- e. **Hontoon muck, frequently ponded, 0-1% slopes.** Deep, flat, very poorly drained, organic soils found in depressions, freshwater marshes, swamps, and drainageways. Organic matter and natural fertility are moderate to high. Under natural conditions the soil is ponded, or the water table is within 10 inches of the surface for 6 to 9 months during most years, except during extended dry periods. Potential natural vegetation consists of loblolly bay (*Gordonia lasianthus*), maple (*Acer spp.*), black gum (*Nyssa*

- sylvatica*), and scattered cypress trees with a ground cover of greenbriers (*Smilax spp.*), ferns, and other aquatic plants. In a few areas, there is a ground cover of osmunda fern (*Osmunda spp.*).
- f. Immokalee sand.** Very deep, very poorly and poorly drained soils located in flatwoods and in depressions. Organic matter and natural fertility are moderate. The water table is at depths of 6 to 18 inches for 1 to 4 months during most years. It is between depths of 18 inches to 36 inches for 2 to 10 months during most years. It is below 60 inches during the dry periods of most years. Depression areas are covered with standing water for periods of 6 to 9 months or more in most years. The principal vegetation consists of longleaf and slash pine with an undergrowth of saw palmetto, gallberry, wax myrtle and wiregrass. In depressions, water tolerant plants such as cypress, loblolly bay, red maple (*Acer rubrum*), sweetbay (*Magnolia virginiana*), maidencane, blue maidencane, chalky bluestem (*Andropogon capillipes*), sand cordgrass, and bluejoint panicum (*Panicum tenerum*) are common.
  - g. Pompano fine sand.** Very deep, very poorly and poorly drained, rapidly permeable soils in depressions, drainageways, flatwoods, and broad flats in the southern flatwoods. Organic matter and natural fertility are low. The water table is at depths of less than 10 inches for 2 to 6 months each year. Even during the drier months, it is within depths of 30 inches for more than 9 months each year. In depressed areas, the water table is above the soil surface for more than 3 months each year. Natural vegetation consists of palmetto, widely spaced cypress, gum, South Florida slash pine, and native grasses.
  - h. Samsula muck, frequently ponded, 0-1% slopes.** Very deep, very poorly drained, rapidly permeable sandy organic soils that exist in swamps, poorly defined drainageways, and flood plains. Organic matter and natural fertility are moderate to high. The water table is at or above surface of the soil except during extended dry periods. Natural vegetation is loblolly bay with scattered cypress, maple, gum, and pine trees with a ground cover of greenbriers, ferns, and other aquatic plants.
  - i. Satellite sand, 0-2% slopes.** Very deep, somewhat poorly drained, rapidly permeable soils on low knolls and ridges. Organic matter and natural fertility are low. The water table is at about 12 to 42 inches and are saturated at depths of 10 to 40 inches for 2 to 6 months during the summer rainy season. Native vegetation consists of South Florida slash pine, Florida rosemary (*Ceratiola ericoides*), sand live oak (*Quercus geminata*), longleaf pine, saw palmetto, wiregrass, and other native grasses.
  - j. Tavares fine sand, 0-5% slopes.** Very deep, moderately well drained, and moderately rapid to rapidly permeable soils on hills, ridges, and knolls of the lower Coastal Plain. Organic matter and natural fertility are low. The water table is between depths of 42 to 72 inches for more than 6 to 10 months during most years but recedes to depths greater than 72 inches during periods of drought. In most places, the natural vegetation consists of slash pine, longleaf pine, a few scattered blackjack oaks, and turkey oak, with an undercover of wiregrass. In some places, natural vegetation consists of turkey oak, blackjack oak, and post oak (*Quercus stellata*), with scattered slash pine and longleaf pine.

### 3. Soil Protection

In recent years, there have been ongoing issues of poor drainage, flooding, and soil erosion identified on the Arbuckle and Prairie tracts at LWRSF; primarily within wetlands, flatwoods, and prairies, which may have been altered from excessive water levels related to outdated infrastructure (i.e., culverts) or flow from adjacent natural watersheds. During the summer and early fall months, several portions of the Arbuckle Tract have experienced unusually high-water levels influenced by factors located off state forest property. One example includes excessive flow or lack of flow from adjacent properties via old abandoned culverts located on western Arbuckle, which flow onto state forest property from adjacent creeks in southern Arbuckle. With the water levels higher than normal for extended periods of time, existing pines and hardwoods within these adjacent wetlands or flatwoods sites have experienced areas of tree mortality.

The greatest potential for degradation exists is where firelines tie into roads or ditches and channelized surface water carrying sediment. FFS Hydrologist and LWRSF staff assessments of disking and plowing through any natural community type for fire suppression have demonstrated that there is some risk to site degradation where lines run perpendicular to the slope or run for long distances. Therefore, it is recommended that the LWRSF staff ‘rehab’ firelines through all the natural communities as soon as possible after prescribed burns are completed and wildfires are extinguished.

Management activities will be executed in a manner to minimize soil erosion. As problems arise, corrective action will be implemented by FFS staff under the direction of the FFS Forest Hydrology section in conjunction with recommendations as contained in the most current version of the Florida Silviculture Best Management Practices Manual.

## **B. Water Resources**

The water resources on LWRSF perform essential roles in the protection of water quality, groundwater recharge, flood control, and aquatic habitat preservation. Maintenance and restoration of native ecosystems is a high management priority. Properly managing the soil, water, and watershed resources of this forest are an integral part of accomplishing this objective. In the interest of maintaining these valuable resource functions, state forest management personnel will work with the FFS Hydrology Section to incorporate wetland restoration into the overall resource management program as opportunities arise, particularly where wetland systems have been impaired or negatively impacted by previous management activities or natural disasters. All silvicultural activities, including timber harvesting and reforestation, will be conducted in accordance with Florida's Silviculture BMPs Manual publication and/or other appropriate measures as deemed necessary by the FFS's Forest Hydrologist and/or Watershed Specialist.

The LWRSF falls within the jurisdiction of the SFWMD and SWFWMD. Water resource protection will be coordinated with the appropriate district. The FFS, through its Forest Hydrology Section, will work with the appropriate district to monitor levels and quality of ground and surface water resources. In 2017, there has been request for installing four ground and surface water monitoring sites on the western portion of the Arbuckle tract

through the SWFWMD within existing wetland areas. Any activities requiring WMD permits will be handled accordingly.

See [Exhibit M] for a map of the water resources at LWRSF.

## 1. **Resources**

### a) **Arbuckle Tract:**

Lake Godwin, a 20-acre lake, is located in the interior of the forest. Two (2) major creeks (Livingston and Reedy) join the property and flow into Lake Arbuckle. Isabel Creek, flows north from a large forested wetland to Livingston Creek. Arbuckle Creek, another major creek, flows from Lake Arbuckle along the southeastern boundary of the tract south of State Road 64. Another creek system begins on the state forest and flows into Bonnet Creek south of the property. Lake Arbuckle borders the Arbuckle Tract to the east. All of these water bodies are considered Class III (62-302.400, F.A.C.). Wetland communities historically comprised approximately 68% of the Arbuckle Tract.

Arbuckle currently has one 640-acre in-holding in the center of the property which must be considered in any hydrological restoration plan. Livingston Creek flows adjacent to the northwest corner of this property. The in-holding, an active cattle/pasture and nursery/citrus farm, is infested with non-native invasive plant species, and is identified as a potential future acquisition property by the state.

Another private parcel, owned by ALICO, lies to the west of the forest boundary, north of the Livingston Pond parcel, but is bordered on three sides by Arbuckle. The western extent of the old railroad tram crosses this property. The property is currently in citrus production. During 2016-2017, excessive flooding to the north and south of this portion of western Arbuckle was experienced, likely from poor drainage through old culverts and along the old railroad tram. This has led to natural pine and hardwood mortality, soil erosion, and altered hydrology within adjacent wetlands on the state forest.

### b) **Walk-in-the-Water Tract:**

Lake Weohyakapka borders the northeast corner of this tract. This is a Class III, shallow depression lake, with cattails as the dominant vegetation. Hydrilla occurring within the lake is being addressed by the Polk County Natural Resources and Drainage Division. Tiger Creek sheet flows from wetlands in the Tiger Creek Preserve and nearby private property, across the extreme north end of the tract, and into Lake Weohyakapka. Tiger Creek is considered pristine by state and local water authorities.

The vast majority (~80%) of the land west of Walk-in-Water Road is characterized by an extensive system of sandhill and depression marshes with small patches of scrub scattered throughout. Most of the marshes have sandy bottoms, while some have muck soils.



**c) Hesperides Tract:**

There is a small pond, known as Dinner Lake, (<1 acre) on the western side of the Babson Parcel. Other wetland communities on this tract include baygall, depression/basin marshes, and mesic-wet flatwoods.

**d) Prairie Tract:**

Otter Slough flows from the western side of the tract to Lake Kissimmee. Several canals have been built on the tract for irrigating the grove during droughts and removing excess water during the rainy season.

In 2010, a wetland restoration project was completed in Otter Slough with grant funding through the USDA Natural Resources Conservation Service (NRCS). The most dominant natural feature of the landscape is Otter Slough. Based on USGS contour maps, the contributing watershed area for the Otter Slough is estimated to be approximately 3,117 acres. The slough channels most of the surface drainage into the Kissimmee Lake/River via a 500-foot agriculture ditch that crosses a dyke constructed sometime after 1952, the earliest available aerial photo in which the ditch appears.

The landscape also hosts approximately 378 acres of active citrus grove. The network of canals and dykes established for irrigation and drainage control in association with the grove was constructed in the 1980s and stretch for approximately seven (7) miles across the property. The water levels in these canals are maintained by a series of pumps and water control structures, mostly flashboard risers of varying sizes. The topography of the tract, outside of the citrus grove, is flat, with the natural elevation ranging between approximately 55 to 60 feet NGVD.

In 2016, an excavator was rented to remove excessive invasive aquatic vegetation within the ditch/canal system. This cleanout started at the citrus grove and continued east for 2.5 miles within the canal just south of Lake Kissimmee. Also, there were three (3) large culverts replaced due to poor drainage within this canal/ditch system which has improved drainage and helped eradicate invasive species.

**e) All Tracts:**

The water resources on the LWRSF perform essential roles in the protection of water quality, groundwater recharge, flood control, and aquatic habitat preservation. In the interest of maintaining these valuable resource functions, state forest management personnel will work with the FFS's Hydrology Section to incorporate wetland restoration into the overall resource management program as opportunities arise, particularly where wetland systems have been impaired or negatively impacted by previous management activities or natural disasters.

Wetland restoration objectives on the state forest include erosion control, restoration of hydrology and/or hydroperiod, and restoration of wetland plant and

animal communities. To achieve these objectives, restoration activities may involve road and soil stabilization, water level control structure removal or installation, non-native invasive species control, site preparation and revegetation with native wetland species, and project monitoring. These activities may be conducted individually or concurrently, implemented by FFS personnel or by non-FFS personnel under mitigation or grant contractual agreements. Wetland restoration projects should be conducted in conjunction with other restoration activities indicated elsewhere in this plan.

Where applicable, LWRSF, with assistance from the FFS Hydrology Section, will pursue funding to develop and implement wetland restoration projects. In addition, cooperative research among the FFS, other state agencies, and the federal government will provide valuable information in determining future management objectives of wetland restoration.

Per the 2017 LMR Team recommendations [Exhibit U], any changes to roads, culverts, or bridges will be covered in the LWRSF Road Plan. These changes, in addition to fireline construction and maintenance, will follow the latest edition of the FFS's Silviculture BMP Manual, on file at the LWRSF Headquarters, and appropriate WMD rules and permitting procedures.

## **2. Water Classification**

Part of the site (Arbuckle Tract) has been designated as Outstanding Florida Waters (OFW). This tract was historically a state park that was designated to contain OFW, but was then subsequently transferred to the FFS for management. All of the surface waters on or adjacent to the site are classified as Class III waters, which is the statewide default classification. [Exhibit L]

## **3. Water Protection**

The water resources on LWRSF perform essential roles in the protection of water quality, groundwater recharge, flood control, and aquatic habitat preservation. Maintenance and restoration of native ecosystems is a high management priority. Properly managing the soil, water, and watershed resources of this forest are an integral part of accomplishing this objective. In the interest of maintaining these valuable resource functions, state forest management personnel will work with the FFS Hydrology Section to incorporate wetland restoration into the overall resource management program as opportunities arise, particularly where wetland systems have been impaired or negatively impacted by previous management activities or natural disasters. All silvicultural activities, including timber harvesting and reforestation, will be conducted in accordance with Florida's Silviculture BMPs Manual publication and/or other appropriate measures as deemed necessary by the FFS's Forest Hydrologist and/or Watershed Specialist.

The LWRSF falls within the jurisdiction of both the SFWMD and the SWFWMD. Water resource protection will be coordinated with the appropriate district. The FFS, through its Forest Hydrology Section, will work with the appropriate district to

monitor levels and quality of ground and surface water resources. Any activities requiring WMD permits will be handled accordingly. See [Exhibit M] for a map of the water resources at LWRSF.

Water resource protection measures, at a minimum, will be accomplished through the use of BMPs as described in the most current version of Silviculture BMP Manual.

#### **4. Swamps, Marshes, and Other Wetlands**

Forested wetlands, depression and floodplain marshes, floodplain swamps, sloughs, cypress swamps and wet prairie (which is seasonally inundated) constitute the wetlands distributed throughout the state forest. The western part of the WIW Tract is dominated by depression marshes while the eastern portion contains extensive forested wetlands with small pockets of scrubby flatwoods. A small cypress dome is somewhat centrally located in the West Management Block of the WIW Tract.

Arbuckle has the largest acreage of forested wetlands on the state forest with several large baygall swamps, wet/cutthroat flatwoods, basin swamp, and floodplain swamp. Hesperides tract contains a large baygall swamp on the central-eastern portion of the Babson parcel and Boy Scout parcel also contains a baygall along the eastern portion of the tract. The Prairie tract contains several baygall wetlands, Otter Slough, and cypress dome swamps within cattle lease portions of the tract.

Maintenance of these wetland communities is a high priority and will be accomplished through prescribed fire and a cautious avoidance of activities that would threaten the natural hydrology of these areas.

#### **5. Wetlands Restoration**

Wetland restoration objectives on the state forest include erosion control, restoration of hydrology and/or hydroperiod, and restoration of wetland plant and animal communities. To achieve these objectives, restoration activities may involve road and soil stabilization, water level control structure removal or installation, non-native invasive species control, site preparation and re-vegetation with native wetland species, and project monitoring. These activities may be conducted individually or concurrently, implemented by FFS personnel or implemented by non-FFS personnel under mitigation or grant contractual agreements. Wetland restoration projects should be conducted in conjunction with other restoration activities indicated elsewhere in this plan.

Where applicable, LWRSF, with assistance from the FFS Hydrology Section, will pursue funding to develop and implement wetland restoration projects. Additionally, cooperative research among FFS, other state agencies, and the federal government will provide valuable information in determining future management objectives of wetland restoration.

#### **6. Florida Department of Environmental Protection Basin Management Action Plans (BMAP)**

Basin Management Action Plans are a "blueprint" for restoring impaired waters by reducing pollutant loadings to meet the allowable loadings established in a Total Maximum Daily Load (TMDL). It represents a comprehensive set of strategies, including, but not limited to: permit limits on wastewater facilities, urban and agricultural best management practices, conservation programs, financial assistance, and revenue generating activities, all designed to implement the pollutant reductions established by the TMDL. These broad-based plans are developed with local stakeholders, as they rely on local input and local commitment, and are adopted by Secretarial Order to be enforceable.

LWRSF resides in the Lake Okeechobee BMAP. It was developed as part of DEP's TMDL Program and represents the collaborative efforts of stakeholders to identify current and planned management actions to achieve pollutant load reductions required by the TMDL.

The BMAP provides for phased implementation under Subparagraph 403.067(7)(a)1, F.S. The management actions and adaptive management approach described in the BMAP will address Total Phosphorous (TP) reductions, and the process will continue until the TMDL is attained. The phased BMAP approach allows for the implementation of projects designed to achieve incremental reductions, while simultaneously monitoring and conducting studies to better understand the water quality dynamics (sources and response variables) in the watershed.

Local FFS managers execute all silviculture operations, including timber sales, in a manner consistent with the Silviculture BMP manual, as well as, the Public Lands guidelines. In addition, the existing citrus lease at LWRSF requires the lessee to have an active Notice of Intent (NOI) to implement DACS Citrus BMPs. The current lessee does hold an active Notice of Intent, which, the DACS Office of Agriculture Water Policy (OAWP) monitors to verify BMP implementation on the site.

The cattle lessee holding two (2) of the three (3) existing grazing agreements is signed-up under a Cow/Calf BMP NOI with implementation being verified by OAWP. The lessee of the third pasture will be encouraged to take the necessary steps to obtain a Cow/Calf BMP NOI. All new and renewed cattle leases on FFS-managed state land require the lessee to hold a Cow/Calf BMP NOI.

#### **Agricultural Nonpoint Sources**

The primary agricultural land uses in the Lake Okeechobee Watershed (LOW) are improved pastures, unimproved pastures, citrus groves, and woodland pastures. Other agricultural land uses include field crops (e.g., sugar cane), dairies, croplands and pasture, row crops, tree nurseries, specialty farms, and ornamentals. Per Section 403.067, F.S., all agricultural nonpoint sources in the BMAP area are statutorily required either to implement appropriate BMPs, or to conduct water quality monitoring that demonstrates compliance with state water quality standards.

### **C. Wildlife Resources**

**1. Threatened and Endangered Species**

The intent of FFS is to manage LWRSF in a fashion that will minimize the potential for wildlife species to become imperiled. FFS employees continually monitor the forest for threatened or endangered species while conducting management activities. Specialized management techniques will be used, as necessary, to protect or increase rare, threatened, and endangered species and species of special concern, as applicable for both plants and animals.

LWRSF is situated along the ancient Lake Wales Ridge and a portion of the Kissimmee Valley. The Lake Wales Ridge is recognized as a biodiversity hot spot (Dobson et al, 1997; Estill and Cruzen, 2001; Turner et al., 2006a and 2006b), supporting a great number of endemic plants and animals within its characteristic xeric upland habitats (Peroni and Abramson 1986; Christman and Judd 1990; Myers, 1990; Menges, 1999).

The forest contains a number of plants and animals that are either state or federally listed as threatened or endangered. LWRSF occupies a keystone position in the network of protected sites along the Lake Wales Ridge and is the largest property on the ridge under public ownership. Of the 19 scrub and sandhill plants federally listed as endangered or threatened (USFWS 1999), 16 occur on LWRSF. LWRSF contains one (1) of the most endangered plants in Florida, the Florida ziziphus (*Ziziphus celata*).

Specialized management techniques will be used, as necessary, to protect or increase rare, threatened, and endangered species and species of special concern, as applicable for both plants and animals. The FFS is aware of recent FWC published rule changes (January 2017) regarding 23 imperiled species’ status changes. FFS will utilize the most current listing for management purposes throughout the ten-year management period.

Table 5 lists endangered, threatened, or rare species found on LWRSF. Species are listed as endangered, threatened, or species of special concern by either the federal government (USFWS) or the state (FWC, FDACS), or are otherwise rare species tracked by FNAI. The known presence of listed species is based on information compiled from FNAI tracking records, FWC data, as well as field observations by FWC and FFS staff on site.

**Table 5. Endangered, Threatened, or Rare Species Documented on LWRSF**

	<b>Scientific Name</b>	<b>Common Name</b>	<b>Federal Status *</b>	<b>State Status *</b>	<b>FNAI Global Rank *</b>	<b>FNAI State Rank *</b>
Mammals	<i>Mustela frenata peninsulae</i>	Florida long-tailed weasel	N	N	G5T3	S3
	<i>Neofiber alleni</i>	round-tailed muskrat	N	N	G3	S3
	<i>Podomys floridanus</i>	Florida mouse	N	N	G3	S3
	<i>Puma concolor coryi</i>	Florida panther	FE	E	G5T1	S1
	<i>Sciurus niger shermani</i>	Sherman’s fox squirrel	N	SSC	G5T3	S3

	Scientific Name	Common Name	Federal Status *	State Status *	FNAI Global Rank *	FNAI State Rank *
	<i>Ursus americanus floridanus</i>	Florida black bear	---	N	G5T2	S2
Birds	<i>Athene cunicularia floridana</i>	Florida burrowing owl	N	ST	G4T3	S3
	<i>Aphelocoma coerulescens</i>	Florida scrub-jay	LT	FT	G2	S2
	<i>Aramus guarauna</i>	limpkin	N	---	G5	S3
	<i>Buteo brachyurus</i>	short-tailed hawk	N	N	G4G5	S1
	<i>Egretta caerulea</i>	little blue heron	N	SSC	G5	ST?
	<i>Egretta tricolor</i>	tricolored heron	N	ST	G5	S4
	<i>Elanoides forficatus</i>	swallow-tailed kite	N	N	G5	S2
	<i>Grus canadensis pratensis</i>	Florida sandhill crane	N	ST	G5T2T3	S2S3
	<i>Haliaeetus leucocephalus</i>	bald eagle	N	N	G5	S3
	<i>Mycteria americana</i>	wood stork	LT	FT	---	S2
	<i>Pandion haliaetus</i>	osprey	N	SSC	G5	S3S4
	<i>Peucaea aestivalis</i>	Bachman's sparrow	N	N	G3	S3
	<i>Platalea ajaja</i>	roseate spoonbill	N	ST	G5	S2
	<i>Picoides villosus</i>	hairy woodpecker	N	N	G5	S3
	<i>Polyborus plancus audbuonii</i>	Audubon's crested caracara	LT	FT	---	---
	<i>Ros trhamus sociabilis</i>	snail kite	LE	N	G4G5	S2
	<i>Falco sparverius paulus</i>	southeastern American kestrel	N	ST	G5T4	S3
	Reptiles	<i>Alligator mississippiensis</i>	American alligator	SAT	FT(S/A)	G5
<i>Drymarchon couperi</i>		eastern indigo snake	LT	FT	G3Q	S3
<i>Gopherus polyphemus</i>		gopher tortoise	C	ST	G3	S3
<i>Lampropeltis extenuata</i>		short-tailed snake	N	ST	G3	S3
<i>Macrolemys temminckii</i>		alligator snapping turtle	N	SSC	G3G4	S3
<i>Plestidon egrregius lividus</i>		blue-tailed mole skink	LT	FT	G2	S2
<i>Plestiodon reynoldsi</i>		sand skink	LT	FT	G2	S2
<i>Sceloporus woodi</i>		Florida scrub lizard	N	N	G2G3	S2S3
<i>Pituophis melanoleucus mugitus</i>		Florida pine snake	N	ST	G4	S3
Amphibians	<i>Lithobates capito</i>	gopher frog	N	N	G3	S3

	Scientific Name	Common Name	Federal Status *	State Status *	FNAI Global Rank *	FNAI State Rank *
Invertebrates	<i>Aethecerinus hornii</i>	Horn's aethecerinus long-horned beetle	N	N	G2	S2
	<i>Aneflomorpha delongi</i>	Delong's aneflomorpha	N	N	G2	S1S2
	<i>Aphodius troglodytes</i>	gopher tortoise aphodius beetle	N	N	G2G3	S2
	<i>Cernotina truncona</i>	Florida cernotinan caddisfly	N	N	G4	S3
	<i>Chelyoxenus xerobatis</i>	gopher tortoise hister beetle	N	N	G2G3	S2
	<i>Chimarra florida</i>	Floridian finger-net caddisfly	N	N	G4	S3S4
	<i>Cicindela highlandensis</i>	Highlands tiger beetle	C	N	G2G3	S2S3
	<i>Cicindela scabrosa</i>	scrub tiger beetle	N	N	G3	S3
	<i>Dasymutilla archboldi</i>	Lake Wales Ridge velvet ant	N	N	G2G3	S2S3
	<i>Dorymyrmex flavopectus</i>	bi-colored scrub cone ant	N	N	G2	S2
	<i>Floridobolus penneri</i>	Florida scrub millipede	N	N	G1G2	S1S2
	<i>Geolycosa xera</i>	McCrone's burrowing wolf spider	N	N	G2G3	S2S3
	<i>Geopsammodius relictillus</i>	relictual tiny sand-loving scarab	N	N	G2G3	S2S3
	<i>Haroldiataenius saramari</i>	sand pine scrub ataenius beetle	N	N	G3G4	S3S4
	<i>Hetaerina Americana</i>	American rubyspot	N	N	G5	S2
	<i>Ischyryus dunedinensis</i>	three spotted pleasing fungus beetle	N	N	G2G3	S2S3
	<i>Keltonia rubrofemorata</i>	scrub wireweed mirid bug	N	N	G2	S2
	<i>Latrodectus bishopi</i>	Red widow spider	N	N	G2G3	S2S3
	<i>Melanoplus tequestae</i>	Tequesta grasshopper	N	N	G2G3	S2S3
	<i>Nectopsyche tavana</i>	Tavares white Miller caddisfly	N	N	G3	S3
<i>Oecetis porteri</i>	Porter's long-horn caddisfly	N	N	G3G4	S2S3	
Invertebrates	<i>Onthophagus aciculatulus</i>	Sandyland onthophagus beetle	N	N	G2	S2
	<i>Onthophagus polyphemi polyphemi</i>	punctate gopher tortoise onthophagus beetle	N	N	G2G3T2T3	S2
	<i>Orthotrichia curta</i>	short orthotrichian microcaddisfly	N	N	G4	S2S3
	<i>Photomorphus archboldi</i>	nocturnal scrub velvet ant	N	N	G2	S2
	<i>Phyllophaga elongata</i>	elongate june beetle	N	N	G3	S3
	<i>Phyllophaga panorpa</i>	Southern Lake Wales Ridge june beetle	N	N	G1	S1

	Scientific Name	Common Name	Federal Status *	State Status *	FNAI Global Rank *	FNAI State Rank *
	<i>Pleotomodes needhami</i>	ant-loving scrub firefly	N	N	G1	S1
	<i>Plesioclytus relictus</i>	Florida relictual long-horned beetle	N	N	G1	S1
	<i>Praticolella bakeri</i>	ridge scrubsnailed	N	N	G2G3	S2S3
	<i>Selonodon archboldi</i>	Archbold cembrionid beetle	N	N	G1G2	S1S2
	<i>Serica frosti</i>	Frost's silky june beetle	N	N	G1G2	S1S2
	<i>Sosippus placidus</i>	Lake Placid funnel wolf spider	N	N	G1G2	S1S2
	<i>Stenacron floridense</i>	a mayfly	N	N	G3G4	S3S4
	<i>Telamona archboldi</i>	Archbold's treehopper	N	N	G1	S1
	<i>Trigonopeltastes floridana</i>	scrub palmetto flower scarab beetle	N	N	G2G3	S2S3
	<i>Typocerus fulvocinctus</i>	yellow-banded Typocerus long-horned beetle	N	N	G2G3	S2S3
Plants and Lichens	<i>Asclepias curtissii</i>	Curtiss' milkweed	N	LE	G3	S3
	<i>Bonamia grandiflora</i>	Florida bonamia	LT	LE	G3	S3
	<i>Calamintha ashei</i>	Ashe's savory	N	LT	G3	S3
	<i>Calopogon multiflorus</i>	many-flowered grass pink	N	LT	G2G3	S2S3
	<i>Chionanthus pygmaeus</i>	pygmy fringe tree	LE	LE	G2G3	S2S3
	<i>Chrysopsis highlandensis</i>	Highlands goldenaster	N	LE	G2	S2
	<i>Cladonia perforata</i>	perforate reindeer lichen	LE	LE	G1	S1
	<i>Clitoria fragans</i>	scrub pigeon-wing	LT	LE	G3	S3
	<i>Conradina brevifolia</i>	short-leaved rosemary	LE	LE	G2Q	S2
	<i>Encyclia tampensis</i>	Florida butterfly orchid	N	CE	G4	SNR
	<i>Erigonum longifolium var. gnaphalifolium</i>	scrub buckwheat	LT	LE	G4T3	S3
	<i>Garberia heterophylla</i>	garberia	N	LT	G3G4	S3S4
	<i>Hypericum cumulicola</i>	Highlands scrub hypericum	LE	LE	G2	S2
	<i>Lechea cernua</i>	nodding pinweed	N	LT	G3	S3
	<i>Lechea divaricata</i>	pine pinweed	N	LE	G2	S2
	<i>Liatris ohlingerae</i>	scrub blazing star	LE	LE	G2	S2
	<i>Lilium catesbaei</i>	pine lily or Catesby's lily	N	LT	G4	S4
	<i>Nolina brittoniana</i>	Britton's beargrass	LE	LE	G3	S3
	<i>Panicum abscissum</i>	cutthroat grass	N	LE	G3	S3
	<i>Pinguicula caerulea</i>	blue-flowered butterwort	N	LT	G4	S3S4



	Scientific Name	Common Name	Federal Status *	State Status *	FNAI Global Rank *	FNAI State Rank *
	<i>Pinguicula lutea</i>	yellow-flowered butterwort	N	LT	G4G5	S3
	<i>Paronychia chartaceae ssp. chartaceae</i>	paper-like nailwort	LT	LE	G3T3	S3
	<i>Polygala lewtonii</i>	Lewton's polygala	LE	LE	G2G3	S2S3
	<i>Polygonella basiramia</i>	Florida jointweed	LE	LE	G3	S3
	<i>Polygonella myriophylla</i>	Small's jointweed	LE	LE	G3	S3
	<i>Prunus geniculata</i>	scrub plum	LE	LE	G3	S3
	<i>Pteroglossaspis ecristata (Eulophia)</i>	false coco, giant orchid	N	LT	G2	S2
	<i>Rhychospora megaplumosa</i>	large-plumed beaksedge	N	LE	G2	S2
	<i>Sarracenia minor</i>	hooded pitcher plant	N	LT	G4	S4
	<i>Schizachyrium niveum</i>	scrub bluestem	N	LE	G1G2	S1S2
	<i>Spiranthes longilabris</i>	long-lipped ladies tresses	N	LT	G3	S3
	<i>Stylisma abdita</i>	scrub stylisma	N	LE	G3	S3
	<i>Thelypteris serrata</i>	toothed maiden fern	N	LE	G5	S1
	<i>Tillandsia balbisiana</i>	Balbis' airplant, inflated and reflexed wild-pine	N	LT	G4G5	S3
	<i>Tillandsia fasciculata</i>	common wild-pine	N	LE	G5	SNR
	<i>Tillandsia utriculata</i>	spreading air plant	N	LE	G5	S3
	<i>Warea carteri</i>	Carter's mustard	LE	LE	G3	S3
	<i>Ziziphus celata</i>	Florida ziziphus	LE	LE	G1	S1

**\* STATUS/RANK KEY**

Federal Status (USFWS): LE= Listed Endangered, LT= Listed Threatened, N= Not currently listed, C = Candidate species for which federal listing agencies have sufficient information on biological vulnerability and threats to support proposing to list the species as Endangered or Threatened.

State Status (FWC): Animals: FE = Listed as Endangered Species at the Federal level by the USFWS, FT = Listed as Threatened Species at the Federal level by the USFWS, F(XN) = Federal listed as an experimental population in Florida, FT(S/A) = Federal Threatened due to similarity of appearance, ST = State population listed as Threatened by the FWC, SSC = Listed as Species of Special Concern by the FWC, N = Not currently listed, nor currently being considered for listing.

Plants: LE = Endangered: species of plants native to Florida that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue; includes all species determined to be endangered or threatened pursuant to the U.S. Endangered Species Act; LT = Threatened: species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in number as to cause them to be Endangered; N = Not currently listed, nor currently being considered for listing.

FNAI Global Rank: G1= Critically Imperiled, G2= Imperiled, G3= Very Rare, G4= Apparently Secure, G5= Demonstrably Secure, GNR = Element not yet ranked (temporary), G#?= Tentative rank, T# = Taxonomic Subgroup; numbers have same definition as G#'s.

FNAI State Rank: S1= Critically Imperiled, S2= Imperiled, S3= Very Rare, S4= Apparently Secure, S5 = Demonstrably secure in Florida, S#?= Tentative Rank.

## **2. Florida Natural Areas Inventory**

The Florida Natural Areas Inventory (FNAI) is the single most comprehensive source of information available on the locations of rare species and significant ecological resources. FNAI has reported the following:

**a. Element Occurrences**

FNAI reports several documented Element Occurrences of rare or endangered species within the vicinity of the property [Exhibit N].

Documented species are listed in Table 5.

Documented habitat includes: Basin Marsh, Basin Swamp, Baygall, Blackwater Stream, Depression Marsh, Dome Swamp, Flatwoods Lake, Floodplain Marsh, Floodplain Swamp, Hydric Hammock, Mesic Flatwoods, Mesic Hammock, Sandhill, Sandhill Upland Lake, Scrub, Scrubby Flatwoods, Wet Flatwoods, Wet Prairie, Xeric Hammock, Pasture Improved, Pasture Semi-improved, Pine Plantation, and Other Altered Landcover Types.

**b. Likely and Potential Habitat for Rare Species**

LWRSF may be located near other rare species and natural communities. See [Exhibit N] for more information.

**c. Land Acquisition Projects**

This site is located within the Lake Wales Ridge Ecosystem and the Bombing Range Ridge Florida Forever projects, which are a part of the State of Florida's Conservation and Recreation Lands land acquisition program.

FNAI recommends that professionals familiar with Florida's flora and fauna conduct a site-specific survey to determine the current presence or absence of rare, threatened, or endangered species before any expansions or alterations are made to any facilities.

**3. Florida Fish and Wildlife Conservation Commission**

The Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute (FWRI) reports numerous records of listed species occurrences or critical habitats within the confines of the property. This includes state and federally listed endangered or threatened species. [Exhibit O]

Other findings by the FWC include:

- a.** The property is located adjacent to and within multiple Strategic Habitat Conservation Areas
- b.** LWRSF is located within an area of Species Richness.
- c.** Multiple Priority Wetlands are located on and in close proximity to LWRSF.
- d.** FWC's response includes a map indicating multiple species locations.
- e.** LWRSF is within Florida black bear range.
- f.** LWRSF is within Florida bonneted bat range.

These data represent only those occurrences recorded by FWC staff and other affiliated researchers. The database does not necessarily contain records of all listed species that may occur in a given area. Also, data on certain species are not entered into the database on a site-specific basis. Therefore, one should not assume that an absence of occurrences in their database indicates that species of significance do not occur in the area. [Exhibit O]

The FWC recommends the review of management guidelines in the published FWC Gopher Tortoise Species Management Plan to guide management actions for the gopher tortoise (*Gopherus polyphemus*) on the area. The FWC Gopher Tortoise Species Management Plan provides beneficial resource guidelines for habitat management and monitoring of the gopher tortoise. For reference, the FWC Gopher Tortoise Species Management Plan can be accessed at this web address:  
<http://myfwc.com/wildlifehabitats/managed/gopher-tortoise/management-plan/>

The FWC recommends the review of management guidelines in the FWC Scrub Management Guidelines for Peninsular Florida to guide management actions for the Florida scrub-jay. The FWC Scrub Management Guidelines provide beneficial resource guidelines for habitat management and monitoring of the Florida scrub-jay (FWC 2015).

The FWC recommends the review of management guidelines in FWC's published Species Action Plans for the management of imperiled, rare, and focal species. The FWC Species Action Plans provide beneficial resource guidelines for habitat management and monitoring of the respective species. For reference, the FWC Species Action Plans can be accessed at this web address:  
<http://myfwc.com/wildlifehabitats/imperiled/species-action-plans/>

#### **4. Game Species and Other Wildlife**

Wildlife management will play an important role in the management of resources on LWRSF. Hunting is allowed in the Walk-In-Water Wildlife Management Area and the Arbuckle Wildlife Management Area. The WIW WMA covers 6,034 acres and the Arbuckle WMA covers 13,530 acres. FWC provides cooperative technical assistance in managing the wildlife and fish populations, setting hunting seasons, establishing bag and season limits, and overall wildlife and fish law enforcement.

LWRSF provides habitat for a number of different species of wildlife. More common species include: white tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*) gray squirrel (*Sciurus carolinensis*), rabbit (*Sylvilagus* sp.), feral hogs (*Sus scrofa*), and migratory birds in season.

Non-game species will be managed and protected through the restoration and maintenance of native ecosystems found on the forest. The current State Forest Handbook gives additional details for such things as snag management and retention.

#### **5. Survey and Monitoring**

FFS will implement species-specific management plans developed by FWC and other agencies. FFS will cooperate with FWC and other agencies in the development of new management plans and monitoring protocols, as necessary. Such plans will be consistent with rule and statute promulgated for the management of such species.

##### **a. Florida Scrub-Jay**

LWRSF contains some of the largest acreage of scrub on the Lake Wales Ridge in public ownership and provides critical habitat for the endangered Florida scrub-jay. FSJ families at LWRSF are an important part of the larger, regional Lake Wales Ridge population of FSJ (USFWS 1999). LWRSF contains a notable population of the FSJ on the Arbuckle and WIW Tracts in scrub, scrubby flatwoods, and sandhill habitat. FSJ occur in the north, central and southern portions of the Arbuckle Tract; in scrub habitat in the northern portion of the Arbuckle Tract, scrub habitat along the east side of the tract, scrubby areas on the northwest portion of the tract, and scrub habitat at the south end of the Arbuckle Tract, just south of Highway 64. The Sandhill management block on the north portion of the Arbuckle Tract contains a matrix of scrub, scrubby flatwoods, depression marshes and flatwoods. This area has historically contained the highest number of FSJ families.

FSJ's on the WIW Tract currently occur in the north-central portion of the tract, occupying scrubby areas, primarily along pond edges in disturbed southern ridge sandhill, scattered with xeric hammock (FWC 2012). See [Exhibit Z].

Long-term data from annual FWC and JayWatch surveys from 1997-2017 on the Arbuckle Tract show a relatively stable FSJ population. The number of total FSJ on the Arbuckle Tract experienced historic lows from 2005 to 2010, but have since increased. From 2012 to 2017, the number of FSJ on the Arbuckle Tract has ranged from 38 to 82 birds. Additional scrub habitat south of Highway 64 in the Arbuckle Tract was additionally surveyed in 2017, which caused a sharp increase in the total number of FSJ on the Arbuckle Tract. See [Exhibit Z].

Long-term data (2002 to 2017) from annual surveys on the WIW Tract have shown a decline in the number of FSJ on the WIW Tract since the early 2000's. From 2012 to 2017, the number of FSJ on the WIW Tract have ranged from 17 to 26 birds. Surveys from last three (3) years on the WIW have shown slight increases in the number of FSJ. See [Exhibit Z].

Management of FSJs on LWRSF will include, continued monitoring that includes annual FSJ surveys in cooperation with FWC, and habitat enhancement or restoration of known and potential FSJ habitat. Monitoring has helped guide management, and recent efforts have been made to enhance FSJ habitat on the WIW Tract.

Per 2017 LMR Team recommendations [Exhibit U], a survey of the FSJ is being conducted annually on LWRSF by FWC biologists with the assistance of FFS staff. Surveys are conducted in known FSJ territories and potential jay habitat. See [Exhibit Z] for information. Survey methods for the FSJ on LWRSF follow FWC protocol, primarily adapted from Fitzpatrick et al. (1991). Sites are surveyed for FSJ's systematically, using a high-quality tape recording of FSJ territorial scolding in an attempt to attract the jays.

Future annual surveys should continue in both the Arbuckle and WIW Tracts to monitor population sizes. Monitoring FSJ's on the WIW Tract is imperative since FSJ's in this tract were found to be in decline. 61 acres of sub-optimal FSJ territory and potential FSJ territory was treated mechanically and chemically, and followed up with prescribed fire in 2016. The applied treatments and prescribed fire aim to improve habitat for FSJ and create more suitable habitat between two (2) known groups of jays on the WIW Tract.

**b. Gopher Tortoises**

Surveys for gopher tortoise burrows have been conducted by FFS staff intermittently, and in cooperation with FWC. Burrow location and activity status are maintained in a GIS database. Future work may include sampling to determine baseline data on population size and monitoring over time. LWRSF was ranked by FWC as a high priority on conservation lands for Gopher tortoise population surveys. Future surveys will depend on resources and respective agency priorities in a given fiscal year. FFS will consult with FWC prior to any gopher tortoise population surveys to determine the recommended appropriate gopher tortoise survey methodology.

**c. Florida Black Bear**

FFS will continue to cooperate with FWC to implement FWC's state-wide Florida Black Bear Management Plan, with an emphasis on establishing and maintaining connectivity.

**d. Listed Plant and Lichen Species**

There are 38 plants or lichen species on the LWRSF that are listed as endangered, threatened, or species of concern by either the federal government (USFWS) or the State (FNAI, FDACS). A plant ecologist position has been maintained at LWRSF since 1995, under the auspices of the FFS Florida Statewide Endangered and Threatened Plant Conservation Program (FPCP), which is supported through U.S. Fish and Wildlife Endangered Species Act (ESA) Section 6 recovery funds. Funding from USFWS has helped facilitate some of the longest-running monitoring and research conducted for the federally listed plant species found on LWRSF. The plant ecologist is responsible for developing monitoring protocols and management plans for the 16 federally listed species occurring on LWRSF.

All federally listed species on the LWRSF are monitored at one (1) or more levels of monitoring intensity, following monitoring intensity for rare plant species (Menges and Gordon 1996). This task involves mapping species distributions of listed plants using GPS and GIS, conducting annual field surveys of mapped populations to monitor fluctuations in populations size, various projects and studies to evaluate the biological and ecological requirements of these rare species, and the implementation of restoration projects to restore natural fire regimes and improve habitat quality of federally listed species. Some of the research is conducted in conjunction with other organizations.

New areas and appropriate habitat within LWRSF are systematically searched for rare plant occurrence, and if found, are mapped with GPS after burns, before and after management activity (e.g., timber harvesting and other projects that affect the management of scrub and other xeric habitat), or stochastic events (hurricanes). GIS shapefiles/coverages of listed populations are updated with new occurrence records regularly, that include prior rare plant locations.

All known locations of listed or rare flora are GIS mapped and location data were shared with FNAI prior to their mapping of natural communities in 2017. Future work may include submitting data to FNAI to enter into the State Natural Heritage database and the Florida Elements Occurrence database.

Surveys for rare, state, or federally listed flora may be conducted in areas of the WIW Tract and Prairie Tract, as appropriate. These tracts have not been as extensively searched as the Arbuckle and Hesperides Tracts.

Some species-specific management plans may be developed to protect, enhance, and aid in the recovery of the most sensitive federally listed plant and lichen species on the state forest guided by U.S. Fish and Wildlife Service's Multi-Species Recovery Plan.

**e. Other Rare and Biota Surveys**

Surveys are done as time and staffing allow. During routine management activities, incidental sightings of rare animals and plants are GIS mapped by FFS staff. High quality plant communities continue to have ad hoc surveys for both invasive weeds and listed plants. Newly acquired land parcels will be surveyed for listed species.

Species-specific surveys for state or federally listed wildlife species may be implemented when necessary, with assistance from FWC. Such plans will be consistent with rule and statute promulgated for the management of such species. Continued biological surveys may be conducted to determine locations of these species. FFS will seek assistance from universities, FWC, and other agencies to conduct surveys.

Gopher frogs (*Lithobates capito*) occur on LWRSF. Surveying and monitoring for gopher frogs are currently underway on selected wetlands at LWRSF. This project will take place from 2015 to 2021 and is being conducted by FWC's Fish and Wildlife Research Institute.

Natural roosts of the federally endangered Florida bonneted bat (*Eumops floridanus*) were recently found in nearby Avon Park Air Force Bombing Range. LWRSF is within Florida bonneted bat range based on information from FWC. In consultation with FWC and USFWS, FFS may pursue formal surveys in likely habitat for the potential presence of the Florida bonneted bat at LWRSF.

There is occurrence of federally endangered Red-cockaded Woodpecker (*Picoides borealis*, RCW) near LWRSF. FFS may pursue surveys for the presence of RCW on the state forest. FFS will document any RCW individuals seen on the state forest and take action accordingly if the species is ever documented on the state forest.

The Florida burrowing owl (*Athene cunicularia floridana*) occurs on the Prairie tract. Surveys for the Florida burrowing owl may be conducted to document their locations and if resources allow, estimate on population size.

FFS may look for opportunities with other agencies or organizations to conduct arthropod surveys at LWRSF.

FFS will consider if a coyote assessment is needed based on negative impacts on cattle-leased areas within the Prairie Tract. If negative impacts are found, FFS will work towards a control management technique, as long as staff and funding permits.

#### **D. Sustainable Forest Resources**

FFS practices sustainable multiple-use forestry to meet the forest resource needs and values of the present without compromising the similar capability of the future. Sustainable forestry involves practicing a land stewardship ethic that integrates the reforestation, managing, growing, nurturing, and harvesting of trees for useful products with the conservation of soil, air, and water quality, wildlife and fish habitat, and aesthetics. This is accomplished by maintaining and updating accurate estimates of standing timber in order to assure that the timber resources retain their sustainability. Forest inventories will be updated on a continual basis according to guidelines established by the FFS Forest Management Bureau.

FFS will implement sound silvicultural practices, including harvesting, thinning, prescribed burning, and reforestation, to establish a healthy forest with an age distribution that best mirrors natural conditions. Well timed and executed timber harvests play an integral role in the health of forest ecosystems by removing off-site trees to reestablish native species, and thinning dense forest stands to improve understory habitat. This allows for less damaging prescribed burns and improved forest health.

The management of timber resources on the LWRSF will not seek to maximize short-term economic revenue but rather to achieve a wide array of long-term public benefits, many of which are intrinsic and not easily quantified. Good stewardship and resource sustainability are essential goals for any proposed silvicultural activity. The health of the forest ecosystem is of paramount importance.

#### **E. Beaches and Dune Resources**

LWRSF is in the center of peninsular Florida. No beaches occur on the LWRSF. The LWRSF is situated along the Lake Wales Ridge, a relict of a shoreline and beach dune system dating back to the Pleistocene.

#### **F. Mineral Resources**

There are no known commercial mineral deposits on the Arbuckle, Prairie, or Hesperides Tracts. The former owners of the WIW Tract had considered sand mining most of the West Management Block in the recent past but the proposed Conditional Use Permit failed to pass local zoning approval.

#### **G. Unique Natural Features and Outstanding Native Landscapes**

This state forest is the largest tract of Lake Wales Ridge sandy xeric upland habitat in public ownership. It comprises the largest area of ancient scrub under protection and occupies a keystone position in the network of protected sites (both proposed and existing) along the Lake Wales Ridge. Numerous stands of sand pine, oak, and rosemary scrub, varying in size, location, and proximity to one another, occur in a remarkably little disturbed and unbroken matrix of all the natural community types associated with the Lake Wales Ridge.

#### **H. Research Projects / Specimen Collection**

Research projects may be performed on the forest on a temporary or permanent basis for the purpose of obtaining information that furthers the knowledge of forestry and related fields. FFS cooperates with other governmental agencies, non-profit organizations, and educational institutions, whenever feasible, on this type of research. FFS will consider assisting with research projects when funds and manpower are available.

All research to be considered on LWRSF must be considered in accordance with the guidelines stated in the State Forest Handbook. Any requests for research should be submitted in writing to the appropriate field staff to be forwarded to the Forest Management Bureau for approval. Requests must include: a letter outlining the purpose, scope, methodology, and location of the proposed research. Requests are subject to review by FFS Foresters, Biologists, the Forest Health Section, and the Forest Hydrology Section, as appropriate. Authorization to conduct research will require that the investigator provide copies of any reports or studies generated from any research to the FFS and the LWRSF staff. Other special conditions may be applicable and the authorization may be terminated at any point if the study is not in compliance. The status of existing projects will be subject to periodic review by the Forest Management Bureau.

#### **I. Ground Disturbing Activities**

Although the FFS's approach to handling ground disturbing activities is identified in other sections of this plan, the FFS's overall approach to this issue is summarized here. FFS recognizes the importance of managing and protecting sensitive resources and will take steps to ensure that such resources are not adversely impacted by ground disturbing activities. This includes areas such as known sensitive species locations, archaeological, fossil, and historical sites, ecotones, and wetlands.

When new pre-suppression firelines, recreational trails, or other low-impact recreational site enhancements are necessary, their placement will be reviewed by state forest field staff



to avoid sensitive areas. For ground disturbing activities such as construction of buildings, parking lots, and new roads, the FFS will consult with FNAI, DHR, SWFWMD, SFWMD and the Acquisition and Restoration Council (ARC), as appropriate.

## **V. Public Access and Recreation**

The primary recreation objective is to provide the public with dispersed outdoor recreational activities that are dependent on the natural environment. FFS will continue to promote and encourage public access and recreational use by the public while protecting resources and practicing multiple-use management. Recreation activities available on LWRSF include nature study, picnicking, hiking, horseback riding, hunting, biking, birding, geocaching, canoeing, and fishing.

Periodic evaluations will be conducted by FFS staff to monitor recreational impacts on resources. Modifications to recreational uses will be implemented should significant negative impacts be identified. New recreation opportunities and facilities, which are compatible with the primary goals and responsibilities of the FFS, will be considered only after FFS determines their compatibility with other forest uses and forest resources. Assessment of visitor impacts, outdoor recreation opportunities and facilities, and proposed changes will all be addressed in the Five-Year Outdoor Recreation Plan updates.

### **a. Public Access and Parking**

#### **Arbuckle Tract**

Four (4) paved roads provide access to the Arbuckle Tract and one (1) improved clay road bisects the tract on the eastern interior. Parking areas are provided every 1/3 of a mile on School Bus Road running through the tract. There is a horse trailer parking area near the McLean Cabin. There are seven (7) parking areas on the border of the tract and areas along Tram Road that handle parking needs during hunting season.

#### **Walk-in-the-Water Tract**

County Road 630 runs east/west along the southern end of the tract. There are two (2) parking areas along County Road 630 in addition to the parking available at the new LWRSF Headquarters which is at the southwestern end of the tract located off County Road 630.

Walk-in-Water Road runs north/south through the eastern portion of the tract. Parking is available at the old Blue Jordan Check-in Station area on Old Vero Beach Road, King Trail Road north entrance, and Tiger Creek picnic area located off WIW Road. The WIW Primitive Campground is located midway in the tract on the western side of WIW Road with parking for campers and horse trailers.

#### **Hesperides Tract**

Walk-in-Water Road/Boy Scout Road is the primary access road for both parcels on the Hesperides Tract. A parking area is on the east side of Walk-in-Water Road on the Babson Parcel. No parking areas are currently being planned for the Boy Scout Parcel.

There are several interior roads on each parcel. However, due to the smaller size of these parcels it is unlikely that public access roads will be added except for the short (< ¼ mile) access road to Dinner Lake on the Babson Parcel which has been improved with shell rock.

### **Prairie Tract**

State Road 60 runs along the west/southern border of the tract allowing access to Kissimmee Shores Road. This road provides an easement to two (2) privately owned homes and a citrus grove. Plans are to maintain this road for cattle operations, citrus grove, forest management activities, fire suppression, OOF hunts/Camp Prairie, and private residents.

### **Self Service Pay Stations**

There are six (6) self-service pay stations located throughout the state forest. Four (4) pay stations are located on the Arbuckle Tract and two (2) are located on the WIW Tract. Pay station sites will be located on tracts as deemed necessary.

Florida Statute 589.011(3) and Florida Administrative Code Section 5I-4.004(1) have authorized fee collection. Fees for recreation have been set to be within the reach of the average visitor without putting an undue hardship on any segment of the population. Frequent visitors are encouraged to purchase an annual use pass from the state forest office.

## **b. Campground Reservation System and Recreation Facilities:**

### **Campground Reservation System**

All state forests will be implementing new camping reservations options for making reservations to designated campsites through a Campground Reservation System. At LWRSF, this will be an option with two (2) primitive campgrounds and all primitive campsites off hiking trails on Arbuckle and WIW tracts. There will also be sites that are designated as “Walk-Up” sites within each campground. Even with the campground reservation system, there will be a few campsites left for first come first serve customers. Campsite 1 at Walk In Water Primitive Campground and Reedy Creek I Primitive Campground are the only two (2) “Walk-Up” sites available at LWRSF. Campsite posts are installed at each campsite within each campground, which contain directions for how to occupy for camping.

### **Arbuckle Tract**

The Arbuckle Tract has a primitive campground facility with eight (8) campsites located off Rucks Dairy Road. This primitive campground is known as Reedy Creek I Primitive Campground, and currently has one (1) walk-up site and seven (7) campsites that can be reserved through the Campground Reservation System. Reedy Creek II Primitive Hunt Camp is a new addition to the camping opportunities during hunt dates for licensed, exempt, or quota-permitted hunters only at ten (10) campsites located across Rucks Dairy Road. Each of these primitive campgrounds contain picnic tables and fire rings, along with two (2) portable restrooms and one (1) dump station available on site. Also, within the Reedy Creek II Hunt Camp is a newly

constructed pavilion available to all recreational users year-round for use, which can also be reserved through the Campground Reservation System.

There are five (5) primitive campsites along the Florida Trail on the Arbuckle Tract (hike-in only) that all require reservations made through the Campground Reservation System. These sites include Creekside, Grave Island, Hidden Hammock, Isabell, and Lakeside primitive campsites. These five (5) sites are equipped with fire rings and picnic tables. The horse trailer parking is located off School Bus Road just south of the McLean Cabin. McLean Cabin serves as the starting point for a nature trail, and during hunting season it serves as the FWC check-in station for the Arbuckle WMA. The Lake Godwin recreation area has a fire ring, picnic table, and an observation dock which allows for wildlife observation, fishing and canoe launching.

#### **Walk-in-the-Water Tract**

The WIW Tract has a primitive campground facility with ten sites located off WIW Road. This primitive campground is known as WIW Primitive Campground, and currently has one (1) walk-up site and nine (9) campsites that can be reserved through the Campground Reservation System. This primitive campground contains picnic tables and fire rings at all campsites along with two (2) portable restrooms and one (1) dump station available on site. There is also a horse trailer parking area located by the WIW Primitive Campground.

There are two (2) primitive campsites equipped with a picnic table and a fire ring off the Big Bay Loop Trail that require reservations made through the Campground Reservation System. These sites include Black Bear and Wood Duck primitive campsites (hike-in only). There currently is no FWC check station that serves the WIW WMA, but previously there was one (1) located off WIW Road at Old Vero Beach Road.

#### **All Other Tracts**

There are currently several improved recreation facilities located on the Hesperides and Prairie Tracts. A primitive camping/picnicking area has been established on the Hesperides Tract at the Babson Parcel and its use is allowed through an issuance of special-use permits.

Camp Prairie has been constructed in cooperation with the OOF Program through donations from private individuals/groups. Facilities that currently exist are two (2) bunkhouses, one (1) bathhouse, one (1) summer kitchen, and one (1) pavilion. OOF hunts run at Camp Prairie include turkey, deer, quail, and hog hunts. Other types of recreation, where appropriate, will be considered as well.

#### **A. Existing**

A wide variety of recreational opportunities are available at LWRSF. Hiking, hunting, horseback riding, biking, picnicking, birding, geocaching, and nature study can be enjoyed using existing service roads, old road beds, and established trails. LWRSF is part of the

Florida Trail System, FFS Trailwalker Program, and the FFS Trailtrotter Program. See [Exhibit E] for a map of the Facilities and Improvements.

**a. Recreational Trails**

**Arbuckle Tract**

The Florida Trail Association (FTA) has installed and maintains over 22 miles of hiking trails within the Arbuckle Tract called the Florida Trail System Loop Trail. This trail is part of the FTA trail system and is composed of two overlapping loops, approximately 11 miles each, intersecting a variety of ecosystems ranging from ancient scrub to forested wetlands.

A short, 1 mile interpretive trail beginning behind the “McLean Cabin” in the Godwin Flatwoods Management Block follows a short span of the Florida Trail System Loop Trail diverging to the Nature Loop Trail back to the cabin.

Horseback riding is allowed on the Arbuckle Tract in compliance with state forest and WMA rules. Horses are allowed on all roads and firebreaks except those trails designated as single-use hiking trails. Cross-country horseback riding is prohibited. The designated horse trailer parking area is located on School Bus Road.

**Walk-in-the-Water Tract**

Recreational hiking and horse trails have been completed for this tract. There are two (2) hiking trails located just north of County Road 630 East that include Big Bay Loop Trail and FSJ Loop Trail. Access to these hiking trails can be made from two (2) trailhead/kiosk locations on the north side of County Road 630 East.

Horseback riding is allowed on the WIW Tract in compliance with state forest and WMA rules. There are two (2) horseback riding trails that are called the blue and red trails that total roughly 12 miles within the WIW tract. Horses are allowed on all roads and firebreaks except those trails designated as single-use hiking trails. Cross-country horseback riding is prohibited. The designated horse trailer parking area is located next to WIW Primitive Campground.

The FFS staff will work with local groups (FTA, Florida Sport Horse Association, etc.) to ensure that trail development is accessible and convenient to users, and to enlist volunteer assistance with new trail development and maintenance.

**All Other Tracts**

There are currently no recreational trails located on the Hesperides or Prairie Tracts. Trails will be established in the future in areas that are appropriate for each tract.

**b. Camping**

**Arbuckle Tract**

The Reedy Creek I Primitive Campground is located to the east of Rucks Dairy Road. The camp is open year-round and features eight (8) sites, picnic tables, fire rings, two (2) portable toilets, and a dumpster. Reedy Creek II Primitive Hunt Camp is a

new addition to the camping opportunities during hunt dates for licensed, quota permitted, or exempt hunters at ten (10) primitive campsites located on the west side of Rucks Dairy Road (across from Reedy Creek I Primitive Campground). Each of these primitive camping facilities contain picnic tables and fire rings at campsites along with two (2) portable restrooms and one (1) dump station available on site.

There are five (5) primitive campsites for hikers/backpackers located at various points along the Florida Trail System Loop Trail on Arbuckle. There is one (1) in the Reedy Creek Management Block, one (1) along Livingston Creek, one (1) along the shore of Lake Arbuckle, one (1) near Isabel Creek, and one (1) in a xeric hammock/wet flatwoods site near the south entrance to the state forest.

#### **Walk-in-the-Water Tract**

A year-round primitive campground has been established off of Walk-in-Water Road featuring ten (10) sites, picnic tables, fire rings, portable toilets, and a dumpster. Two (2) primitive campsites for backpackers have been established along a designated hiking trail, Big Bay Loop Trail.

#### **c. Hunting and Fishing**

The forest is open to regulated hunting and fishing in cooperation with FWC. WMA areas are established as well as OOF hunts. Hunting on the forest is scheduled annually through a cooperative effort between the FFS and the FWC. Specific hunting seasons, quotas, and bag limits are agreed upon between the two (2) agencies at the annual meeting held in the state office following a meeting and recommendations from local FFS/FWC staff.

#### **d. Environmental Education/Ecotourism**

The FFS and its partners in the Lake Wales Ridge Ecosystem Working Group are committed to educating the public about the unique habitats on the Lake Wales Ridge. Staff conducted field trips and presentations on a variety of topics for the general public, school groups, and various user groups. Outdoor education opportunities are created each year with annual State Forest Education days and other social events. FFS staff will continue to collaborate with Polk/Hillsborough County Farm Bureau staff/other agency staff and the County Forester for environmental education at Agrifest (Polk County Cooperative Extension-Bartow) and AgVenture (Florida State Fairgrounds). One pavilion has been built at Reedy Creek II Primitive Hunt Camp that can substitute as an environmental education facility, similar to how McLean Cabin has in years past on Arbuckle. McLean Cabin, LWRSF Headquarters, Camp Prairie, and hiking trails also have been used for educational purposes/facilities by FFS staff at LWRSF.

#### **e. Visitor Center**

An office/visitor center with interpretive displays, community room, and public restrooms was completed April 2004. This complex serves as the main entrance to the state forest and is located off of County Road 630 on a previously disturbed site. Only native Florida landscape plant material will be utilized around the building

structures. A native plant garden was created in 2009 in remembrance of the previous District Biologist at LWRSF.

## **B. Planned**

FFS will continue to assess plans for additional recreational opportunities based on demand, carrying capacity, demographics, and impact to the resources on the forest. Both terrestrial and aquatic resources and related activities will be evaluated. Any specific plans will be incorporated into the Five-Year Outdoor Recreational Plan on file at LWRSF.

### **1. Public Access and Parking – Arbuckle, Walk In Water, Hesperides**

Within this ten-year planning cycle, other parking and access points will be evaluated. There are plans to install and maintain parking areas on Arbuckle, WIW, and Hesperides Tracts. The existing parking areas are located in sites that are along the exterior boundary on WIW and Hesperides tracts, as well as exterior and interior tract access points on Arbuckle. These parking areas are for all recreational users on the state forest and FFS staff use. There will be no resources impacted other than the clearing of small diameter oaks, sand pines, and other understory vegetation that will be removed for creating parking area space.

On all tracts, new parking areas will be designated by appropriate LWRSF staff by location. Listed plants, listed animals, and known archeological sites will be avoided. The size of parking areas will be determined by location for public access. Materials for this project will be broken tile or shell rock and 15-20 wood posts for parking barriers surrounding each parking area. LWRSF staff will purchase and install parking areas materials at designated locations on Arbuckle, WIW, and Hesperides Tracts.

Additional signage for all tracts are planned to be updated as needed.

### **2. Recreational Trails – Arbuckle/WIW**

Suitable locations are being explored for additional hiking trails. The construction, maintenance, and improvements of nature and hiking trails will be ongoing. Install and replace trail directional signs along trails on the WIW Tract to help with trail signage and hiking access along trail for trail walkers.

### **3. Camping – Arbuckle/Walk In Water**

The need for primitive campsites/facilities on the LWRSF continues to be evaluated through camping enhancements. Campsites will be equipped with fire rings and in some cases, a picnic table. Assessments of picnic tables and fire rings at campsites will occur each year on Arbuckle and WIW Tracts. One (1) pavilion may be built within Reedy Creek I Primitive Campground and WIW Campground as an available supplemental picnic area.

If budgeting allows and demand justifies future improvements, Phase 2 improvements at the Reedy Creek II Hunt Camp may include a full flush restroom with showers, a potable water source, dump station, water and electric utilities or hook-ups at each site. When and if Phase II is initiated, the hunt camp will be re-designated as a developed

campground that will be offered to all forest users year-round.

**4. Hiking Bridges - Arbuckle**

The FTA has installed and maintains over 22 miles of hiking trails within the Arbuckle Tract called the Florida Trail System Loop Trail. This trail is part of the FTA Florida Trail System Loop Trail and is composed of two (2) overlapping loops, approximately 11 miles each, intersecting a variety of ecosystems ranging from ancient scrub to forested wetlands.

At designated trail locations on Arbuckle, hiking/walking bridges exist, that over time, will require new wood posts, boards, and composite materials. Some hiking/walking bridges located along the Florida Trail System Loop Trail will require a new or replaced hiking/walking bridge to improve hiking access through the trail. These sites require hiking/walking bridges due to water levels within wet flatwoods, creeks, ditches, or within adjacent wetlands. There will be no resources impacted other than the clearing of small diameter pines, hardwoods, and other understory vegetation that will be removed for creating hiking bridge space for wood materials.

**5. Kiosks – Arbuckle/WIW**

Each kiosk is used for display and information for all recreational activities on the state forest. Each will be installed, replaced, or repaired as needed annually and will be a recurring project on Arbuckle and WIW Tracts.

**6. Environmental Education**

At this time only self-guided tours are available. If a need is determined in the future, LWRSF may implement an environmental education program which may include guided tours, additional self-guided tours, and hands-on events.

**7. Bird Watching**

A birding checklist for LWRSF may be developed in the future. The local checklists will be used as guides from TNC and FWC.

**8. Recurring projects**

Volunteers – Continued upkeep and marketing of volunteer programs

Brochures – Continue re-printing LWRSF brochures and FWC –  
Arbuckle/WIW WMAs, as needed

Special Events – Continue to host Forest Educational days

**9. Equestrian, Hunter, and Hiker Education**

There is a need for education of some user groups concerning refuse and debris. FFS will evaluate the best methods for communicating concerns and solutions to these user groups.

The FFS will handle permitting requests for recreational activities.

**C. Hunter Access**

The forest is open to regulated hunting and fishing in cooperation with FWC. WMA areas are established as well as OOF hunts. Hunting on the forest is scheduled annually through a cooperative effort between the FFS and the FWC. Specific hunting seasons, quotas, and bag limits are agreed upon between the two (2) agencies at the annual meeting held in the state office following a meeting and recommendations from local FFS/FWC staff. Non-hunting recreation users are encouraged to check the WMA regulations and season dates before visiting LWRSF. Currently, hunting on LWRSF is limited.

**D. Education**

FFS may create partnerships with local K-12 schools and/or universities for the purpose of the development and implementation of educational opportunities on LWRSF. The LWRSF Five-Year Outdoor Recreation Plan may help to enhance management activities as they pertain to future educational opportunities that are offered to the public. Additionally, FFS intends to establish an educational program for the public which will highlight to visitor's operations, the natural environment and the preservation of LWRSF.

**VI. Forest Management Practices**

**A. Prescribed Fire**

Forest management practices on LWRSF are important in the restoration and maintenance of forest ecosystems and provide a variety of socio-economic benefits to Floridians. Management practices on LWRSF include a prescribed fire program which is an effective tool in controlling the growth of hardwood trees, stimulating the recovery of native herbaceous groundcover, and promoting the regeneration of native pines.

FFS utilizes a fire management program on state forests that includes wildfire prevention, detection and suppression, and prescribed burning. This program is the responsibility of FFS's Lakeland District and is detailed in the Five-Year Prescribed Burning Management Plan. Emphasis will be placed on prescribed burning, wildfire prevention, and education to help reduce wildfire occurrence on the forest.

A Fire History spreadsheet detailing the recent history of prescribed burns and wildfires at LWRSF is available in [Exhibit P].

No fire towers exist on LWRSF. Two (2) tractor / plow units located at LWRSF Headquarters. Additional support is available from Dundee Forestry station in eastern Polk County. Personnel and equipment stationed at LWRSF will be used for pre-suppression practices, establishment of firebreaks, rehabilitation of existing firelines, construction of new firelines (where absolutely necessary), maintenance of perimeter firebreaks, and prescribed burning.

The annual prescribed burning program on the forest produces multiple benefits. The purposes of prescribed burning on LWRSF are to facilitate forest management operations; enhance wildlife and listed species habitat; decrease fuel loading; enhance public safety; and restore, maintain, and protect all native ecosystems, ecotones, and their ecological processes. FFS personnel are responsible for planning and implementing the annual



prescribed burn program for LWRSF, which will consist of growing and dormant season burns. An update to the Five-Year Prescribed Burning Management Plan is developed each year by FFS staff. All burns conducted on LWRSF are executed by Florida Certified Prescribed Burn Managers in accordance with F.S.-590.125 and F.A.C. 5I-2. The smoke screening system will be used as a smoke management tool to minimize the adverse impact of smoke that may affect residential communities, public roads, schools, and other smoke sensitive areas.

According to FNAI, historic, fire dependent natural communities on LWRSF are estimated to have occupied approximately 24,308 acres, and to have burned at approximately 2-10 year intervals, depending on the community. Past land uses have left some of these historically fire dependent communities in a condition unable to carry prescribed fire. Based on current conditions and management objectives, LWRSF will plan for 5,000 to 8,000 acres to be burned annually through prescribed fire to maintain the appropriate fire return intervals across the state forest. Restoration of these areas by removal of the off-site pine species and reforestation with native pines will increase prescribed burn acreage goals over time. Meeting prescribed fire goals will be largely dependent on weather conditions, personnel, and statewide emergency situations such as wildfires, hurricanes, and other natural disaster response and relief.

The southern portion of the state has an extended growing season for pines and other vegetation. There is also an extended wet season that could limit the frequency of prescribed burns. Therefore, the objective is to encourage year-round prescribed burning whenever possible, with the understanding that much of the prescribed fire will be applied, but not limited to, the dormant season. This will meet several resource objectives including hazard fuel reduction, wildfire mitigation, and management of cattle forage on LWRSF.

Fires caused by lightning at the end of the dry season and through the rainy season (growing season) represent the natural fire regime in central Florida. It is believed that native range present at LWRSF has been subjected to this type of fire for many centuries. Numerous groundcover species found in flatwood communities are adapted to and dependent upon growing season fires. However, Florida ranchers have typically burned native range in winter or early spring. Prescribed fires conducted in late spring or summer will create a ground cover mosaic that will promote herbaceous plant species, while also retaining patches of palmetto cover to provide denning and escape cover for the Florida panther, Florida black bear, and other game and non-game wildlife species. Inclusion of periodic spring and summer prescribed burns in the typical burn regime will likely benefit native plant communities, as well as cattle grazing and wildlife.

Control of wildfires and the proper application of prescribed fire in the Wildland-Urban Interface (WUI) is important for FFS to address. Any current or future encroachment by development near LWRSF may present smoke and fire management challenges.

### **1. Fire Management**

FFS will develop a fire management plan that will serve as a working tool and an informational document for LWRSF. The plan will provide guidelines

regarding wildfire suppression and prescribed fire management. It will specify burn units, burn unit prescriptions, appropriate fire return intervals, and fire suppression planning. The plan may be reviewed and amended as necessary.

The use of prescribed fire in the management of timber, wildlife, and ecological resources on LWRSF is necessary if the FFS is to fulfill the goals and objectives stated in this plan including: enhancing and restoring native plant communities, managing protected species, managing timber, recreation, historical, and other resource values. The fire management plan and its objectives shall reflect and incorporate these multiple-resource objectives.

- a. **Prescribed Fire:** Prescribed fire is the most important land management tool, both ecologically and economically, for managing vegetation and natural communities and perpetuating existing wildlife populations in Florida. Forest operation records and staff experience should be combined with the FNAI inventory and assessment (2017) to identify areas that may require mechanical treatments in conjunction with prescribed fire to restore a more natural vegetative structure.
- b. **Burn Unit Plans:** Each prescribed fire will be conducted in accordance with FFS regulations and state law (Rule Chapter 5I-2 F.A.C., Chapter 590 F.S.) and have a burn unit plan (prescription). Each prescription will contain, at a minimum, the information, as required by Section 590.125(3), F.S., needed to complete the FFS Prescribed Burn Plan Form FDACS 11461.

Aerial ignition may be considered for large burn units where this tactic can be cost effective for higher burn acreages. Consideration should be given to rotating burn units between dormant and growing season burns over time. Fire return intervals for a burn unit are recommended to fall within the natural, historic range for the dominant natural community or communities within a given burn unit.

Based upon available species survey data, burn units within a prescription that have listed wildlife species shall explicitly state their presence and any restrictions or requirements relative to prescribed burning in proximity to these species or habitats. These may include time of year, pre-burn preparation, fire return intervals, and other burn parameters.

## **B. Wildfires, Prevention, Fire / Prescribed Fire Strategies**

FFS utilizes a comprehensive wildfire management approach on state forests that includes an ongoing program of wildfire prevention, detection and suppression, and prescribed burning. Implementation of this program is the responsibility of FFS's Lakeland District. Emphasis will be placed on consistent accomplishment of prescribed burning goals and

community outreach to increase public understanding of wildfire prevention and the benefits of prescribed fire.

FFS has three (3) paramount considerations regarding wildfires, and these are listed in priority order:

- 1) Protection of human lives, both that of the firefighter and the public
- 2) Protection of improvements
- 3) Protection of natural resources

All procedures regarding wildfire will follow the State Forest Handbook and the LWRSF Fire Management Plan.

### **1. Suppression Strategies**

If a wildfire occurs on LWRSF there are two (2) alternative suppression strategies as defined below:

- a. Contain** is defined as a suppression strategy where a fire is restricted to a certain area by using existing natural or constructed barriers that stop the fires spread under the prevailing and forecasted weather until it is out. This strategy allows the use of environmentally sensitive tactics based on fuels, fire behavior and weather condition that keep a wildfire from burning a large area or for a long duration.
- b. Control** is defined as a suppression strategy where aggressive suppression tactics are used to establish firelines around a fire to halt its spread and to extinguish all hotspots. This alternative is used whenever there is a threat to human life, property, private lands, and/or critical natural or cultural resources. This strategy should also be used when the total district fire load dictates that crews not be involved with individual fires for any longer than absolutely necessary.

Appropriate suppression action will be that which provides for the most reasonable probability of minimizing fire suppression cost and critical resource damage, consistent with probable fire behavior, total fire load, potential resource and environmental impacts, safety and smoke management considerations. The Incident Command System (ICS) will be used for all suppression actions.

### **2. Smoke Management**

Caution will be exercised to prevent a public safety or health hazard from the smoke of any prescribed burn or wildfire. Prescribed burns must pass the smoke screening procedure and be conducted by a certified burner. If smoke threatens to cause a safety hazard then direct, immediate suppression action will be taken.

### **3. Fire Breaks and Firelines**

A system of permanent fire breaks will be developed and maintained around and within the boundaries of LWRSF to guard against fires escaping from and entering the forest. Such fire breaks will consist of natural barriers, roads, trails, permanent grass strips and where appropriate, well maintained harrowed lines. All pre-suppression fire breaks will meet the established BMP criteria.

During wildfire suppression, the use of water and foam, permanent fire breaks, natural barriers, and existing roads and trails for firelines can be used when human life safety, property, and resource considerations allow. Plowed and/or bulldozed lines will be used for initial installation of firelines in heavy fuels and in cases where it's considered necessary to protect life, property, or resources and/or to minimize threats to firefighters. Plow and bulldozed lines will be rehabilitated and BMPs implemented as soon as practical after the fire is suppressed.

#### **4. Sensitive Areas**

LWRSF has on file in the state forest headquarters an Environmentally Sensitive Area Map that identifies protected sites such as critical wetlands and archaeological and historical sites known to occur on the state forest. FFS personnel are aware of these areas in the event of a wildfire. Special precautions will be followed when prescribed burning in sensitive areas on LWRSF. To the greatest extent practical, fire staff will avoid line construction in wetland ecotones throughout the forest.

#### **5. Firewise Communities**

Communities in wildfire prone areas must work together to be fully prepared for wildfire. A "Fire Adapted Community" incorporates people, buildings, businesses, infrastructure, cultural resources, and natural areas to prepare for the effects of wildfire. The Fire Adapted Community concept serves as an umbrella to the various programs that help communities become more fire adapted. The FFS has implemented the Fire Adapted Community concept for prevention statewide. Specifically, in the area adjacent to or nearby LWRSF, efforts have included identifying Communities at Risk through the web-based Southern Area Wildfire Risk Assessment Portal (South WRAP) and working with communities to become Firewise.

#### **6. Adjacent Neighbor Contacts**

The staff at LWRSF maintains a list of neighbors that have requested they be notified in advance of prescribed burns. Per 2017 LMR Team recommendations [Exhibit U], these families are contacted by telephone or email with potential sites and dates of anticipated prescribed burns.

#### **7. Post-Burn Evaluations**

A post-burn evaluation is required for each wildfire and prescribed burn on the state forests to assess impacts on timber and habitat. Based on the evaluations, decisions will be made on timber salvage operations. An historical fire record for all fires and prescribed burns will be maintained. This will be accomplished using the burn plans in the Forester's files and through the maintenance of GIS data. These records are intended to provide data for future management decisions.

### **C. Sustainable Forestry & Silviculture**

Timber is a valuable economic and ecological resource, and timber harvesting for the purposes of generating revenue, improving stand viability, forest health, wildlife, and

ecological restoration and maintenance is critical to the silvicultural objectives on the state forest.

## **1. Strategies**

The following silvicultural strategies will apply to silvicultural practices on LWRSF:

- a.** To restore and maintain forest health and vigor through timber harvesting, prescribed burning, and reforestation, both naturally and artificially, with species native to the site.
- b.** To create, through natural regeneration, uneven-aged, and even-aged management, a forest with both young and old growth components that yields sustainable economic, ecological, and social benefits.
- c.** Maintain ecosystem functionality using prescribed fire.
- d.** Restore and enhance sandhill and scrub communities using established methods and new methods developed through research.
- e.** Improve, maintain, and protect in perpetuity all native ecosystems.
- f.** Ensure the long-term viability of populations and species considered rare, endangered, threatened, or of special concern.
- g.** Maintain a sustainable timber management program that enhances the natural diversity of the state forest with minimal environmental impact.
- h.** Restore native pine species where appropriate through artificial reforestation projects and native ground cover establishment where ecosystems are currently dominated by non-native grass species.
- i.** Continue timber harvests of planted off-site slash pine in the cutthroat grass flatwoods in order to prioritize and to establish appropriate strategies and a schedule for their removal in those areas. Develop and implement site plans for removal and replacement of off-site species in wet/mesic flatwoods, targeting restoration to historic desired mature pine densities of 10-50 trees per acre. Clear-cuts and thinning will be considered as part of this continued restoration of flatwoods sites.
- j.** Timber harvests in natural pine stands in wet/mesic flatwoods will be considered to promote a natural pine density and continued prescribed fire within these natural communities.
- k.** Establish management criteria for sand pine stands that will allow for the natural cycle of scrub/sand pine communities.
- l.** Use appropriate site preparation treatments that ensure tree survival and stand establishment and have the least negative impact on native plant communities.
- m.** Maintain and protect water quality and aquatic resources.

## **2. Silvicultural Operations**

Silvicultural operations on LWRSF will be directed toward improving forest health, wildlife habitat, ecological and economical sustainability, as well as toward recovery from past management practices that are not in accordance with the objectives of this plan. Stands of off-site species with merchantable volume will be scheduled for harvest, followed by reforestation with the appropriate tree species. Herbicide applications may be necessary to control woody competition and to re-establish desired natural species of both overstory and groundcover. Site preparation methods may include prescribed fire, mechanical vegetation control, and/or herbicide applications.

Herbicides used will be registered for forestry use by the U.S. Environmental Protection Agency (EPA) and will not adversely affect water resources.

Prescribed fire is the most desirable method of vegetation control in fire dependent ecosystems. However, due to the existence of areas where fuel loads have reached dangerous levels or urban interface dictates prescribed fire is not suitable, mechanical or chemical vegetation control may be used. Mechanical and / or chemical vegetation control will be utilized where appropriate as determined by FFS staff for wildlife enhancement, fuel mitigation, and reforestation.

Maintenance and restoration of timber stands and natural communities through timber harvesting will include thinning for maintenance, regeneration harvests applicable to the species present, and clear-cutting to remove off-site species.

All silvicultural activities, including timber harvesting and reforestation, will meet or exceed the standards in FFS's Silviculture BMPs and the State Forest Handbook, and will follow the Five-Year Silviculture Management Plan.

Timber harvesting guidelines will be developed for each sale contract on a site-specific basis to minimize damage to sensitive resources. These guidelines will address the importance of snags for wildlife habitat, BMP compliance, special considerations (related to rare and endangered species), limitations on harvesting in wet periods, machinery use, road systems, protection of ground cover, inspection of equipment to prevent invasive species dispersal in the sale area, hiking trail considerations, and other items pertinent to the site. Silvicultural prescriptions will be developed to favor the development of larger and older native pine trees. Natural regeneration will be assessed by site for artificial reforestation needs within flatwoods areas on LWRSF.

Areas designated for timber harvests will be surveyed for all listed species in conjunction with the fieldwork necessary for timber sale preparation. State forest staff will develop timber harvesting plans and all timber harvesting will be conducted to meet or exceed the compliance guidelines set forth in the public lands section of the Silviculture Best Management Practices Manual publication.

Reforestation is a key component in restoring natural ecosystems. When considering areas for restoration, where appropriate, site preparation treatments utilized will ensure the best opportunity for tree survival and stand establishment while also minimizing negative impacts on desired ground cover species. Reforestation plans are developed for each site on a site-specific basis. Existing plant communities, listed species, desired stocking levels, species to be planted, and site preparation techniques will be addressed for each site.

### **3. Forest Inventory**

The purpose of a forest inventory is to provide FFS resource managers with information and tools for short and long-range resource management and planning. Ten percent of

LWRSF forest will be re-inventoried annually to provide an accurate estimation of the standing timber and to ensure that stands will be managed sustainably.

Timber/forestry resources available on the property include sand pine, longleaf pine, planted slash pine, natural South Florida slash pine, and mixed hardwoods.

#### **4. Timber Sales**

Timber sales are generally advertised for competitive bids and sold on a per unit or lump sum basis. All timber sales are conducted according to guidelines specified in the State Forest Handbook.

In the case of wildfire, insect, disease, or other catastrophic events, salvage sales may be conducted to harvest dead or dying timber. These sales will typically be per unit sales and advertised for competitive bids as well. The FFS will consult the State Forest Handbook for salvage sale guidance. When conducting salvage cuts, a minimum of 6 snags per acre will be retained where feasible. When possible, the remnant snags shall be greater than 8 inches diameter at breast height (DBH).

All timber related activities and other forest product sales or leases on LWRSF will comply with the most recent version of the Silviculture BMPs.

#### **D. Non-Native Invasive Species Control**

FFS employees continually monitor the forest for non-native invasive species while conducting management activities. LWRSF has an aggressive non-native invasive species program. In-house technicians survey, GPS, and control/eradicate all non-native plant species. New occurrences are treated immediately when found. Ongoing infestations are treated every year and each species is treated according to its optimal treatment time. Monitoring continues throughout the year on areas that have been treated. Herbicide application is the primary method for controlling these species. Other methods will be considered where possible and applicable. FFS will locate, identify, and apply control measures with the intent to eradicate or control non-native invasive species.

On-going maintenance and monitoring strategies are outlined in the Five-Year Ecological Management Plan which is developed to locate, identify, and control non-native invasive plant species. Occurrences of non-native invasive species are recorded in the LWRSF GIS database, monitored, and treated annually as funding permits. The GIS database is updated as new infestations are discovered.

Each year, funding for invasive treatments is pursued through FWC's Upland Invasives Treatment Program and through internal FFS project proposals. These projects are approved for contractors to conduct invasive plant treatments in known infested areas on LWRSF. When these projects receive approval and funding, FFS staff monitor these contractors' treatment until project completion and make desired recommendations as needed during treatments.

Adjacent landowners who are known to have these species on their property will be approached in an effort to cooperate on control measures. FFS works to control the spread of non-native invasive species by decontaminating agency equipment and equipment used by private contractors according to the State Forest Handbook.

Feral hogs are a nuisance and a non-native invasive species. Damage to the land can be severe in areas where hog populations are not kept to a minimum. Feral hog hunting is allowed during all hunting seasons except spring turkey. Trapping is permitted with a special use permit. Hog populations will be kept as low as possible, though the population levels can change rapidly over a short time. FWC has issued a feral hog control permit to FFS for all state forests and FFS allows for hog removal on LWRSF through trapping and hunting as needed.

Training in the identification and control of invasive species will be scheduled for personnel as time and resources permit. Training concerning non-native invasive plants will be coordinated with the Forest Management Bureau's Forest Health Section and opportunities through the Heartland Cooperative Invasive Species Management Area (CISMA). Control of non-native invasive species will be target-specific and use a variety of methods including appropriately labeled and efficacious herbicides.

**Table 6. Non-Native Invasive Plant and Animal Species Occurring on LWRSF**

Invasive Plant / Animal Species	Population Status (Stable, Increasing, Decreasing, Eradicated)	Impacted Acres	Treatment Strategy
Old World Climbing Fern	Increasing	133.171	Poodle cut w/ herbicide
Cogon grass	Decreasing	85.425	herbicide
Brazilian Pepper	Stable	5	cut stump w/ herbicide
Rosary Pea	Decreasing	6	cut stump w/ herbicide
Lantana	Decreasing	5.583	cut stump w/ herbicide
Water Hyacinth	Increasing	20	herbicide
Burhead Sedge Grass	Increasing	2.8	herbicide
Air Potato	Stable	0.546	herbicide
Caesar's Weed	Increasing	54.835	herbicide
Coral Ardisia	Decreasing	0.1	herbicide
Guinea Grass	Increasing	1.766	herbicide
Japanese Climbing Fern	Stable	1	Poodle cut w/ herbicide
Tropical Soda Apple	Decreasing	16.9	herbicide
Strawberry Guava	Decreasing	40	cut stump w/ herbicide
Wedelia	Decreasing	1.734	herbicide



Feral Hog	Decreasing		2 Hog trappers/Hunts - FWC permitted - Arbuckle, WIW, Hesperides, Prairie tracts
Nutria			FWC
Walking Catfish			FWC
Cuban Treefrog			FWC

**E. Insects, Disease, and Forest Health**

There are several known insects and disease occurrences on LWRSF. Forest management practices will be conducted in such a way as to avoid insect and disease problems. In the event of an outbreak of any disease or insects, consultation with the Forest Management Bureau’s Forest Health Section will be sought to formulate an appropriate and effective response. Specific long-range strategies to avoid and/or minimize losses to such outbreaks in the future will be the management objective. State forest management staff will consult with the Forest Health Section to develop scientifically sound responses and/or management prescriptions. During the past ten (10) years, known occurrences of pine bark beetles (*Ips*, Black Turpentine, Ambrosia beetle), pitch canker, and laurel wilt have been found at various locations at LWRSF. Pine bark beetles have been found in flatwoods and scrub communities on the state forest. Pitch canker has been found primarily in mesic and wet flatwoods sites that contain off-site or natural slash pine. Laurel wilt has been found in baygall, flatwoods, swamps, and other associated wetlands that contain redbay (*Persea sp.*) and other members of the Lauraceae family.

In compliance with Section 388.4111, Florida Statutes and Section 5E-13.042, F.A.C., all lands have been evaluated and subsequently designated as environmentally sensitive and biologically highly productive. Such designation is appropriate and consistent with the previously documented natural resources and ecosystem values, and affords the appropriate protection for these resources from arthropod control practices that would impose a potential hazard to fish, wildlife, and other natural resources existing on this property. The local arthropod control agencies in Polk County will be notified of the approval of this plan documenting this designation. [Exhibit Y]

As a result, prior to conducting any arthropod control activities on LWRSF, the local agency must prepare a public lands control plan that addresses all concerns that FFS may have for protecting the natural resources and ecosystem values on the state forest. In this regard, FFS will provide the local agency details on the management objectives for LWRSF. This public lands control plan must be in compliance with DACS guidelines and using the appropriate DACS form. The plan must then be approved and mutually adopted by the county, FFS, and DACS, prior to initiation of any mosquito control work. Should the local mosquito control district not propose any mosquito control operations on the property, no arthropod control plan is required. [Exhibit Y]

**F. Use of Private Land Contractors**

The forest manager makes ongoing evaluations of the use of private contractors and consultants to facilitate the total resource management activities of this state forest. The opportunities for outsourcing land management work include, or are anticipated to include:

1. Herbicide applications
2. Restoration activities
3. Tree reforestation
4. Timber harvesting
5. Biological assessments and mapping
6. Boundary/State Forest Surveys

## **G. Habitat Restoration**

### **FSJ Habitat Enhancement and Restoration on the WIW Tract**

FSJs occupy areas in the main portion of the WIW Tract, west of WIW Road. FSJs on the WIW Tract occur primarily on disturbed sandhill with inclusions of scattered xeric hammock. This is atypical habitat for FSJs, which generally occupy scrub and scrubby flatwoods habitat (USFWS 1999). Previous landowners mechanically treated the entire site, which may have artificially created conditions that FSJs prefer, with bare patches of sand and short patchy vegetation dominated by oak species.

FSJs persist mainly along pond edges where habitat structure remains suitable and allows increased visibility to detect potential predators (Myers et al. 2012). Many parts of this area contain tall shrub and canopy sized trees, outside optimal FSJ habitat of 1 to 3-meter-tall oaks interspersed with 10 to 50 percent un-vegetated, sandy openings and sand pine (*Pinus clausa*) of less than 20 percent (Woolfenden and Fitzpatrick 1990).

In 2002, there were over 20 FSJ families on the WIW Tract. The number of FSJ families and the total number of birds has varied from 2012 to 2017, ranging from 5 to 9 families and 18 to 26 individual birds. Based on 2017 FWC annual FSJ surveys, there are 6 families and 26 total birds on the WIW tract.

Long term management goals for FSJs on the WIW Tract include improving existing and potential FSJ habitat and increasing connectivity between currently occupied FSJ habitat. Ideally, having enough potential habitat to support greater than 20 family groups would help increase the stability of the WIW sub-population (Myers et al. 2012). FWC identified 6 potential areas on the WIW Tract, selected to increase the amount of potential habitat available to current FSJ groups and improve connectivity between currently occupied FSJ habitat (Myers et al. 2012). See [Exhibit Z] for information. Subsequent habitat enhancement and restoration will focus on the establishment of a FSJ core area on WIW, guided by FWC recommendations to provide the greatest effect toward facilitating the expansion of the FSJ population to the numbers recorded in the early 2000's (Myers et al. 2012). This core area will focus on achieving desired conditions to meet the specific needs of FSJs, regardless of natural community type. Restoration efforts will be prioritized and will focus on areas of the WIW tract to benefit known FSJ groups. Restoration and enhancement work will be done through in-house staff, volunteers, and through grant proposals when funding and resources allow.

Restoration objectives are to reduce density and height of hardwoods, and the creation of areas of open, bare sand to provide more suitable habitat for FSJ. Oak species, primarily sand live oak (*Quercus geminata*), myrtle oak (*Quercus myrtifolia*), Chapman oak (*Quercus chapmanii*), and bluejack oak (*Quercus incana*) will be targeted for reduction. Specific management prescriptions will be developed for each restoration area and restoration objectives will be met using prescribed fire, mechanical, and herbicide treatments.

A prescribed burn plan will be developed for each restoration area. Initial burns may need to be more aggressive to promote the top-kill of large hardwoods. Subsequent prescribed burns will be applied roughly every 6-10 years as needed to maintain the average oak shrub height under six (6) feet tall, with an emphasis on growing season burns when possible. Restoration areas and adjacent FSJ territories will be managed to promote a mosaic of conditions across the landscape within appropriate fire intervals and that some suitable habitat remains available to resident FSJs. Post burn evaluations will be conducted to ensure the burn objectives were met.

Mechanical work may be done to improve burn conditions, mechanically reduce hardwoods and sand pines, or maintain fuels in areas where fire is not possible. The edges or perimeters of restoration areas may be mechanically treated with mowing to improve ignition conditions prior to a prescribed fire. Areas that have transitioned into xeric hammock and/or have a dense canopy of hardwoods will be targeted with chain saw work to reduce hardwood density and height. Mechanical treatment involving heavy equipment should be limited to equipment that causes minimal soil disturbance, with no ground digging or plowing component, like a gyro trac or single pass empty roller drums. Roller chopping will be avoided. Surveys will be conducted for sensitive wildlife species (gopher tortoises and their burrows) and threatened and endangered plants prior to any management activity. Mechanical work will avoid damaging sensitive plant and wildlife species and if present, gopher tortoise burrows will be marked and avoided during mechanical treatment. Areas treated mechanically will be closely monitored for soil disturbance and the introduction or establishment of non-native invasive plants. All areas that are mechanically treated will be followed with prescribed fire.

Chemical herbicide treatments may be used in some areas to reduce the overstory. Herbicide treatment will also be conducted to reduce Bahia grass ground cover in many parts of the enhancement areas.

A FSJ restoration project was completed in a prioritized enhancement area of the WIW Tract in 2016. Funding for this project came from a grant from U.S. Fish and Wildlife Service and TNC. This project focused on creating habitat connectivity between two (2) known groups of FSJs in the center of the core FSJ area.

FFS will continue to consult with FWC to monitor the FSJ population on the WIW Tract and to evaluate the effectiveness of restoration efforts. FSJ habitat enhancement

monitoring projects have been developed for one project and new protocols will be developed as restoration continues with assistance from FWC.

### **FSJ Habitat Restoration on Arbuckle**

Currently, the Arbuckle tract contains approximately 366 acres of sandhill and 2,328 acres of scrub. Xeric hammock within the Arbuckle tract totals roughly 171 acres. On Arbuckle, most of the sandhill, scrub, and scrubby flatwoods are planned to be maintained through prescribed fire within the desired fire intervals. Any portions of these areas that are not able to burn with prescribed burning will be assessed for mechanical and herbicide treatments to help facilitate fire.

### **Sandhill Restoration on the Walk In Water Tract**

Restoring sandhill to its natural integrity on the WIW Tract is a primary goal for the next ten-year planning period. WIW tract contains some of the largest contiguous parcels of sandhill. Sandhill community on this tract varies in structure and condition. Many parts of the sandhill on the WIW Tract have been altered by past management including cattle grazing, mechanical disturbance, the introduction of Bahia grass, and fire suppression. Prior to state acquisition in 1995, WIW was leased for cattle grazing. Trees, shrubs, and groundcover were roller-chopped by heavy machinery to prepare the soil for Bahia grass planting. Bahia grass was aerielly seeded as forage for cattle, and is common today throughout the sandhill on WIW. Throughout the sandhill on WIW, wiregrass is generally sparse and not a dominant groundcover. In areas that have been fire-suppressed, there are inclusions of xeric oak hammock that have an established oak canopy and areas of dense woody vegetation that are transitioning into xeric hammock.

The sandhill on WIW presents unique challenges for prescribed burning. For example, the WIW tract is close to residential areas, lacks continuous fuels, has patchy groundcover, and Bahia grass is common throughout. Areas of oak cover produce relatively incombustible oak litter and increased shading decreases growth of fine herbaceous fuel. Wiregrass and other sandhill groundcover is critical to restoring the native understory of the longleaf pine ecosystems and serves as the principal fuel for frequent fires (Clewell 1989, Outcalt 1999). The reestablishment of longleaf pine, wiregrass and other sandhill groundcover on the WIW tract is essential to carry frequent, low intensity fire. Work is needed to restore the sandhill to a more open structure, enhance groundcover, and make frequent surface fires more possible.

Goals will be met through a combination of prescribed fire, herbicide treatment, native pine plantings, mechanical treatment, and groundcover planting. Sandhill restoration on this tract will focus on areas outside of the FSJ core area. Sandhill areas are numerous and highly variable in size, so a plan is underway to develop a prioritized, long-term restoration plan for the sandhill on WIW.

Restoration areas will be identified as having the greatest restoration potential using the criteria of current vegetation structure and species composition. Management actions will be developed for each site and monitoring will be developed to track changes in vegetation

structure, species composition, groundcover conditions, and distribution of listed plant species.

Surveys will be conducted for sensitive wildlife species (gopher tortoises and their burrows) and threatened and endangered plants prior to any management activity. Mechanical work will avoid damage to sensitive plant and wildlife species and if present, gopher tortoise burrows will be marked and avoided during treatment.

A prescribed burn plan will be developed for each restoration site. Initial burns may need to be more aggressive to promote a reduction in dense woody vegetation and overstory. Subsequent prescribed burn will be applied when adequate fuels and conditions allow.

Mechanical work may be completed to improve burn conditions, reduce hardwoods/sand pines, or maintain fuels in areas where prescribed fire is not possible. The edges or perimeters of restoration areas may be mechanically treated to improve ignition conditions prior to prescribed fire. If resources and funding allow, areas that have a dense canopy or sub canopy of xeric oaks may be targeted primarily with chain-saw felling to reduce hardwood density and height.

Herbicide may be used in the suppression of non-native weedy or invasive grasses, such as Bahia grass (*Paspalum notatum*) and natal grass (*Melinis repens*), prior to the planting of wiregrass. The use of Imazapic and Glyphosate to suppress weedy and invasive grass in a previous pilot project on the WIW tract showed that several rounds of application are needed prior to planting.

Wiregrass (*Aristida stricta*) will primarily be sown by direct seeding and if resources and funding allow, through the out-planting of wiregrass plugs. In the past two years, several small areas that were recently burned and relatively open (gaps free of oak and pine vegetation) were directly-seeded with wiregrass. The areas were raked of litter, hand seeded then rolled using a culti-packer to ensure better seed contact with the soil. There has been some success with this method on a small scale, and it has generally taken two (2) years before recruitment was detected. Wiregrass plugs may be out-planted as well, in areas where direct seeding is not feasible. An on-going wiregrass plug out-planting project in collaboration with the University of Central Florida has shown good results. Overall survival of wiregrass plugs since 2013 has been 69% with a steady increase in growth.

Wiregrass seed source will come from LWRSF if available, or come from nearby conservation land or nursery. Seeds will be harvested in November or December following a growing season burn, either by hand or by mechanical seed collector (Flail-Vac or mechanical seed stripper). Wiregrass seed may be sown at a minimum rate of 3-4 pound an acre, though higher rates provide the best results (NRCS 2002). Areas that are planted with wiregrass seed will be burned 2-3 years after planting (Mulligan and Kirkman 2002) to promote wiregrass growth and recruitment.

A small restoration project has already begun on the Newell Parcel; a sandhill area north of the main portion of WIW adjacent to Tiger Creek Preserve. This long-unburned sandhill

contains some of the last remaining old-growth longleaf pines in the region, and has retained its wiregrass groundcover. There is a plan underway to introduce fire back into this site safely. FFS staff and volunteers have applied mechanical and herbicide treatments to reduce hardwood canopy.

### **Sandhill/Scrub Restoration on the Hesperides Tract**

The Babson parcel contains approximately 190 acres of sandhill and 77 acres of scrub. Xeric hammock within the Babson parcel totals roughly 9.7 acres. On Babson, all of the sandhill, scrub, and xeric hammock areas are planned to be maintained through prescribed fire at the desired fire intervals. Native pine reforestation projects with both longleaf and South Florida slash pines will also be considered. Any portions of these areas that are not able to burn will be assessed for mechanical and herbicide treatments to help facilitate prescribed fire use.

The Boy Scout parcel contains approximately 10.3 acres of sandhill and 78 acres of scrub. Xeric hammock does not exist on Boy Scout. On Boy Scout, all the sandhill and scrub areas are planned to be maintained through prescribed fire at the desired fire intervals. Native pine reforestation projects with both longleaf and South Florida slash pines will also be considered in the abandoned grove. Any portions of these areas that are not able to burn will be assessed for mechanical and herbicide treatments to help facilitate prescribed fire use.

### **Cutthroat Flatwoods (Wet-Mesic flatwoods) Restoration**

On the Arbuckle tract, there are approximately 3,525 acres of wet flatwoods and 1,949 acres of mesic flatwoods. In July 2009, a flatwoods restoration plan was written to address flatwoods areas with off-site planted slash pine. The urgency of this plan was due to an increasing number of dead and dying planted off-site slash pines that occurred in different areas throughout the Arbuckle tract. Restoration is an important goal, and the potential loss of revenue due to tree mortality and continued forest health issues caused staff to move forward. Dead trees also add to the danger and complexity of conducting the prescribed fires required to properly manage the flatwoods. As part of this plan, staff intend to continue to harvest most of the off-site slash pine, thin any natural South Florida slash pine, and leave all longleaf pine. The goal is to leave the flatwoods with a desired stand density of 10-50 trees per acre, which is in line with historic stand densities. This will help bring native pine seed sources back into the ecosystem for future generations and continue restoration efforts.

Several criteria were looked at as part of this plan, including: access, natural communities, stand health, forest inventory data, presence of rare species, unique features (e.g. hiking trails), and burn plans or special needs post-harvest. Each stand containing planted off-site slash pine was given a harvest year based on staff considerations and decisions for harvest. During the past ten-year period, thinning/selective harvest has been the harvest method used. Timber harvests that include small clear cuts and thinning harvests to remove remaining off-site slash pine will be considered over the next ten-year period followed by native pine reforestation projects with South Florida slash and longleaf pine seedlings.

Once thinning was completed for each of these timber sale areas, prescribed burning has been conducted every 1-5 years to maintain the cutthroat grass ecosystem. Native South Florida slash pine and longleaf pine continues to be hand planted in timber sale landings throughout stands to restore native trees to the cutthroat grass flatwoods ecosystem. This project will continue during the next ten-year period in designated flatwoods sites with prescribed burns on Arbuckle. Other wet-mesic flatwoods on WIW, Hesperides, and Prairie tracts will be managed primarily through burning on a 1-4 year fire interval as part of restoration and maintenance of the sites.

### **Wetlands Restoration on Arbuckle and Prairie Tracts**

Wetland restoration objectives on the state forest include erosion control, restoration of hydrology and/or hydroperiod, and restoration of wetland plant and animal communities. To achieve these objectives, restoration activities may involve road and soil stabilization, water level control structure removal or installation, non-native invasive species control, site preparation and re-vegetation with native wetland species, and project monitoring. These activities may be conducted individually or concurrently; implemented by FFS personnel or by non-FFS personnel under mitigation or grant contractual agreements. Wetland restoration projects should be conducted in conjunction with other restoration activities indicated elsewhere in this plan.

Where applicable, LWRSF, with assistance from the FFS Hydrology Section, will pursue funding to develop and implement wetland restoration projects. Additionally, cooperative research among FFS, other state agencies, and the federal government will provide valuable information in determining future management objectives of wetland restoration.

In January-February 2007, a Wetlands Restoration Needs Assessment was conducted for the Arbuckle and Prairie tracts by the Hydrology Section of the (former) Planning Resources and Support Services Bureau of the Florida Forest Service. This was the first formal assessment done by the Hydrology Section on any of the state forests. The process consisted of an on-the-ground inspection of road systems, water drainage structures, established man-made drainage systems, and natural wetland systems.

The state forest management team provided maps, aerial photos, road overlays and soil and topographical information, as well as a Garmin 76 CS handheld GPS instrument for use during the assessment. The Hydrology Section obtained historic documents, management plans, a vehicle, and other instruments and materials needed to conduct the assessment.

### **Arbuckle Tract - Summary of Recommendations** **(Listed in order of priority from highest to lowest)**

**1. Tram Road Area:** Provide mitigation opportunities for wetland enhancement in those areas where the Tram Road interrupts cutthroat seeps and is a barrier between those seeps and the

cutthroat flatwoods and wet prairies. Some existing culverts should be replaced; more should be added. In certain cases, ditch footprints may be restored by fill and planting; some sections need to be armored and stabilized with native vegetation to protect water quality.

**2. Cutthroat Grass Communities - Forest Roads:** Restoration in some areas may be accomplished by simply closing non-essential roads to all traffic to encourage the natural reestablishment of the cutthroat grass in the road footprint. Where soil structure or site integrity is impaired reconstruction may be necessary, using armoring materials suitable to the site and conditions (USFWS 1999). Any work done in these areas should be monitored for continued degradation caused by unauthorized vehicular traffic or failure, especially in areas of higher slope. Some areas may be suitable for mitigation purposes.

**3. Cutthroat Grass Communities - Firelines:** The greatest potential for degradation exists is where firelines tie into roads or ditches and channelized surface water carrying sediment may smother cutthroat grass communities (USFWS 1999). Nevertheless, this assessment recognizes that there is some risk to site degradation where lines run perpendicular to the slope or runs for long distances. Therefore, it is recommended that the LWRSF staff 'rehab' firelines through cutthroat grass communities as soon as possible after burns are complete.

**4. Livingston Creek at Forest Boundary NW Corner of Ruck's Dairy Property:** Due to the slopes adjacent to the creek, forest operations and fireline construction should follow Silviculture BMPs designed for steep topography. Since this area is a common corner with private landowners, FFS should take extra precautions to protect water quality in this area by stabilizing disturbed sites with native vegetation.

**5. McLean Cabin Pond:** The ditches that affect this site have been in place since the 1950s or 1960s (Nature Conservancy 1989). There is a short interpretive hiking trail encircling the main pond at this site, with a footbridge crossing over one of the ditches. Installing ditch plugs would restore hydroperiods of the pond closer to its natural regime and, to some extent, historic vegetative wetland species. If, however, restoration work is done in this manner, the hiking trail *may* need to be moved to drier ground.

**Prairie Tract - Summary of Recommendations**  
**(Listed in order of priority from highest to lowest)**

**1. Otter Slough – PROJECT COMPLETED IN 2010**

The major portion of this area was targeted for restoration and enhancement under the NRCS Wetland Reserve Program (WRP). The area to be affected by the project was approximately 550 acres. Program funding for the project lasted for seven (7) years and was completed in 2011. Other work may be done on the dyke system north of the citrus grove (west of Otter Slough) to restore hydrology and hydroperiod. However, nothing can be done unless there are assurances in place that any modifications to the dyke/canal system will not affect the citrus grove operation while it's under contract.

**2. Open Prairie areas south of the canal/dyke system**



Historical photos show these areas as open prairies which made the area attractive to cattle grazing. Since the dyke was installed, however, the hydroperiod has been extended unnaturally over several hundred acres. With the absence of regular growing season fires over the last decade or more, natural prairie communities in these areas have been affected by the encroachment of wax myrtle and other transition woody and herbaceous shrubs.

There are at least two private properties located to the east of this area that may be impacted by hydrological restoration activities on this part of the forest. Assurances should be made that there would be no off-site impacts as a result of activities conducted to satisfy recommendations 2 or 3 of this assessment.

### **3. Pastureland**

A series of ditches expedites drainage from the pasture fields in this part of the forest. If the FFS is going to continue to offer this area for use under cattle lease management, there is nothing to be done in terms of restoration except to monitor the site for degradation and non-native plant invasion.

There are at least two private properties located to the north and east of this area that may be impacted by hydrological restoration activities on this part of the forest. Assurances should be made that there would be no off-site impacts as a result of activities conducted to satisfy recommendations 2 or 3 of this assessment.

### **4. Culverts and Crossings Repair/Replacement**

Several of the culverts associated with the canal/dyke system need replacement, though it appears to function adequately well. At least one culvert under Kissimmee Shores Road is damaged and partially blocked and should be cleaned out. Also, the two low water crossings just south of the dyke/canal should be reinforced with rock if the management team intends to continue using them for access. The cattle crossings should be closely monitored for degradation and erosion on the canal banks, especially in the Otter Slough area where water quality protection should be a priority.

## **VII. Proposed Management Activities for Natural Communities**

In 2017, FNAI completed an inventory and natural community mapping project on LWRSF and a historic natural community type map was created [Exhibit S]. Current natural communities and cover types can be found in [Exhibit R]. Based on the 2017 FNAI survey, the total acreage mapped for historic and current natural communities at LWRSF is 118-119 acres over the actual total acreage for LWRSF at 26,579 acres. The total acreage based from the FNAI survey in 2017 is 26,696 acres in historic natural communities and 26,697 acres in current natural communities.

**Table 7. Natural Communities / Historical & Current Conditions**

Historical Natural Community Type (acres)	Historic Natural Community (acres)	Current Habitat Condition Status (acres*)				
		Intact and/or Desired Conditions Exist	Restoration Community (in progress)	Successional Hardwood Forest	Pine Plantations	Altered Other **
Basin Marsh	923	918	5			
Basin Swamp	189	180	9			
Baygall	2,771	2,730	143			8
Blackwater Stream	35	33	2			
Depression marsh	1,533	1,503	8			24
Dome Swamp	35	34	1			
Flatwoods Lake	28	28				
Floodplain Marsh	450	436	9			2
Floodplain Swamp	201	181	20			
Hydric Hammock	810	769	40			1
Mesic Flatwoods (including restoration)	6,060	2,471	1,333	2	6	1,952
Mesic Hammock	195	439	49			
Sandhill (including restoration areas)	3,806	761	2,091			123
Sandhill Upland Lake	3	3				
Scrub	3,201	2,088	1,001			107
Scrubby Flatwoods	1,694	1,436	92			146
Wet Flatwoods (including restoration areas)	4,531	1,670	2,700		28	27
Wet Prairie	231	172	2			56
Xeric Hammock	0	7	852			
<b>TOTAL</b>	<b>26,696</b>	<b>15,859</b>	<b>8,357</b>	<b>2</b>	<b>34</b>	<b>2,446</b>

\* Note rounding errors exist in “Current” category totals

\*\* See Table 8

\*\*\* Other altered land cover acres are based on shapefiles for historic natural communities and current natural communities provided by 2017 FNAI surveys.

While the acres shown above in Table 7 represent the status at the time of preparing this Ten-Year Management Plan, it is the goal of FFS over the next ten (10) years to increase the amount of forest communities (currently 15,859 acres) that can be considered to have achieved the desired condition. Therefore, the staff priority will be to focus the more intensive management efforts on the 8,357 acres described as “restoration communities”. This will primarily be accomplished through prescribed burning and efforts to control undesired hardwoods/pines in upland sandhill, scrub, mesic flatwoods, and wet flatwoods communities to historical or desired conditions.

Other altered landcover types occur on LWRSF that total approximately 2446 acres. Other altered landcover types at LWRSF are included as a guide (Table 8), which include 1413

acres of improved pasture, 175 acres of semi-improved pasture, 311 acres of roads, 24 acres classified as developed, 378 acres in agriculture (includes citrus grove), 24 acres of utility corridors, and 22 acres of cleared land.

**Table 8. Other Altered Landcover Types Found on LWRSF**

Altered Landcover Type*	Current Acres Mapped
Abandoned fields	49
Agriculture	378
Artificial Pond	5
Canal/Ditch	43
Clearing	22
Developed	24
Pasture-Improved	1,413
Pasture-Semi Improved	175
Roads	311
Successional hardwood forest	2
Utility corridors	24
TOTAL	2,446

\*Protocol as described in Appendix 2 of FNAI's "Guide to the Natural Communities of Florida", 2010 Edition.

For the purposes of this management plan, restoration is defined as the process of returning ecosystems to the appropriate structure and species composition, based on soil type. Management during this ten-year period will begin with a forest wide assessment of the fuel loading, timber densities, reforestation needs, and groundcover in order to develop a five-year comprehensive operational plan for prescribed burning and other operational plans across the forest. Strategies may include thinning of pine plantations, mowing or chopping in areas of heavy fuel buildup, application of both dormant and growing season fires, and/or the use of herbicides to control hardwoods and/or hardwood sprouting. Fire return intervals are included as a guide [Table 9] and may vary depending upon specific conditions. The intention is to use prescribed fire in a manner and frequency that will attain the desired goals. Per 2017 LMR Team recommendations [Exhibit U], prescribed fire frequency and timing is generally adjusted depending upon the conditions of the specific area.

**Table 9. Prescribed Fire Interval Guide on LWRSF**

Habitat Type	Historic Fire Return Intervals (years)**	LWRSF Fire Frequency Goal (Local)	Comments
Basin Marsh	1-10	1-10	
Basin Swamp	5 to 100+	5-100	
Baygall	1-3 each century	5-100+	Periphery for wet flatwoods - 1-4
Blackwater Stream	N/A	N/A	
Depression Marsh	1 to 8	1-8	
Dome Swamp	Periphery 3-5, interior 100+	3-5 Periphery, Interior 100+	
Flatwoods Lake	N/A	1-4 Periphery	Lake Godwin - Surrounded by wet flatwoods
Floodplain Marsh	1-5	1-5	Otter Slough – Prairie Tract
Floodplain Swamp	N/A	N/A	
Hydric Hammock	N/A	N/A	
Mesic Flatwoods	2-4, 1-4 on Prairie Tract	1-4	May vary based on silvicultural needs; Also, contained within cattle leased portions on Prairie Tract
Mesic Hammock	1-8	1-8	
Pasture-Improved	N/A	1-4	Cattle lease – Prairie Tract
Pasture-Semi-improved	N/A	1-4	Cattle lease – Prairie Tract Some mesic flatwoods previously mapped as dry prairie on Prairie Tract
Pine Plantation	2-4 mesic flatwoods 2 to 5 wet flatwoods	2-5	Mesic flatwoods and wet flatwoods historic NC. May vary based on silvicultural needs
Sandhill	1 to 3	3-8	
Sandhill Upland Lake	N/A	3-8	Dinner Lake on Babson Parcel
Scrub	Variable, 6 to 19	6-19	Includes 3 sub-scrub ecosystem types
Scrubby Flatwoods	3-8	3-10	
Wet Flatwoods	2-5	1-5	May vary based on silvicultural needs
Wet Prairie	2-3	1-3	
Xeric Hammock	sandhill 1 to 3 scrub 6 to 19	3-8 or 6-19	Sandhill/Scrub historic NCs

\*\* As suggested by FNAI

The following community descriptions, existing condition descriptions, and management recommendations are taken from a 2017 FNAI mapping project report and the Guide to the Natural Communities of Florida (FNAI 2010), as well as from the knowledge and experience gained by FFS during forest inventory efforts and routine field work on LWRSF.

To achieve the objectives outlined in this plan, the following management activities will be performed in the natural communities at LWRSF during the next ten-year planning period. Goals, desired conditions, standards, and guidelines provide management area direction. These goals and desired conditions may take many planning cycles to attain.

## A. Basin Marsh

### **Description:**

Basin marshes are generally large, regularly inundated freshwater herbaceous wetlands that occur within pyrogenic uplands or small to medium inclusions in baygalls and basin swamps. Species composition is varied both within and between marshes but can be divided into submersed, floating-leaved, emergent, and grassy zones from the deepest to shallowest portion.

At LWRSF, dominant vegetation in basin marshes includes maidencane (*Amphicarpum muhlenbergianum*), common carpetgrass (*Axonopus fissifolius*), sawgrass (*Cladium jamaicense*), southern umbrellasedge (*Fuirena scirpoidea*), Carolina redroot (*Lachnanthes caroliniana*), cutgrass (*Leersia hexandra*), maidencane (*Panicum hemitomon*) and yellow-eyed grass (*Xyris* sp). Less common forbs include sweetscent (*Pluchea odorata*), lemon bacopa (*Bacopa caroliniana*) and combleaf mermaidweed (*Proserpinaca pectinata*). Marsh edges contain shrubs like buttonbush (*Cephalanthus occidentalis*), peelbark St. John's wort (*Hypericum fasciculatum*) and wax myrtle (*Myrica cerifera*). Spatterdock (*Nuphar lutea*), American white waterlily (*Nymphaea odorata*) and pickerelweed (*Pontederia cordata*) are common in the deepest portion of basin marshes.

Florida sandhill crane (*Grus canadensis pratensis*), great blue heron (*Ardea herodias*), great egret (*Casmerodius albus*), little blue heron (*Egretta caerulea*), and bald eagle (*Haliaeetus leucocephalus*) are found in basin marshes at LWRSF.

Other wildlife in basin marsh include two-toed amphiuma (*Amphiuma means*), eastern lesser siren (*Siren intermedia intermedia*), greater siren (*Siren lacertina*), Florida cricket frog (*Acris gryllus dorsalis*), pig frog (*Rana grylio*), American alligator (*Alligator mississippiensis*), eastern mud snake (*Francia abacura abacura*), Florida banded water snake (*Nerodia fasciata pictiventris*) and green water snake (*Nerodia floridana*).

Fire maintains the open herbaceous community by restricting shrub invasion. Frequency of fire varies depends on the hydrology of the marsh and its exposure to fire from surrounding areas. The typical fire return interval is around 1-10 years with smaller marshes burning about every 1-3 years.

### **Current condition:**

Basin marshes occur on all tracts at LWRSF except for the Boy Scout parcel on the Hesperides tract. Most of the basin marshes within upland communities in the Arbuckle and WIW Tracts are in good condition, supporting a mostly treeless plain with woody shrubs and a dense groundcover of grasses and herbs.

The basin marshes that occur in the northwest portion and the center of the Arbuckle Tract are in good condition with sparse hardwood midstory encroachment and limited shrub invasion. Two (2) sizable basin marshes occur within basin swamp and baygall communities along Lake Arbuckle that are visible on 1941 aerial photographs. These marshes are currently being filled in by cypress and hardwoods from surrounding basin

swamp and baygall communities. Along the west portion of Lake Arbuckle and all other locations on the Arbuckle Tract, encroaching dominant overstory canopy tree species within these marshes that exist may include bald cypress (*Taxodium distichum*), South Florida slash pine (*Pinus elliottii* var. *densa*), loblolly bay (*Gordonia lasianthus*), sweetbay (*Magnolia virginiana*), red maple (*Acer rubrum*), swamp bay (*Persea palustris*), swamp tupelo (*Nyssa sylvatica* var. *biflora*), swamp laurel oak (*Quercus laurifolia*), and water oak (*Quercus nigra*). Most of these marshes in the north/southwest portion of Arbuckle and center of Arbuckle have pine and hardwood encroachment.

The large basin marshes in the WIW Tract occur as deep inclusions with sandhill and remain relatively open, with little to no pine, hardwood, or shrub encroachment. On the WIW Tract, the main overstory canopy tree species currently encroaching these marshes include South Florida slash pine (*Pinus elliottii* var. *densa*) and various native bay and oak species.

On the Prairie Tract, the basin marshes that occur along the Lake Kissimmee shoreline have been disturbed by cattle grazing and contain woody encroachment from adjacent mesic hammocks. This encroachment includes various oak species and other native understory shrubs.

**Management Needs:**

Prescribed fire will be periodically introduced into this natural community on a 1-10 year fire interval, generally by allowing fires from surrounding community types to burn into the marsh and extinguishing naturally. Prescribed fire will be not excluded, unless drought conditions create conditions for muck fires. Periodic burning will be used to keep woody vegetation from encroaching and help maintain native groundcover. Ground disturbance will be avoided when possible to prevent impact on hydrological processes and avoid the introduction of invasive plant species. Invasive species locations within these marshes will continue to be assessed for treatments on Arbuckle, WIW, and Prairie Tracts. All invasive treatments of these species will be monitored and reassessed as needed.

**B. Basin Swamp**

**Description:**

Basin Swamp is a large, forested, irregularly shaped wetland with hydrophytic trees and shrubs that can withstand an extensive hydroperiod. These swamps are generally large but also occur as small inclusions within non-pyrogenic communities like hydric hammock or along lake shorelines. Basin swamps at LWRSF have an open to moderately dense canopy dominated by red maple (*Acer rubrum*), bald cypress (*Taxodium distichum*), sweetgum (*Liquidambar styraciflua*), sweetbay (*Magnolia virginiana*), South Florida slash pine (*Pinus elliottii* var. *densa*) and swamp tupelo (*Nyssa sylvatica* var. *biflora*). In areas of transition to baygall or hydric hammock, loblolly bay (*Gordonia lasianthus*) and cabbage palm (*Sabal palmetto*) are common in the subcanopy. The sparse shrub cover is usually made up of common buttonbush (*Cephalanthus occidentalis*), dahoon (*Ilex cassine*), and scattered wax myrtle (*Myrica*

*cerifera*). Herbaceous cover is variable and includes toothed midsorus fern (*Blechnum serrulatum*), maidencane (*Panicum hemitomon*), lizard's tail (*Saururus cernuus*), hottentot fern (*Thelypteris interrupta*) and Virginia chain fern (*Woodwardia virginica*). Vines are occasional and include laurel greenbrier (*Smilax laurifolia*), eastern poison ivy (*Toxicodendron radicans*), and muscadine (*Vitis rotundifolia*). Southern needleleaf (*Tillandsia setacea*) and Spanish moss (*Tillandsia usneoides*) are common epiphytes typically growing on cypress trees.

Wildlife species found in basin swamps at LWRSF include little grass frog (*Pseudacris ocularis*), striped mud turtle (*Kinosternon baurii*), Florida cottonmouth (*Agkistrodon piscivorus conanti*), black bear (*Ursus americanus*), hawks, raccoon, and white-tailed deer. Fire intervals are highly variable, ranging from 5-100+ years. Fire frequency depends on such factors as dominant vegetation, fire exposure, and drought. The lowest portions of basin swamps rarely, if ever, burn. Graminoid-dominated ecotones and the more open-canopied variation burn in conjunction with the adjacent uplands, and these may burn as frequently as every 2-5 years.

#### **Current Condition:**

Basin swamps at LWRSF occur on the Arbuckle Tract along the Lake Arbuckle shoreline, on the WIW Tract south of the mouth of Tiger Creek, and on the Hesperides Tract bordering the eastern edge of the large baygall community. Most of the basin swamps grade into hydric hammock or baygall communities. Basin swamps on LWRSF are generally in good condition.

Old World climbing fern (*Lygodium microphyllum*) has been treated in basin swamp along the shoreline of Lake Arbuckle on the Arbuckle Tract. Primrose willow (*Ludwigia peruviana*), Caesar's weed (*Urena lobata*), and water hyacinth (*Eichhornia crassipes*) also occur within this same area on the Arbuckle Tract, but are not currently prioritized for treatment.

Part of the basin swamp south of the mouth of Tiger Creek borders a residential community, and several species of invasive plants occur including cogon grass (*Imperata cylindrica*), air potato (*Dioscorea bulbifera*), Brazilian pepper (*Schinus terebinthifolius*) and coral ardisia (*Ardisia crenata*), have been treated by FFS staff. Para grass (*Urochloa mutica*) and primrose willow (*Ludwigia peruviana*) are also present within this area on WIW, but are not currently prioritized for treatment. Cogon grass has been found and treated in a small section of basin swamp that occurs along the transition area between wet flatwoods/mesic flatwoods on the Hesperides Tract.

#### **Management Needs:**

Maintaining historic hydrological regimes and limiting off road vehicle traffic from the edge are a recommended focus for forest management in all basin swamps on LWRSF. When possible, occasional prescribed fires will be allowed to burn into basin swamps and extinguish naturally when burning adjacent natural communities to maintain the cypress component, as swamp tupelo and hardwoods dominate basin swamps that burn less often. The expected fire return interval is between 5-100+ years for these swamps.

Native cypress and pines are tolerant of light surface fires, but muck-fires burning into the peat layer can kill these trees and lower the ground surface, possibly transforming the swamp into a lake, pond, or basin marsh. Careful attention must be paid to low-lying ecotones throughout so as not to negatively affect sensitive species.

Non-native invasive plant species will continue to be searched for, monitored, and treated. If timber harvests are planned that border these swamps on Arbuckle within adjacent natural communities, FFS will continue to follow all Silviculture BMPs and will occur when conditions are suitable for timber harvest operations.

### C. Baygall

#### **Description:**

Baygall is characterized as a closed canopy, forested wetland that may develop at the bases of slopes with seepage from surrounding uplands, or in basins where high water tables maintain saturated conditions. Deep peat soils and seepage from uplands or adjacent wetlands work to maintain a constantly saturated but rarely flooded environment. Baygall at LWRSF typically has a dense canopy of loblolly bay (*Gordonia lasianthus*), red maple (*Acer rubrum*), sweet bay (*Magnolia virginiana*) and South Florida slash pine (*Pinus elliotii* var. *densa*). Subcanopy species include common persimmon (*Diospyros virginiana*), dahoon (*Ilex cassine*), swamp bay (*Persea palustris*), swamp laurel oak (*Quercus laurifolia*) and water oak (*Quercus nigra*). Dominant shrub species include fetterbush (*Lyonia lucida*) and wax myrtle (*Myrica cerifera*). Occasional shrub species include American beautyberry (*Callicarpa americana*), common buttonbush (*Cephalanthus occidentalis*), swamp dogwood (*Cornus foemina*), sawtooth blackberry (*Rubus pensilvanicus*), elderberry (*Sambucus nigra* ssp. *canadensis*), and highbush blueberry (*Vaccinium corymbosum*). Gallberry (*Ilex glabra*) and saw palmetto (*Serenoa repens*) are common shrubs in baygall areas bordering flatwoods.

Herbaceous cover is generally sparse to moderate. Common herbaceous species include toothed midsorus fern (*Blechnum serrulatum*), cinnamon fern (*Osmunda cinnamomea*), and Virginia chain fern (*Woodwardia virginica*). Occasional herbs may include woodoats (*Chasmanthium* spp.), wild Boston fern (*Nephrolepis exaltata*), goldenclub (*Orontium aquaticum*), royal fern (*Osmunda regalis* var. *spectabilis*), and common arrowhead (*Sagittaria latifolia*). Cutthroat grass (*Panicum abscissum*) may be present in a narrow band in areas where baygall borders uplands. Vines are common and diverse, including Virginia creeper (*Parthenocissus quinquefolia*), several greenbrier species (*Smilax* spp.), eastern poison ivy (*Toxicodendron radicans*), and muscadine (*Vitis rotundifolia*). Occasional epiphytes include southern needleleaf (*Tillandsia setacea*) and Spanish moss (*Tillandsia usneoides*). Several of the large baygall swamps on the southern half of Arbuckle have populations of toothed lattice-vein fern (*Thelypteris serrata*), a species endangered in the state of Florida.

Baygall on LWRSF provides important habitat for wildlife species such as striped mud turtle (*Kinosternon baurii*), pig frog (*Rana grylio*), ringneck snake (*Diadophis punctatus punctatus*), scarlet kingsnake (*Lampropeltis triangulum elapsoides*),



cottonmouth (*Agkistrodon piscivorus conanti*) wood duck (*Aix sponsa*), great horned owl (*Bulbo virginianus*), barred owl (*Bubo virginianus*), pileated woodpecker (*Dryocopus pileatus*), black bear (*Ursus americanus*), bobcat (*Felis rufus*), songbirds, racoon, river otter, and white-tailed deer.

Baygall burns infrequently, perhaps only a few times each century in the deepest baygalls. Fire will occasionally burn through narrow baygalls often associated with seepage streams, or will burn into the edge of large basins and extinguish naturally. Although the saturated soils and humid conditions within baygalls typically inhibit fire, droughts may create conditions that allow them to burn catastrophically. These fires may destroy the canopy and may also ignite the deep peat layers that can smolder for weeks, or even months.

**Current Condition:**

Baygall is a major component of LWRSF and present on all tracts. Most of these baygall communities are in good condition. On the Arbuckle Tract, some baygall are smaller in acreage, mapped as an inclusion in some of the hydric hammocks, as the two (2) communities grade into each other. Two (2) large mature forests of baygall occur in the southern half of the Arbuckle Tract. In some areas, baygall vegetation is expanding into transition areas which grade into wet flatwoods. This expansion is noticeably visible in the two large baygall communities on the southern half of the Arbuckle Tract, where the baygall depressions have expanded into the adjacent wet flatwoods, when comparing current aerials to 1941 aerial photography. Large baygall occur on the southwest portion of the WIW Tract, along the eastern boundary of the WIW Tract that borders Lake Weohyakapka, and in a large section northeast of the Babson parcel on Hesperides Tract. Smaller baygall occur on the Boy Scout parcel on the Hesperides Tract and the Prairie Tract. Many of the baygall on LWRSF have been susceptible to a variety of invasive species. Many of the baygall areas are being treated for Old World climbing fern (*Lygodium microphyllum*), especially the large baygall along Lake Arbuckle and the southern portions of the Arbuckle Tract.

On the WIW Tract, a baygall near the mouth of Tiger Creek bordering residential homes near Lake Weohyakapka contains several invasive plant species currently being treated. They include coral ardisia (*Ardisia crenata*), Caesar's weed (*Urena lobata*), wedelia (*Sphagneticola trilobata*), cogongrass (*Imperata cylindrica*), and smutgrass (*Sporobolus poiretii*). On the Prairie Tract, several baygall sites are being treated primarily for Old World climbing fern and strawberry guava (*Psidium cattleianum*).

**Management Needs:**

Maintain rough historic boundaries between baygall and adjacent communities by maintaining open edges between baygall and surrounding communities. This may prevent the gradual expansion of the baygall community into adjacent communities. The fire return interval that is typical for baygall is between 5-100+ years, though surrounding flatwoods or other community types may be burned on a 1-4 year fire return interval. During any suitable burning conditions, fires from adjacent communities will be allowed to burn into the edges of baygall to prevent encroachment

of bay species into other communities and to maintain open, grassy wetland/upland ecotones. Bordering cutthroat grass (*Panicum abscissum*) bands should burn regularly to prevent coverage by woody vegetation. Staff will continue to search for, treat, and monitor large, problematic areas of invasive plant species, as well as pursue funding for treatment. Treatment will be needed for a sizable infestation of Old World climbing fern (*Lygodium microphyllum*) in the large baygall in the southern half of the Arbuckle Tract. Mechanical soil disturbance should be avoided in ecotones between baygall and adjacent uplands.

#### **D. Blackwater Stream**

##### **Description:**

Blackwater streams are perennial or intermittent watercourses that typically flow through forested communities. Tannins derived from swamps and marshes cause the water to be dark brown and often acidic. Blackwater streams are mostly free of vegetation except for occasional emergent herbs. At LWRSF, emergent vegetation may occur along the shallower and slower moving sections of the stream. Typical plants include smartweed (*Polygonum spp.*), sedges (*Cyperus spp.*) and grasses. The adjacent canopy is composed of hydric hammock, floodplain swamp, or mesic hammock species such as red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), cabbage palm (*Sabal palmetto*), swamp laurel oak (*Quercus laurifolia*), swamp tupelo (*Nyssa sylvatica* var. *biflora*), South Florida slash pine (*Pinus elliottii* var. *densa*), and live oak (*Quercus virginiana*). Fire is not a component of this community.

##### **Current Condition:**

Blackwater streams at LWRSF are delineated from Livingston and Reedy Creeks on the Arbuckle Tract and from Tiger Creek on the WIW Tract. Some portions of blackwater streams on the Arbuckle Tract cannot be delineated under the dense canopy cover. These streams are identified as inclusions in the adjacent forested community.

The blackwater streams at LWRSF are generally in good condition. There is presence and active treatment of several invasive plants, especially Old World climbing fern (*Lygodium microphyllum*) and cogongrass (*Imperata cylindrica*) along all blackwater streams at LWRSF. Other invasive plants, like Peruvian primrosewillow (*Ludwigia peruviana*) and water hyacinth (*Eichhornia crassipes*) occur on the Arbuckle and WIW Tracts.

##### **Management Needs:**

Management will focus on maintaining natural hydrologic patterns and monitoring water quality. The search, treatment, and monitoring of invasive plant/aquatic species will continue within blackwater streams on LWRSF. Future planning for roads, fire lines, and trails that traffic through these communities should be kept to a minimum and are not recommended. Road maintenance and fire line installation will follow the guidelines in the Silviculture BMP manual.

## **E. Depression Marsh**

### **Description:**

Depression marshes are isolated, non-forested wetlands found in small, shallow depressions that are imbedded in a pyrogenic matrix community. These marshes typically have concentric zones of vegetation related to the length of hydroperiod and depth of flooding. Depression marshes are distinguished from basin marshes principally by their landscape position which subjects them to more frequent fires. Trees and shrubs are generally sparse or absent and the herbaceous layer is moderate to dense. Depression marshes on LWRSF generally have an absent canopy, but may include occasional South Florida slash pine (*Pinus elliottii* var. *densa*), swamp tupelo (*Nyssa sylvatica* var. *biflora*), and pond cypress (*Taxodium ascendens*). Shrubs are sparse and may include (*Cephalanthus occidentalis*), peelbark St. John's wort (*Hypericum fasciculatum*), dahoon (*Ilex cassine*), gallberry (*Ilex glabra*), fetterbush (*Lyonia lucida*), wax myrtle (*Myrica cerifera*) and coastal plain willow (*Salix caroliniana*). Depression marshes that are surrounded by sandhill or scrub communities (mostly on the WIW Tract) often have a thin outer edge of saw palmetto (*Serenoa repens*) between the marsh and surrounding uplands.

Herbs are generally dense in depression marshes. The outer zones contain a rich diversity of herbs that include blue maidencane (*Amphicarpum muhlenbergianum*), shortspike bluestem (*Andropogon brachystachyus*), purple bluestem (*Andropogon glomeratus* var. *glaucopsis*), bluestem, big carpetgrass (*Axonopus furcatus*), lemon bacopa (*Bacopa caroliniana*), smallfruit beggarticks (*Bidens mitis*), witchgrasses (*Dichantheium spp.*), pink sundew (*Drosera capillaris*), flattened pipewort (*Eriocaulon compressum*), tenangle pipewort (*Eriocaulon decangulare*), dogfennel (*Eupatorium capillifolium*), yankeeweed (*Eupatorium compositifolium*), southern umbrellasedge (*Fuirena scirpoidea*), marshpennywort (*Hydrocotyle spp.*), slimpod rush (*Juncus diffusissimus*), soft rush (*Juncus effusus solutus*), Carolina redroot (*Lachnanthes caroliniana*), whitehead bogbutton (*Lachnocaulon anceps*), southern cutgrass (*Leersia hexandra*), turkey tangle fogfruit (*Phyla nodiflora*), rosy camphorweed (*Pluchea baccharis*), rustweed (*Polypremum procumbens*), combleaf mermaidweed (*Proserpinaca pectinata*), beaksedges (*Rhynchospora spp.*), largeflower rosegiant (*Sabatia grandiflora*), sand cordgrass (*Spartina bakeri*), yellow hatpins (*Syngonanthus flavidulus*), Virginia chain fern (*Woodwardia virginica*), and Elliott's yellow-eyed grass (*Xyris elliottii*). The innermost zones are typically occupied by sawgrass (*Cladium jamaicense*), yellow pondlily (*Nuphar advena*), floatingheart (*Nymphoides spp.*), maidencane (*Panicum hemitomon*), pickerelweed (*Pontederia cordata*), and grassy arrowhead (*Sagittaria graminea*).

Depression marshes on LWRSF are considered extremely important in providing breeding and foraging habitat for wildlife like gopher frog (*Rana capito*), cricket frog (*Acris gryllus dorsalis*), oak toad (*Bufo quercicus*), pine woods treefrog (*Hyla femoralis*), barking treefrog (*Hyla gratiosa*), squirrel treefrog (*Hyla squirella*), white ibis (*Eudocimus albus*), tricolored heron (*Egretta tricolor*), Florida sandhill crane (*Grus canadensis pratensis*), wood stork (*Mycteria americana*), white ibis (*Eudocimus albus*), and great blue heron (*Ardea herodias*).

Frequency of fire is dependent on the fire return interval of the surrounding community. Depression marshes likely burned irregularly every 1-8 years depending on water levels at the time of fires on the landscape. Prescribed fires will limit hardwood encroachment and peat buildup, while encouraging herbaceous growth in depression marshes.

**Current Condition:**

There are numerous depression marshes on all four (4) tracts at LWRSF. Most of these are in good condition with little woody plant encroachment. Most notably, the depression marshes on the WIW Tract are situated between some of the largest contiguous rolling sandhill community, in an unusual hill and swale topography. On the Arbuckle Tract, depression marshes occur within a matrix of scrubby flatwoods, scrub, and mesic and wet flatwoods.

**Management Needs:**

Applying prescribed fire in surrounding communities when water in the marshes is low or absent will allow fires to burn through the marsh to suppress the establishment of shrubs or pines. Fire return intervals for these marshes will be on a 1-8 year rotation. Depression marshes with substantial shrub cover (either within the marsh or surrounding edges) should be targeted for repeated lightning season fires on a short return interval. Off road vehicle trails through marshes should be eliminated wherever possible. Invasive plant species will continue to be searched for, monitored, and treated when located.

**F. Dome Swamp**

**Description:**

Dome swamps are isolated, shallow, forested wetland basins that are imbedded in a pyrogenic matrix community. These swamps have domed profiles resulting from smaller trees growing around the edges and larger trees growing in the interior. The peat soils are thickest toward the center and are generally underlain with acidic soils and a limestone layer. Dome swamps are distinguished from basin swamps principally by their often more circular shape, smaller size, and higher historical fire frequency due to landscape position. Dome swamps usually have a diverse herbaceous ecotone with the surrounding pine dominated community, created through frequent fires that extinguish naturally along the edge of the dome. Dome swamps are infrequent on LWRSF. The canopy is dominated by pond cypress (*Taxodium ascendens*), with occasional South Florida slash pine (*Pinus elliottii* var. *densa*) and swamp tupelo (*Nyssa sylvatica* var. *biflora*). The subcanopy is made up of young pond cypress and bald cypress (*Taxodium distichum*), dahoon holly (*Ilex cassine*), sweetbay (*Magnolia virginiana*), and swamp bay (*Persea palustris*).

Shrubs are generally sparse to moderate and include common buttonbush (*Cephalanthus occidentalis*), sandweed (*Hypericum fasciculatum*), wax myrtle (*Myrica cerifera*), and fetterbush (*Lyonia lucida*). The groundcover includes a wide variety of ferns, graminoids, and herbs that include a mixture of Virginia chain fern (*Woodwardia virginica*), soft rush (*Juncus effusus solutus*), smartweed (*Polygonum*

spp.), broadleaf cattail (*Typha latifolia*), smallfruit beggarticks (*Bidens mitis*), maidencane (*Panicum hemitomon*), toothed midsorus fern (*Blechnum serrulatum*), and ten-angled pipewort (*Eriocaulon decangulare*). Vines and epiphytes are occasional and include laurel greenbrier (*Smilax laurifolia*) and Spanish moss (*Tillandsia usneoides*).

Domes swamps provide important roosting sites for wading birds like white ibis (*Eudocimus albus*) and wood stork (*Mycteria americana*). Fire is necessary for the maintenance of a cypress dome. Hardwood invasion (commonly by bay species) and peat accumulation can convert the dome swamp to baygall without fire. The fire frequency is greatest at the periphery of the dome swamp where a normal fire cycle might be as short as 3-5 years, while the fire cycle for the interior portions where moisture is greater could be as long as 100 years.

**Current Condition:**

There are several locations of dome swamps on the Arbuckle Tract, WIW Tract, and on the Prairie Tract at LWRSF. These dome swamps are in fair to good condition. There is limited woody encroachment into the dome swamps. The dome swamp in the center of the WIW Tract is in good condition and features a mature canopy of cypress encircled by diverse herbaceous cover. Some shrubs like wax myrtle (*Myrica cerifera*) and fetterbush (*Lyonia lucida*) on the outer edges of this dome swamp may be becoming too dense or reaching subcanopy size. There is a small dome swamp on the Prairie Tract that is in good condition. Old World climbing fern (*Lygodium microphyllum*), strawberry guava (*Psidium cattleianum*), and cogongrass (*Imperata cylindrica*) have been found and are being treated within dome swamps.

**Management Needs:**

The existing dome swamps are not planned to be harvested and are to be kept intact through following the Silviculture BMPs. All of the existing dome swamps will burn along with the surrounding community types on a 3-5 year fire return interval, but the interior may not burn for as long as 100+ years. Prescribed fire within dome swamps will be conducted at a time when water is low or absent. Occasional fires into the swamps are necessary to maintain the cypress as the dominant components. Cypress is very tolerant of light surface fires, but muck fires burning into the underlying peat can kill the existing native tree species within the dome swamp. Invasive plant species will continue to be searched for, monitored, and treated when located.

**G. Flatwoods Lake**

**Description:**

A flatwoods lake is a permanent water body surrounded mostly by flatwoods. These lakes may have a border of wet prairie-like vegetation or a dense ring of saw palmetto and other shrubs. Water is derived mostly through runoff from surrounding uplands. On LWRSF, flatwoods lake has a grassy outer edge of maidencane (*Panicum hemitomon*), sand cordgrass (*Spartina bakeri*), purple bluestem (*Andropogon glomeratus* var. *glaucopsis*), smallfruit beggarticks (*Bidens mitis*), pickerelweed (*Pontederia cordata*), and Virginia chain fern (*Woodwardia virginica*). Yellow

pondlily (*Nuphar advena*) occurs in the deeper floating-leaved zone. Fires from surrounding uplands should be allowed to burn into the lake and extinguish naturally.

**Current Conditions:**

The Arbuckle Tract contains the only flatwoods lake community on LWRSF, also known as Lake Godwin. This lake is in the central portion of the tract. Aquatic invasive plants have not been problematic in Lake Godwin in the past, however, burhead sedge (*Oxycaryum cubense*) has recently been located within the lake. Eradication of other invasive plants in recent years have helped to restrict cogongrass (*Imperata cylindrica*) and Old World climbing fern (*Lygodium microphyllum*) around the edges of this lake.

**Management Needs:**

Flatwoods lakes function as aquifer recharge areas by acting as reservoirs that release groundwater when adjacent water tables drop during periods of drought. Hydrological alteration through ditching or canals should be avoided. Prescribed fires from surrounding uplands will be allowed to burn into the lake on a 1-4 year fire return interval and extinguish naturally. Invasive plant species will continue to be searched for, monitored, and treated when located.

**H. Floodplain Marsh**

**Description:**

Floodplain marshes are freshwater, non-forested wetlands that occur along stream floodplains. These marshes are directly influenced by river flooding on an annual or semi-annual basis. Floodplain marshes are typically underlain by sand, or a thin to thick organic layer over sand and may be saturated for most of the year. Trees are generally sparse or absent and shrubs are generally sparse, but may form thickets in wetter areas. The highest part of the marsh is often a drier, wetter prairie-like zone with a diversity of graminoids and forbs. While the progression from high to low marsh occurs generally from the upland edge to the stream edge, these vegetation patches may also be scattered throughout the marsh, which provides a diversity of habitats beneficial to wildlife. The herbaceous layer is moderate to dense, with species composition varying by flooding depth and duration. On the LWRSF floodplain marsh, trees are infrequent and include red maple (*Acer rubrum*), dahoon (*Ilex cassine*), and swamp tupelo (*Nyssa sylvatica* var. *biflora*). Shrubs are generally sparse and include buttonbush (*Cephalanthus occidentalis*), groundsel tree (*Baccharis halimifolia*), myrtleleaf St. John's wort (*Hypericum myrtifolium*), wax myrtle (*Myrica cerifera*), and Carolina willow (*Salix caroliniana*).

Herbs are moderate to dense and include blue maidencane (*Amphicarpum muhlenbergianum*), purple bluestem (*Andropogon glomeratus* var. *glaucoopsis*), big carpetgrass (*Axonopus furcatus*), lemon bacopa (*Bacopa caroliniana*), spadeleaf (*Centella asiatica*), sawgrass (*Cladium jamaicense*), yellow pondlily (*Nuphar advena*), maidencane (*Panicum hemitomon*), pickerel weed (*Pontederia cordata*), dotted smartweed (*Polygonum punctatum*), pale meadowbeauty (*Rhexia mariana*), shortbristle horned beaksedge (*Rhynchospora corniculata*), largeflower rosegiantian

(*Sabatia grandiflora*), lanceleaf arrowhead (*Sagittaria lancifolia*), common arrowhead (*Sagittaria latifolia*), sand cord grass (*Spartina bakeri*), and Elliott's yellow-eyed grass (*Xyris elliotii*). Floodplain marshes are important habitat for limpkin (*Aramus guarauna*), bald eagle (*Haliaeetus leucocephalus*), little blue heron (*Egretta caerulea*), and tricolored heron (*Egretta tricolor*).

Floodplain marshes typically burn naturally on a 1-5 year cycle depending on water depth, with deeper marshes burning every 3-5 years, and shallow marshes burning every 1-3 years. Fires maintain an open herbaceous community by restricting the invasion of shrubs. Lengthy, catastrophic fires may occur during drought periods as a result of long-term accumulation of a thick layer of peat.

**Current Condition:**

Floodplain marsh occurs largely on the Prairie Tract along the creek flowing into Lake Kissimmee. A small area of floodplain marsh occurs on the Arbuckle Tract along Reedy Creek. On the Prairie Tract, the floodplain marsh has been impacted by cattle grazing and previous ownership with an installation of ditches, canals, and elevated roads that connects to the active citrus grove on the tract. Invasive species like Old World climbing fern (*Lygodium microphyllum*), Japanese climbing fern (*Lygodium japonicum*), and cogongrass (*Imperata cylindrica*) occur on the outside edges of the floodplain marsh on the Prairie Tract and are continually treated by FFS staff. Aquatic invasive species include burhead sedge/Cuban bulrush (*Oxycaryum cubense*), water hyacinth (*Eichhornia crassipes*), and water-lettuce (*Pistia stratiotes*). These species occur within the canal/ditch system and are being treated throughout the floodplain marsh on the Prairie Tract.

**Management Needs:**

Fire suppression or burning only during winter months when the marsh holds water allows establishment of shrubs or trees. This may eventually reduce the hydroperiod and lead to succession of the community to baygall or dome swamp. Fire should be prescribed in the surrounding community at a time when water in the marsh is low or absent (late winter to mid-summer), allowing fires to burn through the marsh. Fire return intervals for floodplain marshes should be 1-5 years. Marshes with substantial shrub cover (either within the marsh or surrounding edges) should be targeted for repeated lightning season fires on a short return interval. Periodic monitoring and treatment of non-native invasive plants along canals/ditches that run along the floodplain marsh community is important, as well as treatment of invasive plants on the periphery of marshes to avoid the spread into surrounding communities. Minimizing cattle disturbance and restoring a more natural hydrologic regime will be continued in this marsh.

**I. Floodplain Swamp**

**Description:**

Floodplain swamp is a closed-canopy forest of hydrophytic trees occurring on frequently or permanently flooded hydric soils adjacent to stream and river channels. There is generally a closed canopy of bald cypress and a varying abundance of shrubs

and groundcover that includes flood tolerant ferns and herbs. On LWRSF, there is a closed canopy of bald cypress (*Taxodium distichum*) and swamp tupelo (*Nyssa sylvatica* var. *biflora*) with occasional red maple (*Acer rubrum*), and swamp laurel oak (*Quercus laurifolia*). Subcanopy species include common persimmon (*Diospyros virginiana*), Carolina ash (*Fraxinus caroliniana*), swamp bay (*Persea palustris*), and cabbage palm (*Sabal palmetto*). Shrubs are generally sparse and include wax myrtle (*Myrica cerifera*), buttonbush (*Cephalanthus occidentalis*), and young canopy species.

Herbs are sparse to moderate and include toothed midsorus fern (*Blechnum serrulatum*), false nettle (*Boehmeria cylindrica*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis* var. *spectabilis*), savannah panicum (*Phanopyrum gymnocarpon*), pickerelweed (*Pontederia cordata*), millet beaksedge (*Rhynchospora miliacea*), lizard's tail (*Saururus cernuus*), alligatorflag (*Thalia geniculata*), and netted chain fern (*Woodwardia areolata*). Epiphytes are common and include golden polypody (*Phlebodium aureum*), southern needleleaf (*Tillandsia setacea*), and Spanish moss (*Tillandsia usneoides*). Balbis' airplant (*Tillandsia balbisiana*) and spreading airplant (*Tillandsia utriculata*), two state listed epiphytes, are found growing on cypress trees, red maple, and Carolina ash in the large floodplain swamp along Arbuckle Creek.

This community is generally too wet to carry fire, so fire is not necessary to maintain floodplain swamp. When floodplain swamps experience drought, fires may occur and can cause damage to the understory.

**Current Condition:**

On LWRSF, floodplain swamp occurs on the south end of Lake Arbuckle, along Arbuckle Creek. Some portions of hydric hammock along Livingston Creek in the Arbuckle Tract and along Tiger Creek in the WIW Tract contain inclusions of floodplain swamp. The large floodplain swamp along Arbuckle Creek is in excellent condition. Several invasive plant species have encroached in the floodplain swamp, particularly Old World climbing fern (*Lygodium microphyllum*), cogongrass (*Imperata cylindrica*), and tropical soda apple (*Solanum viarum*).

**Management Needs:**

Natural hydrology will be maintained to keep floodplain swamps in good condition and hydrological alterations will be avoided. Management activities will include searching for, treating, and monitoring for invasive plant species.

**J. Hydric Hammock**

**Description:**

Hydric hammock is a low-lying, evergreen hardwood and/or palm forest that is periodically flooded. Species composition varies but generally the community has a closed canopy of oaks and palms, an open understory, and sparse to moderate groundcover of grasses and ferns. On LWRSF, hydric hammock typically contains a diverse canopy of mature trees. Cabbage palm (*Sabal palmetto*) is common in most strata and give the area a tropical look. Swamp tupelo (*Nyssa sylvatica* var. *biflora*),



sweetgum (*Liquidambar styraciflua*), sweet bay (*Magnolia virginiana*), South Florida slash pine (*Pinus elliottii* var. *densa*), swamp laurel oak (*Quercus laurifolia*), water oak (*Quercus nigra*), and live oak (*Quercus virginiana*) also occur as dominant trees. The subcanopy includes dahoon (*Ilex cassine*), red maple (*Acer rubrum*), common persimmon (*Diospyros virginiana*), swamp bay (*Persea palustris*), and cabbage palm (*Sabal palmetto*). Shrubs include common buttonbush (*Cephalanthus occidentalis*), wax myrtle (*Myrica cerifera*), and viburnum (*Viburnum obovatum*).

Herbs are sparse to moderate and include toothed midsorus fern (*Blechnum serrulatum*), fireweed (*Erechtites hieraciifolius*), perfumed spiderlily (*Hymenocallis latifolia*), cinnamon fern (*Osmunda cinnamomea*), green arum (*Peltandra virginica*), narrowfruit horned beaksedge (*Rhynchospora inundata*), lizard's tail (*Saururus cernuus*), hottentot fern (*Thelypteris interrupta*), netted chain fern (*Woodwardia areolata*), and Virginia chain fern (*Woodwardia virginica*). Epiphytes commonly include resurrection fern (*Pleopeltis polypodioides* var. *michauxiana*), southern needleleaf (*Tillandsia setacea*), and Spanish moss (*Tillandsia usneoides*). Florida butterfly orchid (*Encyclia tampensis*) and common wild-pine (*Tillandsia fasciculata*) are occasional, rare epiphytes throughout the hydric hammocks. Fires are rare in hydric hammock due to generally saturated soils and lack of flammable groundcover. Fire is not required to maintain this community.

**Current Condition:**

On LWRSF, hydric hammocks occur along Reedy and Livingston Creeks on the Arbuckle Tract and along Tiger Creek on the WIW Tract. These hammocks are generally in good condition with a diverse mature canopy. Floodplain swamp inclusions are common in the hydric hammock along Livingston Creek and Tiger Creek, where swamp tupelo (*Nyssa sylvatica* var. *biflora*) is the dominant canopy species. On the southwest portion of the Arbuckle Tract, hydric hammock runs through a large expanse of baygall along Isabel Creek (grassy creek). These two (2) communities grade into each other in this location and are difficult to distinguish from aerial photography. Mesic hammocks also are common inclusions in hydric hammock, especially along Tiger Creek, where adjacent mesic hammocks have developed from historic mesic flatwoods.

There is occurrence and treatment of invasive plant species along portions of hydric hammock community on LWRSF. Old World climbing fern (*Lygodium microphyllum*) and cogongrass (*Imperata cylindrica*) are the most problematic along all hydric hammock. The portion of hydric hammock to the east of WIW Road, bordering residential homes and Lake Weohyparka, is being treated for several invasive plants such as coral ardisia (*Ardisia crenata*) and Caesar's weed (*Urena lobata*).

**Management Needs:**

Management activities should prioritize searching for, treating, and monitoring invasive plant species along hydric hammocks on LWRSF. The maintenance of a natural hydrologic regime is critical to the health of hydric hammock. Roads crossing

the hammock should have adequate culverts to allow normal water flow. The hydric hammock will be allowed to naturally revegetate areas where it has been cleared.

#### **K. Mesic Flatwoods (Including restoration areas)**

##### **Description:**

Mesic flatwoods are forests of longleaf pine (*Pinus palustris*) and South Florida slash pine (*Pinus elliottii* var. *densa*), which are generally more present in wetter areas (wet flatwoods). There is little to no subcanopy, very few tall shrubs, and a moderate to dense ground cover of herbs and short shrubs. Moderate to dense groundcover of short shrubs and herbs help to maintain community structure by fueling prescribed fires. The ecotone between mesic flatwoods and wetland communities is an important area for many rare species and is maintained with frequent, low-intensity, growing season fires. Soils are mainly in the spodosol family, bearing a spodic horizon (i.e., a clay hardpan) that develops under poorly drained conditions. These low pH soils are characterized by low levels of nutrients and organic matter.

Typical mesic flatwoods at LWRSF has a canopy of natural or planted slash pine (*Pinus elliottii*), South Florida slash pine (*Pinus elliottii* var. *densa*), and/or longleaf pine (*Pinus palustris*). The shrub layer is dominated by saw palmetto (*Serenoa repens*), however gallberry (*Ilex glabra*), coastalplain staggerbush (*Lyonia fruticosa*), fetterbush (*Lyonia lucida*), and dwarf live oak (*Quercus minima*) also are common. Occasional shrubs include bigflower pawpaw (*Asimina obovata*), netted pawpaw (*Asimina reticulata*), tarflower (*Bejaria racemosa*), American beautyberry (*Callicarpa americana*), dwarf huckleberry (*Gaylussacia dumosa*), blue huckleberry (*Gaylussacia frondosa* var. *tomentosa*), roundpod St. John's wort (*Hypericum cistifolium*), Atlantic St. John's wort (*Hypericum tenuifolium*), sensitive briar (*Mimosa quadrivalvis*), wax myrtle (*Myrica cerifera*), pricklypear (*Opuntia humifusa*), winged sumac (*Rhus copallinum*), sawtooth blackberry (*Rubus pensilvanicus*), Darrow's blueberry (*Vaccinium darrowii*), and shiny blueberry (*Vaccinium myrsinites*). Sand live oak (*Quercus geminata*) is common in areas where mesic flatwoods grades into scrubby flatwoods and/or scrub.

Wiregrass (*Aristida stricta*) is a substantial component of the herbaceous layer in addition to a high diversity of grasses and forbs including shortspike bluestem (*Andropogon brachystachyus*), bottlebrush threeawn (*Aristida spiciformis*), big carpetgrass (*Axonopus furcatus*), coastalplain chaffhead (*Carphephorus corymbosus*), witchgrasses (*Dichanthelium* spp.), tall elephantsfoot (*Elephantopus elatus*), dogfennel (*Eupatorium capillifolium*), roundleaf thoroughwort (*Eupatorium rotundifolium*), slender flattop goldenrod (*Euthamia caroliniana*), Elliott's milkpea (*Galactia elliottii*), blazing star (*Liatris* spp.), narrowleaf silkgrass (*Pityopsis graminifolia*), bracken fern (*Pteridium aquilinum*), blackroot (*Pterocaulon pycnostachyum*), little bluestem (*Schizachyrium scoparium*), whip nutrush (*Scleria triglomerata*), licoriceweed (*Scoparia dulcis*), lopsided indiagrass (*Sorghastrum secundum*), Florida dropseed (*Sporobolus floridanus*), queen's delight (*Stillingia sylvatica*), and yellow-eyed grasses (*Xyris* spp.). Mesic flatwoods may require repeated applications of growing season fires on a 2-4 year fire return interval. The short shrub layer should be maintained at

35 -65% cover through prescribed fire. The range in short shrub cover allows ample light for herbaceous species.

**Current Condition:**

Mesic flatwoods occur on all tracts on LWRSF. Mesic flatwoods are generally in good condition due to frequent prescribed fire. Some areas of historic mesic flatwoods on the Arbuckle Tract are currently mapped as pine plantation. Areas of planted off-site slash pine that have been thinned are generally in fair to good condition. These stands are mapped as “restoration mesic flatwoods.” Many of the mesic flatwoods areas on Arbuckle were planted with off-site slash pine in the early 1950’s and have been being harvested between the mid 1990’s to present. In 2009, LWRSF staff developed a Flatwoods Restoration Plan that initiated timber thinning between 2008-present on the Arbuckle Tract that continued restoration efforts through off-site pine timber harvests, native pine plantings, prescribed burning, and improving forest health conditions. Since 2008, there has been roughly 840 acres of mesic flatwoods harvested for planted off-site pine down to 10-50 trees per acre. Scrubby and wet flatwoods are common inclusions in mesic flatwoods throughout LWRSF. Mesic flatwoods often intergrade with scrubby flatwoods making it difficult to delineate the two communities. Cutthroat (wet) flatwoods frequently grades into mesic flatwoods on the Arbuckle Tract, forming “fingers” of cutthroat grass (*Panicum abscissum*) that may be difficult to distinguish.

The large expanse of flatwoods covering most of the Prairie Tract was previously mapped by FNAI as historic dry prairie in the 2006 survey. This area is now mapped as historic mesic flatwoods. LWRSF does not fall into the pre-settlement extent of dry prairie, according to the map produced by Bridges (2006). The majority of this area on the Prairie Tract has been converted to pasture or citrus grove. Ground-truthing was completed in several intact areas and while the shrub layer was mostly low throughout, no stunted shrubs were observed. The general structure of mesic flatwoods on the Prairie Tract may be considered transitional to dry prairie. The canopy is with occasional South Florida slash pine (*Pinus elliottii* var. *densa*) and longleaf pine (*Pinus palustris*). The short shrub layer is dominated by saw palmetto (*Serenoa repens*) and other common shrubs like netted paw (*Asimina reticulata*), Atlantic St. John's wort (*Hypericum tenuifolium*), gallberry (*Ilex glabra*), coastalplain staggerbush (*Lyonia fruticosa*), fetterbush (*Lyonia lucida*), wax myrtle (*Myrica cerifera*), dwarf live oak (*Quercus minima*), winged sumac (*Rhus copallinum*), and shiny blueberry (*Vaccinium myrsinites*). The herbaceous cover includes broomsedge bluestem (*Andropogon virginicus*), bushy bluestem (*Andropogon glomeratus*), wiregrass (*Aristida beyrichiana*), bottlebrush threeawn (*Aristida spiciformis*), coastalplain chaffhead (*Carphephorus corymbosus*), witchgrass (*Dichanthelium aciculare*), early whitetop fleabane (*Erigeron vernus*), slender flattop goldenrod (*Euthamia caroliniana*), blackroot (*Pterocaulon pycnostachyum*), fascicled beaksedge (*Rhynchospora fascicularis*), and yellow-eyed grass (*Xyris* spp.).

**Management Needs:**

Management goals will focus on frequent prescribed fires, timber harvests of off-site pine, native pine reforestation, and invasive species control. Prescribed burning in

mesic flatwoods at LWRSF may be conducted through dormant and growing seasons on a 1-4 year fire return interval.

A couple of the main goals include continued timber harvests and native pine plantings. There are several mesic flatwoods areas on Arbuckle in need of timber harvests to restore a more natural pine overstory density of 10-50 trees per acre and continued off-site pine removal. These areas will continue to have native South Florida slash pine (*Pinus elliottii* var. *densa*) and longleaf pine (*Pinus palustris*) planted both in landings and areas throughout mesic flatwoods, along with prescribed burning. Once a clear-cut or thinning harvest is completed, assessments for reforestation will be planned, where needed, and for natural pine regeneration. A more detailed plan will be developed by FFS staff at LWRSF for future harvests and reforestation projects in mesic flatwoods areas.

Ground disturbing practices, such as heavy roller chopping and the use of plowed firebreaks, will be minimized to prevent elimination of natural groundcover and avoid the establishment of invasive species, except where necessary for regeneration of overstory pines. Depth of plowed firebreaks should be minimized to prevent hydrologic alternation within the surrounding community. For mesic flatwoods previously mapped as dry prairie on the Prairie Tract, management goals will focus on frequent prescribed fires (1-4 years) applied as closely to the early lighting season period as possible. Silvicultural activities on mesic flatwoods communities will follow Florida Silviculture BMPs. Management activities should prioritize searching for, treating, and monitoring invasive plant species within mesic flatwoods on LWRSF.

#### **L. Mesic Hammock**

##### **Description:**

Mesic hammock is a well-developed evergreen hardwood and/or palm forest on soils that are rarely inundated. It occurs primarily as scattered small stands or fringing borders in a matrix of floodplain marsh, bottomland forest, basin marsh, hydric hammock, or other naturally fire-protected areas. Mesic hammocks are infrequently inundated. There is typically a closed canopy and shrubby understory, and herbaceous groundcover is generally low in diversity. Typically, mesic hammocks on LWRSF have a closed canopy of live oak (*Quercus virginiana*), with occasional pignut hickory (*Carya glabra*), sand pine (*Pinus clausa*), longleaf pine (*Pinus palustris*), and South Florida slash pine (*Pinus elliottii* var. *densa*). Cabbage palm (*Sabal palmetto*), various oak species, and sand pine are common in the subcanopy. Shrubs include American beautyberry (*Callicarpa americana*), gallberry (*Ilex glabra*), saw palmetto (*Serenoa repens*), Darrow's blueberry (*Vaccinium darrowii*), and shiny blueberry (*Vaccinium myrsinites*). Herbs are generally sparse and include flatsedges (*Cyperus* spp.), witchgrasses (*Dichanthelium* spp.), tall elephantsfoot (*Elephantopus elatus*), woods grass (*Oplismenus hirtellus*), bracken fern (*Pteridium aquilinum*), and blackroot (*Pterocaulon pycnostachyum*). Fires rarely occur in mesic hammock due to its location along wetlands.

Lightning ignited fires spreading from surrounding uplands likely occurred every 1-8 years, and few were likely able to burn into the hammocks. When conditions enabled hot fires to burn through the hammock, the results were likely dramatic, causing oaks and many shrub species to die back and allowing mesic flatwoods vegetation to establish. Infrequent fires likely maintained a cycle of mesic hammock development, catastrophic fire, mesic flatwoods development, and mesic hammock succession.

**Current Condition:**

Mesic hammock is mapped as a historic community in a few locations near the shorelines of Lake Kissimmee, along Lake Arbuckle, and scattered in some portions of mesic flatwoods in the Arbuckle Tract. Current aerial photography shows an expansion of mesic hammock in most of these locations. In addition, some fire excluded portions of historic mesic flatwoods on the Arbuckle and WIW Tract are currently mapped as mesic hammock, especially along Tiger Creek, where historic mesic flatwoods border hydric hammock. Mesic hammocks along the Lake Kissimmee shoreline are generally in poor condition. Live oak (*Quercus virginiana*) dominates the canopy over scattered clumps of saw palmetto (*Serenoa repens*). The herbaceous groundcover is heavily disturbed from cattle grazing. Herb diversity is low and includes bluestems (*Andropogon spp.*), big carpetgrass (*Axonopus furcatus*), and witchgrasses (*Dichanthelium spp.*). The 1941 aerial photographs show a more open oak canopy suggesting these hammocks may have been partially mesic flatwoods and marsh.

**Management Needs:**

Mesic hammocks are often associated with various types of wetlands, either occurring as a matrix with hydric communities or as a transition to uplands. It is important to maintain the hydrological integrity of the hammocks. Firebreaks should be discouraged to allow a development of a natural ecotone and to help minimize invasion by invasive plant species. The mesic hammocks derived from fire-suppressed mesic flatwoods should be burned regularly to restore their historical condition. A fire return interval of 1-8 years will be targeted for prescribed burning mesic hammocks on LWRSF.

**M. Pasture-Improved**

**Description:**

Improved pasture areas are generally those areas where there are current or former cattle grazing through leases on the Prairie Tract of LWRSF. Improved pastures have undergone enormous alteration from the natural state. The landscape is generally treeless, but there may or may not be scattered pine. Longleaf pine (*Pinus palustris*) and South Florida slash pine (*Pinus elliottii var. densa*) are the primary overstory species. Shrubs are sparse or absent and may include sand blackberry (*Rubus cuneifolius*) and saw palmetto (*Serenoa repens*). Groundcover is dominated by Bahia grass (*Paspalum notatum*). Other herbs may include bluestems (*Andropogon spp.*), flatsedges (*Cyperus spp.*), yankeeweed (*Eupatorium compositifolium*), soft rush (*Juncus effusus solutus*), rustweed (*Polypreum procumbens*), and licoriceweed (*Scoparia dulcis*). Fire should be applied every 1-4 years.

**Current Condition:**

A large portion of historic mesic flatwoods on the Prairie Tract was converted to improved pasture, which is very altered from the natural state of mesic flatwoods. The primary invasive plant species being treated within improved pastures include cogongrass (*Imperata cylindrica*), tropical soda apple (*Solanum viarum*), smutgrass (*Sporobolus poiretii*), and Caesar's weed (*Urena lobata*). Cattle lessees currently conduct invasive treatments as part of their grazing agreements for invasive plant species annually.

**Management Needs:**

Management should focus on application of frequent prescribed fire every 1-4 years. Three (3) separate cattle leases occur on the Prairie Tract of LWRSF. Cattle lessees and FFS will continue to search for, monitor, and conduct invasive plant treatments annually as part of their lease agreements. All reasonable efforts to restore pasture to its native state will be made when or if the land is no longer being leased for cattle grazing. Intensive groundcover restoration and reforestation is needed if the goal is to return these areas to mesic flatwoods.

**N. Pasture-Semi-Improved****Description:**

Semi-improved pasture areas are generally those areas where there are current or former cattle grazing through leases on the Prairie Tract of LWRSF. Semi-improved pastures have undergone enormous alteration from the natural state. Historical species composition and structure are derived from mesic flatwoods and wet prairie community on the Prairie Tract. Semi-improved pasture generally retains scattered patches of native vegetation. Overstory tree canopy species include swamp laurel oak (*Quercus laurifolia*), water oak (*Quercus nigra*), longleaf pine (*Pinus palustris*), South Florida slash pine (*Pinus elliottii* var. *densa*), and live oak (*Quercus virginiana*). Wax myrtle (*Myrica cerifera*) and saw palmetto (*Serenoa repens*) are common shrubs. The herbaceous layer includes bluestems (*Andropogon* spp.) and the invasive natal grass (*Melinis repens*). Fire should be applied every 1-4 years.

**Current Condition:**

On LWRSF, semi-improved pasture occurs in a few sections of historic mesic flatwoods and wet prairie on the Prairie Tract. Semi-improved pastures have been greatly altered from their original state, contain some natural components, but overall are in poor to fair condition. Invasive cogongrass (*Imperata cylindrica*), tropical soda apple (*Solanum viarum*), smutgrass (*Sporobolus poiretii*), Chinese tallow (*Sapium sebiferum*), and Caesar's weed (*Urena lobata*) are being treated within semi-improved pastures. Natal grass (*Melinis repens*) also occurs in semi-improved pasture, but is not currently prioritized for treatment.

**Management Needs:**

Management should focus on application of frequent prescribed fire every 1-4 years and to maintain existing native species. Cattle lessees currently conduct invasive plant treatments annually as part of their grazing agreements. Cattle lessees and FFS will continue to search for, monitor, and conduct invasive treatments annually as part of

their lease agreements. Semi-improved pasture will be evaluated for restoration potential and conversion to the appropriate natural community type if no longer leased for cattle operations. Intensive groundcover restoration and reforestation is needed if the goal is to return these areas to mesic flatwoods.

## **O. Pine Plantation**

### **Description:**

Pine plantations on LWRSF occur in historic wet flatwoods, mesic flatwoods, and baygall. The overstory tree canopy layer is typically dominated by dense slash pine (*Pinus elliottii*), South Florida slash pine (*Pinus elliottii* var. *densa*), and occasional longleaf pine (*Pinus palustris*). The sub-canopy layer includes loblolly bay (*Gordonia lasianthus*), dahoon (*Ilex cassine*), sweetgum (*Liquidambar styraciflua*), sweetbay (*Magnolia virginiana*), laurel oak (*Quercus laurifolia*), and water oak (*Quercus nigra*). Common plants in the shrub layer include groundsel tree (*Baccharis halimifolia*), American beautyberry (*Callicarpa americana*), common persimmon (*Diospyros virginiana*), fourpetal St. John's wort (*Hypericum tetrapetalum*), gallberry (*Ilex glabra*), coastalplain staggerbush (*Lyonia fruticosa*), fetterbush (*Lyonia lucida*), wax myrtle (*Myrica cerifera*), swamp bay (*Persea palustris*), sawtooth blackberry (*Rubus pensilvanicus*), saw palmetto (*Serenoa repens*), Darrow's blueberry (*Vaccinium darrowii*), and shiny blueberry (*Vaccinium myrsinites*).

Common herbaceous species include bluestems (*Andropogon* spp.), bottlebrush threeawn (*Aristida spiciformis*), wiregrass (*Aristida beyrichiana*), Elliott's milkpea (*Galactia elliottii*), Carolina redroot (*Lachnanthes caroliana*), whitehead bogbutton (*Lachnocaulon anceps*), cutthroat grass (*Panicum abscissum*), maidencane (*Panicum hemitomon*), narrowleaf silkgrass (*Pityopsis graminifolia*), yellow milkwort (*Polygala rugelii*), Virginia chain fern (*Woodwardia virginica*) and yellow-eyed grass (*Xyris* spp.). Vines are occasional and include Virginia creeper (*Parthenocissus quinquefolia*), earleaf greenbrier (*Smilax auriculata*), and muscadine (*Vitis rotundifolia*). Fire regimes depend on the historic community type.

### **Current Condition:**

Pine plantations on LWRSF are mapped on the Arbuckle and Hesperides Tracts. There is a pine plantation mapped within cutthroat wet flatwoods on the east side of the Arbuckle Tract, adjacent to Lake Arbuckle that is in good condition. The other pine plantations mapped on LWRSF are smaller and occur within mesic flatwoods and baygall communities. There are areas within pine plantations on LWRSF that contain cogongrass (*Imperata cylindrica*) that continue to be treated.

### **Management Needs:**

Management goals will focus on applying prescribed fire depending on the natural community type; 2-4 years for pine plantation within mesic flatwoods and 2-5 years for pine plantation in wet flatwoods. Growing season fires in the wet flatwoods as close to the early lightning season period (May-June) should be applied when possible. Each site typed as pine plantation will be assessed for timber harvests, native pine reforestation, and forest health considerations. Management activities should prioritize

searching for, treating, and monitoring invasive plant species within pine plantations on LWRSF.

## **P. Sandhill**

### **Description:**

Sandhills occur on crests and slopes of rolling hills and ridges with steep or gentle topography. Soils are characterized as deep, marine deposited, often yellowish sands that are well drained. The deep, sandy soils and a lack of near surface hardpan or water table contribute to a xeric environment. Sandhill is essential for aquifer recharge because the porous sands allow water to percolate rapidly with little runoff or evaporation. Sandhill community at LWRSF generally does not resemble the most typical association of sandhill located further north in Florida; where the landscape is dominated by a scattered overstory of longleaf pine (*Pinus Palustris*) and a grassy groundcover of wiregrass (*Aristida stricta*). Sandhill community takes on a different aspect in south-central Florida along the Lake Wales Ridge and is more associated with southern ridge sandhill.

On LWRSF, sandhills generally have an pine canopy of South Florida slash pine (*Pinus elliotii* var. *densa*), longleaf pine (*Pinus palustris*), and sand pine (*Pinus clausa*) over sand live oak (*Quercus geminata*), bluejack oak (*Quercus incana*), and turkey oak (*Quercus laevis*). Shrubs and other midstory vegetation include bigflower pawpaw (*Asimina obovata*), scrub hickory (*Carya floridana*), sand holly (*Ilex ambigua*), gopher apple (*Licania michauxii*), coastalplain staggerbush (*Lyonia fruticosa*), pricklypear (*Opuntia humifusa*), Chapman's oak (*Quercus chapmanii*), myrtle oak (*Quercus myrtifolia*), saw palmetto (*Serenoa repens*), scrub palmetto (*Sabal etonia*), tough bully (*Sideroxylon tenax*), and Adam's needle (*Yucca filamentosa*).

Wiregrass is the dominant groundcover species in sandhill, however cover is often scattered, sparse or patchy in many areas. Wiregrass is not the prevailing groundcover in more disturbed or fire-suppressed sandhill on the WIW Tract. Other herbaceous species may include Elliott's bluestem (*Andropogon gyrans*), corkscrew threeawn (*Aristida gyrans*), coastalplain honeycomb-head (*Balduina angustifolia*), coastalplain chaffhead (*Carphephorus corymbosus*), Florida alicia (*Chapmannia floridana*), tread softly (*Cnidoscolus stimulosus*), pinebarren frostweed (*Helianthemum corymbosum*), Feay's palafox (*Palafoxia feayi*), bahiagrass (*Paspalum notatum*), Florida needlegrass (*Piptochaetium avenacioides*), narrowleaf silkgrass (*Pityopsis graminifolia*), largeflower jointweed (*Polygonella robusta*), sandyfield beaksedge (*Rhynchospora megalocarpa*), little bluestem (*Schizachyrium scoparium*), lopsided indiagrass (*Sorghastrum secundum*), pineywoods dropseed (*Sporobolus junceus*), queensdelight (*Stillingia sylvatica*), and scurf hoary-pea (*Tephrosia chrysophylla*).

Sandhills on LWRSF provide important habitat for many rare animals including gopher tortoise (*Gopherus polyphemus*), eastern indigo snake (*Drymarchon couperi*), eastern diamondback rattlesnake (*Crotalus adamanteus*), gopher frog (*Rana capito*), and the Florida mouse (*Podomys floridanus*). Gopher tortoise and their burrows are found throughout sandhill habitat in the Arbuckle, WIW, and Hesperides Tracts.



Sandhill communities on LWRSF support many rare plants species. Nine (9) federally endangered or threatened plant species occur on sandhill at LWRSF; and include Florida bonamia (*Bonamia grandiflora*), pygmy fringe tree (*Chionanthus pygmaeus*) scrub pigeon-wing (*Clitoria fragrans*), scrub buckwheat (*Eriogonum longifolium* var. *longifolium*), Britton's beargrass (*Nolina brittoniana*), Lewton's milkwort (*Polygala lewtonii*), scrub plum (*Prunus geniculata*), Carter's warea (*Warea carteri*), and Florida ziziphus (*Ziziphus celata*), one of the most endangered species in Florida. Naturally occurring and introduced populations of Florida ziziphus occur in three sandhill areas on the Arbuckle Tract. The occurrence of Carter's warea is limited to a handful of sandhill locations on LWRSF.

Frequent fire should be applied to this community to maintain an open structure. Variability in the season, frequency, and intensity of fire is important for preserving species diversity, since different species in the community flourish under different fire regimes. Low-medium intensity surface fires are required to maintain a healthy sandhill community. These fires reduce hardwood encroachment, reduce sand pine recruitment, stimulate regeneration of longleaf pines, and seed germination of herbs. Without frequent fires, sandhills will succeed to xeric hammock. Prescribed fires in the sandhills on LWRSF are targeted for a fire return interval of between 3-8 years, due to variable vegetation structure and fuel types.

**Current Condition:**

Sandhill constitutes a large component of LWRSF, occurring on all tracts except the Prairie Tract. The WIW Tract contains the largest contiguous southern ridge sandhill in public ownership, mainly on the western half of the tract. This unique area has a mosaic of narrow sandhill ridges separated by elongated depression and basin marshes Sandhills at LWRSF vary and overall, are in fair condition. Many areas continue to support healthy wildlife and rare plant species populations.

Sandhill on the WIW Tract varies in structure and condition. Some areas have retained the more characteristic high pine aspect and structure of sandhill, such as the northwest quadrant of the main portion of the WIW Tract. However, many parts of the sandhill have been degraded and affected by previous management. Prior to state acquisition, sandhill on the WIW Tract's main parcel was roller chopped and aerially seeded with Bahia grass for cattle forage. As a result, Bahia grass is common throughout the sandhill on WIW and wiregrass is not the dominant groundcover. There is generally a scarcity of wiregrass, groundcover is not continuous, and there are often patches of bare sand. Past fire exclusion in in the sandhill of WIW led to the development of xeric oak hammocks and turkey oak barrens. Turkey oak barrens occur where pines are few or absent, wiregrass groundcover is sparse and where the dominant overstory tree is turkey oak (*Quercus laevis*). Portions of sandhill have succeeded into xeric oak hammock on WIW. Areas of xeric hammock contain a dense midstory and overstory of predominantly oak species. The resulting dense woody vegetation has reduced the herbaceous groundcover, and subsequently, the fine fuels needed to carry low-intensity ground fires. Thus, burning sandhill on this tract has proven to be challenging.

There is a sandhill portion along Walk-In-Water Road that currently has a canopy of planted, off-site slash pine, labeled “restoration sandhill”. The sandhills in the northern portion of WIW Tract are overgrown, with various size merchantable sand pines, and is need of prescribed fire. One site is south of Tiger Creek, adjacent to Sullivan Road and Walk-In-Water Road contains dense pockets of overgrown sand pine in the overstory, patchy groundcover, and occurrence of listed plant species along the western boundary. The Newell Parcel in the northwest portion of the WIW Tract contains some of the last remaining old-growth longleaf pine in the region, with some trees exceeding 200 years in age. This sandhill has retained good groundcover and contains several state and federally listed plants. There is currently a restoration project to restore the fire ecology of this long-unburned sandhill.

Sandhill is more scattered on the Arbuckle Tract and there are generally two (2) primary areas of sandhill, in the center of the tract along School Bus Road and the western side of Arbuckle. The condition of sandhill varies, but generally there is a lower density of longleaf pine and a scarcity of wiregrass. Some areas have a history of fire exclusion with inclusions of canopy and midstory sized sand live oak (*Quercus geminata*) and scrub oak (*Quercus inopina*).

The sandhill along School Bus Road in the center of Arbuckle, is the best example of sandhill on the Arbuckle Tract. This sandhill contains a limited overstory of longleaf pine, sparse subcanopy of turkey oak, more of the characteristic wiregrass groundcover of a sandhill. This sandhill also supports many rare plant species, and in particular, an introduced population of Florida ziziphus. The other sandhill on the western side of Arbuckle have a history of fire exclusion and are in need of prescribed fire. These sandhills are outside of desired conditions and are challenging to burn due to their proximity to adjacent private land and residential homes.

A sandhill on the west side of the Arbuckle Tract, just east of Old Avon park Road and the surrounding scrubby flatwoods is one of the most important and sensitive areas on the state forest. This nine-acre sandhill continues to support eight (8) federally endangered or threatened plant species like *Ziziphus celata*, *Polygala lewtonii*, and *Warea carteri*; all species that have shown a decline through long-term monitoring. Sandhill located in the southern portion of Arbuckle along citrus groves have been treated for lantana (*Lantana camara*) and rosary pea (*Abrus precatorius*) from the adjacent citrus grove by contractors and FFS staff.

Sandhill occurs on both parcels of the Hesperides Tract. The sandhill within the Babson parcel contains some inclusion of xeric hammock, but generally in good condition. The sandhill has been burned within desired fire intervals and maintained the more characteristic structure and groundcover, with a higher abundance of wiregrass. Sandhill on the Boy Scout parcel has been heavily disturbed in the past. Currently, this abandoned grove contains several invasive plant species including lantana (*Lantana camara*), rosary pea (*Abrus precatorius*), natal grass (*Melinis repens*), torpedo grass (*Panicum repens*), and smutgrass (*Sporobolus poiretii*).

**Management Needs:**

Restoration of this community is a primary goal on LWRSF. Prescribed fires in the sandhills on LWRSF are targeted for a fire return interval of 3-8 years, due to variable vegetation structure, fuel types and some inclusion of scrub. Areas that have recently undergone restoration work will be treated with prescribed fire every 2-4 years for continued restoration efforts. In many parts of sandhill across the state forest, a general scarcity of wiregrass, discontinuous groundcover, patchy fuels, the presence of xeric hammocks, previous management and a history of fire exclusion have made low to mid intensity frequent fire difficult in the past. Management goals within sandhills on LWRSF are to reintroduce fire into fire-excluded sandhill and continue prescribed burning for maintenance. Additional goals include reduction of hardwood encroachment, reduction of sand pine, stimulating regeneration of longleaf pine, and promoting the establishment of native groundcover species. A plan is being developed to prioritize and target specific sandhill areas for restoration on LWRSF. A combination of dormant and growing season fires will be applied to reduce hardwood encroachment, reduce sand pine regeneration, and promote an increase in wiregrass abundance. Further intervention, such as the use of chainsaw work and herbicide, may be used to reduce hardwood canopy and subcanopy. Other management techniques will be considered for sandhill restoration on WIW like the removal of off-site slash pine.

The continued effort to establish wiregrass in some sandhill areas will continue in hopes of creating continuous groundcover to carry low intensity, frequent fire. Natal grass (*Melinis repens*) is commonly found along sandhill roads and less commonly in the interior portions of sandhill. Any ground disturbing activities should be avoided and every effort should be made to minimize any detrimental effects to the gopher tortoise (*Gopherus polyphemus*) population and its burrows. The search for, monitoring, and treatment of any invasive plants will continue in all sandhills on LWRSF. The extent of infestation of lantana (*lantana camara*), rosary pea (*Abrus precatorius*) and smutgrass (*Sporobolus poiretii*) should be monitored and treated periodically.

**Q. Sandhill Upland Lake****Description:**

Sandhill upland lakes are characterized as shallow, rounded solution depressions occurring in sandy upland communities. They are generally permanent water bodies, although water levels may fluctuate substantially. Typically, they are lentic water bodies without significant surface inflows or outflows. Water may be largely derived from lateral ground water seepage through the surrounding well-drained uplands and/or artesian sources through connections with the underlying limestone aquifer. Vegetation may be restricted to a narrow band along the shore made up of hydrophytic grasses and herbs or a dense shrub thicket depending on fire frequency and water level fluctuations. Maidencane (*Panicum hemitomon*) dominates the grassy zone along the shoreline. Sandhill upland lakes are important breeding areas for terrestrial amphibians, insects, important water holes for mammals and birds inhabiting the surrounding xeric communities. Frequency of fire varies depending on the hydrology of the lake and its exposure to fire from surrounding areas.

**Current Condition:**

Dinner Lake, a small sandhill upland lake in good condition occurs in the center of the Babson parcel of the Hesperides Tract.

**Management Needs:**

Prescribed fire in surrounding uplands should be allowed to burn into the lake basin to prevent an increase in woody vegetation. The targeted fire return interval will be between 3-8 years due to primarily sandhill surrounding this lake. Prevention of groundwater pollution in the surrounding uplands (such as by septic tanks or chemicals) is a priority as it could significantly alter the nutrient balance of the lake water. There will be continued management activities for invasive plant species within and surrounding the sandhill upland lake on the Babson parcel, for example, searching, treating, and monitoring.

**R. Scrub****Description:**

Scrub is an upland shrub or forest community on dry sand ridges dominated by scrub oaks and other shrubs, with or without a pine canopy. Scrubs are often named by the dominant plant species. On the Lake Wales Ridge, scrub is separated into white sand scrub and yellow sand scrub. White sand scrub is further classified into rosemary-oak scrub and scrubby flatwoods. Rosemary-oak scrub is distinguished by having greater than 10% bare sand, or greater than 20% of this area has less shrubs, or white sand site and individuals of rosemary (*Ceratiola ericoides*) spaced an average of less than 20 meters apart. Both the tall and short shrub layers are moderate to dense and dominated by scrub oaks, sand pines, and herbaceous cover is usually sparse. Gaps, or openings among dominant shrubs, generally feature bare sand, lichens, and herbs. Sandy, open patches necessary for many listed plant and animal species are common throughout. Scrub on LWRSF may or may not have a pine overstory and, if present, is sparse sand pine (*Pinus clausa*), longleaf pine (*Pinus palustris*), and/or South Florida slash pine (*Pinus elliotii* var. *densa*). The shrub layer remains relatively low, with tall and short shrubs that include sand live oak (*Quercus geminata*), Chapman's oak (*Quercus chapmanii*), scrub oak (*Quercus inopina*), myrtle oak (*Quercus myrtifolia*), sand pine, bigflower pawpaw (*Asimina obovata*), scrub holly (*Ilex opaca* var. *arenicola*), rusty lyonia (*Lyonia ferruginea*), coastalplain staggerbush (*Lyonia fruticosa*), fetterbush (*Lyonia lucida*), silk bay (*Persea borbonia* var. *humilis*), saw palmetto (*Serenoa repens*), scrub palmetto (*Sabal etonia*), tough bully (*Sideroxylon tenax*), Darrow's blueberry (*Vaccinium darrowii*), shiny blueberry (*Vaccinium myrsinites*), and hog plum (*Ximenia americana*).

Herbaceous species are generally sparse and include bluestem (*Andropogon floridanus*), corkscrew threeawn (*Aristida gyrans*), Florida indian plantain (*Arnoglossum floridanum*), coastalplain honeycomb-head (*Balduina angustifolia*), capillary hairsedge (*Bulbostylis ciliatifolia*), Florida alicia (*Chapmannia floridana*), lichens (*Cladina subtenuis* and *Cladonia leporina*), tread softly (*Cnidocolus stimulosus*), pinebarren flatsedge (*Cyperus retrorsus*), coralbean (*Erythrina herbacea*), Elliott's milkpea (*Galactia elliotii*), Florida scrub frostweed (*Helianthemum nashii*),

pinweed (*Lechea spp.*), Florida blazing star (*Liatris ohlingerae*), Feay's palaflox (*Palafloxia feayi*), blackseed needlegrass (*Piptochaetium avenaceum*), narrowleaf silkgrass (*Pityopsis graminifolia*), Florida jointweed (*Polygonella basiramia*), October flower (*Polygonella polygama*), bracken fern (*Pteridium aquilinum*), sandyfield beaksedge (*Rhynchospora megalocarpa*), sand spike-moss (*Selaginella arenicola*), jeweled blue-eyed grass (*Sisyrinchium xerophyllum*), and pineland scalypink (*Stipulicida setacea*). Occasional vines include earleaf greenbrier (*Smilax auriculata*) and muscadine (*Vitis rotundifolia*).

Scrub community harbors a wealth of species endemic to Florida, many of which are considered rare. Scrubs on the Lake Wales Ridge support 27 rare plant species (Turner et al. 2006). Of the 19 scrub and sandhill plants federally listed as endangered or threatened, 16 occur at LWRSF (USFWS 1999, Turner et al. 2006). Many state endangered or state threatened plants also occur in the LWRSF scrub. [Table 5]

Scrub on LWRSF is home to the FSJ (*Aphelocoma coerulescens*), scrub lizard (*Sceloporous woodi*), the narrowly distributed sand skink (*Neoseps reynoldsi*), blue-tailed mole skink (*Eumeces egregius lividius*), Florida mouse (*Podomys floridanus*), and short-tailed snake (*Lampropeltis extenuata*). Scrub is also important habitat for gopher tortoise (*Gopherus polyphemus*) and its associated commensals. Many invertebrates from a wide variety of taxonomic groups that are restricted to Florida scrub are found on LWRSF; they include the red widow spider (*Latrodectus bishop*), relictual tiny sand-loving scarab (*Geopsammodius relictillus*), Lake Wales Ridge velvet ant (*Dasymutilla archboldi*), nocturnal scrub velvet ant (*Photomorphus archboldi*), Frost's silky june beetle (*Serica frosti*), and Florida scrub millipede (*Floridobolus penneri*) (Deyrup 2011).

Scrub is a fire-maintained community, though it is not easily ignited. Scrub fire regimes are highly variable, depending on landscape settings and dominant vegetation. Current scientific research suggests oak-dominated scrub would have naturally burned every 6-19 years. More frequent fires (6-10 years) may be needed to maintain optimal shrub heights for FSJ habitat. Scrub fires are often high intensity and require careful application. Prescribed burns will be conducted in scrub on LWRSF on a 6-19 year fire return interval. Scrub management in Florida is typically directed at conditions favorable to FSJs (*Aphelocoma coerulescens*), where the shrub cover is generally less than 6 feet tall and bare soil cover is at least 20 percent.

#### **Current Conditions:**

Scrub on LWRSF ranges from fair to excellent condition. The Arbuckle Tract contains the majority of scrub on the state forest. Most scrub on this tract is in good condition, with some exceptions. Some scrub in the Arbuckle Tract has dense sand pine (*Pinus clausa*). North, central and south portions of the Arbuckle tract support FSJ (*Aphelocoma coerulescens*). Scrub at the north end of the Arbuckle Tract, north of Rucks Dairy Road continues to support rare scrub plants. Portions of scrub in the northwest corner of Arbuckle burned in 2015, though there are inclusions of dense sand pine and oak species. The sandhill management blocks in the north portion of Arbuckle

have historically been very important habitat for the FSJ. Portions of this area were burned recently, leaving a mosaic of varying shrub heights. A section of this area was harvested in 2004 and burned following harvest. Shrub heights in this scrub are outside of desired FSJ desired conditions. Scrub along School Bus Road in the upper portion of Arbuckle is in good condition, with relatively low shrub height. This portion of scrub contains a good population of short leaved rosemary (*Conradina brevifolia*), Florida rosemary (*Ceratolia ericoides*), and also provides important habitat for FSJs.

The Lake Arbuckle management blocks to the east of School Bus Road, in the center of the Arbuckle Tract, contain good example of rosemary scrub, situated on the drier ridge crests and dominated by Florida rosemary (*Ceratolia ericoides*). This scrub contains rosemary bald with large openings between shrubs; open patches that support gap specialist species like Highlands's scrub hypericum (*Hypericum cumulicola*) and contains one of the few places that support the rare perforate reindeer lichen (*Cladonia perforata*) on LWRSF. There are portions of dense sand pine on the edges of this scrub.

There are large areas of scrub just to the north and south of Highway 64 at the south end of the Arbuckle Tract. The rosemary and oak scrub underwent a sand pine timber harvest and bung project between 1997 and 2005. Scrub in some areas of Arbuckle also were harvested for merchantable sand pine in 2004 due to hurricane damage to timber and fuel loading. This timber sale was conducted as a salvage sale of timber resources and removed sand pine overstory from overgrown scrub sites on Arbuckle, WIW, and Hesperides (Boy Scout parcel) Tracts. Some parts of the scrub on WIW was part of this 2004 sale harvest. A part of the Boy Scout parcel on the Hesperides Tract was also included in the 2004 salvage sand pine harvest.

Scrub south of the Tram Road in the Bonnet Creek management block (contain Florida rosemary and the scrub in these units are in good condition. The scrub was burned in 2013 and helped open the canopy structure of tall sand pine, created areas of bare sand, and promoted recruitment of the federally endangered short leaved rosemary (*Conradina brevifolia*). This area also contains the only other subpopulation of perforated reindeer lichen (*Cladonia perforata*) on LWRSF.

At the end of Tram Road contains the best example of a rosemary bald on the state forest. This rosemary bald occurs on a high crest with an oak-dominated scrub. The landscape is dominated by Florida rosemary (*Ceratolia ericoides*) and retains very large openings between shrubs. This site contains important habitat for gap specialists like Highlands scrub hypericum (*Hypericum cumulicola*).

The WIW Tract contains less scrub than the Arbuckle Tract. Much of the scrub is located in the northern part of the tract in the Tiger Creek, North Pine, and North Sandhill management blocks north of Tiger Creek. Much of the scrub on the WIW Tract has been fire suppressed and is transitioning into xeric hammock and features overgrown sand pine. A narrow strip of yellow sand scrub occurs along WIW Road and King Trail road that contains one the few locations of *Warea carterii* on the state

forest. This scrub has long been fire suppressed and contains large canopy sized live oak at the north end and a subcanopy of scrub hickory (*Carya floridana*).

Scrub north of Tiger Creek varies in condition, mainly due to lack of continued prescribed fire. Tiger Creek North was salvaged for sand pine in 2004 for timber resources and fire mitigation due to proximity to residential homes. In these scrubs, many of the added roads and skid trails were slow to re-vegetate and there is dense canopy of sand pine. These areas were not burned after salvage and the lack of prescribed fire may have led to higher densities of sand pine post salvage (Navarra 2011). Other scrub in the northern portion of WIW may have not seen fire in 40-60 years and contain dense, mature sand pine overstory, sand pine midstory, closed canopies, and high fuel loads.

There is a significant area of scrub on the Babson 4 parcel on the Hesperides Tract with several state and federally listed plants and sand skinks (*Neoseps reynoldsi*). This scrub has long been unburned and features a dense, mature sand pine overstory. The Boy Scout parcel contains significant scrub acreage in varying condition. Some scrub portions have been without fire, but support some of the highest densities of federally listed scrub pigeon wing (*Clitoria fragans*) on LWRSF. Scrub in the northern portion of the Boy Scout Parcel had prescribed fire applied in 2012, however there are areas where the short shrub layer is too dense. Cogongrass (*Imperata cylindrica*) is also being treated by the road edges of the Boy Scout Parcel.

#### **Management Needs:**

Management goals include applying prescribed fire to scrub in areas where both sand pine and other hardwood species, shrub height, density, or bare soil percentage is outside of desired range. Measures may also be taken to reduce oak and sand pine density with mechanical or herbicide treatments followed by prescribed fire. Techniques may include a combination of mechanical and herbicide treatments to enhance existing fuels for application of prescribed fire ignition. Prescribed fire techniques may also include hand and aerial ignition to assist in burning these communities.

At LWRSF, FFS plans on burning scrub on a 6-19 year fire return interval. Appropriate fire return intervals will be used for prescribed fires and will consider landscape setting, dominant vegetation type, and management of rare plants and wildlife. Oak-hickory dominated scrub may be burned on a 10-19 year fire return interval, and rosemary and or sand pine dominated scrub on a 20-59 year fire return interval. A minimum of 15-20 years between burns in rosemary dominated scrub should be waited, when possible, to avoid burning rosemary shrubs before they are reproductively mature and contribute to the soil seedbank (Johnson 1982, Gibson and Menges 1994).

Caution should be used in scrub areas where perforate reindeer lichen (*Cladonia perforata*) occurs. This species is found within the white sand rosemary scrub in the center of the Arbuckle Tract, west of Lake Arbuckle. Scattered fragments are most often found in loose combination with other terrestrial lichens in open areas or next to

shrubs. Fire is known to destroy lichens (USFWS 1999) and this species has been observed with slow growth and slow recolonization (Menges and Kohfeldt, 1995). Extremely hot fires may consume all vegetation and not leave unburned patches for recolonization. Areas containing this species should be managed with a fire-return interval long enough to restore vigorous lichen growth and to allow regeneration of mature shrub layers (Johnson 1982, Gibson and Menges 1994).

Scrub areas that are fire suppressed and are transitioning or have transitioned into overgrown sand pine scrub or xeric hammock will be targeted for prescribed fire when possible. Other intervention may be used, such as mechanical or herbicide treatment, to reduce sand pine or hardwood canopy or subcanopy density and height. Mechanical treatments may include chainsaw use, brown tree cutter, gyro trac, and/or other silvicultural equipment. Prior to any management activity, surveys for rare and listed plants or wildlife will be conducted. Two (2) projects have looked at thinning and burning in scrub habitat on LWRSF during the last ten (10) years. In one project, monitoring was conducted pre- and post-harvest in areas in long-unburned (>30 years) sand pine stands in the WIW and Arbuckle Tracts from 2003 to 2011 (Navarra 2011). Operations for this salvage timber sale were completed in 2004-2005. New roads and skid trails were put into the scrub areas accommodate operations. Removal of the sand pine overstory led to expected changes in vegetation structure, however sand pine densities in sites that had not burned post-harvest were higher than before areas were harvested (Navarra 2011).

Weekley et al. (2008 and 2013) studied the effects of silviculture and fire on rosemary-oak scrub as a restoration tool in Florida. The research was conducted between 1997 and 2005 in an area of the Arbuckle Tract. Harvest-only, burn only, and harvest and burn treatments were used in rosemary-oak scrub with a sand pine canopy (Weekley et al. 2008 and 2013). All harvest and burning treatments were successful in reducing sand pine densities; all treatments also initially reduced hardwood stem density, but within five (5) years, the subcanopy had returned to pretreatment levels and equaled or exceeded pretreatment levels; no treatments were successful in reducing stem densities in the shrub layer, and all treatments showed minor and short-term changes in forb abundance and diversity and failed to increase forb diversity or abundance (Weekley et al. 2008 and 2013). Few rare species and low plot occupancy limited the ability to test treatment effects on rare species. Harvest treatments with or without fire were found to create significantly more bare ground and reduced litter compared to the control. However, the levels of bare sand often exceeded the range normally found in oak scrub (3- 10%) and rosemary scrub (10-40%) (Menges and Hawkes 1998). Skid trails, if not subsequently burned, were colonized by weedy native grasses and sedges and the logging treatment was associated with a shift to graminoid cover (Weekley 2008 and 2013). Graminoid cover is not typical of Florida scrub. Future management should consider the increased risk of encouraging invasive species associated with heavy soil disturbance. Excessive bare sand can create a lack of fuel continuity between vegetation patches, and may reduce the ability to burn a community that is strongly fire adapted, and whose fire spread is sensitive to interruptions of fuels in the landscape (Duncan and Schmalzer 2004, Weekley et al. 2008 and 2013).



The preferred tool for management of Florida scrub is appropriate application of prescribed fire (Menges and Gordon 2010), though several factors may constrain the reintroduction of fire. On LWRSF, there are several locations of scrub with past fire suppression that are located near private property and homes, making them a challenge and concern for burning. There are safety concerns in areas along the wildland/urban interface where fuels have accumulated to high levels (Long et al. 2005). The scrub sites that contain mature dense sand pine overstory (20-80 feet) will be assessed for management options due to proximity to residential homes. In order to safely introduce prescribed fire into these fire suppressed scrub areas, timber harvest operations based on existing site characteristics may be required prior to conducting a prescribed burn for desired future management, considering all management factors including listed species, smoke management, access, timber value, water resources, recreation, wildlife, and aesthetics. The use of timber harvest operations on the existing mature sand pine overstory would include a clear-cut harvest, which would reduce fuel loads allowing the site to be safely and effectively burned and brought back into a maintenance state. The other native overstory tree species that would be maintained onsite in these scrub sites include longleaf pine, sand live oak, chapman oak, myrtle oak, turkey oak, scrub hickory, and other midstory species.

## **S. Scrubby Flatwoods**

### **Description:**

Scrubby flatwoods are a well-drained, pine-dominated community characterized by a canopy of pine trees with a xeric shrubby understory on areas of well drained white sand. It occurs in the transitional areas between scrub and mesic flatwoods and on slightly elevated areas within a mesic flatwoods matrix. Flatwoods with a scrub oak component greater than 20% are identified as scrubby flatwoods. Scrubby flatwoods can be distinguished from yellow sand scrub by the white sand substrate, the presence of *Lyonia lucida*, and the lack of dominance by *Quercus myrtifolia*. Soils of scrubby flatwoods are moderately well-drained sands with or without a spodic horizon.

Scrubby flatwoods generally have a canopy of pine, contain a shrub layer with a variety of mesophytic and xerophytic species, and unlike scrub, an herbaceous layer with wiregrass present, along with other herbs. On LWRSF, the canopy is typically scattered sand pine (*Pinus clausa*), longleaf pine (*Pinus palustris*), and/or South Florida slash pine (*Pinus elliottii* var. *densa*). Tall shrubs generally include tarflower (*Bejaria racemosa*), scrub hickory (*Carya floridana*), rusty staggerbush (*Lyonia ferruginea*), coastalplain staggerbush (*Lyonia fruticosa*), fetterbush (*Lyonia lucida*), Chapman's oak (*Quercus chapmanii*), sand live oak (*Quercus geminata*), scrub oak (*Quercus inopina*), myrtle oak (*Quercus myrtifolia*), and winged sumac (*Rhus copallinum*).

The short shrub layer includes bigflower pawpaw (*Asimina obovata*), netted pawpaw (*Asimina reticulata*), dwarf huckleberry (*Gaylussacia dumosa*), Atlantic St. John's wort (*Hypericum tenuifolium*), gallberry (*Ilex glabra*), gopher apple (*Licania michauxii*), sensitive briar (*Mimosa quadrivalvis*), pricklypear (*Opuntia humifusa*), silk bay (*Persea borbonia* var. *humilis*), dwarf live oak (*Quercus minima*), saw palmetto

(*Serenoa repens*), scrub palmetto (*Sabal etonia*), Darrow's blueberry (*Vaccinium darrowii*), shiny blueberry (*Vaccinium myrsinites*), and hog plum (*Ximenia americana*).

Herbaceous cover within the scrubby flatwoods is sparse to moderate and includes Florida bluestem (*Andropogon floridanus*), purple bluestem (*Andropogon glomeratus* var. *glaucopsis*), corkscrew threeawn (*Aristida gyrans*), wiregrass (*Aristida bryrichiana*), coastalplain honeycomb-head (*Balduina angustifolia*), capillary hairsedge (*Bulbostylis ciliatifolia*), coastalplain chaffhead (*Carphephorus corymbosus*), lichens (*Cladina subtenuis* and *Cladonia leporina*), pinebarren flatsedge (*Cyperus retrorsus*), Feay's palafox (*Palafoxia feayi*), narrowleaf silkgrass (*Pityopsis graminifolia*), bracken fern (*Pteridium aquilinum*), sandyfield beaksedge (*Rhynchospora megalocarpa*), little bluestem (*Schizachyrium scoparium*), lopsided indiagrass (*Sorghastrum secundum*), queen's delight (*Stillingia sylvatica*), and pineland scalypink (*Stipulicida setacea*).

Scrubby flatwoods on LWRSF supports several rare plant species (Table 5). Scrubby flatwoods generally burn less frequently than the adjacent mesic flatwoods. This results from the general incombustibility of the oak litter, as well as the many bare sand patches that inhibit the spread of fire. Natural fire frequency is likely every 3-8 years, with most burns occurring during late spring and early summer (April-June).

**Current Condition:**

Scrubby flatwoods occur on all tracts of LWRSF and most are in good condition. The Arbuckle Tract contains the largest percentage of scrubby flatwoods on LWRSF. Scrubby flatwoods and mesic flatwoods sometimes intergrade making it difficult to delineate between the two communities. Many portions of scrubby flatwoods on the western side of the Arbuckle Tract have had prescribed burns applied during the past few years. The scrubby flatwoods occurring within a matrix of scrub, mesic flatwoods, and depression marsh on the northernmost end of the Arbuckle Tract was burned in 2017.

Scrubby flatwoods on the northern half of Arbuckle Tract, just west and east of School Bus Road are in good condition, supporting FSJ families and retaining rare plant populations. Some portions of scrubby flatwoods on the Arbuckle Tract with dense stands of planted pine are now mapped as pine plantation. Since 2008, there has been roughly 125 acres of scrubby flatwoods harvested for planted off-site pine down to 10-50 trees per acre. Other areas of fire-suppressed scrubby flatwoods have developed a dense canopy of sand live oak (*Quercus geminata*) or sand pine (*Pinus clausa*). This can be observed in the scrubby flatwoods between King Trail and Walk-In-Water Road on the WIW Tract. Scrubby flatwoods at the north end of the WIW Tract, north of Tiger Creek, are in fair condition. Nearly all of the historic scrubby flatwoods on the Prairie Tract have been converted to improved or semi-improved pasture.

**Management Needs:**

LWRSF staff may allow fire from adjacent mesic flatwoods to burn into the scrubby flatwoods, but will target prescribed burns every 3-10 years in this community to maintain suitable habitat for rare plant species. Staff will also focus on applying prescribed fire to fire-suppressed scrubby flatwoods on the Arbuckle, WIW, and Hesperides Tracts. Long-term monitoring of certain rare plants that occur in this community will continue. Management activities should prioritize searching for, treating, and monitoring invasive plant species within scrubby flatwoods on LWRSF.

**T. Wet Flatwoods (Including restoration areas)****Description:**

Wet flatwoods are characterized by a canopy pine forests with a thick shrubby understory and very sparse ground cover; or a fire-maintained, sparse understory and dense ground cover of hydrophytic herbs. Wet flatwoods exist on relatively flat, poorly drained land. On the Lake Wales Ridge, wet flatwoods are represented by the cutthroat phase and the gallberry palmetto phase. In the wet flatwoods-cutthroat phase, cutthroat grass (*Panicum abscissum*) dominates the groundcover. The wet flatwoods-gallberry palmetto phase typically occurs around depression marshes and next to baygall. Cutthroat grass is a central peninsular Florida endemic species that is listed as endangered in Florida. LWRSF supports a significant area of cutthroat grass communities on public land.

The canopy is primarily multi-aged slash pine (*Pinus elliottii*), longleaf pine (*Pinus palustris*), and South Florida slash pine (*Pinus elliottii* var. *densa*). The subcanopy, if present, consists of scattered sweetbay (*Magnolia virginiana*), swamp bay (*Persea palustris*), or loblolly bay (*Gordonia lasianthus*). Shrubs include large gallberry (*Ilex coriacea*), fetterbush (*Lyonia lucida*), sweet pepperbush (*Clethra alnifolia*), Saw palmetto (*Serenoa repens*) and gallberry (*Ilex glabra*). In cutthroat flatwoods, areas of solid cutthroat grass (*Panicum abscissum*) form a uniform blanket over the ground. Typical wet flatwoods herbs include wiregrass (*Aristida beyrichiana*), blue maidencane (*Amphicarpum muhlenbergianum*), and/or hydrophytic species such as coastalplain yellow-eyed grass (*Xyris ambigua*), Carolina redroot (*Lachnanthes caroliana*), and beaksedges (*Rhynchospora* spp.).

Wet flatwoods provide habitat for eastern diamondback rattlesnake (*Crotalus adamanteus*), pygmy rattlesnake (*Sistrurus miliarius*), red-tailed hawk (*Buteo jamaicensis*), striped skunk (*Mephitis mephitis*), bobwhite (*Colinus virginianus*), cottontail (*Sylvilagus floridanus*), and white-tailed deer. Historically, fires ignited by lightning during the early thunderstorm season (May-July) would have spread across the landscape every 2-5 years and burned the mesic-wet flatwoods complex.

**Current Condition:**

Wet flatwoods form a large component of the LWRSF landscape. It is found forest-wide. Cutthroat flatwoods are most prominent in the center of the southern half of the Arbuckle Tract. Many of the wet flatwoods areas on Arbuckle were planted with off-site slash pine in the early 1950's and have been harvested between the mid 1990's to

present. In 2009, LWRSF FFS staff implemented a Flatwoods Restoration Plan for continued timber harvests and prescribed burning in wet-cutthroat grass flatwoods. Between 2009-present on the Arbuckle Tract, there have been restoration efforts through off-site pine timber harvests, native pine plantings, prescribed burning, and improving forest health conditions. Since 2008, there has been roughly 1,145 acres of wet flatwoods harvested for planted off-site pine down to 10-50 trees per acre. Wet flatwoods with a dominant groundcover of cutthroat grass (*Panicum abscissum*) are denoted as “cutthroat flatwoods”. Excellent examples of solid cutthroat flatwoods can be observed north and south of Tram Road on the Arbuckle Tract. In the eastern half of the Babson and Boy Scout parcels on the Hesperides Tract, the abundant cutthroat grass suffers from dense shrubs due to fire suppression. Most wet flatwoods occurring on the WIW Tract are gallberry-palmetto flatwoods. Some portions of wet flatwoods on the Arbuckle Tract still contain dense stands of planted off-site slash pine (*Pinus elliottii*) or natural South Florida slash pine (*Pinus elliottii* var. *densa*). Some of these areas are labelled as “pine plantation” in the current map. Areas of planted or natural pine that have been thinned are generally in fair to good condition. These stands are mapped as “restoration wet flatwoods.”

#### **Management Needs:**

Management goals will focus on maintaining a natural fire regime, applying prescribed fire every 1-5 years using dormant and growing season fires. Growing season fires should be applied when possible to cutthroat grass communities to encourage increased flowering of cutthroat grass and other native forbs. (U.S. Fish and Wildlife, 1999). Other major goals include continued timber harvests and native pine reforestation. This will be implemented for continued off-site planted slash pine removal, reintroduction of native pine species, and thinning pines to a natural density of 10-50 trees per acre. There are several wet flatwoods areas on Arbuckle in need of timber harvest to restore a more natural pine overstory density of 10-50 trees per acre and continued off-site pine removal. These areas will continue to have native South Florida slash pine (*Pinus elliottii* var. *densa*) and longleaf pine (*Pinus palustris*) planted in landings and throughout wet flatwoods, and treated with prescribed fire. Once a clear-cut or thinning harvest is completed, assessments for reforestation and natural pine regeneration will be planned as needed. A more detailed plan will be developed by FFS staff at LWRSF for future harvests and reforestation projects in wet flatwoods areas.

Management activities should prioritize searching for, treating, and monitoring invasive plant species within wet flatwoods areas on LWRSF. Specifically, management should survey for and minimize the introduction of invasive plants like cogongrass (*Imperata cylindrica*) through timber harvest practices. Cogongrass has been treated in timber sale landing sites in some portions of the wet flatwoods in the center of the Arbuckle Tract. Existing roads and wetlands should be used as firebreaks whenever possible. The use of plowed firebreaks and other soil-disturbing activities should be minimized. Depth of plowed firebreaks should be minimized to prevent hydrologic alteration. Silvicultural activities in wet flatwoods will follow Florida BMPs and be carried out in a way that minimizes soil disturbance and damage to

cutthroat grass. All timber harvest operations will be conducted during dry conditions to minimize ground disturbance and rutting.

## U. Wet Prairie

### **Description:**

Wet prairie is an herbaceous community found on continuously wet, but not inundated, soils on somewhat flat or gentle slopes between lower lying depression marshes and slightly higher wet or mesic flatwoods. Trees and shrubs are absent or very sparse. On LWRSF, cutthroat grass (*Panicum abscissum*) or wiregrass (*Aristida beyrichiana*) primarily forms the groundcover. There is occasional South Florida slash pine (*Pinus elliotii* var. *densa*) and a mix of herbs that include blue maidencane (*Amphicarpum muhlenbergianum*), cutover muhly (*Muhlenbergia expansa*) shortspike bluestem (*Andropogon brachystachyus*), cutover muhly (*Muhlenbergia expansa*), big carpetgrass (*Axonopus furcatus*), spadeleaf (*Centella asiatica*), witchgrasses (*Dichanthelium* spp.), flattened pipewort (*Eriocaulon compressum*), slender flattop goldenrod (*Euthamia caroliniana*), whitehead bogbutton (*Lachnocaulon anceps*), camphorweed (*Pluchea* spp.), meadowbeauty (*Rhexia* spp.), beaksedges (*Rhynchospora* spp.), largeflower rosegiant (*Sabatia grandiflora*), Virginia chain fern (*Woodwardia virginica*), and yellow-eyed grasses (*Xyris* spp.). Wet prairies require frequent, low intensity ground fires to maintain graminoid groundcover and minimize encroachment of woody vegetation. Wet prairie burns on a frequency like that of mesic and wet flatwoods, every 2-3 years during the early lightning season (April-June).

### **Current Condition:**

The wet prairies on LWRSF occur as narrow strips interwoven with wet and mesic flatwoods, as shallow depressions between depression marshes, and as narrow bands separating basin marsh from neighboring uplands. An excellent example of wet prairie in good condition with high herb diversity occurs on the eastern side of the Prairie Tract.

### **Management Needs:**

Prescribed fire at short intervals, every 1-3 years, will be targeted for wet prairies. Regular fire is important to maintain the diversity of these communities and prevent shrub encroachment. Ideally, the seasonality of fires occurs during the early lightning season (April-June) or as close to this period as possible. Soil disturbance from cattle, ditches, roads, and vehicles should be avoided as these disturbances can drastically change species composition. Management activities should prioritize searching for, treating, and monitoring invasive plant species along wet prairies on LWRSF.

## V. Xeric Hammock

### **Description:**

Xeric hammock is an evergreen forest on well-drained sandy soils. It is often considered an advanced successional stage of scrub or sandhill. These hammocks typically have an open parklike aspect. On LWRSF, xeric hammocks feature a low canopy, more or less closed, generally dominated by sand live oak (*Quercus geminata*).

Other canopy species include scrub hickory (*Carya floridana*), longleaf pine (*Pinus palustris*), South Florida slash pine (*Pinus elliotii* var. *densa*), and live oak (*Quercus virginiana*). Turkey oak (*Quercus laevis*) and sand live oak (*Quercus geminata*) are often present in the subcanopy.

Shrubs include bigflower pawpaw (*Asimina obovata*), American beautyberry (*Callicarpa americana*), persimmon (*Diospyros virginiana*), gopher apple (*Licania michauxii*), coastalplain staggerbush (*Lyonia fruticosa*), fetterbush (*Lyonia lucida*), Chapman's oak (*Quercus chapmanii*), sand live oak (*Quercus geminata*), turkey oak (*Quercus laevis*), myrtle oak (*Quercus myrtifolia*), winged sumac (*Rhus copallinum*), scrub palmetto (*Sabal etonia*), saw palmetto (*Serenoa repens*), and tough bully (*Sideroxylon tenax*). Herbs are generally sparse and include bluestem (*Andropogon* spp.), wiregrass (*Aristida beyrichiana*), witchgrasses (*Dichanthelium* spp.), Elliott's milkpea (*Galactia elliotii*), skyblue lupine (*Lupinus diffusus*), and sandyfield beaksedge (*Rhynchospora megalocarpa*). Vines and epiphytes may be present and include earleaf greenbrier (*Smilax auriculata*), muscadine (*Vitis rotundifolia*), ballmoss (*Tillandsia recurvata*), southern needleleaf (*Tillandsia setacea*), and Spanish moss (*Tillandsia usneoides*).

The sparsity of herbs and the relatively incombustible oak litter impede most fires from invading xeric hammock. When fire does occur, it is nearly always catastrophic and may convert xeric hammock into another community type. Xeric hammock only develops on sites that have been protected from fire for 30 or more years (FNAI 2017).

**Current Condition:**

All xeric hammocks occurring on LWRSF developed from historic scrub or sandhill communities in response to fire exclusion. This is especially evident on the WIW Tract where large portions of historic sandhill have succeeded to xeric hammock. Large portions of xeric hammock occur on WIW, but isolated pockets of xeric hammock exist throughout other sections of WIW, particularly at lower elevations near baygall, basin marshes, and depression marshes. There has been some difficulty in burning the WIW Tract in the past due to patchy groundcover and inadequate fuels. In the Arbuckle Tract, three (3) notable areas of xeric hammock occur on the western portion of the tract that are sandhill-derived and have had fire excluded for long periods. These areas have occurrences of federally endangered or threatened plant species despite having transitioned into xeric hammock.

**Management Needs:**

The goal is to return current xeric hammock to sandhill, especially in areas where there is presence of rare species that require more open habitat. Measures will be taken to reintroduce fire back into xeric hammock and eventually restore the fire ecology of these sites. Fire return intervals will be based on adjacent community types for sandhill or scrub and burned between 3-19 years. Measures may also be taken to reduce oak dominance with mechanical or herbicide treatments followed by prescribed fire. A combination of mechanical or herbicide treatments may be used to improve burn conditions, mechanically reduce hardwoods or sand pines, or maintain fuels where fire

is not possible. The edges or perimeters of units may be matted or mowed to improve ignition conditions for prescribed fire. Prescribed fire may include hand and aerial ignition. Site specific plans will be made and will factor in management objectives and consider current condition of the hammock. Measures may be taken in some sandhill-derived xeric hammock on the WIW Tract to re-establish wiregrass as groundcover. Management activities should also prioritize searching for, treating, and monitoring invasive plant species within xeric hammocks on LWRSF.

## **W. Other Altered Landcover Types**

### **Description:**

Altered landcover types are areas where the natural community has been overwhelmingly altered as a result of human activity. Pine plantation, improved pasture, and semi-improved pasture restoration natural communities are described in separate sections of this plan.

The altered landcover types described in this section are often not appropriate areas for restoration. If restoration is desired, the target future condition of the ruderal habitat is dependent on the historic community. Please refer to the appropriate community type for a more specific explanation of the desired future condition.

### **Current Conditions:**

Altered landcover types LWRSF include abandoned fields, citrus groves, artificial ponds, canals/ditches, clearings, developed areas, roads, successional hardwood forest, and utility corridors.

Abandoned field (49 acres) – An abandoned citrus grove is mapped on the northern Hesperides Tract in historic sandhill and scrub.

Agriculture (378 acres) – A large portion of historic mesic flatwoods on the Prairie Tract has been converted to citrus groves.

Artificial pond (5 acres) – There are 8 artificial ponds mapped on the Prairie Tract. Most are in areas of historic mesic flatwoods or depression marsh.

Canal/ditch (43 acres) – Artificial drainage-way. Several canals associated with citrus groves on LWRSF have been mapped on the Prairie Tract.

Clearing (22 acres) – These are cleared or otherwise unnatural openings. There are several small clearings mapped throughout LWRSF.

Developed (24 acres) – Parking lots, office areas, residential areas, and Reedy Creek Campground are mapped as developed.

Road (311 acres) – LWRSF has an extensive network of roads. Many roads of the Prairie Tract are elevated with associated ditches/canals. Roads  $\geq 5$  meters wide are delineated on the current natural community map. On the Arbuckle, Tram Road has

been delineated separately from all adjoining roads. This was done to note that Tram Road was part of a railroad system in the past and significant ditching remains on both sides of the road in some areas.

Successional hardwood forest (2 acres) – At the north entrance of the Babson Parcel, a small section of historic mesic flatwoods has transitioned to successional hardwood forest due to fire suppression. These forests are dominated by fast growing hardwoods such as laurel oak (*Quercus hemisphaerica*), water oak (*Quercus nigra*), and/or sweetgum (*Liquidambar styraciflua*), often with remnant pines.

Utility Corridor (24 acres) – One utility corridor crosses the Walk-In-Water Tract on the south side of the property. The utility corridor runs through several natural communities, including sandhill, baygall, and wet flatwoods. Some of the species typical of sandhill found in the utility corridor areas include bigflower pawpaw (*Asimina obovata*), gopher apple (*Licania michauxii*), and skyblue lupine (*Lupinus diffusus*).

**Fire Regimes:**

Refer to the historic community.

**Management Needs:**

It may not be practical or desirable to restore some of the altered landcover types (e.g., developed land, roads, etc.) to the historic natural community. However, long term hydrology restoration that includes the removal of certain road beds and ditches would be highly beneficial to the natural communities on the site.

**Literature Cited:**

- Bridges, E.L. 2006. Historical accounts of vegetation in the Kissimmee River dry prairie landscape. Pages 43-62 in R.F. Noss, editor. Land of Fire and Water: The Florida Dry Prairie Ecosystem. Proceedings of the Florida Dry Prairie Conference. Painter, DeLeon Springs.
- Christman, S.P and W.S. Judd. 1990. Plants endemic to Florida scrub. Florida Scientist. 53:52–73.
- Clewell, A. F. 1989. Natural History of wiregrass (*Aristida stricta* Michx., Graminae). Natural Areas Journal 9(4):223-233.
- “Cutthroat Grass Communities” – Multi-Species Recovery Plan for South Florida, USFWS, 1999, pp 3-351;
- Deyrup M. 2011. Conservation status and management of Lake Wales Ridge arthropods restricted to scrub habitat. General Cycle Projects 2007. Final report on project T-15-D: Lake Wales Ridge Scrub Arthropods. 107. Pp.
- Dobson, A. P., Rodriquez, J.P., Roberts, W.M., and D.S. Wilcover. 1997. Geographic



- distribution of endangered species in the United States. *Science* 275:550–553.
- Duncan, B.W., Schmalzer, P.A., 2004. Anthropogenic influences on potential fire spread in a pyrogenic ecosystem of Florida, USA. *Landscape Ecology* 19, 153–165.
- Estill, J.C. and M.B. Cruzen. 2001. Phylogeography of rare plant species endemic to the southeastern United States. *Castanea* 66:3–23
- Fitzpatrick, J.W., G.E. Woolfenden, and M.T. Kopeny. 1991. Ecology and development-related habitat requirements of the FSJ (*Aphelocoma coerulescens coerulescens*). Florida Game and Fresh Water Fish Commission, Nongame Wildlife Program Technical Report No. 8.
- Florida Fish and Wildlife Conservation Commission (FWC). 2012. Gopher Tortoise Management Plan. Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida.
- Florida Fish and Wildlife Conservation Commission. Division of Habitat and Species Conservation. 2015. Scrub Management Guidelines for Peninsular Florida. Draft in preparation.
- Florida Department of State, Division of Historical Resources. Revised 2013. Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Lands. Department of the State, Division of Historical Resources. Tallahassee, Florida.
- Florida Department of Agriculture and Consumer Services. Revised 2008. Silviculture Best Management Practices (BMPs) for Florida. Florida Department of Agriculture and Consumer Services, Florida Forest Service.
- Florida Department of Agriculture and Consumer Services. State Forest Handbook. Florida Department of Agriculture and Consumer Services, Florida Forest Service.
- Florida Natural Areas Inventory (FNAI). 2010. Guide to the natural communities of Florida: 2010 Edition. Florida Natural Areas Inventory, Tallahassee, Florida.
- Gibson, D. J. and E. S. Menges 1994. Population structure and spatial pattern in the dioecious shrub *Ceratiola ericoides*. *American Journal of Botany* 5: 337
- Johnson, A.F. 1982. Some demographic characteristics of the Florida rosemary, *Ceratiola ericoides* Michx. *American Midland Naturalist* 108:170-174.
- Long, A. J., D. D. Wade, and F. C. Bwall. 2005. Managing for fire in the interface: challenges and opportunities. Pp. 201–223. Vince, S. W., M. L. Duryea, E. A. Macie, and R. Hermansen (eds.), *Forests at the wildland-urban interface: conservation and management*. CRC Press, London, UK.
- Menges, E.S. and D.R. Gordon. 2010. Should mechanical treatments and herbicides be used as fire surrogates to manage Florida's uplands? A review. *Florida Scientist* 73:145-172.

- Menges, E.S. 1999. Ecology and conservation of Florida scrub. Pp. 7–22. In: Anderson, R.A., Fralish, J.S., and J.M. Baskin (eds.), *Savannas, Barrens and Rock Outcrop Plant Communities of North America*, Cambridge University Press. New York, NY. 470 pp.
- Mize, R., R.E. Evans, B.R. MacRoberts, M.H. MacRoberts, and D.C. Rudolph. 2005. Restoration of pitcher plant bogs in eastern Texas, USA. *Natural Areas Journal* 25:197-201.
- Mulligan, M.K. and L.K. Kirkman. 2002. Burning influences on wiregrass (*Aristida beyrichiana*) restoration plantings: natural seedling recruitment and survival. *Restoration Ecology* 10(2): 34-339.
- Myers, R.L. 1990. Scrub and high pine. Pp. 150–193. In: Myers, R.L. and J.J. Ewel (eds), *Ecosystems of Florida*. University of Central Florida Press. Orlando, FL. 765 pp
- Myers, J., Myers, D., and C. Faulhaber. 2012. Florida Fish and Wildlife Conservation Commission Recommendations for Florida Scrub-jay Habitat Enhancement at the Walk-in-the Water WMA. Unpublished report. January 2012.
- Navarra, J. 2011. Sand Pine Harvest Monitoring Project. Unpublished report to the Florida Plant Conservation Program of the Florida Forest Service, Tallahassee, FL.
- Outcalt, K. W., M. E. Williams, O. Onokpise. 1999. Restoring *Aristida stricta* to *Pinus palustris* ecosystems on the Atlantic Coastal Plain, U.S.A. *Restoration Ecology* 7(3): 262-270.
- Peroni, P.A. and W.G. Abrahamson. 1986. Succession in Florida sand ridge vegetation: a retrospective study. *Florida Scient.* 49:176–190
- Pfaff, S., Gonter, M.A., and C. Maura. 2002. Florida Native Seed Production Manual. Natural Resource Conservation Service. US Department of Agriculture. Brooksville, FL.
- The Nature Conservancy. 1989. Resource Inventory and Land Management Recommendations for Lake Arbuckle State Forest Polk County, Florida”. p.7.
- Turner, W.R., D.S. Wilcove, and H.M. Swain. 2006. State of the scrub: conservation progress, management responsibilities, and land acquisition priorities for imperiled species of Florida's Lake Wales Ridge. Archbold Biological Station, Lake Placid, Florida.
- Turner, W. R., Wildcove, D.D, and H.M. Swain. 2006a. State of the scrub: conservation progress, management responsibilities, and land acquisition priorities for imperiled species of Florida's Lake Wales Ridge. [http://www.archbold-station.org/abs/publicationsPDF/Turner\\_etal-2006-StateofScrub.pdf](http://www.archbold-station.org/abs/publicationsPDF/Turner_etal-2006-StateofScrub.pdf). Accessed December 2006.
- Turner, W. R., Wildcove, D.D, and H.M. Swain. 2006b. Assessing the effectiveness of reserve acquisition programs in protecting rare and threatened species. *Cons. Biol.* 20:1657–1669.
- US Fish and Wildlife Service. 1999. Multi-Species Recovery Plan for South Florida (revised). U.S. Fish and Wildlife Service, Bethesda, MD

- Weekley, C. W., E. S. Menges, M.A. Rickey, G. Clarke, and S. A. Smith. 2008. Effects of mechanical treatments and fire on Florida scrub vegetation. Final Report to U.S. Fish and Wildlife Service, Vero Beach Office, Vero Beach, FL.
- Weekley, C.W., Menges, E.S., Craddock, A.L. and R. Yahr. 2013. Logging as a pretreatment or surrogate for fire in restoring Florida scrub. *Southern Appalachian Botanical Society* (78) 1, 15-27.
- White, W.A. 1970. The geomorphology of the Florida Peninsula. State of Florida Department of Natural Resources Geological Bulletin No. 51. Florida Department of Natural Resources. Tallahassee, FL. 164+ pp
- Webb, S.D. 1990. Historical biogeography. Pp. 70–100. In: MYERS, R. L. AND J. J. EWEL (eds.), *Ecosystems of Florida*. University of Central Florida Press. Orlando, FL. 565 pp
- Woolfenden, G.E., and J.W. Fitzpatrick. 1990. Florida scrub jays: A synopsis after 18 years of study. Pages 241-266 *in* P.B. Stacey, and W.B. Koenig, eds. *Cooperative breeding in birds*. Cambridge University Press.

#### **Glossary of Abbreviations**

ARC .....	Acquisition and Restoration Council
ARM .....	Archaeological Resource Monitor
APAFR.....	The Avon Park Air Force Range
ALICO .....	Atlantic Land and Improvement Company
BMP .....	Best Management Practice
BSA.....	Boy Scouts of America
CARL.....	Conservation and Recreation Lands
CISMA.....	Cooperative Invasive Species Management Area
DACS.....	Department of Agriculture and Consumer Services
DBH.....	Diameter at Breast Height
DEP .....	Department of Environmental Protection
DHR .....	Division of Historical Resources
DOC .....	Department of Corrections
DOD .....	Department of Defense
DRP.....	Division of Recreation and Parks
DSL.....	Division of State Lands
ESA .....	Endangered Species Act
FCT .....	Florida Communities Trust
FAC.....	Florida Administrative Code
FS .....	Florida Statutes
FFS .....	Florida Forest Service
FSJ.....	Florida Scrub-jay
FPCP.....	Florida Forest Services' Florida Statewide Endangered and Threatened Plant Conservation Program
FNAI.....	Florida Natural Areas Inventory

FTA.....Florida Trail Association  
 FWC.....Florida Fish and Wildlife Conservation Commission  
 FFSF.....Friends of Florida State Forests  
 LOW .....Incident Command System  
 LOW .....Lake Okeechobee Watershed  
 NRCS .....Natural Resources Conservation Service  
 SFWMD .....South Florida Water Management District  
 SWFWMD .....Southwest Florida Water Management District  
 SCA.....FSJ Core Area  
 OALE.....DACS Office of Agricultural Law Enforcement  
 OFW.....Outstanding Florida Water  
 OGT .....DEP Office of Greenways & Trails  
 OOF.....Operation Outdoor Freedom  
 OPS .....Other Personnel Services  
 ORF.....Off Road Vehicle  
 P2000 .....Preservation 2000  
 TMDL .....Total Maximum Daily Load  
 TIITF.....Board of Trustees of the Internal Improvement Trust Fund  
 TNC.....The Nature Conservancy  
 TP .....Total Phosphorous  
 USFS .....United States Forest Service  
 USFWS .....United States Fish and Wildlife Service  
 LWRSF .....Lake Wales Ridge State Forest  
 WUI.....Wildland-Urban Interface  
 WMA .....Wildlife Management Area  
 WRAP .....Wildfire Risk Assessment Portal  
 WIW .....Walk In Water