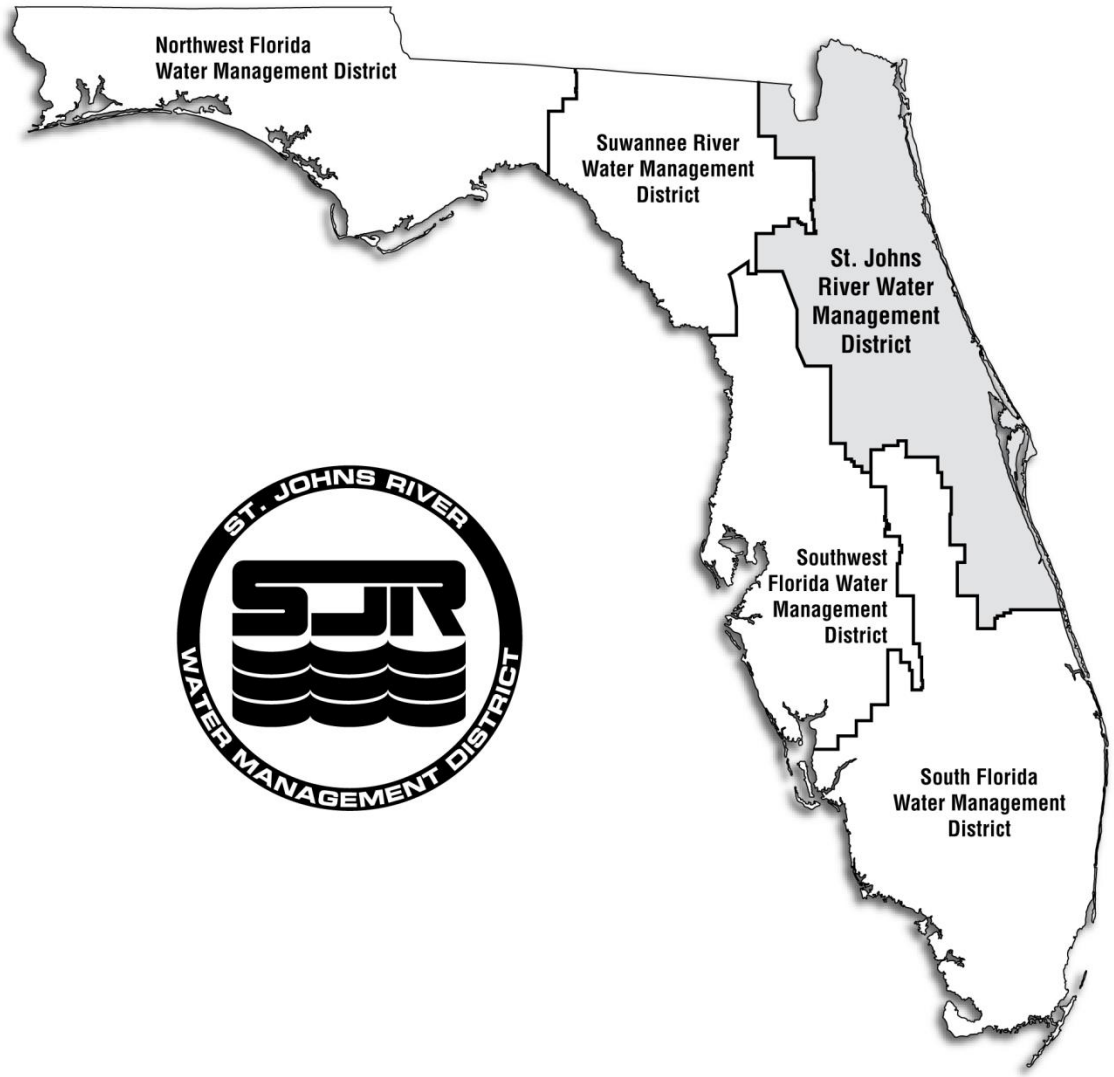
SILVER SPRINGS FOREST CONSERVATION AREA
LAND MANAGEMENT PLAN

MARION COUNTY, FLORIDA

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

NOVEMBER 2022


Northwest Florida
Water Management District
Suwannee River
Water Management
District
St. Johns
River Water
Management
District
Southwest
Florida Water
Management
District
South Florida
Water Management
District
ST. JOHNS RIVER
SJR
WATER MANAGEMENT DISTRICT

EXECUTIVE SUMMARY

MANAGEMENT AREA SIZE: 5,618 acres

DATE OF ACQUISITION: Acquisition of parcels within Silver Springs Forest Conservation Area (Silver Springs Forest) began in 2015.

DATE OF PLAN: November 2022
MAJOR BASIN: Ocklawaha River
PLANNING BASIN: Marshall Swamp and Rodman Reservoir

LOCATION: Silver Springs Forest is located in Marion County near the city of Ocala. The property is located north of State Road (SR) 40 between SR 326 and County Road (CR) 315.

FUNDING SOURCE: The acquisition for Silver Springs Forest was accomplished utilizing District Land Acquisition, Federal Forest Legacy Program, Conservation Trust for Florida and Florida Department of Environmental Protection (FDEP) – Springs Protection funding sources.

MANAGEMENT PARTNERS: A cooperative intergovernmental management agreement exists between the District and the Florida Fish and Wildlife Conservation Commission (FWC), designating Silver Springs Forest Conservation Area as a Wildlife Management Area. FWC manages hunting regulations and law enforcement on the property.

VISION STATEMENT: The management focus for Silver Springs Forest is the continued protection of the water resources of the Silver River, Silver Springs and the associated springshed. This includes protection of the headwaters of two streams, and more than 1,000 acres of diverse wetlands such as hydric hammock, floodplain swamp, wet flatwoods, baygall, depression marsh, basin swamp and basin marsh. Management activities within the uplands of Silver Springs Forest will be focused on forest management and restoration activities to maintain or improve natural communities that support a diverse assemblage of native wildlife species. The District will continue to maintain and improve quality recreational opportunities that are consistent with the ecological needs of the property.

RESOURCE PROTECTION AND MANAGEMENT:

- **WATER RESOURCES** – Sediment-laden water from the property historically caused negative impacts to Silver River's water quality. Significant water resource infrastructure improvements have been made and subsequent water quality improvements have been documented. Continuing to manage water quality improvements will continue to be a significant focus of management of the property.
- **FOREST MANAGEMENT AND RESTORATION** – Prior to acquisition, most of the property was managed for silviculture. While tailored to meet silvicultural management goals, the primary objectives of harvesting on Silver Springs Forest are restorative in nature and are intended to improve species diversity and the overall natural community health and vigor. The District will utilize a combination of harvesting, mechanical and herbicide vegetation management, and prescribed burning to encourage optimal forest health during the scope of this plan. Forest management activities will be conducted utilizing silvicultural best

management practices to protect water resources. As stands of off-site species mature, they will be evaluated for stand replacement with site-appropriate species. Mesic hammock restoration will be incrementally and adaptively implemented within stands as appropriate.

- **FIRE MANAGEMENT** – Implementation of prescribed burns occurs in accordance with annual burn plans and individual unit prescriptions.
- **FLORA AND FAUNA** – Silver Springs Forest provides habitat for numerous wildlife species, including listed species such as the gopher tortoise (*Gopherus Polyphemus)*. The conservation area lies within the primary range for the Ocala subpopulation of the Florida black bear (*Ursus americanus floridanus*). Invasive and exotic plant and animal species occur on the property. The District regularly monitors for the presence of exotic and invasive plants and animals and executes appropriate management actions.
- **CULTURAL AND HISTORICAL RESOURCES** – A review of State of Florida Division of Historical Resources (DHR) Florida Master Site File data indicates two cultural resource sites are either partially or completely encompassed by the Silver Springs Forest boundary. If any additional sites are verified, District staff will document and report sites to the DHR. District land management activities that may affect or impact these resources will be evaluated and modified to reduce the potential for disturbance of the identified sites.

LAND USE MANAGEMENT:

- **ACCESS** – Three public parking areas are available on Silver Springs Forest. Parking areas are located on: Baseline Rd., SR 326, and CR 315.
- **RECREATION** – Silver Springs Forest is open to the public for bicycling, picnicking, hiking, horseback riding, fishing, wildlife viewing, hunting and photography. Silver Springs Forest has more than 12.5 miles of blazed trails. Public hunting opportunities are administered by the FWC.
- **SECURITY** – Maintenance of fence lines, parking areas, gates, and locks is conducted as needed. The District maintains contact with FWC, local law enforcement, and a private security firm for security needs.

ADMINISTRATION:

- **REAL ESTATE ADMINISTRATION** – The District may consider purchasing parcels near Silver Springs Forest that become available and that will aid in the conservation of water resources within the Silver and Ocklawaha River watersheds. The District may pursue acquisition of small parcels or property exchanges with neighbors to improve and provide additional access to the conservation area.
- **COOPERATIVE AND SPECIAL USE AGREEMENTS, LEASES, AND EASEMENTS** – The District administers numerous leases, agreements, easements, special use authorizations (SUAs) and concessions related to the management of Silver Springs Forest. The District will continue to manage the property to meet agreement requirements and coordinate with FWC to administer the existing Wildlife Management Area (WMA).
- **MANAGEMENT COSTS AND REVENUES** – Management costs at Silver Springs Forest were $246,058 from 2016–2022 and are projected at $2,697,594 from 2022–2032. Revenues from forest management at Silver Springs Forest were $529,793 from 2016–2022 and are projected at $2,224,856 from 2022–2032.

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VISION STATEMENT

The management focus for Silver Springs Forest is the continued protection of the water resources of the Silver River, Silver Springs and the associated Silver springshed. This includes protection of the headwaters of two streams, and more than 1,000 acres of diverse wetlands such as hydric hammock, floodplain swamp, wet flatwoods, baygall, depression marsh, basin swamp and basin marsh. Management activities within the uplands of Silver Springs Forest will be focused on forest management and restoration activities to maintain or improve natural communities that support a diverse assemblage of native wildlife species. The District will continue to maintain and improve quality recreational opportunities that are consistent with the ecological needs of the property.

OVERVIEW

This document provides the goals and strategies to guide land management activities at Silver Springs Forest Conservation Area (Silver Springs Forest or Property) over the next 10 years. This land management plan was developed in accordance with Section 373.1391, and Section 373.591, Florida Statutes. This is the first comprehensive land management plan for this Property. However, this document does build upon the foundation established in the October 2015 Forest Legacy Multi-Resource Management Plan.

The St. Johns River Water Management District (District) owns interest in nearly 780,000 acres of land, acquired for the purposes of water management, water supply, and the conservation and protection of water resources. The District is the lead manager of approximately 428,000 acres.

LOCATION

Silver Springs Forest covers approximately 5,618 acres in Marion County within the Silver River Tributary, Silver River and Ocklawaha River Basins, all of which are sub-basins of the Ocklawaha River Basin. The Property is located in sections 16, 17, 19, 20, 21, 28, 29, 30, 31 and 33 of Township 14 and Range 23 East; north of State Road 40, approximately two miles northeast of the Ocala city boundary (Figure 1). Figure 2 provides aerial imagery from 2017 of Silver Springs Forest.

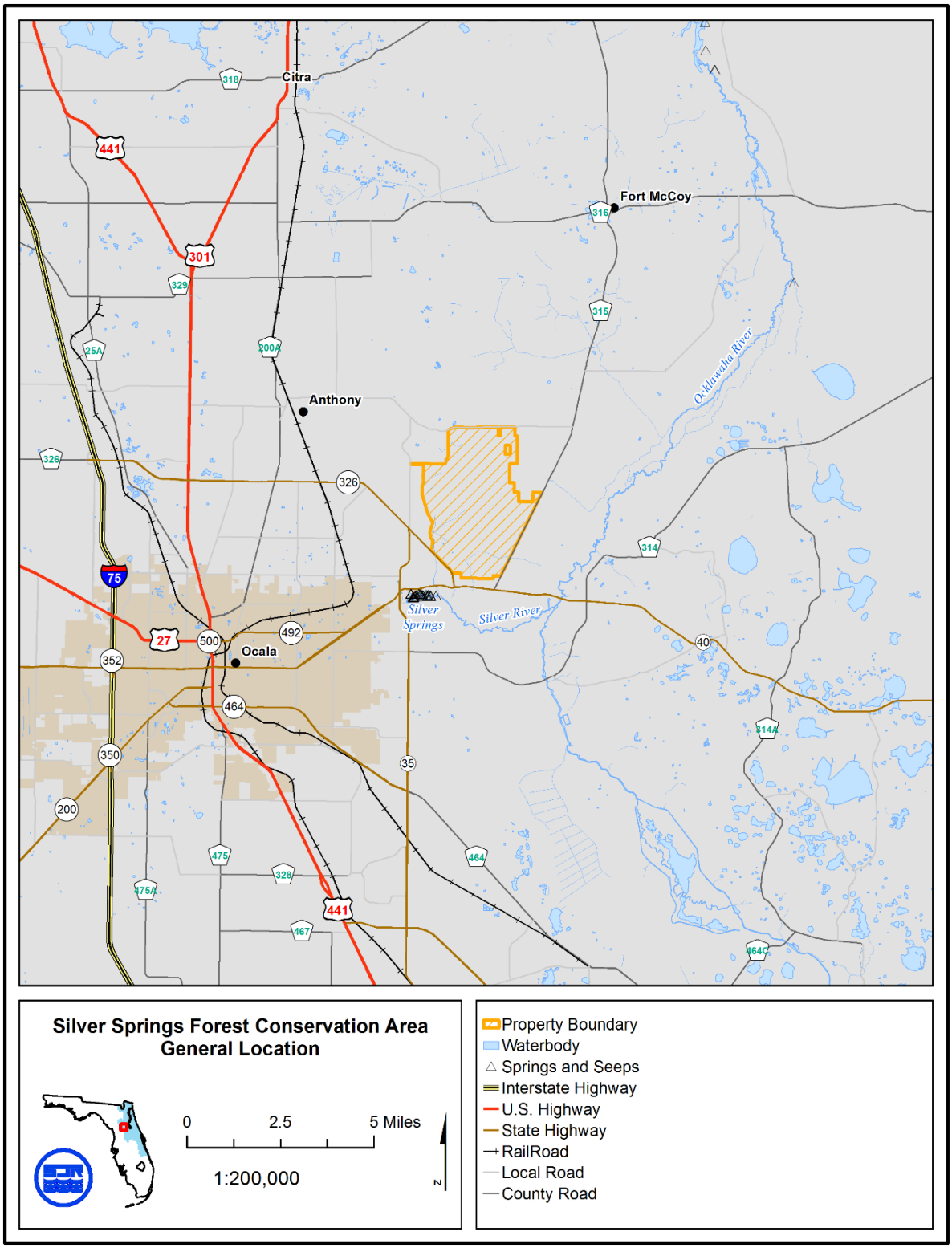

Figure 1: General Location

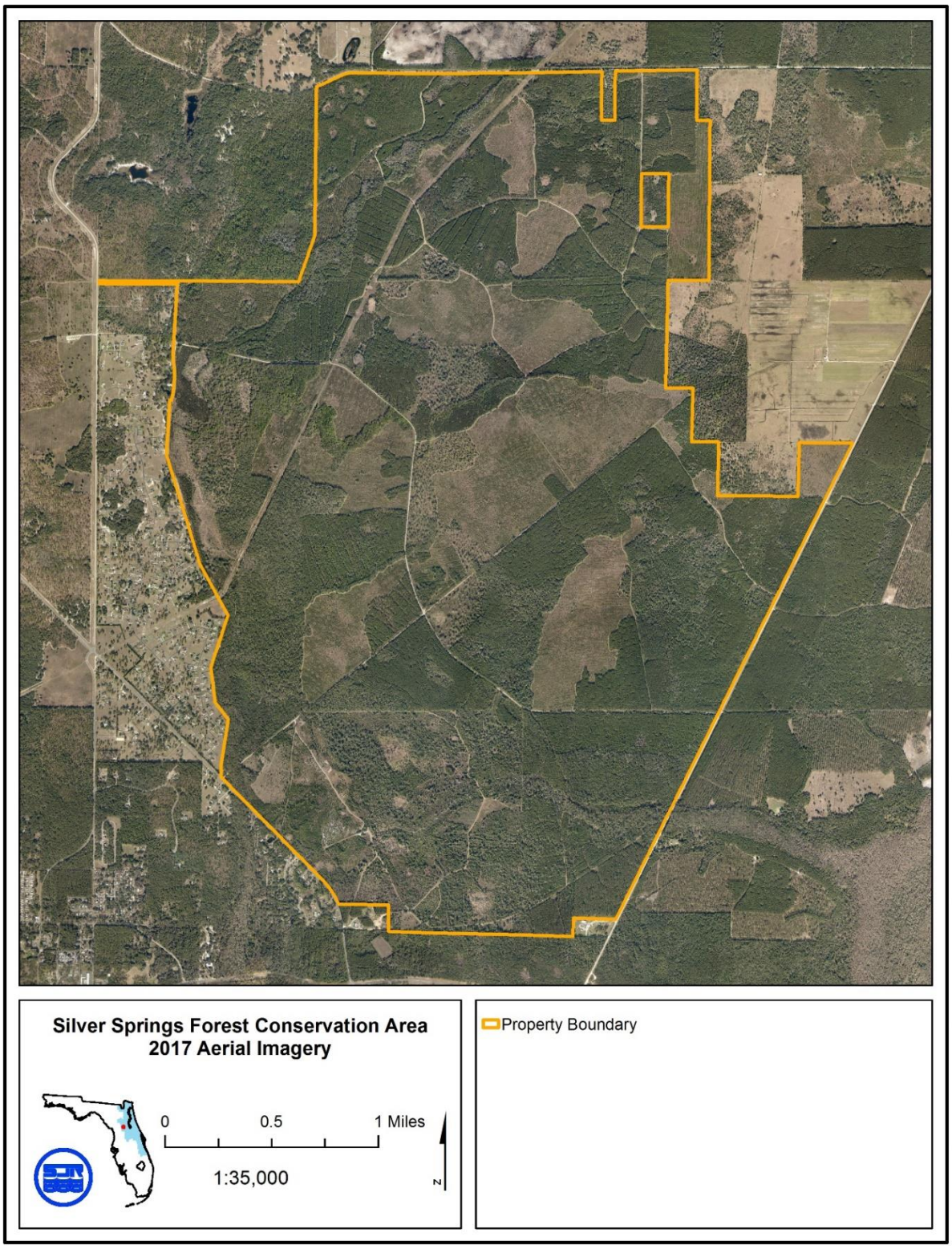

Figure 2: Aerial Imagery.

REGIONAL SIGNIFICANCE

Silver Springs Forest provides significant water resource protection for the regionally important Silver and Ocklawaha Rivers. Additionally, the property is an integral component of a larger network of interconnected publicly owned lands and privately owned conservation easements across a large part Central Florida centered in Marion County and including portions of Alachua, Citrus, Lake, Putnam, and Sumter counties (Figure 3). The interconnected public lands include the Ocala National Forest, Lake George State Forest, Lake Woodruff National Wildlife Refuge and numerous public conservation easements (Table 1). Within 25 miles of the Property, over 640,500 acres of land is protected for conservation. Together, these lands provide for the protection of water quality and storage, native plant and wildlife species, as well as numerous natural resource-based recreational opportunities.

Lead Manager	**Conservation Area**
Alachua Conservation Trust	Little Orange Creek Preserve
Alachua County	Lochloosa Slough Preserve
Alachua County	Phifer Flatwoods Preserve
Alachua County	Barr Hammock Preserve
City of Hawthorne	Little Orange Creek Nature Park
Florida Forest Service	Indian Lake State Forest
Florida Forest Service	Ross Prairie State Forest
Florida Forest Service	Welaka State Forest
FL Dept. of Environmental Protection	Silver Springs State Park
FL Dept. of Environmental Protection	Paynes Prairie Preserve State Park
FL Dept. of Environmental Protection	Rainbow Springs State Park
FL Dept. of Environmental Protection	Marjorie Harris Carr Cross Florida Greenway
Florida Fish and Wildlife Conservation Commission	Caravelle Ranch Wildlife Management Area
Florida Fish and Wildlife Conservation Commission	Half Moon Wildlife Management Area
Lake County Water Authority	Sawgrass Island Preserve
Southwest Florida Water Management District	Halpata Tastanaki Preserve
Southwest Florida Water Management District	Potts Preserve
Southwest Florida Water Management District	Lake Panasoffkee
St. Johns River Water Management District	Lochloosa Wildlife Conservation Area
St. Johns River Water Management District	Ocklawaha Prairie Restoration Area
St. Johns River Water Management District	Emeralda Marsh Conservation Area
St. Johns River Water Management District	Sunnyhill Restoration Area
St. Johns River Water Management District	Longleaf Flatwoods Reserve
St. Johns River Water Management District	Orange Creek Restoration Area
U.S. Forest Service	Ocala National Forest
US Department of Defense, Navy	Rodman Bomb Target

Table 1: Public conservation areas over 1,000 acres in size within 25 miles of Property boundary (FNAI)

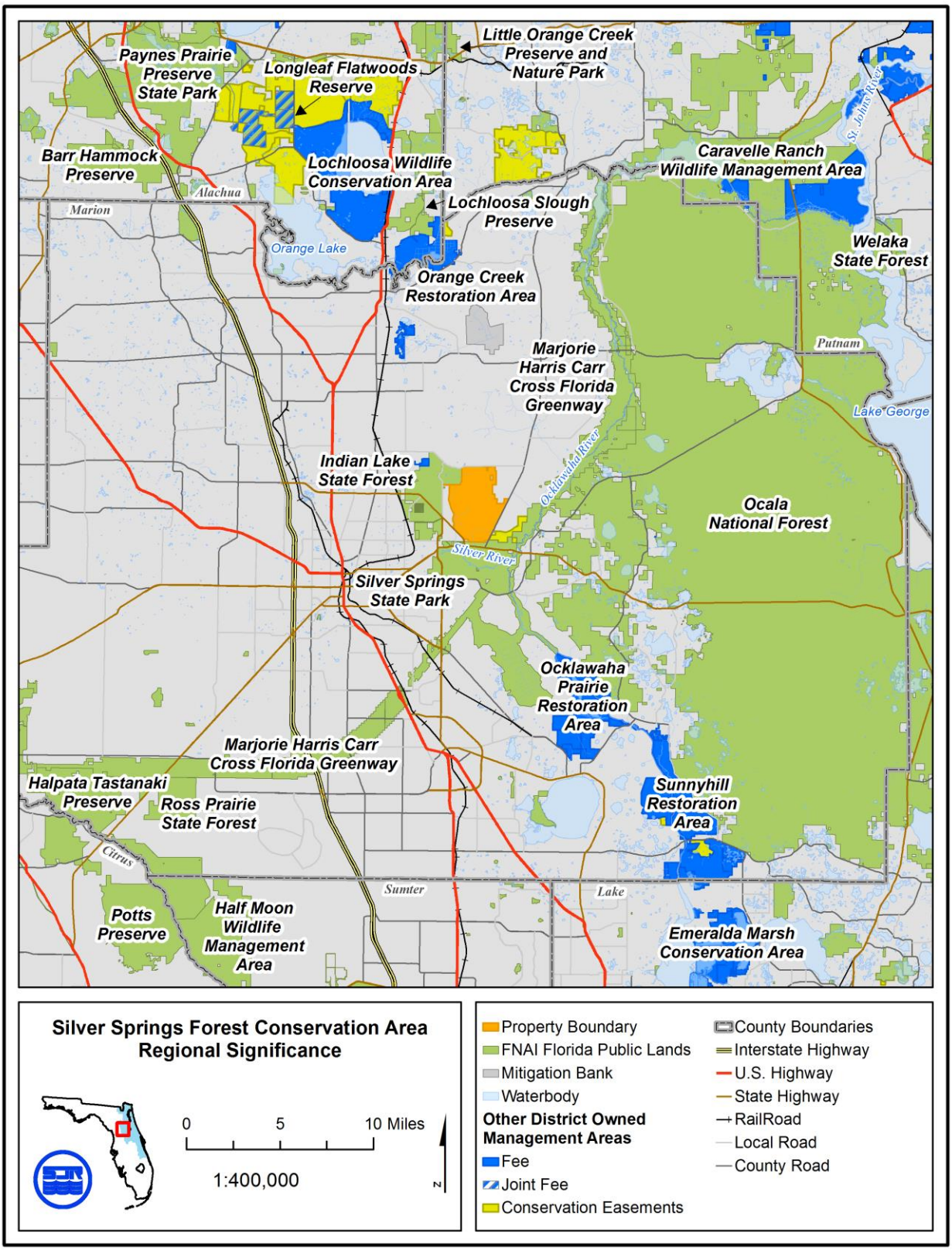

Figure 3: Regional Significance.

ACQUISITION HISTORY

The acquisition of parcels that comprise Silver Springs Forest provides for the protection of important water resources and ecological functions. These acquisitions are consistent with the goals of the Southern and Northern Ocklawaha River Basin projects as set forth in the District's Land Acquisition and Management Five Year Plan, the Federal Forest Legacy Program and the Florida Department of Environmental Protection (FDEP) – Springs Protection. These goals, as they apply to the Property, include:

- Improve water quality, maintain natural hydrological regimes, and maintain flood protection by preserving important wetland areas
- Restore, maintain, and protect native natural communities and biodiversity
- Maintain forested land cover
- Provide opportunities for resource-based recreation where compatible with the above listed goals

Acquisition of Silver Springs Forest began in 2015. The Property currently consists of three (3) parcels totaling 5,618 acres (Figure 4).

The three parcels that currently comprise Silver Springs Forest are listed below, and all acreage reported is derived from GIS calculations.

Silver Springs Forest Rayonier (4,878 acres) Land Acquisition number 2015-004-P1

The Silver Springs Forest Rayonier parcel totals 4,878 acres and was acquired on December 9, 2015, for $11,467,154. This acquisition was accomplished utilizing District Land Acquisition Fund, Federal Forest Legacy Program, Conservation Trust for Florida, and FDEP – Springs Protection funding sources. A Memorandum of Agreement, dated January 29, 2016, exists between the District and the Florida Forest Service related to the Forest Legacy Program funding obligations.

Halfmile Creek Property aka Rainey Land Company (720 acres) Land Acquisition number 2014-009-P1

The Halfmile Creek Property aka Rainey Land Company parcel totals 720 acres and was acquired by the District on April 30, 2015. The District acquired this property along with another parcel and a conservation easement in exchange for Bear Track Bay (LA2012-006-P1) plus $1,000,000 from the District Land Acquisition Fund.

Indian Lake Addition Sublease from Florida Forest Service (20 acres) no Land Acquisition number

The Indian Lake Addition Sublease from Florida Forest Service parcel totals 20 acres. This parcel is owned by the Board of Trustees of the Internal Improvement Trust Fund of the State of Florida (BOT), leased to the Florida Forest Service (FFS) and subleased from the FFS to the District. The Sublease Agreement (Number 4830-001) was made effective on April 20, 2021.

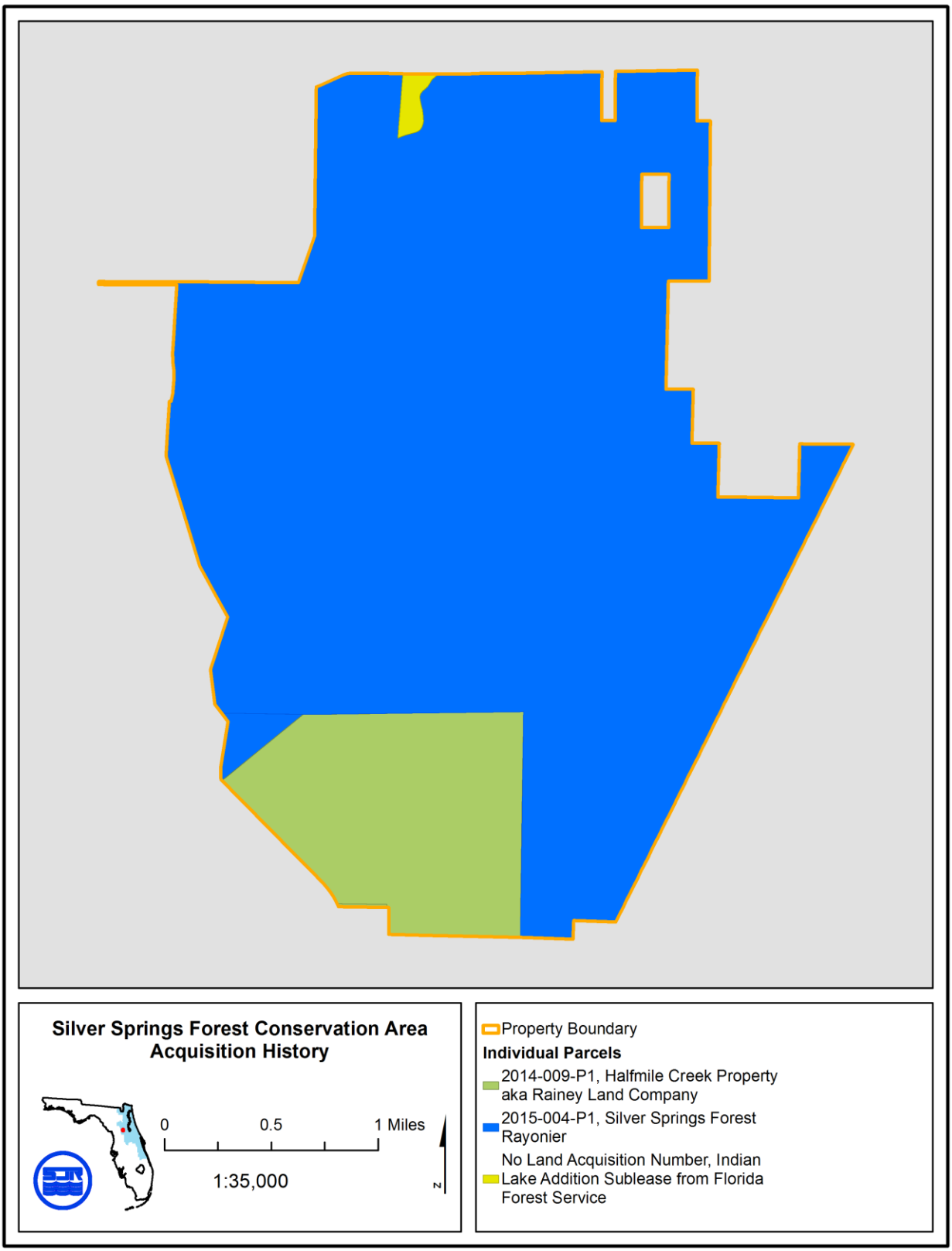

Figure 4: Acquisition History.

LOCAL GOVERNMENT LAND USE DESIGNATION

According to the 2018 Marion County Comprehensive Plan, the Future Land Use designation for Silver Springs Forest is Rural Land (https://www.marionfl.org/government/departments-facilities-offices/growth-services/planning-zoning/comprehensive-plan). According to Marion County, development in this area shall protect the existing rural character of the area and foster the continued operation of agricultural activities, farms, and other related uses. Land adjacent to the Conservation Area is designated as either Rural or Preservation.

The designation for land at Silver Springs Forest should be changed to Preservation to reflect that the Conservation Area is intended for conservation purposes and operated by contractual agreement with or managed by a federal, state, regional or local government or non-profit agency.

NATURAL RESOURCES

WATER RESOURCES

This section describes the surface and ground water resources of Silver Springs Forest.

SURFACE WATER

Silver Springs Forest is located in the central Ocklawaha River Surface Water Basin (Figure 5). The Ocklawaha River is the St. Johns River's largest tributary. The Ocklawaha River Surface Water Basin is characterized by forestry, agricultural, and conservation land uses. Most of Silver Springs Forest is within the Marshall Swamp planning unit. The southeastern portion of the property is within the Rodman Reservoir planning unit. Approximately 90% of the Ocklawaha River's length is associated with the Marshall Swamp and Rodman Reservoir planning units. The Rodman Reservoir planning unit covers 456 square miles. It is the second largest planning unit within the Ocklawaha River Basin and contains its namesake, the Rodman Reservoir.

The Surface Water Improvement and Management Act (SWIM legislation, Chapter 87-97 Laws of Florida) mandated the water management districts to identify and prioritize water bodies in need of restoration or conservation, as well as to plan, implement and coordinate restoration and conservation strategies. The Marshall Swamp planning unit is located at the northern terminus of the Upper Ocklawaha River basin (UORB) and is included in the 1995 SWIM plan for the UORB. The UORB SWIM plan prioritizes projects that improve water quality by reducing nutrients and pollutants, restore wetlands and other fish and wildlife habitats, encourage interagency coordination in management, and promote public awareness and education (Fulton 1995). The District's acquisition of Silver Springs Forest and the recent hydrologic improvements have been integral to improving downstream water quality for multiple sensitive and unique waterbodies.

Two streams have headwaters that are associated with Silver Springs Forest. No Name Creek is a small secondary order stream that begins immediately south of the Property. No Name Creek flows through Silver Springs Forest and the adjacent Bear Track Bay Conservation Easement

before finally discharging into the Ocklawaha River. Halfmile Creek is a primary order stream that is designated as an Outstanding Florida Water (OFW) (Figure 6). Halfmile Creek flows south to discharge into Silver Springs and Silver River, which are also designated as OFWs as well as unique and endemic state resources. These in turn flow into the nearby OFW of the Ocklawaha River Aquatic Preserve. The designation of OFW allows no degradation of water quality other than what is allowed in rules 62-4.424(2) and (3), F.A.C. (Rule 62-302.700 F.A.C.). In addition to the two major creeks of Silver Springs Forest, there are several unnamed creeks as well as many forested and herbaceous wetlands on the Property.

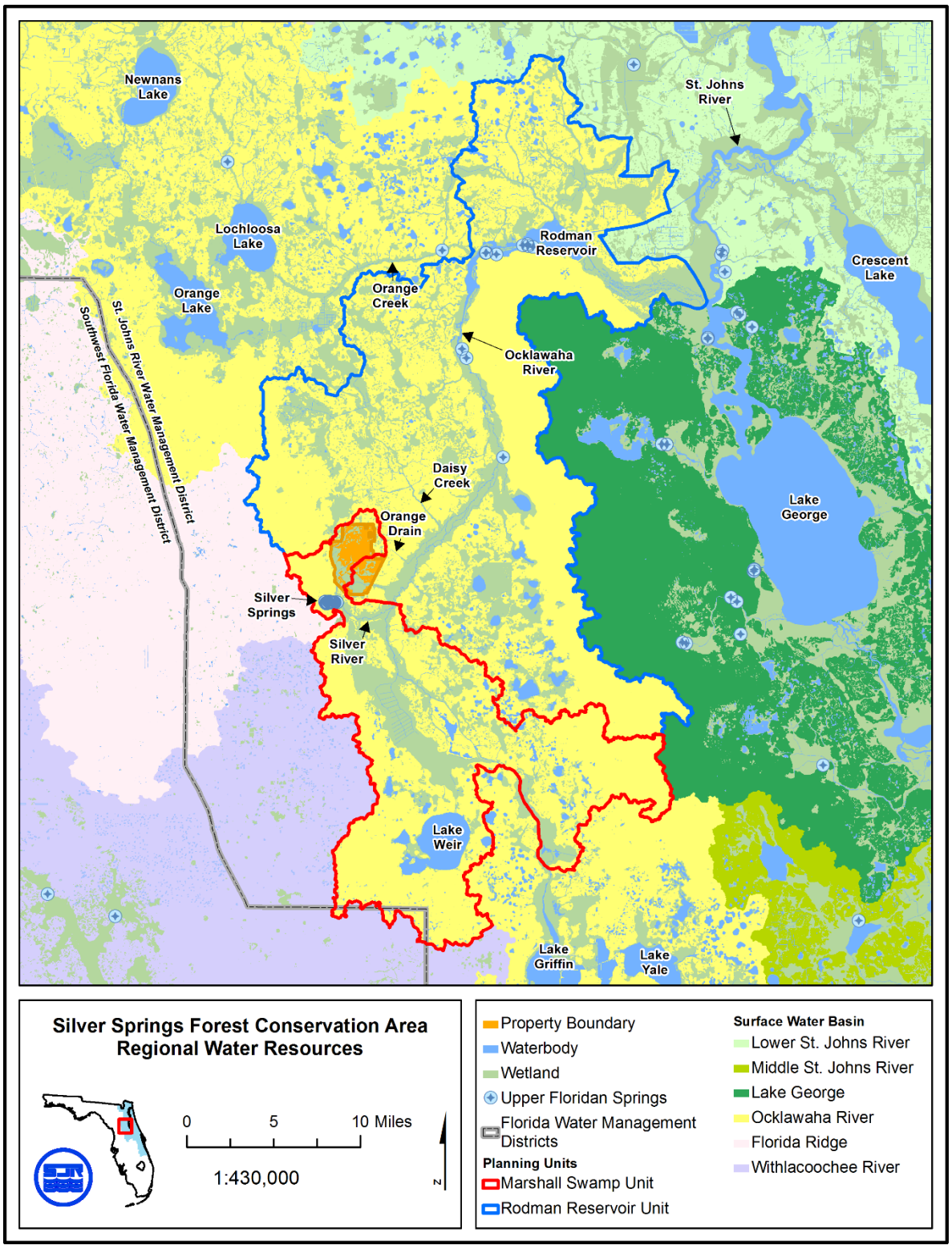

Figure 5: Regional Water Resources

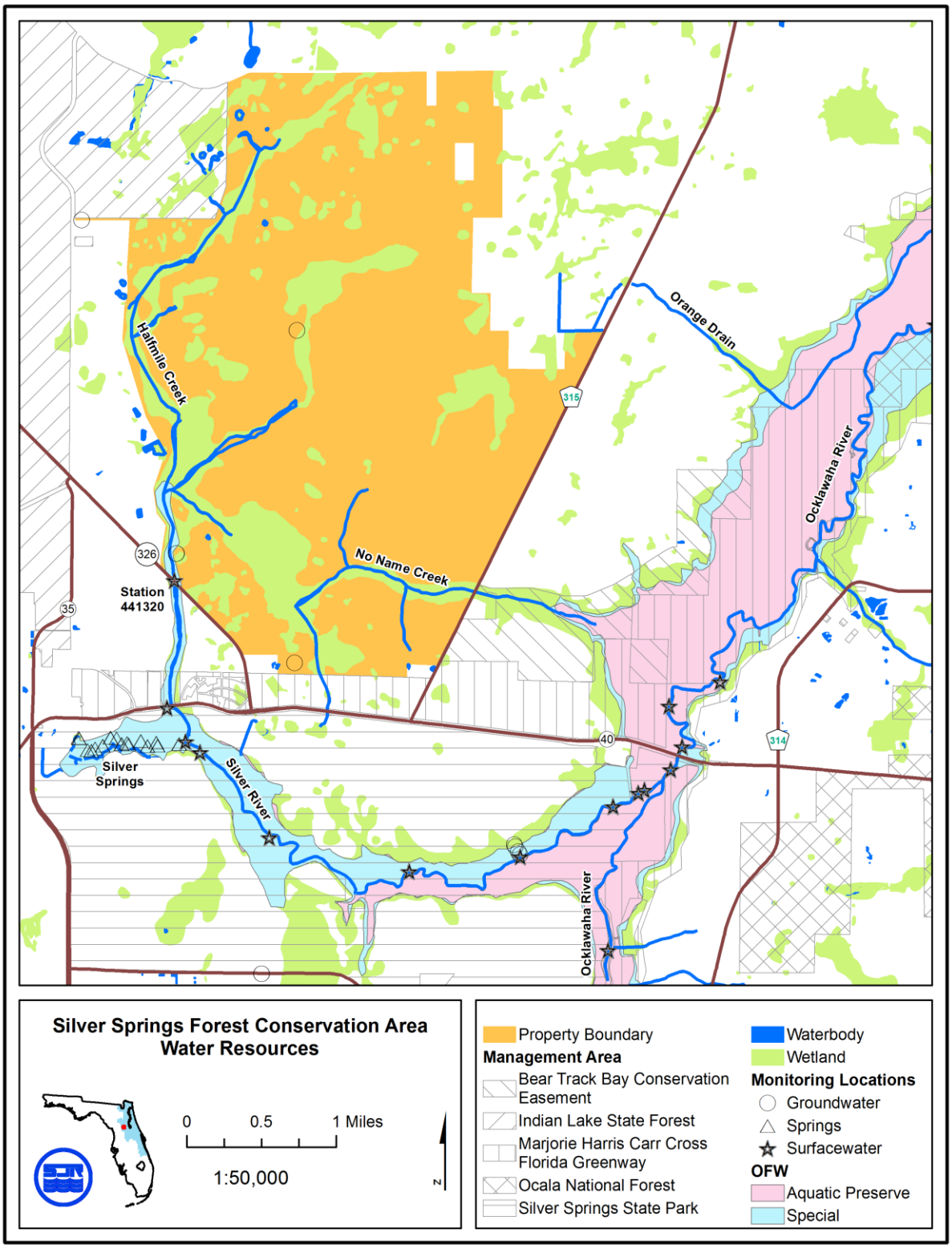

Figure 6: Water Resources

TOPOGRAPHY

A Light Detection and Ranging Digital Elevation Model (LiDAR DEM) is available from 2003 (Marion County, Figure 7) for the Property. Land surface elevation for Silver Springs Forest ranges from approximately 35 to 70 ft NAVD. In general, the highest elevations are present on the north and northwest portions of the property with elevations grading downwards to the creeks on the west and southern parts of the Property.

PHYSIOGRAPHY

Silver Springs Forest is located within the Ocala Uplift District (Brooks 1981) where Early Tertiary limestones are at or near the surface in most places (Brooks 1982). This area is a region of relict hills and karst features, characterized as "a broad uplift that occurred in Middle and Late Tertiary time" (Brooks 1982). Low rolling limestone plains are the most distinctive feature, but the landscape is varied. The Property is specifically located in the sub-district of the Ocklawaha Valley, which is an "erosional valley partially backfilled with Plie-Pleistocene estuarine deposits with poorly drained flatwoods terrace bordering river swamp" (Brooks 1981, 1982).

GEOLOGIC FORMATIONS

According to the Geologic Map of Marion County (FGS 1992), Silver Springs Forest is "comprised of undifferentiated sands and lies on Hawthorn Group or Ocala Limestone" and may contain some Cypresshead Formation. These areas are karst with some of the karst features containing Hawthorn Group sediments (FGS1992).

The Ocala Limestone (Eocene) consists of nearly pure limestones and occasional dolostones (USGS 2021).

The Hawthorn Group Coosawhatchie Formation (Miocene) is composed of poorly consolidated, variably clayey and phosphatic sand to poorly to moderately consolidated, slightly sandy, silty clay (USGS 2021). Permeability of Coosawhatchie sediments is low and form part of the intermediate confining unit of the Floridan aquifer system (USGS 2021).

The Cypresshead Formation (Pliocene) is comprised of siliciclastics (USGS 2021). It is a shallow marine near shore deposit that consists of reddish brown to reddish orange, unconsolidated to poorly consolidated, fine to very coarse grained, clean to clayey sands (USGS 2021). The Cypresshead Formation has permeable sands that form part of the surficial aquifer system (USGS 2021).

More information about Ocala Limestone, Hawthorn Group, and Cypress Formation can be found at USGS (2021).

HYDROGEOLOGY

Due to being located within the Silver Springs springshed, the principal hydrogeologic unit in the area is the Upper Floridan aquifer (UFA). According to Sutherland et al. 2017:

> "The UFA is approximately 300 ft thick in this region and occupies the Avon Park Formation and the Ocala Limestone where present (Munch et al. 2006). Both of these

> limestone units have a high matrix porosity and the presence of conduits. These structural features result in extraordinarily high transmissivity (i.e., a measure of the ease with which water can move through pore spaces or fractures) when compared to noncarbonate aquifers. UFA transmissivity ranges from 10,700 to 25,500,000 feet squared per day (ft^2 /day), with an average value of 2,000,000 ft^2 /day (Faulkner 1973). The high transmissivity values result in the rapid flow of water in the springshed."

Local geologic formations and soils data show that at Silver Springs Forest the UFA is mostly confined by the intermediate confining unit of the Hawthorn Group (USGS 2021) and has low to very low infiltration of the local soils (Figure 8).

The Property is located within the Lower St. Johns River groundwater basin. Although the vast majority of Silver Springs Forest is pervious area, most of the area is rated as low to medium for groundwater recharge (Figure 9). The Marion County Soil Survey (General Soil Map, Marion County Area, Florida) shows the Property as being predominantly Eureka-Paisley-Eaton association, meaning that the area is nearly level with poorly drained soils, and sandy to a depth of 5-40 inches with clayey soil below (USDA SCS 1976). Although the soils for most of the property are predominantly hydric (Figure 10), they are listed as having a low to very low infiltration rate due to the confining clay in the area (Figures 9 and 10).

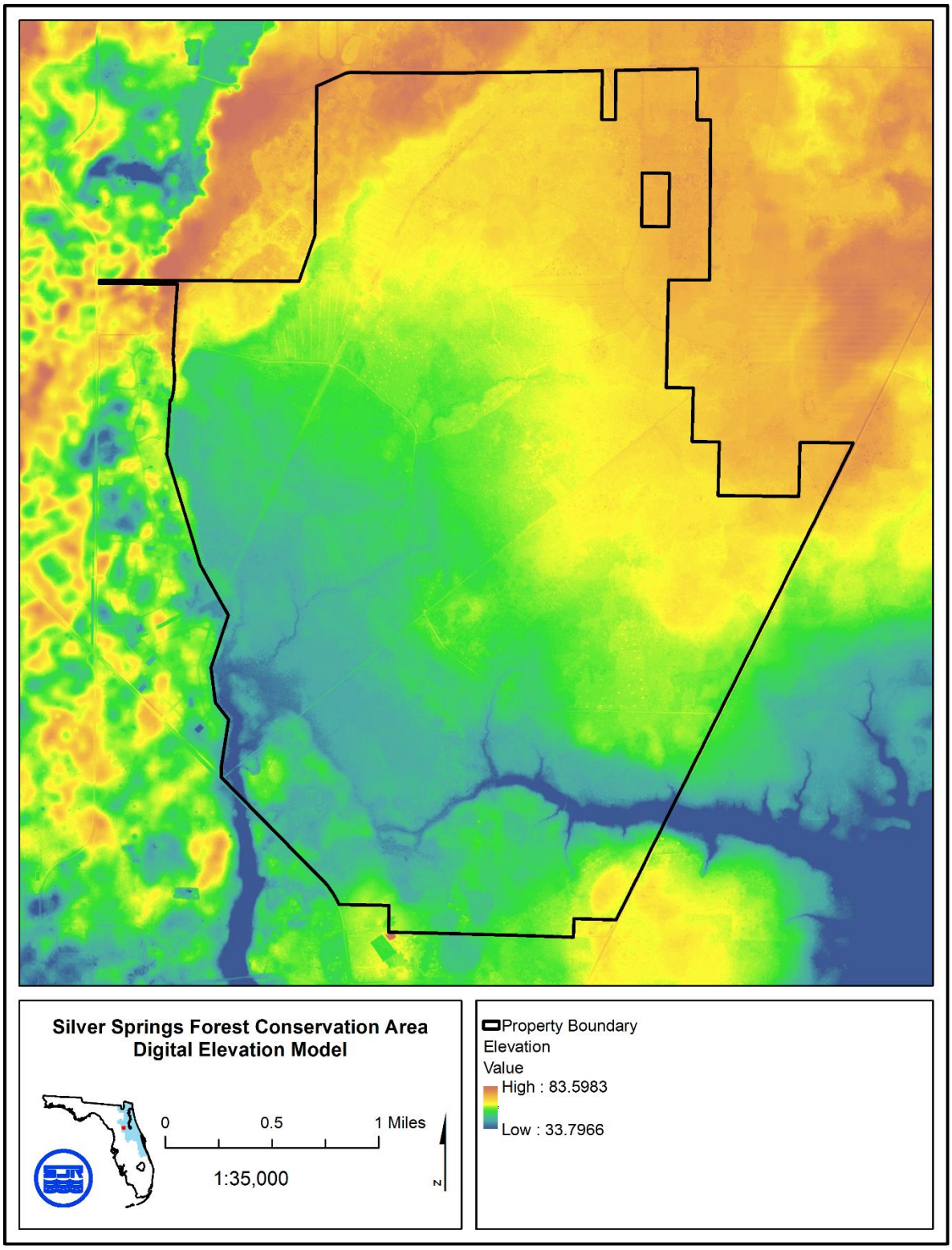

Figure 7. Digital Elevation Model (DEM) of Marion County in North American Vertical Datum (NAVD) 1988 (2003) for the Silver Springs Forest Conservation Area

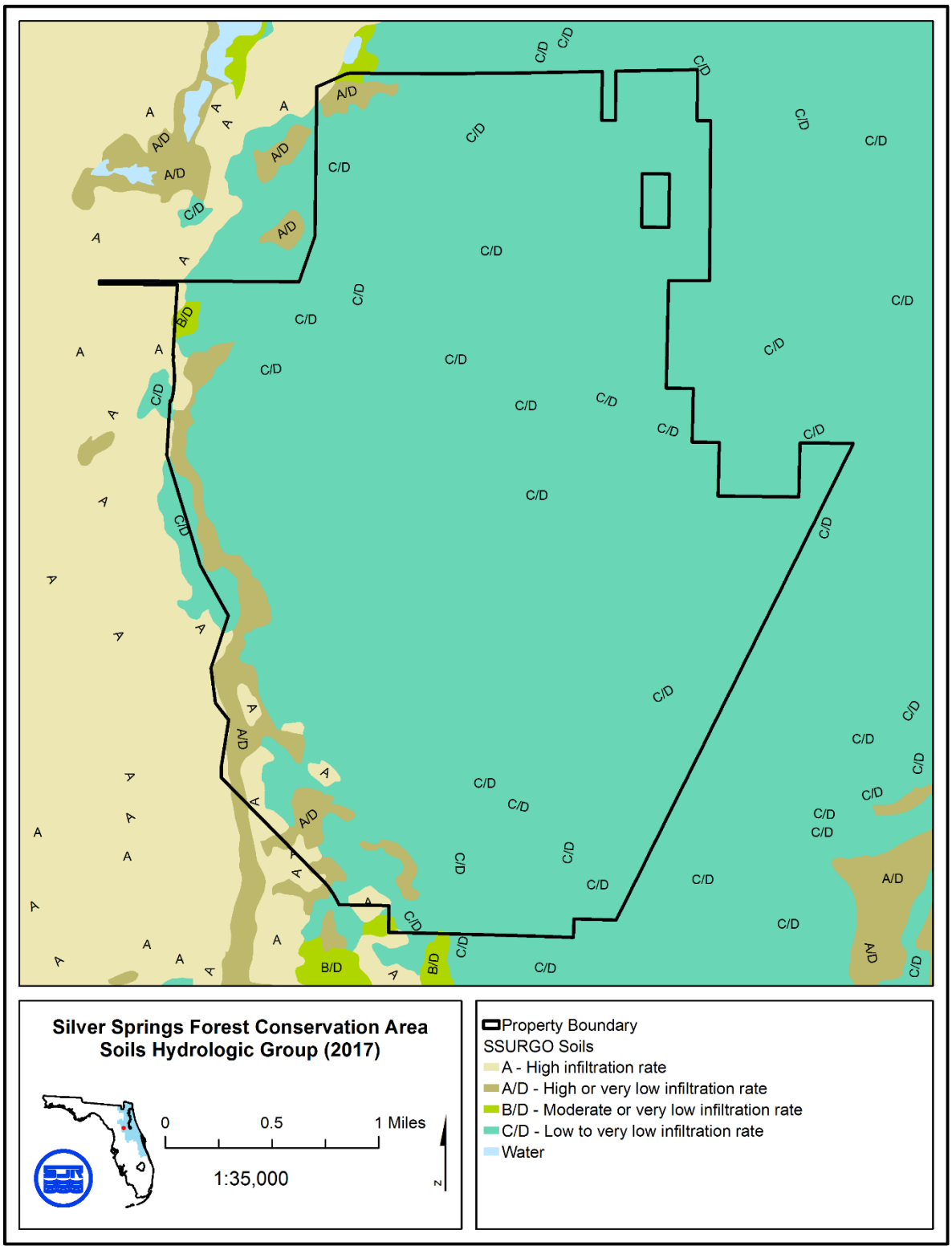

Figure 8. Soils Hydrologic Group for the Property (SSS 2017)

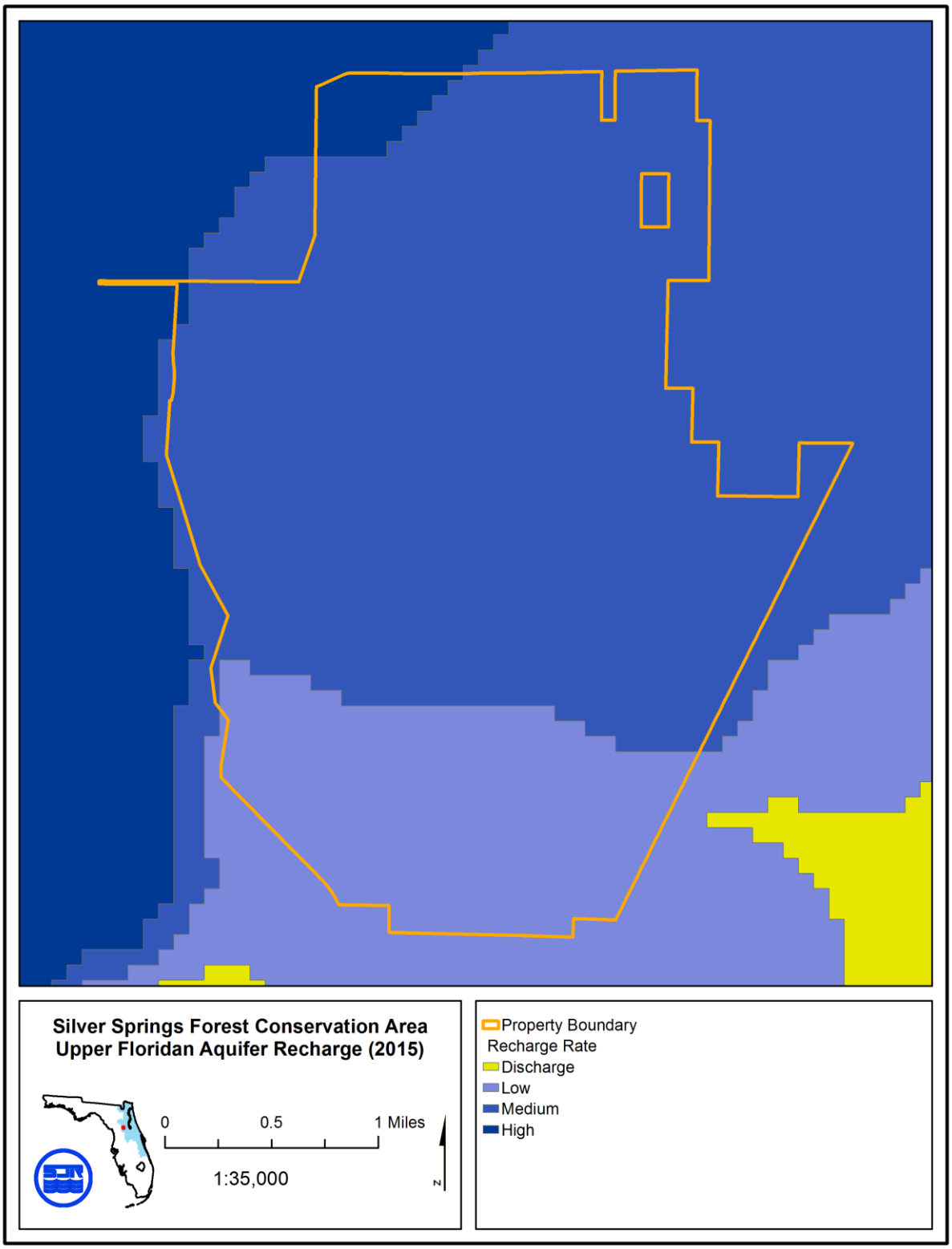

Figure 9. Predicted Upper Floridan Aquifer (UFA) Groundwater Recharge of the Property

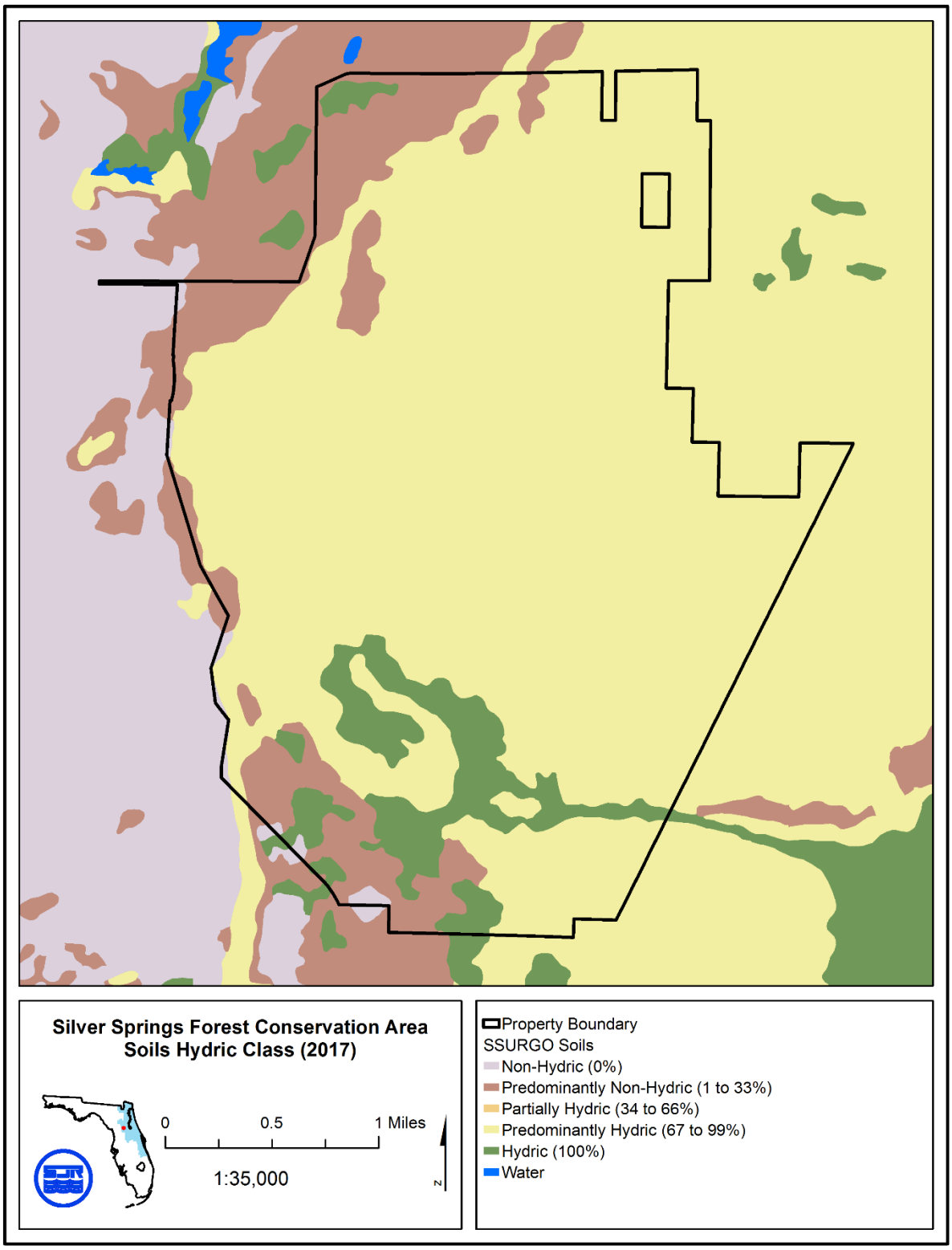

Figure 10. Soils Hydric Class for the Property (SSS 2017)

SPRINGSHED BOUNDARIES

Silver Springs Forest is within the springshed boundaries of the Silver Springs group (Figure 11). Although it is located within the 2-10 year capture zones (Figure 11), the majority of the area is confined (USGS 2021) with low infiltration rates and aquifer recharge (Figure 9).

OUTSTANDING FLORIDA WATERS

All waters of the state fall into one of five surface water classifications (Rule 62-302.400 F.A.C.) with specific criteria applicable to each class of water. In addition to its surface water classification, a water may be designated as an Outstanding Florida Water (Rule 62-302.700 F.A.C.). According to the Florida Department of Environmental Protection (FDEP) an Outstanding Florida Water (OFW) is "a water designated worthy of special protection because of its natural attributes (Subsection 403.061(28) F.S.). This special designation is applied to certain waters and is intended to protect existing good water quality" (https://floridadep.gov/dear/water-quality-standards/content/outstanding-florida-waters). The designation of OFW allows no degradation of water quality other than what is allowed in rules 62-4.242(2) and (3), F.A.C. (62-302.700 F.A.C.).

Halfmile Creek is designated as an OFW and is partially located within the Property boundaries (Figure 6). Halfmile Creek flows south to discharge into Silver Springs and the Silver River, which are also designated as OFWs. These in turn flow into the nearby OFW of the Ocklawaha River, which is protected within the FDEP Ocklawaha River Aquatic Preserve.

This status makes it imperative that best management practices are practiced when managing the Property to avoid negative impacts to the Property and the downstream protected waters.

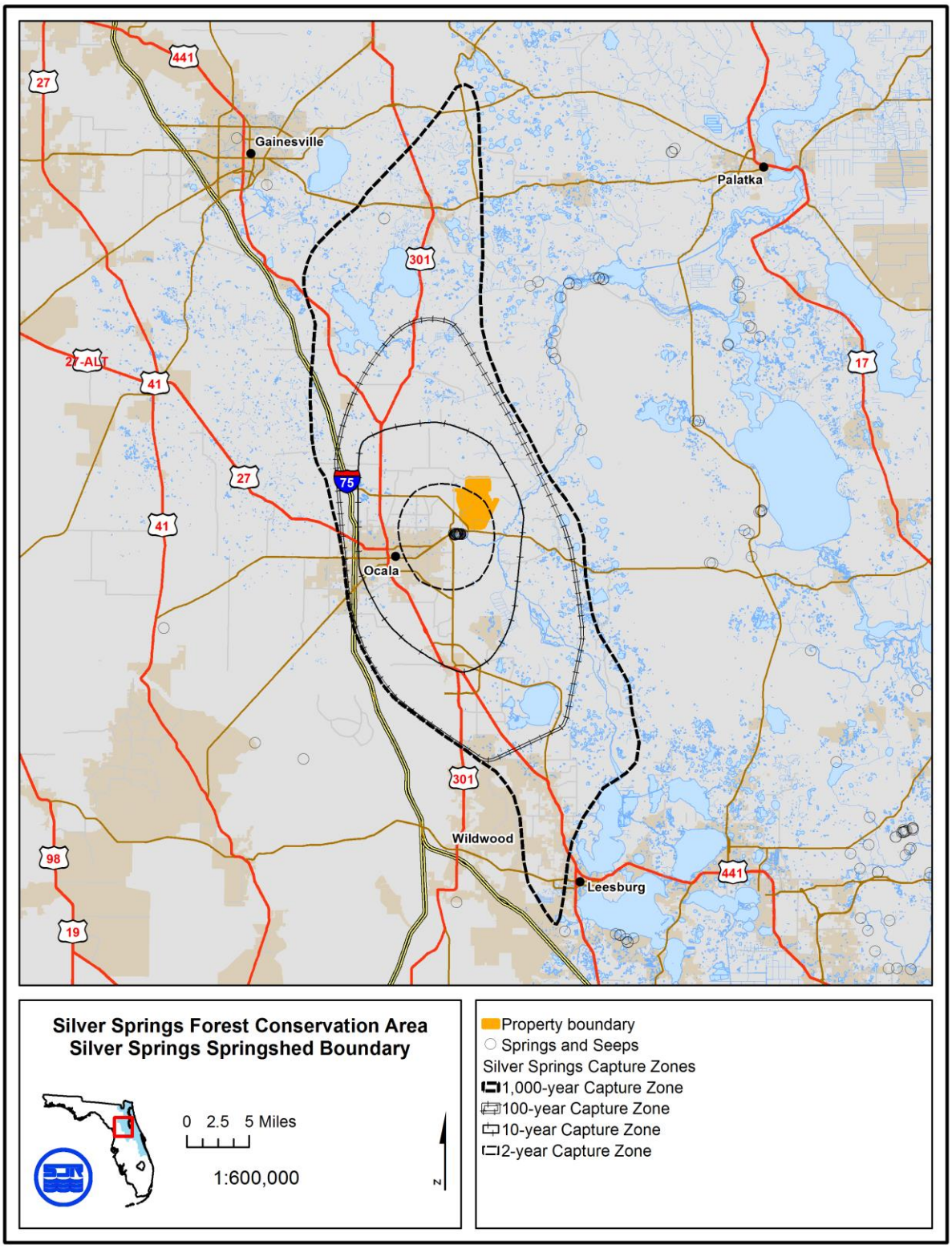

Figure 11. District Springshed Boundary Capture Zones for Silver Springs

HYDROLOGIC MODIFICATIONS

Ditches

Prior to District acquisition, ditches were constructed adjacent to roads throughout the property. The spoil material from these ditches was used as fill to elevate the land to create roads. Most of these ditches are not designed for the conveyance of water and exist as a byproduct of road construction.

Silvicultural Bedding

The silvicultural practice of bedding is a site preparation method that mounds soil into a series of linear mounds and alternating trenches designed to improve soil aeration and nutrient concentrations on wet and/or nutrient poor sites. Primary objectives of bedding are to elevate seedling root systems out of the water into mounds where the concentrated nutrients are readily available. Bedding is also used to reduce competition for newly planted trees.

Bedding negatively impacts the topsoil and organic matter, mixing soils and affecting habitat for benthic organisms. In addition, bedding negatively impacts hydrology, similar to ditching, by creating high areas of deposition and low drainage areas in habitats that may have originally been wet. This inhibits natural hydrologic pathways, reduces sheet flow in areas and can increase erosion if rows are not angled perpendicular to topography. As noted in the Natural Communities section, the practice of silvicultural bedding also allows for the conversion of vegetative composition within specific wetland types from their desired condition to a pine dominated condition. Silver Springs Forest was previously a site of intensive pine plantation silviculture and there is evidence that bedding was a preferred site preparation method extensively used there.

Previous Erosion and Site Enhancements

Historically, an inadequate number of undersized culverts were installed across Silver Springs Forest. These culverts were unable to handle the flashy – high flow, short duration – hydrology in areas where onsite streams and creeks crossed the developed roadways. This resulted in extensive erosion along the natural creeks as well as at culvert locations. During periods of high rainfall, runoff from Silver Springs Forest would transport suspended solids downstream, discharging into and through increased turbidity, negatively impacting water quality within the Silver River.

An Interconnected Pond Routing (ICPR) model of the Marshall Swamp watershed was developed by Jones Edmunds as part of the Lake Panasoffkee and Marshall Swamp Floodplain Analysis for the Marion County Board of County Commissioners (CDM Smith 2016). Silver Springs Forest is located in the northeast corner of the Marshall Swamp ICPR model. This existing ICPR model, with modifications to add detail within the Property, was used to represent site conditions and was incorporated into 2016 Silver Springs Forest modeling efforts to reduce turbidity downstream to Silver River (CDM Smith 2016). This modeling resulted in project recommendations that adjusted the number and capacity of the existing culverts at the three

existing locations, including culvert boxes to encourage suspended solids to settle and reduce flow. It also recommended the installation of two low water crossing overflow weirs and seven Gabion weirs to reduce water flow rates and to further increase the settling of suspended solids.

These CDM Smith (2016) recommendations were implemented onsite between 2017-2020 (Figure 12). Existing undersized culverts were replaced and redesigned. Appropriately sized culverts were installed at three sites and attached to culvert boxes on the upstream and downstream side to force the water to overflow the boards and then to 'bubble up' in order to slow the water flow, thus allowing suspended solids and clay material to settle from the water column. Board heights on the upstream and downstream culvert boxes are adaptively managed based on existing and predicted rainfall amounts.

Gabion weirs were also installed along the natural creeks that had experienced previous erosion to slow water flow and retain water behind the rock weirs to increase hydrological retention. These Gabion weirs were constructed of caged granite and work to impede the flow of water, thereby lessening future erosion in those creeks.

In addition, two sites had overflow weir low water crossings installed to handle flow over the roads under high water conditions. These areas were designed to retain water upstream thus increasing the hydroperiod of water and reducing the flow under normal conditions. Under higher water conditions, the water flows over the roadway downstream in a shallow controlled area, minimizing road erosion and impacts.

Both the rehabilitation of the culverted crossings and the installation of the Gabion and overflow low water crossings have improved hydrology on the Property by decreasing water velocity and turbidity onsite. In addition, the upgrades have decreased the loss of onsite soil from erosion and its subsequent offsite export of suspended solids downstream, thereby improving the water quality to State protected Outstanding Florida Waters.

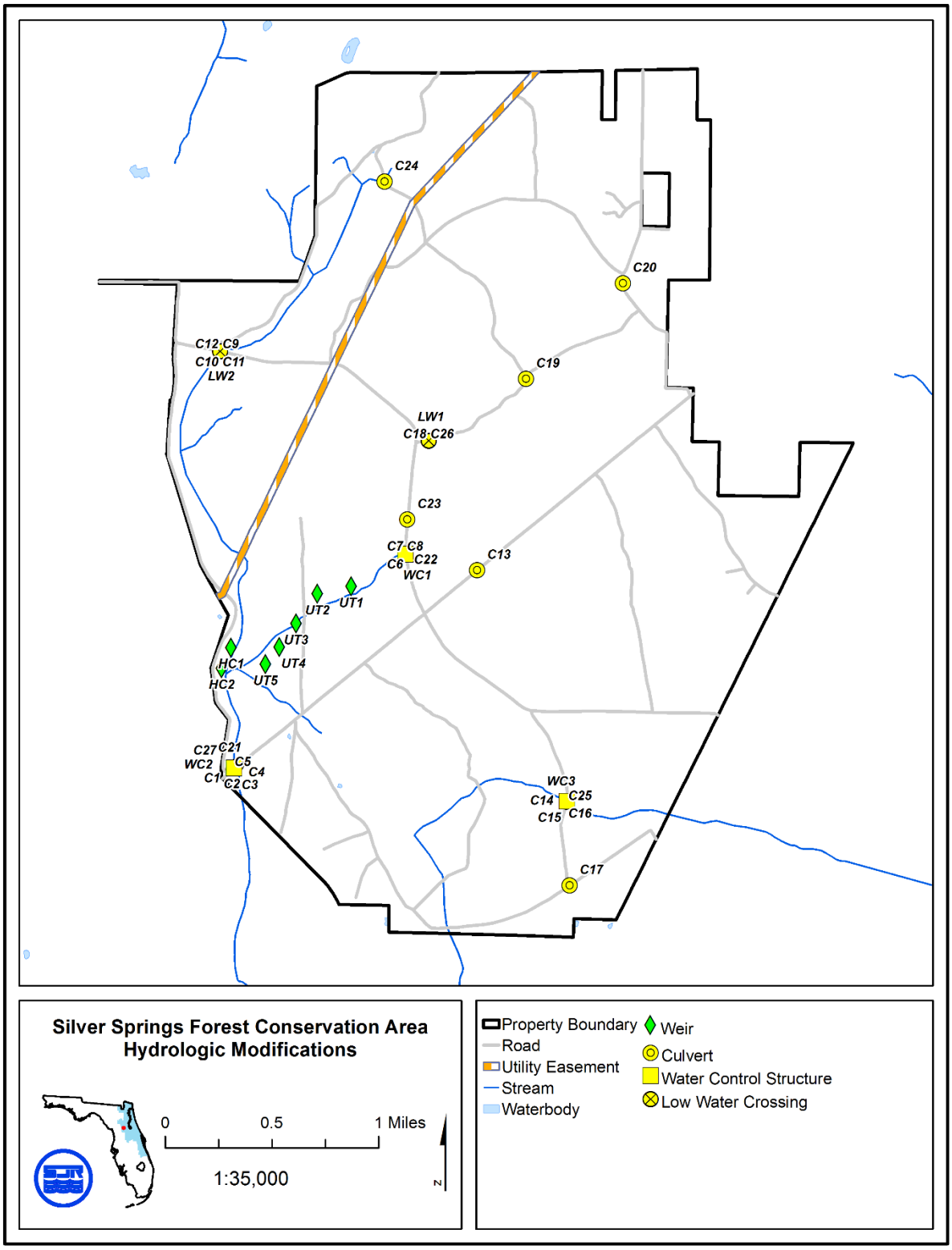

Figure 12. Hydrologic Modifications

MONITORING

Surface Water

Silver Springs Forest is located within the Ocklawaha River surface water basin. SJRWMD has been monitoring where Half-Mile Creek exits the Property at County Road 326 to evaluate the success of water resource enhancements to reduce soil erosion, slow water speed, and reduce downstream conveyance of suspended solids. Data for 75 analytes were reported for Station 0441320 HMCSR326.

There were no concerns regarding nutrients, such as nitrogen or phosphorus, from the Property. The main analytes of concern for the area were Total Suspended Solids (TSS) and Turbidity, which have historically had negative impacts on Halfmile Creek and the Silver River and have been described as having an appearance similar to 'chocolate milk.' Table 2 shows the summary of values for the two analytes of concern for the full period of record, as well as the pre- and post-enhancement summary values. Overall, there has been a reduction in turbidity contributions downstream from the Property, thereby improving water quality in Half-Mile Creek and the Silver River, safeguarding these OFWs.

Table 2. Available data summarized for St. Johns River Water Management District Surface Water Quality Station 0441320 HMCSR326 by Period of Record, Pre-Enhancement (historic values), and Post-Enhancement (renovated values) time frames to highlight the positive impacts renovation of established and installation of new erosion control structures have had on inputs to downstream waters.

Analyte	Year	Mean	Median	Min	Max	N
Total Suspended Solids (mg/L)	2014-2021 (Period of Record)	8.28	6.20	0.20	30.60	43
	2014-2019 (Pre-Enhancement)	8.72	6.40	0.20	30.60	37
	2020-2021 (Post-Enhancement)	5.57	5.90	1.20	9.80	6
Turbidity (ntu)	2014-2021 (Period of Record)	15.38	12.80	3.06	43.45	45
	2014-2019 (Pre-Enhancement)	16.77	14.23	3.67	43.45	38
	2020-2021 (Post-Enhancement)	7.84	6.72	3.06	15.61	7

Groundwater

Due to the lack of artesian springs and the clay confining layer existing on most of the property, Silver Springs Forest is mostly reliant upon rainfall and surface water to maintain its ecology. In addition, the clay confining layer limits the aquifer connectivity, thereby minimizing local consumptive use impacts from neighboring permitted areas.

Weather

Historically, three weather stations have recorded rainfall near Silver Springs Forest (Table 3). Locations and rainfall data are available through the District's website at http://webapub.sjrwmd.com/agws10/hdsnew/map.html. One rainfall station is active and has current data available, Station 00270034 Pine Oaks at Ocala (RN).

Table 3. St. Johns River Water Management District Hydrologic Data Map Rain Stations near Silver Springs Forest Conservation Area.

STATION NUMBER	STATION NAME	MAJOR SURFACE WATER BASIN	PERIOD OF RECORD
00053029	Ocala Repeater Tower (RN)	Marshall Swamp Unit	1991-1993
03830559	Joes Lake (RN)	Rodman Reservoir Unit	1995-2000
00270034	Pine Oaks at Ocala (RN)	Florida Ridge Unit	1998-2021

For the past 24 years, annual rainfall near the Property has ranged dramatically depending upon annual weather conditions and if the area was impacted by hurricane or tropical storm systems. The average annual rainfall for the area is 75.2 inches. However, between 1998 and 2021 annual rainfall ranged from a minimum of 27.3 to a maximum of 125.1 inches (September, Figure 13). Seasonal rainfall patterns in the area surrounding Silver Springs forest typically mimic those for much of peninsular Florida. A majority of precipitation occurs during the summer months through rainfall associated with afternoon thunderstorm activity and tropical low-pressure systems. Rainfall during other seasons is typically associated with the boundary of cold front weather systems. Many cold fronts that move from northern latitudes and impact portions of the continental United States, the Panhandle of Florida and North Florida do not make it as far south as the Property.

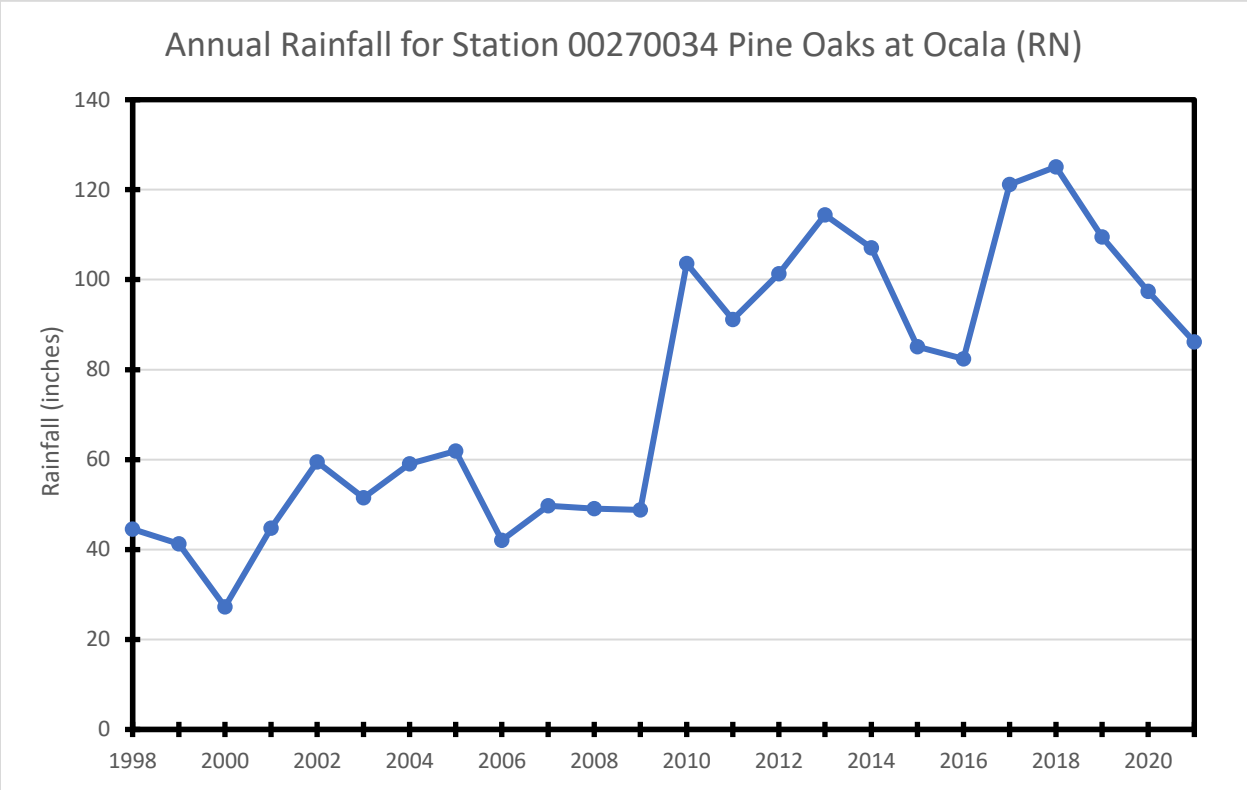

Figure 13. Annual rainfall for St. Johns River Water Management District Station 00270034 Pine Oaks at Ocala (RN) (1998-2021), located immediately west of Silver Springs Forest Conservation Area, in Ocala, Florida.

The Property is located in an area that receives variable annual rainfall (Figure 13), but also exhibits an especially flashy response to local daily rainfall (Figure 14) because of the lack of percolation through the clay confining layer. During initial periods of high rainfall, it is common for there to be a quick accumulation of rainwater behind the culvert and low water crossing structures, usually within hours. Historically, the local rainfall immediately funneled downstream, eroding soils, suspending sediments and creating turbid waters that flowed into the Silver River within a matter of hours.

Since rehabilitation of the Property hydrology by upgrading infrastructure and installing additional weirs, rainwater is now retained behind those weirs and downstream flows are much reduced, increasing hydroperiod on-site. This enhanced system not only reduces the speed of the water, but also the peak amount of water that flows downstream. This mimics natural hydrology and how the system would have functioned prior to the extensive road construction. However, during times of repetitive rainfall, the rainwater is staged up behind the structures and additional water cascades into downstream flows. The design of this enhanced hydrological system still incorporates the flashy (high flow, short duration) aspects of the system, but now only under high water conditions during the rainy season while still minimizing the suspension of solids and maximizing turbidity reduction.

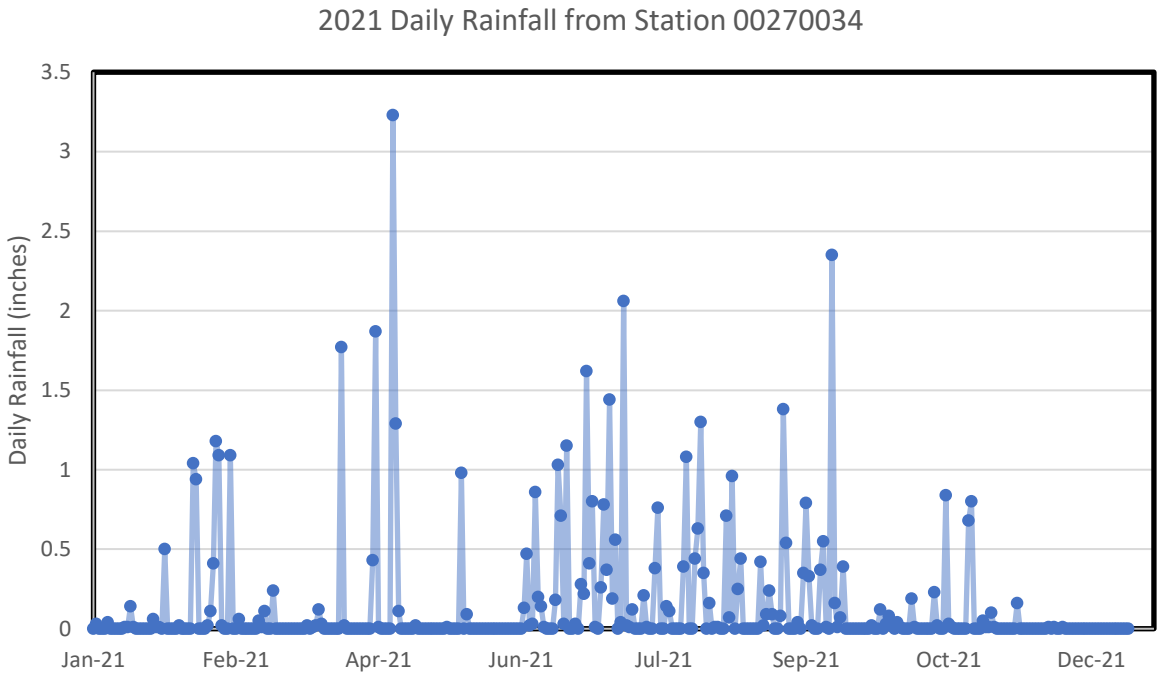

Figure 14. Daily rainfall for 2021 for St. Johns River Water Management District Station 00270034 Pine Oaks at Ocala (RN), located immediately west of Silver Springs Forest Conservation Area, in Ocala, Florida.

NATURAL COMMUNITIES

Historically, the 5,618 acres that comprise Silver Springs Forest consisted primarily of mesic hammock, mesic flatwoods, and hydric hammock (Figure 15). The historic natural community delineations and community descriptions provided below were produced by staff at the Florida Natural Areas Inventory (FNAI), under contract by the District. A full description of FNAI methods is provided in Appendix A. The general natural community descriptions are characterized using descriptions published in the FNAI 2010 *Guide to the Natural Communities of Florida.*

As described below, natural communities across Silver Springs Forest were dramatically altered prior to District acquisition, likely through clearing of both forested uplands and wetlands, road construction, cattle grazing, hydrologic modifications including ditching, soil modifications including silvicultural bedding, pine planting, and intensive industrial forestry management. Consequently, a majority of the vegetation communities currently present at Silver Springs Forest do not exhibit conditions indicative of the natural communities one would expect given their location on the landscape, soil or hydrologic attributes.

Perhaps the most dramatic change that has occurred at Silver Springs Forest over the course of the past 80 or more years is the conversion of what historically appeared to be a large mesic hammock system. Additional anthropogenic changes to land cover at Silver Springs Forest are described in the Altered Areas section.

Flatwoods communities are distinguished by very flat, level topography. The mesic, wet, and scrubby flatwoods communities within the Property vary in levels of disturbance, with the most significant impacts in the areas of the clear-cut. Historic management practices for all parcels were primarily for commercial timber production.

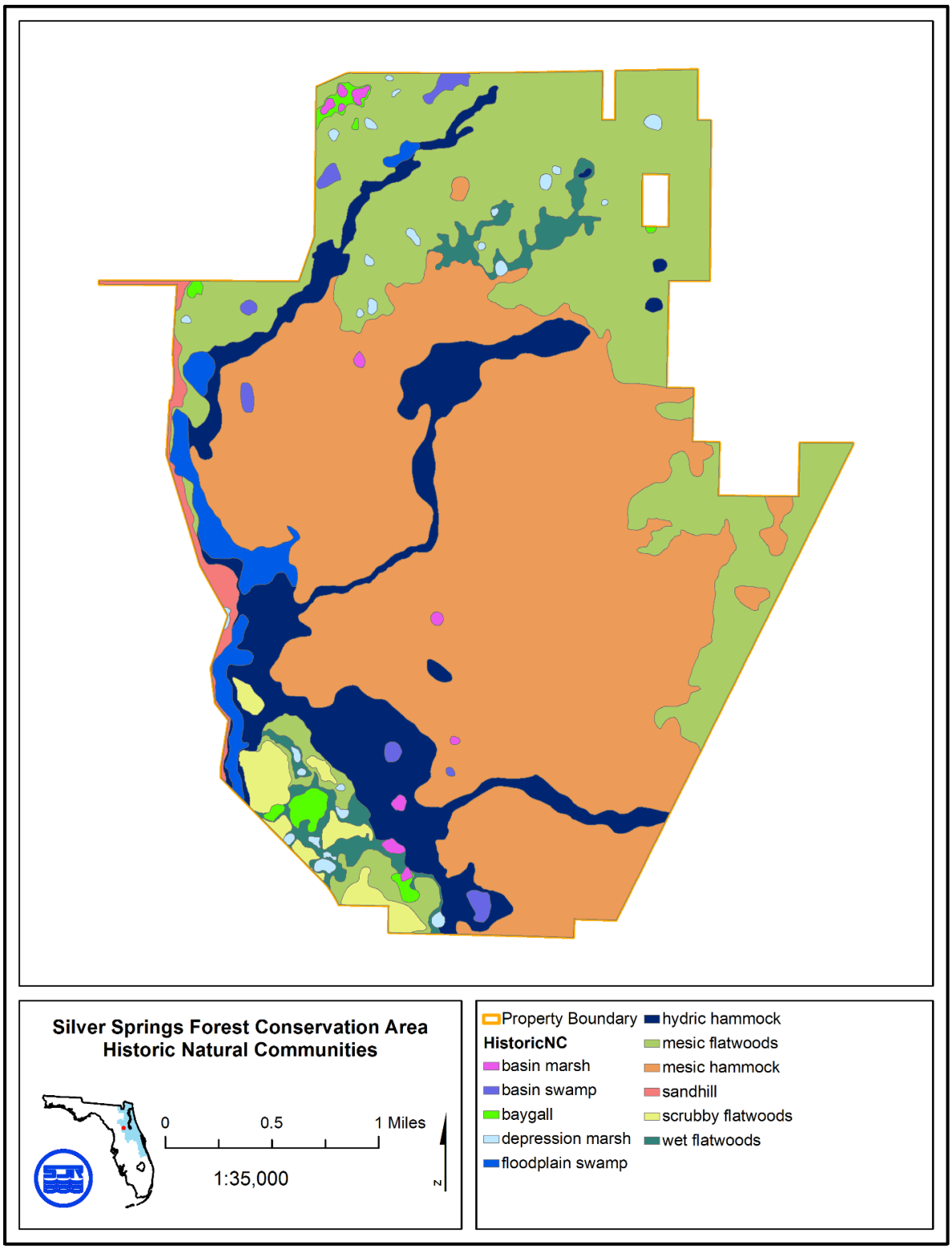

Figure 15: Historic Natural Communities.

Mesic Hammock (2,892 acres, 51%)
Mesic hammocks are upland, closed-canopy, evergreen forests of mainly live oak and cabbage palm. They are similar to the upland hardwood forests mostly found further north, but generally have a less diverse, more evergreen canopy. At Silver Springs Forest, the majority of uplands are believed to have historically been a large mesic hammock protected from fire between drainages to the east and west flowing into the Silver River floodplain to the south. Soils are fairly loamy sands and fires would have only entered this area from the north, providing an environment conducive to hardwood forest development. Extensive clearing of the area for timber, grazing, and agriculture prior to 1940 makes the historic imagery less useful for determining original community types. However, early land survey records from 1849 refer to this area as "2nd Hammock" and witness trees selected at section corners within it are mostly live oaks. Other trees mentioned by the surveyor include "cabbage palm, sweetgum, water oak, and swamp pine." The hammock contains pockets of hydric hammock or basin swamp in lower areas, but these are very difficult to determine from imagery or even lidar elevation.

Most of the large historic mesic hammock was cleared many years ago and in more recent years has been planted with loblolly pine (*Pinus taeda*). Intensive site preparation has removed much of the natural structure and composition of the hammock, but a few clues remain. Plantations often have some scattered large live oaks (*Quercus virginiana*) with abundant epiphytes of resurrection fern (*Pleopeltis michauxiana*) and Bartram's air-plant (*Tillandsia bartramii*), frequent cabbage palms (*Sabal palmetto*), and trumpet creeper (*Campsis radicans*) often climbs every pine in the planted stand.

There are a few remaining areas of disturbed mesic hammock mixed in with the planted stands. These have a canopy and subcanopy component of loblolly pine, but also large live oaks and cabbage palms, laurel oak (*Quercus hemisphaerica*), sweetgum (*Liquidambar styraciflua*), winged elm (*Ulmus alata*), and water oak (*Quercus nigra*). Shrubs include coastalplain staggerbush (*Lyonia fruticosa*) American beautyberry (*Callicarpa americana*), sweetgum (*Liquidambar styraciflua*), cabbage palm (*Sabal palmetto*), and saw palmetto (*Serenoa repens*). Herbs are often weedy generalists, but other common species include longleaf woodoats (*Chasmanthium laxum* var. *sessiliflorum*), Carolina scalystem (*Elytraria* sp.), and bracken fern (*Pteridium aquilinum*). Sarsaparilla vine (*Smilax pumila*) is occasional as a groundcover and vine of saw greenbrier (*Smilax bona-nox*) and muscadine (*Vitis rotundifolia*) are found in addition to trumpet creeper. Restoration and management of the historic mesic hammock should include eventual thinning of the loblolly pine stand and natural regeneration of the hardwood stand.

Mesic Flatwoods (1,571 acres, 28%)
Mesic flatwoods are open canopy upland communities of uneven aged pines with a low, diverse understory of herbs and shrubs maintained by frequent fires. On Silver Springs Forest, the northern portion of the Property was likely a historic mix of wet and mesic pine flatwoods. There is also an island of flatwoods on the Halfmile Creek tract that is surrounded by hammock and swamp. The signature on the 1940s and 1960s aerial photography is generally more open and smooth than the historic hammock area, but widespread clearing and grazing prior to 1940 makes the distinction not only between wet and mesic flatwoods, but also between flatwoods and hammock, very difficult to determine. Early land survey records from 1849 provide some clarity along section lines where the surveyor notes a transition from "2nd Hammock" to "1st Pine." The

witness trees selected at section corners, whether pines or live oaks, are another source of information.

The flatwoods on the west side of the Property are heavily influenced by seepage from the adjacent sandhill ridge and tends to be wetter. The entire area of former flatwoods was cleared many decades ago, grazed, and then converted to bedded pine plantation. Site preparation may have also included chemical treatments, making the vegetation types very difficult to determine. In areas with the best remnant groundcover there is a canopy of planted slash pine (*Pinus elliottii*) or loblolly pine (*Pinus taeda*). The shrub layers contain some flatwoods species including saw palmetto (*Serenoa repens*), dwarf live oak (*Quercus minima*), winged sumac (*Rhus copallinum*), shiny blueberry (*Vaccinium myrsinites*), netted pawpaw (*Asimina reticulata*), fourpetal St. John's wort (*Hypericum tetrapetalum*), and gallberry (*Ilex glabra*). However, in most plantations on the Property, gallberry and winged sumac are the only flatwoods shrubs remaining. Weedy species such as purple bluestem (*Andropogon glomeratus* var. *glaucopsis*) dominate the herbaceous layer, but some higher quality areas may contain species such as fragrant eryngo (*Eryngium aromaticum*), shortleaf gayfeather (*Liatris tenuifolia*), and narrowleaf silkgrass (*Pityopsis graminifolia*). Wiregrass (*Aristida stricta*) would have been a dominant grass in the historic flatwoods, but is only present in a few locations as scattered clumps.

The long history of grazing and silviculture in former pine flatwoods on the Property has greatly altered the groundcover. Restoration activities should include growing season fires and pine thinning in dense stands.

Hydric Hammock (637 acres, 11%)
Hydric hammock is a low-lying, closed-canopy forest that is periodically flooded, often occurring on shelly sands or where limestone is near the surface. The community is characterized by a mix of cabbage palm (*Sabal palmetto*) and swamp laurel oak (*Quercus laurifolia*). On Silver Springs Forest, the floodplain draining into the Silver Springs system to the south is primarily a hydric hammock with lower areas of floodplain swamp along its length. The hammock is fairly rich and seems somewhat intermediate with bottomland forest, a more deciduous freshwater forested community. Isolated hydric hammocks are also scattered in the historic mesic hammock and were sometimes excluded from conversion to pine plantation. On the 1940s and 1960s aerial photography, the hydric hammock signature is intermediate in color between the darker mesic hammock and lighter swamps.

The canopy and subcanopy layers are dominated by a mix of mostly hydrophytic trees but have a consistent component of cabbage palm and swamp laurel oak. Sweetgum (*Liquidambar styraciflua*) can be quite abundant, and a diversity of other trees and shrubs may be found including loblolly pine (*Pinus taeda*), bald cypress (*Taxodium distichum*), red maple (*Acer rubrum*), American hornbeam (*Carpinus caroliniana*), southern bayberry (*Morella cerifera*), swamp tupelo (*Nyssa biflora*), swamp chestnut oak (*Quercus michauxii*), live oak (*Quercus virginiana*), basswood (*Tilia americana*), and American elm (*Ulmus americana*). Red cedar (*Juniperus virginiana*), a characteristic hydric hammock species, is occasional in the understory. Longleaf woodoats (*Chasmanthium laxum* var. *sessiliflorum*) are the most abundant herbaceous species, with other hydrophytic herbs including jack-in-the-pulpit (*Arisaema triphyllum*), false hop sedge (*Carex lupuliformis*), sedge (*Carex* sp.), yellow spikerush (*Eleocharis flavescens*), West Indian marsh grass (*Hymenachne amplexicaulis*), soft rush (*Juncus effusus* ssp. *solutus*),

frog's bit (*Limnobium spongia*), taperleaf waterhorehound (*Lycopus rubellus*), maidencane (*Panicum hemitomon*), panic grass (*Panicum* sp.), and giant ironweed (*Vernonia gigantea*). Resurrection fern (*Pleopeltis michauxiana*) and Bartram's air-plant (*Tillandsia bartramii*) are common epiphytes on oaks, and golden polypody (*Phlebodium aureum*) are occasionally found on cabbage palms. Vines of peppervine (*Ampelopsis arborea*), greenbrier (*Smilax* sp.), bristly greenbrier (*Smilax tamnoides*), and eastern poison ivy (*Toxicodendron radicans*) are common.

As discussed in the floodplain swamp description, the hammock/swamp floodplain is impacted by roads and silviculture in the surrounding areas. The sandhill ridge to the west combined with relatively heavy soils on site make the floodplain prone to flash flooding, producing increased sedimentation downstream in the Silver Springs floodplain. Mitigation efforts include the construction of several concrete weirs to slow floodwaters. These create small permanently flooded impoundments that will eventually become open water or marshy habitats.

Bottomland forest is a deciduous, or mixed deciduous/evergreen, closed-canopy forest on terraces and levees within riverine floodplains and in shallow depressions. Found in intermediate areas between swamps (which are flooded most of the time) and uplands, the canopy may be quite diverse with both deciduous and evergreen hydrophytic to mesophytic trees. This community can be very similar to the more evergreen, oak/palm hydric hammock type, and on Silver Springs Forest, many forested wetlands seem to be somewhat intermediate between the two. Although labeled as hydric hammock, parts of the forested wetlands associated with flowing streams have a more diverse, deciduous canopy composition that could be considered bottomland forest. These areas still have a large component of hammock species like swamp laurel oak (*Quercus laurifolia*) and cabbage palm (*Sabal palmetto*). However, canopy species like swamp chestnut oak (*Quercus michauxii*) and American elm (*Ulmus americana*), and understory components such as bluestem palmetto (*Sabal minor*) are more suggestive of a rich bottomland forest.

Floodplain Swamp (126 acres, 2%)
Floodplain swamps occur on flooded soils along stream channels and in low spots and oxbows within river floodplains. Dominant trees are usually buttressed hydrophytic trees such as cypress and tupelo; the understory and ground cover are generally very sparse. Canopy coverage is usually high but can be sparse as the community grades into open water areas. Shrub and herbaceous layers are often sparse and concentrated in open areas of the community and on included hummocks and stumps.

At Silver Springs Forest, there are patches of floodplain swamp along streams in depressional areas within the larger hydric hammock/bottomland forest system. The intact swamps can be distinguished vegetatively by the dominance of swamp tupelo (*Nyssa biflora*) and bald cypress (*Taxodium distichum*) in the canopy, although they also contain swamp laurel oak (*Quercus laurifolia*) and sweetgum (*Liquidambar styraciflua*). In addition to canopy species, red maple (*Acer rubrum*) and cabbage palm (*Sabal palmetto*) are frequent components of the lower canopy and shrub layers. Common buttonbush (*Cephalanthus occidentalis*), Carolina ash (*Fraxinus caroliniana*), dahoon (*Ilex cassine*), Virginia willow (*Itea virginica*), bluestem palmetto (*Sabal minor*), small cabbage palms and cypress are all common components of the open, shrubby understory. Herbs are mostly found on hummocks and include sedge (*Carex* sp.), longleaf woodoats (*Chasmanthium laxum* var. *sessiliflorum*), and common yellow stargrass (*Hypoxis*

curtissii), with lizard's tail (*Saururus cernuus*) occupying lower areas. The epiphytic Bartram's air-plant (*Tillandsia bartramii*) and Spanish moss (*Tillandsia usneoides*) are abundant on tree branches. Vines are occasional to common and include peppervine (*Ampelopsis arborea*), trumpet creeper (*Campsis radicans*), bristly greenbrier (*Smilax tamnoides*), and eastern poison ivy (*Toxicodendron radicans*)

Large areas of the historic floodplain swamp were logged prior to state acquisition, and these now resemble weedy marshes thick with common buttonbush and other shrubs and vines, with pickerelweed (*Pontederia cordata*), woolgrass (*Scirpus cyperinus*), and broadleaf cattail (*Typha latifolia*).

Other impacts to floodplain swamp on the site include roads and silviculture in the surrounding historic hammock and flatwoods. The sandhill ridge to the west combined with relatively heavy soils on site make the floodplain prone to flash flooding, producing increased sedimentation downstream in the Silver Springs floodplain. Mitigation efforts include the construction of several concrete weirs to slow floodwaters. These create small permanently flooded impoundments that will eventually become open water or marshy habitats.

Logged areas of swamp on the Property will need many years to naturally re-establish a closed canopy. The community should be monitored for invasive species infestations.

Wet Flatwoods (123 acres, 2%)
Wet flatwoods are an open pine-dominated community with a short understory of hydrophytic herbs and shrubs. Wet flatwoods that burn frequently typically have a sparse understory and a dense complement of herbs and smaller shrubs. Conversely, thick, shrubby understory layers tend to suppress ground cover plants. On Silver Springs Forest, the northern portion of the Property was likely a historic mix of wet and mesic pine flatwoods. There is also an island of pine flatwoods on the Halfmile Creek tract that is surrounded by hammock and swamp. The signature on the 1940s and 1960s aerial photography is generally more open and smooth than the historic hammock area, but widespread clearing and grazing prior to 1940 makes the distinction not only between wet and mesic flatwoods, but also between flatwoods and hammock, very difficult to determine. Early land survey records from 1849 provide some clarity along section lines where the surveyor notes a transition from "2nd Hammock" to "1st Pine." The witness trees selected at section corners, whether pines or live oaks, are another source of information.

The flatwoods on the west side of the Property are heavily influenced by seepage from the adjacent sandhill ridge and tend to be wetter. These areas also tend to have baygall vegetation encroaching from adjacent wetlands into the historic flatwoods. The entire area of former flatwoods was cleared many decades ago, grazed, and then converted to bedded pine plantation. Site preparation may have also included chemical treatments, making the vegetation types very difficult to determine. Historic pine flatwoods were assumed in areas with remnant gallberry (*Ilex glabra*). A few other species were also thought to indicate wet flatwoods, including Mohr's thoroughwort (*Eupatorium mohrii*) and hairy wicky (*Kalmia hirsuta*).

The long history of grazing and silviculture in former pine flatwoods on the Property has greatly altered the groundcover. Restoration activities should include growing season fires every 2-4 years and pine thinning in dense stands. On the northwestern corner of the Property, seepage is

driving more baygall formation, and more frequent fires may be required to push back woody encroachment into historic areas of wet flatwoods.

Scrubby Flatwoods (100 acres, 2%)
Scrubby flatwoods have elements characteristic of both mesic flatwoods and scrub communities. Beneath an open canopy forest of widely scattered pines, scrubby flatwoods support a short understory of scrub oaks and flatwoods shrubs mixed with wiregrass (*Aristida stricta*) and other grasses and herbs. On Silver Springs Forest, there are a few small areas of historic scrubby flatwoods in the southwestern corner, mostly in the Halfmile Creek tract, but also just north on a scrubby rise surrounded by hydric hammock.

Historic scrubby flatwoods on the Halfmile Creek tract have been extensively cleared in the past, and the scrubby rise found just north has been long unburned, now resembling a low xeric hammock with some loblolly pine (*Pinus taeda*) in the overstory, but mostly a low stand of sand live oak (*Quercus geminata*), with a dense shrub layer of wild olive (*Cartrema americanum*), rusty staggerbush (*Lyonia ferruginea*), fetterbush (*Lyonia lucida*), sand live oak, and saw palmetto (*Serenoa repens*). There are few herbs, mainly Elliott's milkpea (*Galactia elliottii*) and sweet goldenrod (*Solidago odora*).

The structure of scrubby flatwoods is maintained by fires, usually on a 3 to 15-year interval. Returning fire into the landscape on Silver Springs Forest would be highly beneficial to all of the flatwoods communities.

Sandhill (49 acres, 1%)
Sandhills are open pinelands of widely spaced longleaf pine (*Pinus palustris*) with a sparse subcanopy of deciduous oaks, in particular turkey oak (*Quercus laevis*), and a diverse, usually dense, groundcover of wiregrass (*Aristida stricta*) and other grasses and herbs. Soils are deep, well-drained sands. The western boundary of Silver Springs Forest runs along the extreme eastern edge of a sandhill ridge, creating a narrow strip of this historic community just where it drops down into the small creek floodplain running south on the Property.

The sandhill is now a planted pine stand, but some scrubby remnants remain in the understory including sand live oak (*Quercus geminata*), wild olive (*Cartrema americanum*), and rusty staggerbush (*Lyonia ferruginea*). The signature is very open on the historic aerial photography, but the transition to fringing mesic flatwoods along the floodplain is difficult to determine exactly.

The open, grassy structure of sandhills is maintained with fires every 1-3 years, mostly during the growing season. Fire exclusion along the western boundary of the Property and conversion to pine plantation have greatly altered the structure of this strip of sandhill, creating a mix of open pine stands and xeric hammocks along the edge of the floodplain wetland.

Baygall (38 acres, 1%)
Baygall is an evergreen, forested wetland characterized by a bay tree dominated canopy typically found at the base of sandy slopes where water seepage maintains a saturated peat substrate. It may form an ecotone between uplands and swamps, or it may develop as a bay swamp in isolated basins or broad areas of seepage. Baygalls are found at Silver Springs Forest on the

northwestern portion where seepage from the sandhill ridge to the west helps to drive this vegetation type. Several depressions within the historic pine flatwoods matrix are a mix of baygall and swamp species, and baygall inclusions are common in depression marshes in the same area.

Baygalls at Silver Springs Forest have a canopy and sub-canopy of slash pine (*Pinus elliottii*) or loblolly pine (*Pinus taeda*), loblolly bay (*Gordonia lasianthus*), dahoon (*Ilex cassine*), sweetgum (*Liquidambar styraciflua*), sweetbay (*Magnolia virginiana*), and red maple (*Acer rubrum*). Although pines are a natural part of the canopy structure of baygall communities, past silvicultural activities have likely increased their frequency. The understory includes the same species plus swamp bay (*Persea palustris*) and southern bayberry (*Morella cerifera*), and occasionally cabbage palm (*Sabal palmetto*) or swamp laurel oak (*Quercus laurifolia*). The herbaceous layer is a sparse to dense cover of mainly cinnamon fern (*Osmunda cinnamomea*) and Virginia chain fern (*Woodwardia virginica*). Vines of muscadine (*Vitis rotundifolia*) and eastern poison ivy (*Toxicodendron radicans*) are common. There is a thick layer of duff covering the ground.

On historic aerial photography, baygalls often appear as a very dark signature. They are difficult to distinguish from basin swamp, with which they often intergrade. Silviculture and fire exclusion over the past several decades has allowed the expansion of fire-intolerant baygall species into the surrounding historic wet flatwoods. But silviculture has also likely destroyed the smallest baygalls, which were probably planted through with pine trees.

Baygall should burn infrequently, perhaps only a few times each century in the deepest baygalls. Although the saturated soils and humid conditions within baygalls typically inhibit fire, droughts may create conditions that allow them to burn catastrophically. These fires not only destroy the canopy, but also may ignite the deep peat layers that can smolder for weeks, or even months. If it can be done safely, prescribed fires in adjacent uplands should be allowed to burn into baygall edges to maintain grassy ecotones and to kill bay shrubs encroaching into the uplands. Plowed firebreaks and ditches should be restored and hydrology should be returned to its natural state where possible.

Depression Marsh (35 acres, 1%)
Depression marshes are identified as shallow, rounded, herb-dominated depressions that are seasonally inundated. Frequently there are concentric zones of vegetation that respond to the hydroperiod and edaphic conditions within each zone. A common series of vegetation zones in depression marshes is, blue maidencane (*Amphicarpum muhlenbergianum*) closest to and grading into the adjacent flatwoods, then an intermediate zone of maidencane (*Panicum hemitomon*), and in the deeper center of depressions bulltongue arrowhead (*Sagittaria lancifolia*) and pickerelweed (*Pontederia cordata*) often are dominant.

Historically, there were several small depression marshes scattered in the pine flatwoods in the northern portion of Silver Springs Forest. These were mainly herbaceous communities, but the strong seepage generated from the adjacent sandhill ridge just west of the property may have also contributed to some baygall vegetation in the same depressions. The historic matrix communities of pine flatwoods are now plantations with rows of planted slash pine (*Pinus elliottii*) or loblolly

pine (*Pinus taeda*), and marshes are greatly impacted by bedding and trees planted sometimes right through the small wetlands.

There is little zonation in the depression marshes on the Property, but herbs do tend to form patches according to water depth. Shallower areas have blue maidencane (*Amphicarpum muehlenbergianum*), longleaf woodoats (*Chasmanthium laxum* var. *sessiliflorum*), spadeleaf (*Centella asiatica*), lateflowering thoroughwort (*Eupatorium serotinum*), clustered bushmint (*Hyptis alata*), maid marian (*Rhexia nashii*), beaksedges (*Rhynchospora* spp.), and yellow-eyed grass (*Xyris* sp.). Deeper areas contain lemon bacopa (*Bacopa caroliniana*), sawgrass (*Cladium jamaicense*), yellow spikerush (*Eleocharis flavescens*), mountain spikerush (*Eleocharis montana*), soft rush (*Juncus effusus* ssp. *solutus*), primrosewillow (*Ludwigia* sp.), maidencane (*Panicum hemitomon*), mild waterpepper (*Persicaria hydropiperoides*), pickerelweed (*Pontederia cordata*), and sugarcane plumegrass (*Saccharum giganteum*).

Planted and regenerating pines are common around the edges of these small marshes, as are scattered red maple (*Acer rubrum*), dahoon (*Ilex cassine*), sweetgum (*Liquidambar styraciflua*), sweetbay (*Magnolia virginiana*), and swamp tupelo (*Nyssa biflora*). Tall and short shrubs of common buttonbush (*Cephalanthus occidentalis*), common persimmon (*Diospyros virginiana*), fetterbush (*Lyonia lucida*), red bay (*Persea borbonia*), sawtooth blackberry (*Rubus pensilvanicus*), highbush blueberry (*Vaccinium corymbosum*), or southern bayberry (*Morella cerifera*) may be scattered to dense around the edges or form small thickets within the marsh. Patches of woody vegetation are often covered with peppervine (*Ampelopsis arborea*), laurel greenbrier (*Smilax laurifolia*), or muscadine (*Vitis rotundifolia*).

Depression marshes require frequent fires to maintain a high herbaceous species component and reduce woody encroachment. The natural fire return interval for depression marshes is every 1-8 years, primarily during the growing season (April-June) when water levels are low and fuels in surrounding uplands are dry. Prescribed burns should be implemented more often for depression marshes encroached by woody species to reduce their abundance.

Basin Swamp (33 acres, 1%)
Basin swamps are forested depressions that are typically large and/or embedded in a non-pyrogenic community and thus are not heavily influenced by frequent fires in the surrounding landscape. The soils are generally acidic, nutrient-poor peats overlying an impervious soil layer. This community type is dominated by cypress and/or tupelo, but may contain additional hydrophytic trees and shrubs that can withstand inundation for most or all of the year.

At Silver Springs Forest, there are several low areas of swamp vegetation in the former mesic hammock and also in areas of seepy pine flatwoods where they form a matrix with baygall and basin marshes. Mostly intact swamps have a canopy and subcanopy of swamp tupelo (*Nyssa biflora*) and bald cypress (*Taxodium distichum*) with some sweetbay (*Magnolia virginiana*), slash pine (*Pinus elliottii*), red maple (*Acer rubrum*), and dahoon (*Ilex cassine*). Epiphytes, particularly Spanish moss (*Tillandsia usneoides*), are abundant. There is an open shrub layer of common buttonbush (*Cephalanthus occidentalis*), Carolina ash (*Fraxinus caroliniana*), Virginia willow (*Itea virginica*), fetterbush (*Lyonia lucida*), southern bayberry (*Morella cerifera*), cabbage palm (*Sabal palmetto*), and highbush blueberry (*Vaccinium corymbosum*). Herbs are

mostly scattered sedges (*Carex* sp.), cinnamon fern (*Osmunda cinnamomea*), and royal fern (*Osmunda regalis* var. *spectabilis*).

Several swamps were logged prior to acquisition of the Property and now resemble weedy marshes, with large cypress stumps as evidence of the historic condition. These have scattered shrubs and small trees, but also dense patches of pickerelweed (*Pontederia cordata*), narrowfruit horned beaksedge (*Rhynchospora inundata*), lizard's tail (*Saururus cernuus*), and alligatorflag (*Thalia geniculata*). Inundated areas have waterlily (*Nymphaea* sp.) and eastern purple bladderwort (*Utricularia purpurea*). Evidence of feral hog digging was found in these clearcut areas.

Fire intervals in basin swamps are highly variable. The lowest portions of basin swamps rarely, if ever, burn. Where it can be done safely, prescribed fires should be allowed to burn into basin swamp edges to restrict shrub encroachment into ecotones and promote the cypress component. Swamp tupelo and other hardwoods dominate areas that burn less often. If hydrology has been altered (i.e., ditches/canals), normal hydroperiod should be restored if possible, since shortened hydroperiods can also allow devastating fire to enter, potentially altering the community. Heavy equipment that causes rutting will alter the micro-hydrology of the ecotone; use of heavy equipment, if necessary, should be limited to dry seasons. This community is thought to be very stable as long as hydrological conditions and water quality are maintained**.**

Basin Marsh (18 acres, <1%)
Basin marshes are depressional, non-forested wetlands that are typically large and/or embedded in a non-pyrogenic community and thus are not heavily influenced by frequent fires in the surrounding landscape. This community type is dominated by herbs or occasionally shrubs that can withstand inundation for most or all of the year. On Silver Springs Forest, a few small basin marshes historically existed as inclusions within swamps or within the large hammock extent, appearing on the 1940s and 1960s aerial photograph as a smooth signature within the dark oak trees of the hammock that have a rough texture. Today, these are wet depressions in the extensive planted loblolly pine plantation. They are thick with stands of large common buttonbush (*Cephalanthus occidentalis*) and coastalplain willow (*Salix caroliniana*). Herbs that are typical of these disturbed wetlands are mainly soft rush (*Juncus effusus* ssp. *solutus*).

Although not considered a pyrogenic community, occasional fires can be beneficial for restoring an herb-dominated vegetation structure.

Altered Areas (139 acres, 3%)

Significant anthropogenic alterations to the land cover at Silver Springs Forest are a result of a history of land uses. The current land cover (Figure 16) reflects many of these changes. Large portions of the property have undergone stages of land cover conversion that lack documentation and are thus impossible to reflect within this plan. For example, portions of the Property appear to have been cleared of trees and utilized as cattle grazing land. Most of the former grazing land has subsequently been planted and managed for pine production. Other areas have undergone clearcut forestry operations and been left to naturally recruit vegetation, leading to successional land covers.

In addition to the anthropogenic land covers described below, widespread conversion of the historically expansive central mesic hammock and most other upland habitat to pine plantation – shown as mesic flatwoods in Figure 16 – is possibly the most dramatic alteration of land cover on the Property.

Abandoned Field (11 acres)
Areas identified as abandoned field include a narrow strip of historic sandhill on the western property boundary, bordering the adjacent residential development – likely cleared for cattle grazing. Additionally, a portion of what was likely historically scrubby flatwoods in the southwest corner of the Property was cleared prior to 1949 – also likely cleared for cattle grazing.

Borrow Area (8 acres)
Three separate formerly used borrow areas are identified on the Halfmile Creek tract – two of which occur in former scrubby flatwoods, one of which is within former mesic flatwoods.

Canal/Ditch (14 acres)
There are approximately two miles of ditches on the Property. These are not ditches associated with the roads. They appear to be created to drain wet areas on the Property.

Road (56 acres)
Approximately 29 miles of roads have been mapped at Silver Springs Forest. Some of the roads have been built up and have ditches on either side, others are on grade.

Utility Corridor (50 acres)
There is a single powerline on the Property that is approximately three miles long with an average width of 150 ft. There is no access road along this corridor route as is typical along many powerlines.

SOILS
According to the USDA Natural Resource Conservation Service, 12 different soil types are within Silver Springs Forest (Figure 17). The Marion County Soil Survey provided information used to develop descriptions of the predominant soil series found within Silver Springs Forest. The soil descriptions are located in Appendix B.

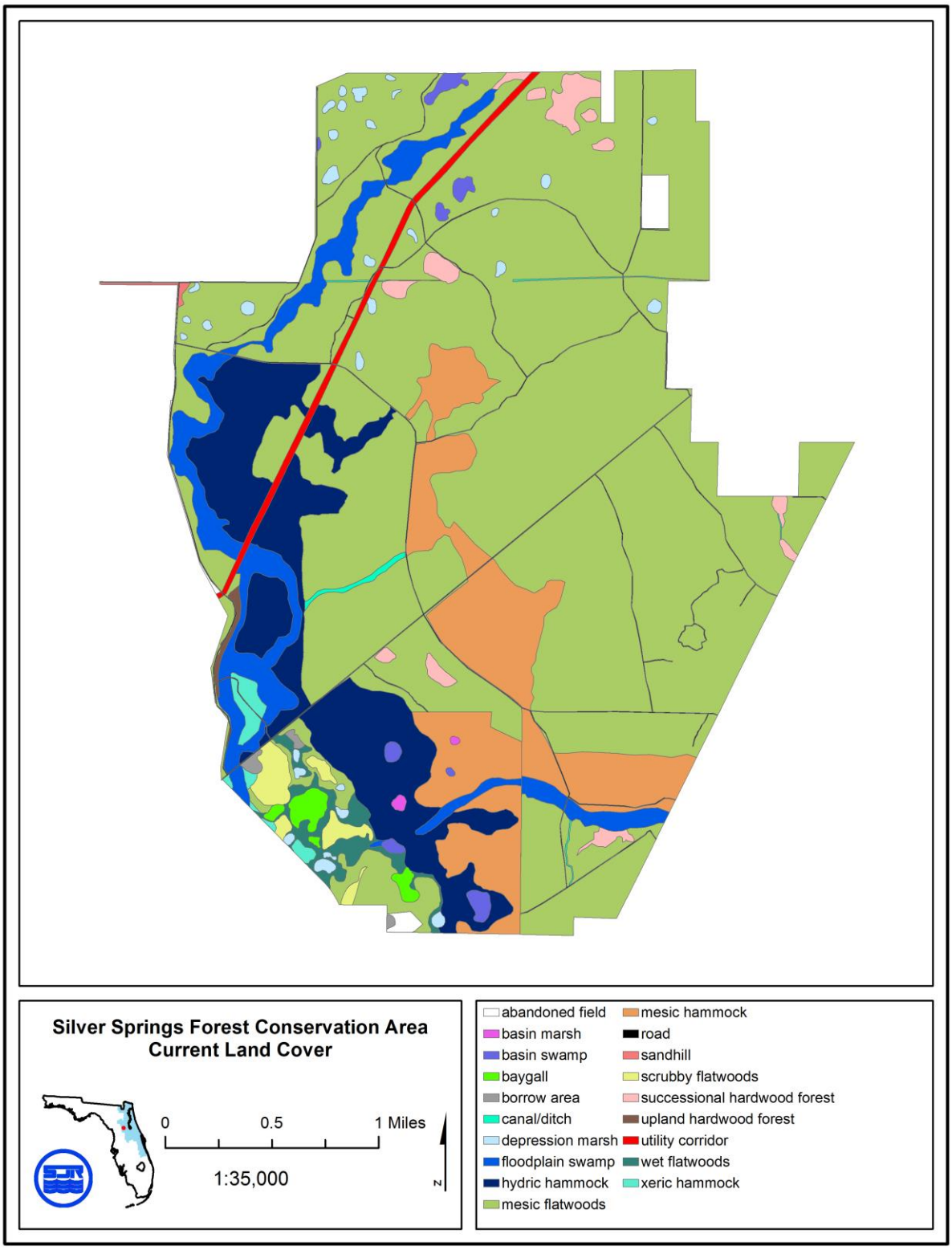

Figure 16: Current Land Cover.

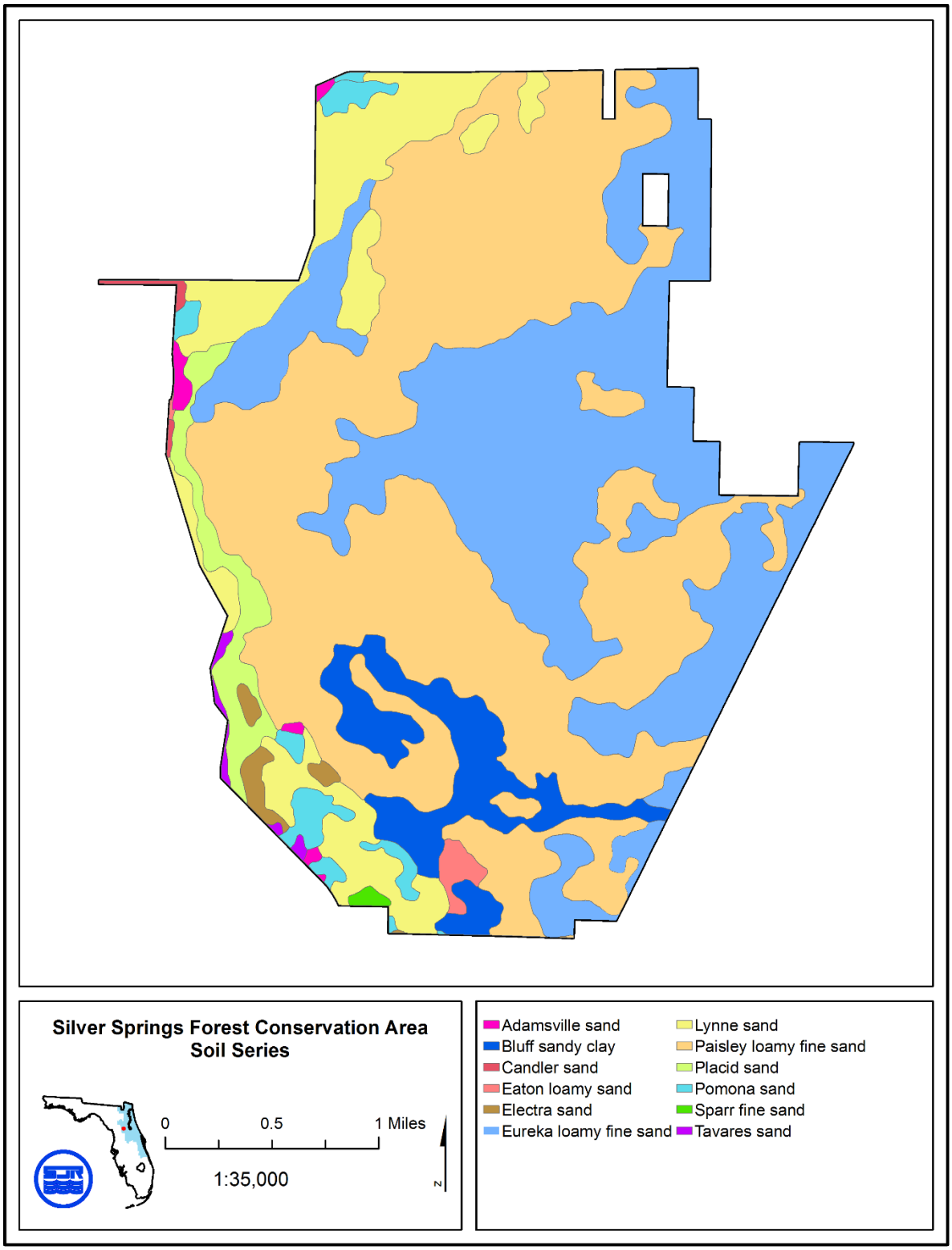

Figure 17: Soil Series.

CULTURAL AND HISTORICAL RESOURCES

A review of Department of State Division of Historical Resources (DHR) Florida Master Site File data indicates two cultural resource sites are either partially or completely encompassed by the Silver Springs Forest boundary. The site that is completely with the conservation area is a small prehistoric campsite. A much larger prehistoric midden spans the District Property and is primarily on private lands. This prehistoric midden is listed as being "likely National Register Historic Places eligible" in the Master Site File. The site is visited regularly by District staff and the portions of it on the Property appear to be in good condition.

Preliminary indications are that one of the main roads on the Property was an old railroad grade, probably the Ocala Northern Railroad, which operated in the early part of the 20th century. Further investigation will be needed to confirm it. Lithic scatter has been observed on the Property as well. District staff has consulted with public archaeologists at the Florida Public Archaeology Network (FPAN) to identify additional cultural resources. If any sites are confirmed, District staff will document and report the sites to the Division of Historical Resources.

The District will conduct land management activities in a manner that will provide protection for cultural resources and serve to reduce the potential for adverse impacts. The District will follow the management procedures outlined in "Management Procedures of Archaeological and Historical Sites and Properties on State-owned or Controlled Lands" (Appendix C). Additionally, detrimental activities discovered on these sites will also be reported to the DHR and appropriate law enforcement agencies. Due to District and State policy, the locations of the sites are not identified on public maps.

IMPLEMENTATION

The following sections outline land management strategies for resource protection, land use, and administration on Silver Springs Forest for the next ten years.

RESOURCE PROTECTION AND MANAGEMENT

Water Resources

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

Strategies:

- Continue to manage for reduced turbidity/sedimentation impacts on Silver River.
- Work with Bureau of Water Resources to continue evaluation and adjustment, as necessary, to water levels at control structures.
- Incorporate water resource infrastructure into the water control structure database.
- Inspect and maintain roads, bridges, culverts, low water crossings, water control structures and trails for damage.
- Repair and improve specific sections of road that have been impacted by erosion.
- Consider opportunities to remove silvicultural beds from timber harvest areas if restoration is feasible.

- Rehabilitate wildfire suppression lines to restore hydrology.
- Identify and map locations of shallow ditches/swales that are connecting and draining isolated and/or ephemeral wetlands within the flatwoods and incorporate into regional database for restoration needs and/or mitigation potential and opportunities.
- Continue Halfmile Creek FDOT Mitigation Monitoring.
- As appropriate, work with Regulatory staff to identify and pursue opportunities to fulfill mitigation needs within regulatory basin 12.

While most wetland protection was accomplished through acquisition, portions of the wetlands and surface waters within Silver Springs Forest have a history of disturbance. Hydrologic modifications within the conservation area include: 28.75 miles of roads, 2 low water crossings, 2 miles of ditches, 27 culverts, 3 water control structures, 7 gabion weirs and unknown miles of silvicultural beds. Table 4 provides a list of the water resource infrastructure at the conservation area. During the term of this plan, these records will be incorporated into the Bureau of Operation and Maintenance's database of water control structures that is used to track the status and condition of water resource infrastructure.

Roads and associated ditches exist on all parcels within Silver Springs Forest, providing access for both management and recreation. The District has made significant improvements (see Natural Resources – Water Resources section for additional information) to, and conducted maintenance on, many of these roads and ditches helping to reduce the potential for erosion. The specific intent of many hydrologic improvements at the Property are to improve the quality of water discharging from Half Mile Creek into the Silver River. District staff will continue to inspect roads, trails, bridges, low water crossings, and culverts for erosion problems and maintenance/repair needs. The District will continue to evaluate turbidity/sediment loading from Halfmile Creek and as necessary pursue additional projects to further improve water quality both on property and downstream.

Additionally, as a mitigation requirement for impacts to wetlands adjacent to State Road 40, the Florida Department of Transportation has provided significant funding for management actions on the Halfmile Creek Property. Monitoring of these mitigation actions will continue during the term of this plan. Bureau of Land Resources staff will be consulted as additional potential mitigation needs are considered within the relevant regulatory basin(s).

Prior to acquisition by the District, the majority of acreage within Silver Springs Forest were managed for commercial silvicultural production. As part of this legacy, expanses of the Property were bedded as site preparation for planting pine. Numerous isolated wetlands (especially depression marshes), which hold significant ecological value on the landscape, have been negatively impacted by silvicultural bedding. During the scope of this plan, where restoration is feasible, and when such activities will not produce unacceptable disturbance to existing, desirable groundcover, silvicultural beds will be removed.

Structure ID	Type	Size/Material	Condition
C1	Culvert	C21	Culvert
C2	Culvert	C22	Culvert
C3	Culvert	C23	Culvert
C4	Culvert	C24	Culvert

C5	Culvert	C25	Culvert
C6	Culvert	C26	Culvert
C7	Culvert	C27	Culvert
C8	Culvert	LW1	Low water crossing
C9	Culvert	LW2	Low water crossing
C10	Culvert	WC1	Water control structure
C11	Culvert	WC2	Water control structure
C12	Culvert	WC3	Water control structure
C13	Culvert	UT1	Gabion weir
C14	Culvert	UT2	Gabion weir
C15	Culvert	UT3	Gabion weir
C16	Culvert	UT4	Gabion weir
C17	Culvert	UT5	Gabion weir
C18	Culvert	HC1	Gabion weir
C19	Culvert	HC2	Gabion weir
C20	Culvert		

Table 4: Water Resource Infrastructure.

Silver Springs Forest contains many natural communities that are fire adapted and require periodic fire in the form of prescribed burning to manage for ecological diversity. Prescribed burning provides a multitude of benefits, including the protection of adjacent landowners by reducing fuels, and thereby reducing chances for wildfires. However, due to the magnitude of this task, wildfires cannot be eliminated. Many of these wildfires required suppression via a tractor/plow, leaving trenches behind that may alter hydrology and ecological systems. As needed, the District will rehabilitate suppression lines on the Property. Suppression lines will be brought back to a natural grade, so as not to channelize run-off or disrupt sheet flow to maintain natural plant communities.

Approximately two miles of ditches have been documented at Silver Springs Forest. Additional shallow interior ditches designed to facilitate drainage across the Property for the purposes of cattle grazing and timber production likely exist that have not been identified. These ditches have the potential to drain water from bayheads and historic depressional marshes within the flatwood areas into roadside ditches and eventually to the large hydric hammocks, floodplain swamps, and associated creeks. During the scope of this plan, District staff plan to identify and map locations of shallow ditches/swales that are connecting and draining isolated and/or ephemeral wetlands and incorporate them into a regional database for restoration needs or mitigation potential and opportunities. District staff will evaluate the site hydrology and determine additional restoration needs. Restoration work in these areas will be subject to any relevant permit requirements, budget availability, and/or mitigation needs.

Forest Management

Goal: Maintain, improve, and restore forest resources.

Strategies:

- Manage the Rayonier parcel to meet objectives of Forest Legacy Program funding requirements, maintain ≥75% forested land cover.

- As resources allow, incrementally implement the Silver Springs Forest Conservation Area Mesic Hammock Restoration Plan utilizing the principles of adaptive management (Appendix D).
- Where appropriate, based on soil type and hydrology, consider managing planted loblolly pine stands without conversion to other pine species.
- Evaluate the opportunity to reforest upland portions of Halfmile parcel that are not a part of mitigation plan, conduct reforestation efforts if appropriate.
- Identify specific areas in which to maintain basal area of 60-70 sq ft to control invasive populations and reduce loblolly regeneration, incorporate this strategy into master harvest plan.
- Restore groundcover where appropriate.
- Maintain up-to-date information within forest management database.
- Harvest/thin timber from 1,977 acres, alter harvest plans to facilitate conversion of pine stands to reflect historic land cover as appropriate.

Chapter 253.036, Florida Statutes, requires the lead agency of state lands to prepare a forest resource analysis, "…which shall contain a component or section…which assesses the feasibility of managing timber resources on the parcel for resource conservation and revenue generation purposes through a stewardship ethic that embraces sustainable forest management practices if the lead management agency determines that the timber resource management is not in conflict with the primary management objectives of the parcel." The District will employ a variety of forest management strategies over the term of this plan.

One of the terms of the Forest Legacy Program funding, used for acquisition of the Rayonier parcel, is that the property be managed according to the Florida Legacy Program Implementation Guidelines. A key component of these guidelines is that a minimum of 75% of the parcel will be managed as forest land. According to a 2014 agreement between the FFS and the District, forest land is "any upland or wetland …that has, or is being prepared to have…a sufficient number of trees on the site to form a canopy at maturity."

A majority of Silver Springs Forest land cover in the center of the Property was historically dominated by roughly 2,892 acres of mesic hammock (Figure 15). This hammock has been heavily altered to maximize silvicultural pine production. This plan includes a brief description of mesic hammock restoration considerations. Attached to this plan is a detailed Mesic Hammock Restoration Plan (Restoration Plan) for the historic mesic hammock at Silver Springs Forest (Appendix D). Traditional forest management operations – including timber harvest planning/operations and prescribed burning – will be conducted in concert with any potential future stand conversion.

Conversion from managed pine to hardwood cover has potential to provide numerous benefits. Few stands of contiguous mesic hammock approach the scale that was historically present on the Property. Restoration of even a portion of the hammock will provide recognition to the unique resource at this site. In the long term, hardwood hammock will require less active management on the Property. Decreasing management intensity will reduce the frequency of infrastructure improvements/repairs and is likely to result in reduced transport of sediments off the site.

Few guiding resources are available regarding hardwood vegetative community restoration in Florida. Initial phases of mesic hammock restoration will be conducted incrementally, experimentally and using the principles of adaptive management. Several considerations will be used when planning the restoration of mesic hammock natural communities on the Property. When planning conversion of pine plantation stands, the District will only consider methods that minimize and mitigate sediment transport. Mesic hammock restoration costs should not cause total management cost for Silver Springs Forest to exceed revenues generated from the Property. Cost of hammock restoration will be monitored annually. If necessary, restoration strategies, methods and objectives will be adapted to meet this budgetary goal.

Many stands of loblolly pine exist outside of the footprint of potential mesic hammock restoration on the Property. For these stands, where appropriate based on soil type and hydrology, consider managing planted loblolly pine without conversion to other pine species. The objective of maintaining existing pine composition in appropriate stands is to prevent future negative water quality impacts resulting from clearcut operations. Reforestation of upland portions of the Halfmile parcel will be considered and implemented if appropriate.

Additional forest management strategies will be considered and implemented to improve the overall ecological condition of forest resources at Silver Springs Forest. Loblolly pine is a prolific species. If thinned to a low basal area, loblolly regeneration can rapidly overtake a site with canopy cover closing after a generation. To reduce loblolly regeneration and control invasive plant populations, appropriate sites should be maintained at a basal area of 60-70 sq ft. If pursued, this strategy will be incorporated into the harvest master plan for the Property. Additionally, restoring groundcover in stands that will be managed as flatwoods should be considered and implemented. Groundcover restoration in appropriate sites will provide ecological benefits to a suite of species.

Silver Springs Forest is partitioned into forest management compartments and each compartment is further divided into stands. Figure 18 illustrates the compartments and stands within the Property and Figure 19 illustrates the dominant pine species within each stand.

On properties like Silver Springs Forest, where silvicultural management is an intrinsic component of the overall management of the upland portions of the property, timber inventory data are collected, verified, and incorporated into the District's forest management database. Changes that may occur over time within the compartments and stands resulting from growth, harvests, natural disturbances, and reforestation activities are also recorded in the database. This information is used to help land management staff forecast forest management needs.

The primary objectives of harvesting on Silver Springs Forest are restorative in nature and are designed to increase species diversity and overall natural community health and vigor. The District applies all revenue generated through these forest management activities toward the District's land management budget to offset management costs for District properties. Since acquisition of the Property, forestry accomplishments include thinning of approximately 899 acres of pine. The District will continue to employ several methods of harvest intended to increase diversity and alter tree density to allow for a healthier, more natural looking forest. Figure 20 illustrates the location of the accomplished harvest and reforestation activities.

Forest management activities anticipated during the scope of this plan include forest inventory evaluations, reforestation, and pine thinning operations. Seedling survival monitoring is also conducted to assess the need for replanting an area through the determination of the number of target trees per acre. Reforestation projects may be preceded by various site preparation techniques including mechanical treatments, roller chopping and mowing, herbicide applications, and prescribed fire. These techniques may be used singularly or in combination as site conditions warrant. First thinning operations typically occur during the 16th year and second thinning operations are conducted, on average, 10 years after the first. Third thinning operations generally fall 15-20 years following the second. These times are largely dependent on ecological factors that affect tree growth. In addition, the District uses regeneration methods such as shelterwood cuts, seed tree cuts, and clearcuts. At Silver Springs Forest, clearcut harvests are scheduled for stands reaching 25 years within the historic mesic hammock footprint, at the beginning of the hammock restoration process. All timber harvest operations scheduled for the period of this plan total 2,575 acres.

Through periodic thinning, the District will remove the poorest trees to reduce crown density and in time, allow for larger trees with full, vigorous crowns. There are 14 planned pine thinning and three clearcut harvests within Silver Springs Forest from 2022–2032 (Figure 21). Clearcut harvests are limited to sites that are targeted for restoration from pine plantation to mesic hammock. Harvesting may also provide some protection against wildfires and pine beetle outbreaks.

The District will abide by Florida Silviculture Best Management Practices, Florida Forestry Wildlife Best Management Practices for State Imperiled Species and target the achievement of appropriate overstory species in proper stand densities as described in the District Forest Management Plan (Appendix D). In addition to planned forest management activities, the District will remove trees as needed in the case of insect infestations, disease, and damage from severe weather, wildfire, or other occurrences that could jeopardize the health of natural communities.

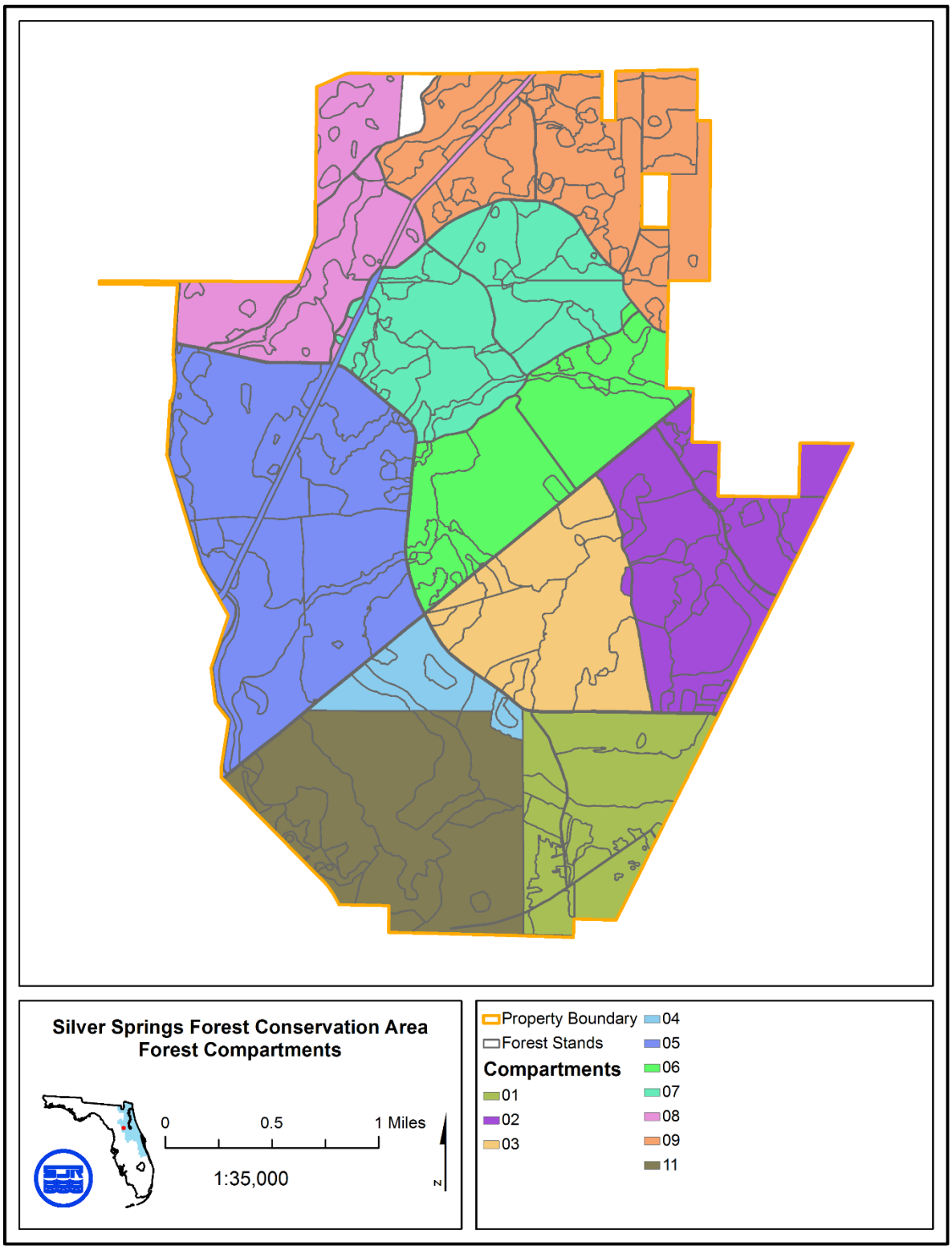

Figure 18: Forestry Compartments.

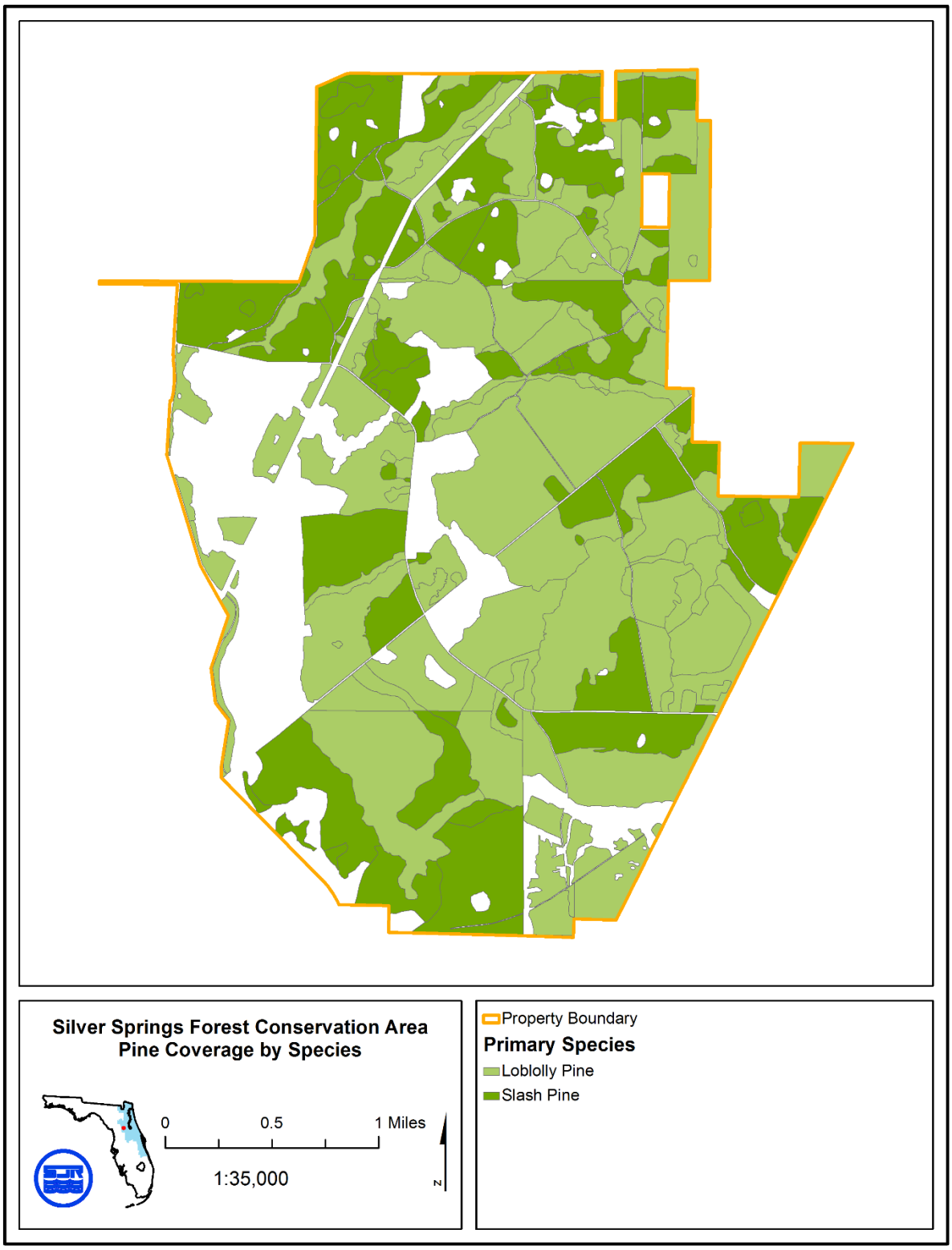

Figure 19. Pine Coverage by Species.

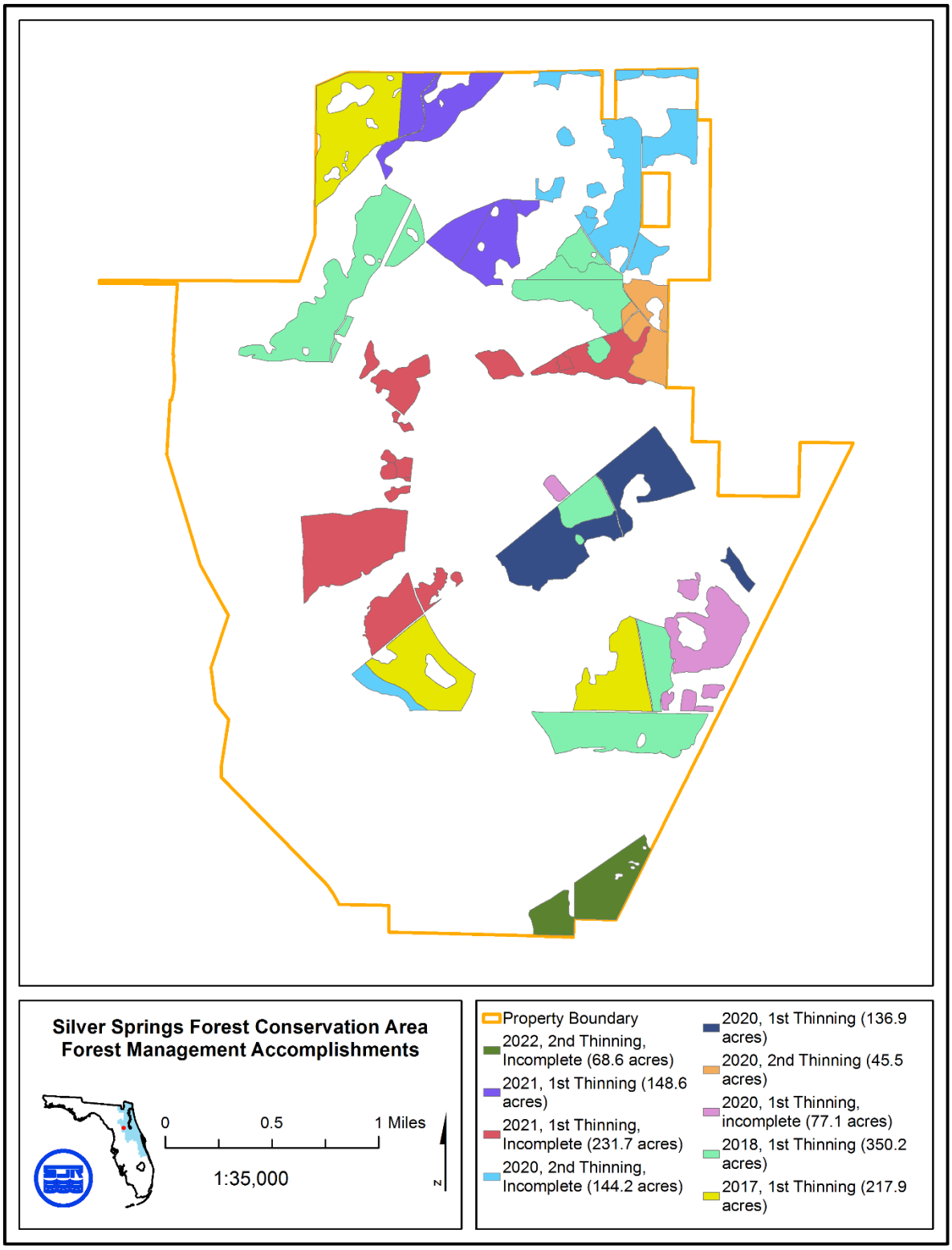

Figure 20: Forest Management Accomplishments Between 2017 and 2022.

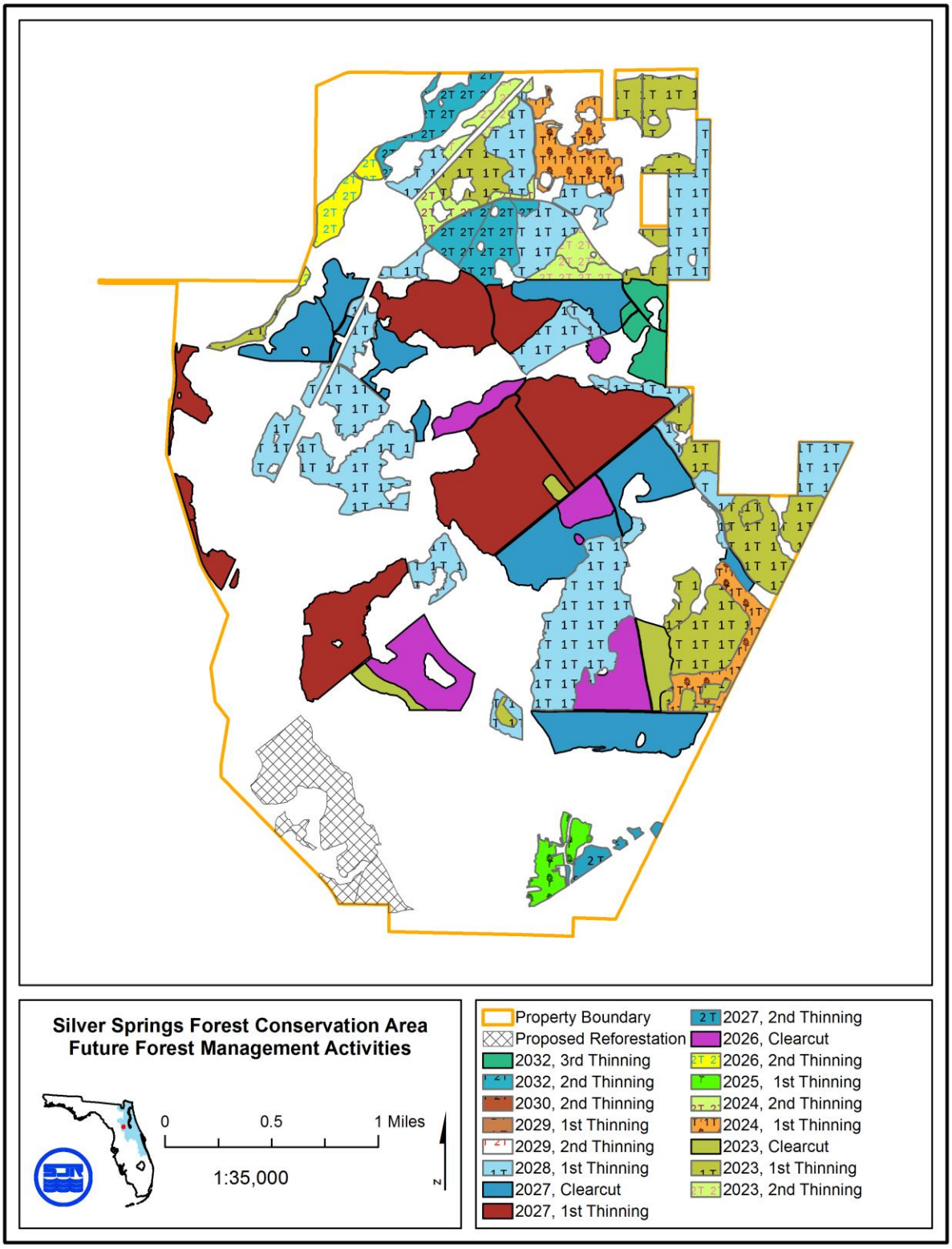

Figure 21: Forest Management Planned for 2022-2032.

Fire Management

Goal: Implement a prescribed burning program in accordance with District's Fire Management Plan.

Strategies:

- Establish adequate fire control and boundary lines to fire management units (FMUs) where needed and as funding is available.
- Develop annual burn plans.
- Conduct dormant season burns in pine plantations and areas of high fuel loading and/or extended fire exclusion.
- Conduct growing season burns as appropriate.
- Continue to populate fire management database on an annual basis.
- Use mechanical fuel reduction as a fire surrogate in areas where it is difficult to burn due to high fuel loads or proximity to highways.

Fire is a vital factor in managing the character and composition of vegetation in many of the natural communities in Florida. The District's primary use of fire is to mimic natural fire regimes to encourage the perpetuation of native pyric plant communities and dependent wildlife. Additionally, the application of fire aids in the reduction of fuels and minimizes the potential for catastrophic and damaging wildfires. Many of the natural communities at Silver Springs Forest are fire adapted, making prescribed fire an important tool for use in the restoration and maintenance of plant communities within the conservation area. Forest and fire management activities within Silver Springs Forest are critically important and integrally linked. The planning and implementation of forest and fire management activities must be coordinated to achieve restoration and management goals. Since 2016, District staff implemented prescribed fire on 214 acres within the property (Figure 22).

Historically, the majority of fires occurring on what is now Silver Springs Forest would have been ignited by lightning during the growing season. In more recent history, previous landowners shifted the fire regime to include primarily dormant season burning, lack of prescribed burning, or suppression of wildfire, which served to protect the growth of fast-growing loblolly and slash pine investment on the property. The District makes an effort to reintroduce prescribed fire to the Property during dormant season, and expand to the growing season, where possible. The District will continue to implement growing season fires where possible, understanding that constraints in some areas such as young pine, high fuel loading, and proximity to smoke sensitive areas may require the use of dormant season burning.

Limiting factors narrowing the window of opportunity for the application of prescribed fire on portions of the Property is the close proximity to critical smoke sensitive areas including SR 40, SR 326, CR 315, and developed areas such as the neighboring Silver Meadows subdivision. Smoke management is a primary consideration, and all burns will be conducted to minimize off-site impacts by maneuvering smoke plumes away from smoke sensitive areas and by ensuring adequate smoke dispersal. Smoke management concerns and smoke impact distances for Silver Springs Forest are depicted in Figure 23. FMU boundaries will be evaluated and possibly modified during the course of this plan. Changes to current FMU boundaries would be made to improve efficiency and reduce challenges when applying prescribed fire.

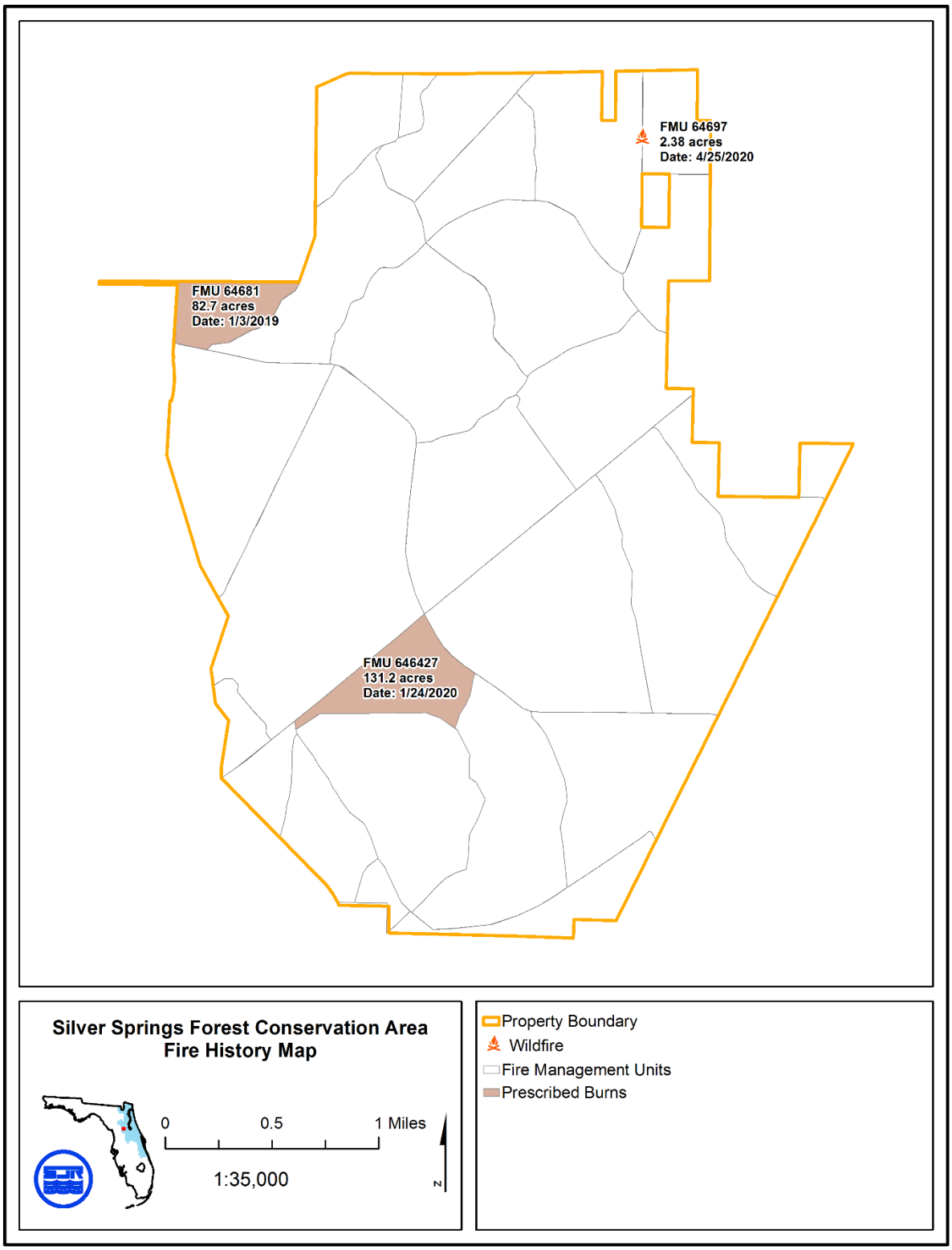

Figure 22: Fire History Map.

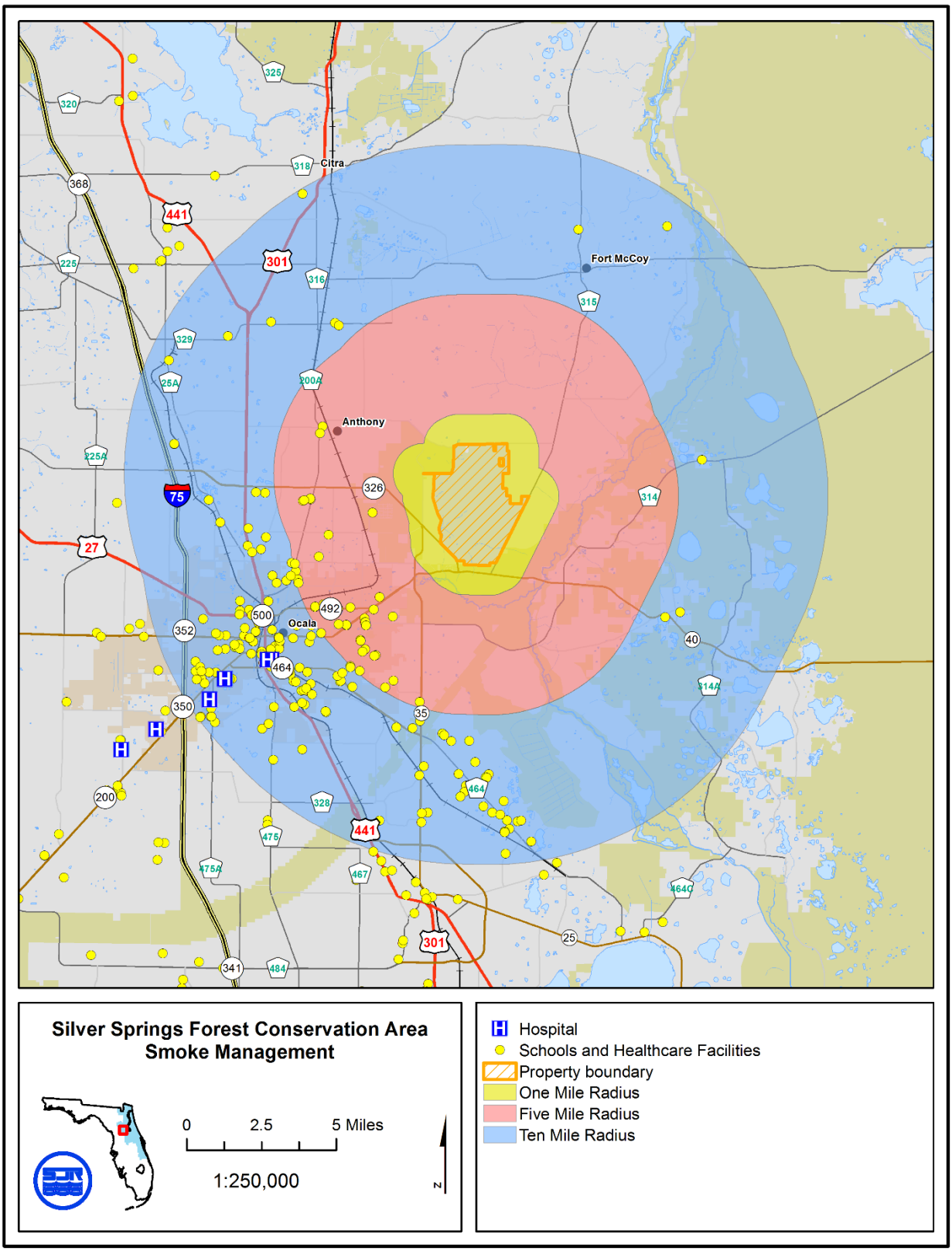

Figure 23: Smoke Management.

While prescribed fire is the preferred tool for management, restoration, enhancement, and maintenance of natural communities within the Property, it will be necessary at times to implement alternative methods. The District may utilize management techniques such as selective herbicide treatments, silvicultural thinning, mowing, and roller chopping in combination with fire as part of an integrated approach to restoring, creating, and maintaining desired conditions within the Property.

A system of Fire Regime Condition Class measures was originally developed by the Nature Conservancy and the USDA Forest Service in 2003 as an effort to assess ecosystem health. It is based on a relative measure and describes the degree of departure from the historical natural fire regime of a given ecosystem (Hann, et al., 2003). This departure results in changes to one or more of the following ecological components: species composition, structural stages, stand age, canopy closure, or mosaic pattern. The District adapted the system in 2008 to establish a reference for ecosystem health and land management effectiveness. While fire is the preferred disturbance that maintains most natural communities in Florida, other disturbances, though not an ecological surrogate, may serve to accomplish or aid in the accomplishment of management objectives. Annually, each burn zone is assigned a Condition Class score based upon the most recent disturbance and the fire frequency recommended for that plant community by FNAI (Guide to the Natural Communities of Florida, 2010). If FNAI recommends a fire return interval of 3-5 years, a plant community that has benefited from disturbance in the past 5 years is in Condition Class 1. If it has been more than 5 years but less than 15 years, or three cycles, the zone is in Condition Class 2. If it has been more than three times the fire return interval, but can still be recovered by fire, it would fall into condition class 3. If the plant community has gone without disturbance so long that fire alone can no longer restore the area, it is in condition class 4.

District staff will make annual condition class assessments and incorporate them into annual burn and work plans. The overall condition class distribution of the conservation areas habitats in 2022 was 28% Condition Class 1; 29% Condition Class 2; 43% Condition Class 3; 0% Condition Class 4. There has been an overall increase in the percentage of habitat in Condition Class 1 and decreases in Condition Classes 2, 3 and 4 from 2017 to 2022 (Figure 24).

All implementation of prescribed fire within the conservation area will be conducted in accordance with the District's Fire Management Plan, the Silver Springs Forest Fire Management Plan (Appendix E), and the annual burn plan for the Property.

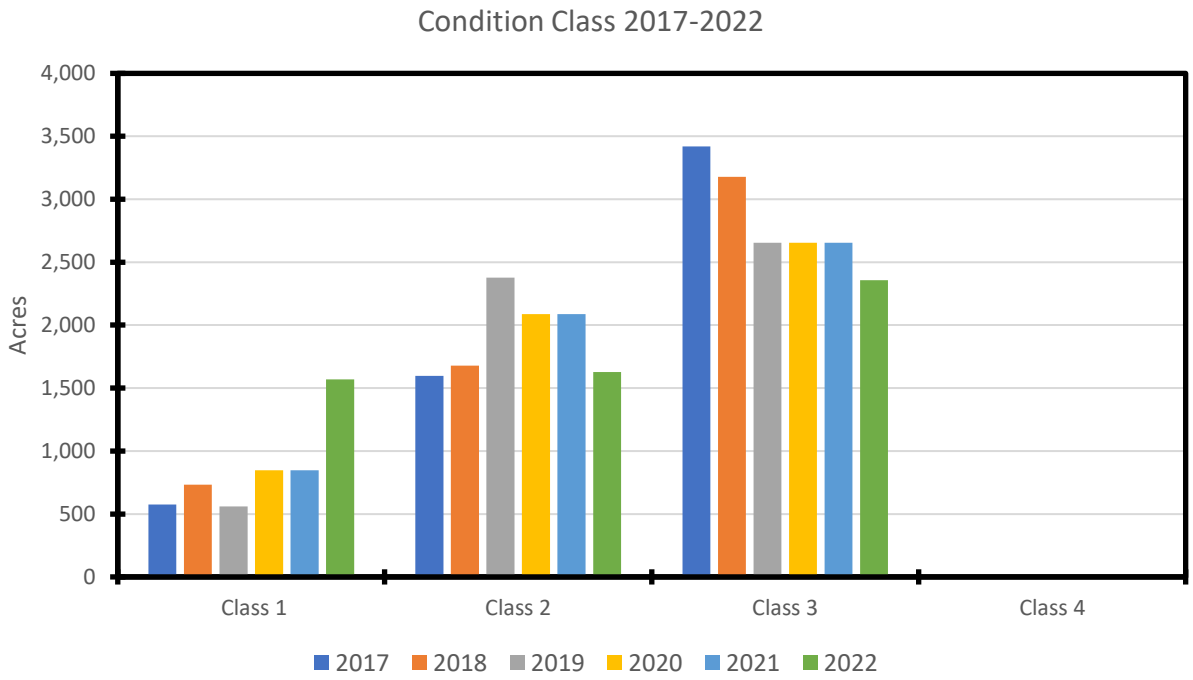

Figure 24: Condition Classes.

Flora and Fauna

Goal: Maintain, improve, or restore native and listed species populations.

Strategies:

- Continue to collect baseline data at established locations to be used for possible future restoration progress tracking.
- Conduct plant and wildlife surveys and build upon species lists.
- Monitor for the presence of listed species and adjust management actions appropriately.

Goal: Manage invasive and/or exotic plants and animals.

Strategies:

- Conduct feral hog removal activities as needed.
- Locate, map, and treat any new infestations of invasive and/or exotic plant species.

Silver Springs Forest has a diverse assemblage of natural communities providing significant habitat for a variety of floral and faunal species. In June of 2018, District staff conducted a bioblitz across the Property and have continued to add to the species list (Appendix F).

Flora

The District has developed a plant list from observations within Silver Springs Forest. The District may seek the assistance of local Native Plant Society and other volunteers to further

develop the knowledge of plant species within Silver Springs Forest. To date, no State or Federally listed plant species have been documented on the property.

Fauna

Florida Black Bear
The Florida black bear (*Ursus americanus floridanus)* is documented within Silver Springs Forest. In addition to habitat loss and fragmentation and a host of diseases and parasites, threats to the Florida black bear include human caused mortality and incompatible habitat management. The property lies within the primary range of the Ocala subpopulation of the Florida black bear. The Property provides desirable habitat and seasonal food sources for bears, as well as cover for denning and protection from humans. To the extent that issues relate to District-managed lands, District staff will coordinate as necessary with the FWC, FDOT, and any other relevant parties regarding the management of bear habitat and the facilitation of movement across the landscape. The District currently holds a seat on the FWC Statewide Bear Technical Assistance Group and provides stakeholder input for updates of the Florida Black Bear Management Plan (2019 Florida Black Bear Management Plan).

Gopher Tortoise
The gopher tortoise (*Gopherus polyphemus*) is a federal candidate species for listing as a threatened species and a state-listed threatened species which occurs within Silver Springs Forest. This species is typically found in dry upland habitats, such as sandhill, scrub, and pine flatwoods. Gopher tortoises excavate deep burrows and are considered a keystone species because their burrows provide refuge for more than 300 animal species. Management activities within the pine flatwood communities of Silver Springs Forest will focus on restoring species composition and natural fire return intervals, which will benefit the gopher tortoise.

Non-native Invasive Species

Several invasive plants are known to occur within the Property including:

- Mimosa (*Albizia julibrissin*)
- Paper mulberry (*Broussonetia papyrifera*)
- Camphor-tree (*Cinnamomum camphora*)
- West Indian marshgrass (*Hymenachne amplexicaulis*)
- Cogongrass (*Imperata cylindrica*)
- Japanese climbing fern (*Lygodium japonicum*)
- Chinaberry (*Melia azedarach*)
- Chinese tallow tree (*Sapium sebiferum*)
- Johnsongrass (*Sorghum halpense*)
- Caesar-weed (*Urena lobate*)

These invasive plants are managed by District. Invasive species control is necessary to inhibit the continued proliferation of invasive plants and integral in the maintenance and restoration of

natural plant communities. The Invasive Plant Management Program uses a variety of techniques including fire, mechanical, and chemical treatments. Herbicide is applied per label rates using the most appropriate method of application for the target species and employing the appropriate personal protective equipment.

While it is unlikely that the District will entirely eradicate invasive or exotic plants within the Property, maintaining or achieving maintenance control of such species is targeted within the scope of this plan. The Property was acquired with significant populations of many invasive plants, especially Chinese tallow and cogongrass. District staff have intensively surveyed 2,800 acres of infested land at the Property and applied herbicide to known populations repeatedly since 2016. All known occurrences of Florida Exotic Pest Plant Council (FLEPPC) Category I and II invasive plants at Silver Springs Forest are currently at a maintenance level (2019 FLEPPC List of Invasive Species).

Invasive non-native wildlife species known to occur within Silver Springs Forest include feral hogs (*Sus scrofa*), brown anoles (*Anolis sagrei*), and nine-banded armadillos (*Dasypus novemcinctus*). The District currently utilizes feral hog removal agents through a Special Use Authorization (SUA) process to assist in the control of feral hogs. The District keeps records of hog removal from the Property. Additionally, feral hogs are harvested from Silver Springs Forest in conjunction with public hunting opportunities associated with the Lake George Wildlife Management Area.

On other District-managed properties, the District has coordinated via contract with the United States Department of Agriculture (USDA) to assist in the removal of feral hogs. If necessary, the District may utilize the USDA to address specific population reduction initiatives at Silver Springs Forest.

Cultural Resource Protection

Goal: Identify, protect, and maintain any cultural resources found on the Property.

Strategies:

- Identify and report sites to the DHR.
- Identify and report any detrimental activities to the sites to the DHR and law enforcement.

A review of DHR Florida Master Site File data indicates two cultural resource sites are either partially or completely encompassed by the Silver Springs Forest boundary. District staff is aware of additional sites that are potentially eligible to be added to the Florida Master Site File. If any additional sites are verified, District staff will document and report sites to the DHR. District land management activities that may affect or impact these resources will be evaluated and modified to reduce the potential for disturbance of the identified sites. Additionally, detrimental activities discovered on these sites will be reported to the DHR and appropriate law enforcement agencies. Due to District and State policy, the location of any sites are not identified on public maps.

LAND USE MANAGEMENT

Access
Goal: Provide public access to District lands**.**

Strategies:
- Retain the ability to close roads as necessary for a variety of reasons including, but not limited to, hydrologic conditions.
- Maintain parking areas, signs, gates, trails, roads, and other recreational facilities.
- Update District database on maintenance of existing and creation of new parking areas, signs, gates, trails, and roads.

Three public parking areas are available on Silver Springs Forest. Parking areas are located on: Baseline Rd., SR 326, and CR 315. Parking areas are fenced and have walkthroughs providing for non-motorized recreational access. Informative kiosks are provided at parking area trailheads.

There are currently 11 gates providing management access to and across the Property. These gates are monitored regularly for maintenance and/or repair needs from normal wear and tear and vandalism. In an effort to expedite emergency responses and to assist law enforcement and fire rescue in locating individuals in the event of an emergency, 911 addresses have been issued at certain parking areas and access points to the Property. Table 5 includes the 911 addresses for Silver Springs Forest.

911 Address	Description/Usage
4410 NE Highway 315	Main Access Gate
7699 NE 58th Avenue	Main Access Gate
6381 E Highway 326	Main Access Gate

Table 5: 911 Addresses for Emergency Access

Approximately 29 miles of interior management roads traverse the Property, some of which incorporate the multiuse trail system. To manage road maintenance, the District utilizes a roads classification system. This system includes the following classifications:

A. Paved Road – Any road that is paved.
B. Primary Road – Any road that requires routine maintenance of any kind.
C. Secondary Road – Any road that does not require routine maintenance, only periodic or no maintenance.

Twenty-one (21) miles within the Property are classified as primary road, about half of the primary road length is stabilized with limerock. Approximately 8 miles of secondary roads are located within Silver Springs Forest, with the majority consisting of native surface without stabilization material.

District staff will update the roads database to reflect changes to the road network within the Property area, as necessary. Roads will be regularly inspected and receive maintenance and repair as necessary and may be subject to closure during these times. Activities such as prescribed fire, wildfires, timber harvesting, and other mechanical activities may result in temporary road closures. Roads may also be closed by the District due to hydrologic conditions. Figure 25 depicts the location of the parking areas, roads, access easements, and gates on the Property.

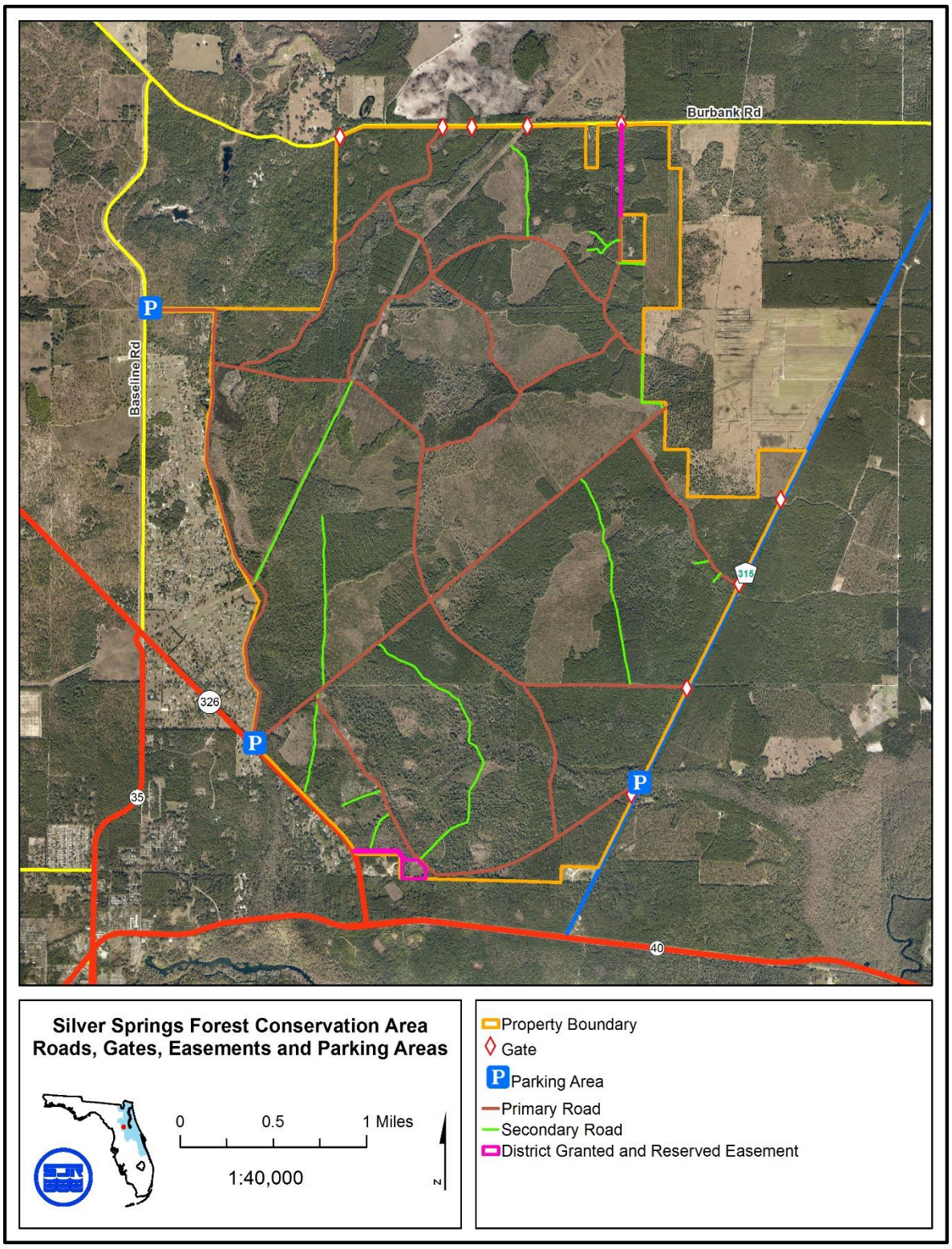

Figure 25: Roads, Gates Easements, and Parking Areas.

Recreation

Goal: Provide recreational opportunities consistent with the ecological needs of the property.

Strategies:

- Maintain parking areas, picnic area, kiosks, and trails.
- Update the District's online Recreation and Lands interactive site with recreation improvements.
- Create trail linkage between Indian Lake State Forest and Silver Springs State Park.

The primary objective of the Recreation Management Program is to facilitate resource-based recreational activities on District lands. An aspect in developing the District Recreation Program is not to compete with other local recreational opportunities, but rather complementing what they may already have in place by filling an outdoor recreation niche through dispersed recreation opportunities. Dispersed recreation activities generally require large tracts of land with some level of isolation. This type of recreation blends well with District conservation areas, providing numerous opportunities for passive recreation which also provides solitude and challenge.

Recreational opportunities available within the Silver Spring Forest include hiking, bicycling, fishing, wildlife viewing, nature study, equestrian activities, photography, and seasonal hunting. Figure 26 depicts the multi-use trail system.

Recreational improvements on Silver Springs Forest include:

- **Land Management Roads** – Many miles of land management roads are available for hiking, biking, and equestrian use. The District may close and roads or portions of trails and roads to accomplish land management activities when conditions pose a public safety concern or when hydrologic conditions necessitate.
- **Multi Use Trails** – Approximately 12.5 miles of blazed trails located on Silver Springs Forest for hiking, biking, and equestrian use. As described in the Forest Legacy Program Memorandum of Understanding, a trail linkage will be developed to connect Indian Lake State Forest, Silver Springs Forest and Silver Springs State Park. The District may close and roads or portions of trails and roads to accomplish land management activities when conditions pose a public safety concern or when hydrologic conditions necessitate.
- **Kiosks** – Informational kiosks are located at public access points and provide information including maps, trail guides, and displays.
- **Wildlife Management Area –** The Property is cooperatively managed as the Silver Springs Forest Wildlife Management Area. Seasonal public hunting opportunities are available and managed under the jurisdiction of FWC.

The targeted maintenance schedule for trails includes:

- Mowing trails and road edges four times yearly.
- Trail blazing, trimming of overhanging branches, and tree removal along trails as needed.
- Monthly trailhead maintenance.

Any changes to the recreational infrastructure will be updated on the District's recreation section on the website, which can be viewed online at https://www.sjrwmd.com/lands/recreation/.

Security
Goal: Provide and maintain the security on the Property.

Strategies:
- Maintain signage, fencing, gates, and locks.
- Continue coordination with private security firm, FWC, and local law enforcement.

Security concerns within Silver Springs Forest include damage to parking areas caused by activities associated with motorized vehicle access, dumping, vandalism of gates, fences, conservation signage, and poaching. The boundaries of the Property were marked and posted soon after the original survey work was complete. District staff will evaluate the need for new fencing and incorporate all new fencing into future budget and annual work plans. The District utilizes a contract security firm as well as coordination with FWC and local law enforcement to administer security within the Property.

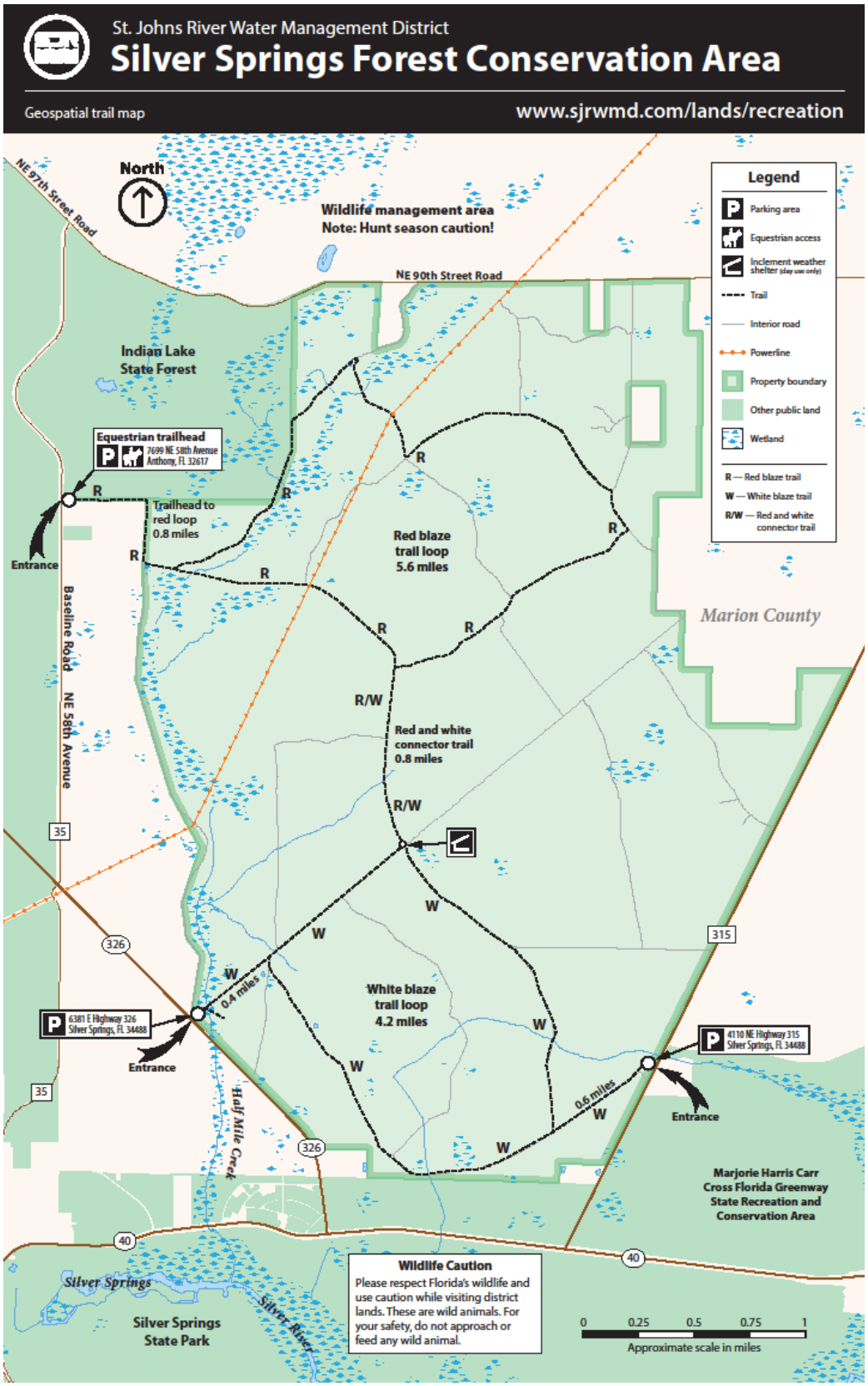

Figure 26: Trail Map.

ADMINISTRATION

Real Estate Administration

Goal: Explore opportunities for adjacent property acquisition.

Strategies:

- Evaluate adjacent properties for potential acquisition.

Approximately 7,300 acres surrounding Silver Springs Forest have been identified as potential acquisitions (Figure 27). Four small parcels are identified as either inholding or boundary straightening acquisitions. Additional large parcels are considered potential acquisition because they are either part of the Florida Forever Heather Island Project Area or close a potential gap with this project area. If neighboring parcels become available which increase continuity between the Silver Springs Forest and nearby conservation land, provide additional protection to water resources, or allow for restoration of impacted land, they will be evaluated for acquisition by District staff. Transfers with adjacent landowners and/or government agencies will be evaluated on a case-by-case basis.

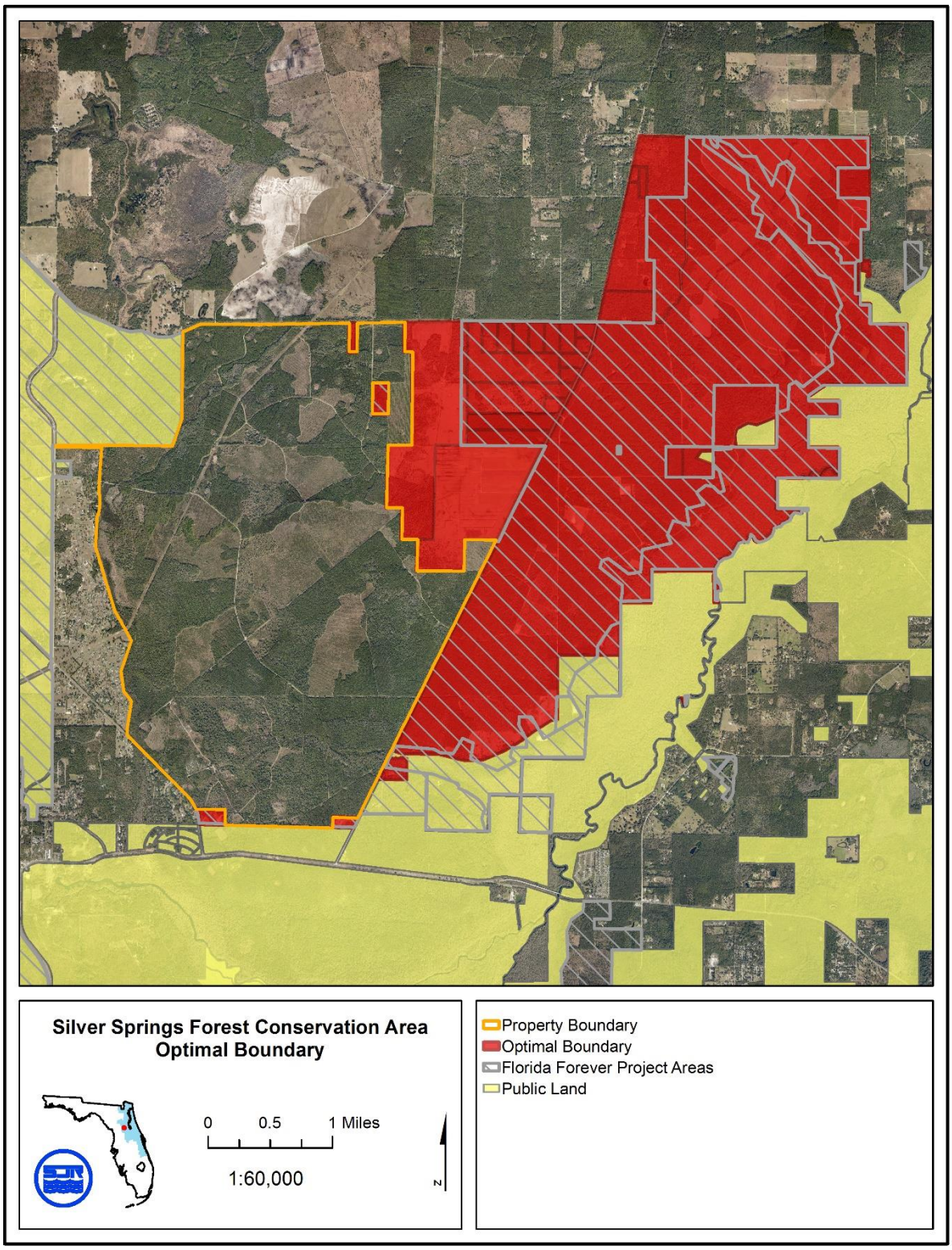

Figure 27: Potential Acquisition and Surplus Parcels.

Cooperative Agreements, Leases, Easements, and SUA
Goal: Evaluate, pursue, and manage cooperative opportunities.

Strategies:

- Continue to cooperate with researchers and universities as appropriate.
- Incorporate any new acquisitions into existing cooperative management agreements as needed.
- Evaluate lease and Special Use Authorization opportunities for compatibility with conservation and management goals.

Section 373.1391, Florida Statutes, authorizes and encourages the District to enter into cooperative land management agreements with state agencies or local governments to provide for the coordinated and cost-effective management of lands to which the water management districts, the Board of Trustees of the Internal Improvement Trust Fund, or local governments hold title. District Policy #820 promotes the District entering into agreements with other agencies and private parties for cooperation and coordination of management of the District's lands. In addition, the District is authorized to enter into Cooperative Agreements, Cooperative Management Leases, Leases, Easements and Special Use Authorizations to protect the District's water management interests and to enhance the management and public value of the land. Leases can be a useful tool to accomplish land management objectives and will be evaluated and implemented where appropriate. Common examples include cattle grazing and apiaries, and the District remains open to considering other types of leases which help achieve management goals. Table 6 details the agreements, leases, and SUAs in effect during the writing of this plan.

Agreement Number	Type/Purpose	Agreement Name	Term
1008	Intergovernmental	FWC – WMA	May 2034
1501	Intergovernmental	FDEP Restrictive Covenants	Perpetual
2043	Easement – Access/Construction/Operations/Maintenance	FDOT Access Easement at Halfmile Creek	Perpetual
2042	Easement – Facility	FDOT Floodplain Compensation Easement at Halfmile Creek	Perpetual
1502	Intergovernmental	FFS Restrictive Covenants	Perpetual
1532	Lease/Apiary	ITO Straughn Farms LLC	March 2024
2263	Easement – Access	Encumbering 2015-004-P1 to Sashy	Perpetual
2224	SUA /Recreation	Art Ferrell Horse Riding	March 2026
2268	SUA/Sampling	KSU Lobelia & Soil Sampling	September 2026
1834	SUA/Recreation	Patti Mehling Horse and Carriage	March 2025

1597	SUA/Recreation	Scott Hefner Horse and Cart	March 2024
2176	Lease/Management Designation	Silver Springs Forest Inholding Sublease	June 2069

Table 6: Cooperative Agreements, Leases, and Special Use Authorizations.

Silver Springs Forest is subject to a lease agreement between the District and FWC that establishes the conservation area as Silver Springs Forest Wildlife Management Area. FWC is responsible for hunt management and associated law enforcement.

The District is a party to several other agreements with State agencies that affect various aspects of management on the conservation area. The Rayonier parcel is subject to a restrictive covenant (LRS agreement 1501) related to acquisition funding provided by FDEP. The covenant requires that the Property be managed primarily to help protect Silver Springs, the Silver River and water quality and water quantity within the Silver Springs springshed. The Rayonier parcel is also subject to a MOA and restrictive covenants (LRS agreement 1502) resulting from funding provided by the Forest Legacy Program. This agreement states that the property be managed according to the Florida Legacy Program Implementation Guidelines, requiring ≥75% of the Property be maintained as forest lands. Finally, two agreements (LRS agreement 2042 and 2043) relate to projects administered by the Florida Department of Transportation (FDOT) as a result of wetland impacts caused by widening of SR 40. In the southwest corner of the Halfmile Creek parcel FDOT maintains a stormwater pond and access to the pond. FDOT also provided mitigation funding to improve habitat within the eastern 2/3 of the Halfmile Creek tract. The District also subleases (LRS agreement 2176) a parcel from the BOT, through the FFS.

Straughn Farms, LLC, holds a five-year lease to maintain three apiary sites, each site holding a maximum of 100 colonies. Revenue generated from this apiary lease totals $362.52 annually. At time of acquisition of the Rayonier parcel a perpetual access easement was transferred to the District for a private inholding within Silver Springs Forest. Several relatively short-term recreation and research SUAs are active at the time of this plan. The District will continue to administer SUAs during the course of this plan, as appropriate.

Management Revenues and Costs

Goal: Analyze and report projected and actual costs and revenues.

Strategies:

- Analyze and report revenues.
- Analyze and report land management costs.

All revenue generated through apiary leases and forest management accomplishments are applied towards the District's land management budget to offset management costs for the Property.

Costs and revenues are projected into the future. However, prices of timber fluctuate depending on the markets.

Revenues Since Acquisition (2016)

Revenues since 2016, totaling $529,793, are primarily from timber thinning (Table 7).

Activity	Year	Revenue
Timber sale	2017	$52,908
Timber sale	2018	$33,986
Timber sale	2019	$213,591
Timber sale	2020	$38,968
Timber sale	2021	$40,543
Timber sale	2022	$148,709
Apiary Lease	2019-2022	$1,088
Total		**$529,793**

Table 7: Management Revenues from 2016 to 2022

Costs Since Acquisition (2016)

Since 2016, management costs have totaled $246,058 (Table 8).

Annual Costs

Activity	Annual Number of Units	Units	Annual Cost	Total Cost (Since 2009)
Invasive plant control	2,866	Acres	$23,288	$139,728
Prescribed fire	214	Acres	$1,157	$6,945
Security	30	Hours	$225	$1,350
Road maintenance	29	Miles	$5,800	$34,800
Mowing (roads, trails)	56	Acres	$839	$5,031
Service mowing	1	Acres	$180	$1,080
Trail and camp site maintenance	12.5	Miles	$2,613	$15,675
Fireline disking	2	Miles	$540	$3,240
Fence maintenance	14.5	Miles	$1,148	$11,484

One Time Cost

Activity	Total Number of Units	Units	Cost	Total
2016 Forest inventory	197	Plots	$3,713	$3,713
2017 Forest inventory	65	Plots	$1,264	$1,264
2018 Forest inventory	34	Plots	$804	$804
2019 Forest inventory	88	Plots	$2,262	$2,262
Timber Marking	286	Acres	$18,226	$18,226
Wildfire suppression	2	Acres	$456	$456
Total Cost Since 2016 Plan				**$246,058**

Table 8: Management Costs from 2016 to 2022

Projected Revenues

The projected revenues from forest management and the apiary lease at Silver Springs Forest between 2022 and 2032 are $2,224,856 (Table 9). All revenue generated through forest management accomplishments for this time will be applied towards the District's land management budget to offset management costs for the Property.

Activity	Fiscal Year(s)	Revenue
Timber sale	2023	$497,686
Timber sale	2024	$80,237
Timber sale	2025	$18,466
Timber sale	2026	$288,646
Timber sale	2027	$856,735
Timber sale	2028	$362,350
Timber sale	2032	$117,111
Apiary Lease	2022-2032	$3,625
Total		**$2,224,856**

Table 9: Projected Revenues Between Fiscal Years 2022 to 2032

Projected Management Costs

Projected management costs for Silver Springs Forest from 2022-2032 are $1,871,439.

Activity	Number of Units (annual)	Units	Annual Cost	10 Year Total Cost
Mesic hammock restoration*	60	Acres	$125,412	$1,250,415
Invasive plant control	526	Acres	$28,181	$281,810
Prescribed fire	200	Acres	$10,000	$100,000
Security	40	Hours	$2,000	$20,000
Road maintenance	29	Miles	$6,380	$63,800
Mowing (roads, trails)	56	Acres	$922	$9,220
Service mowing	1	Acres	$198	$1,980
Fireline Disking	14.5	Miles	$5,264	$52,640
Trail maintenance	12.5	Miles	$2,874	$28,740
Fence maintenance	14.5	Miles	$1,531	$15,312
Forest inventory	45	Plots	$979	$9,794
Timber Marking	52	Acres	$3,773	$37,728
Total cost over 10 years				**$1,871,439**

Table 10: Projected Management Costs from 2022-2032

**Annual units and cost will vary. The 10 Year Total Cost of mesic hammock restoration is based on proration – using per acre cost estimates from Restoration Plan Table 2 – over plan period to reflect the incremental approach of project. For example, 47 acres of restoration will be managed for 9 years of plan; an additional 180 and 367 acres managed for six and five years, respectively. Cost and unit values are based on annual average of actual calculated total cost for project.*

RESOURCE PROTECTION AND MANAGEMENT

Water Resources

Goal	Protect water quality and quantity, restore hydrology to the extent feasible, and maintain the restored condition	Measure	Planning Period
Strategy A	Continue to manage for reduced turbidity/sedimentation impacts on Silver River.	Turbidity levels	Ongoing
Strategy B	Work with Bureau of Water Resources to continue evaluation and adjustment, as necessary, to water levels at control structures.	Control structures operating as designed	Ongoing
Strategy C	Incorporate water resource infrastructure into the water control structure database.	Database updated	1-5 Years
Strategy D	Inspect and maintain roads, bridges, culverts, low water crossings, water control structures and trails for damage.	Infrastructure inspected	Ongoing
Strategy E	Repair and improve specific sections of road that have been impacted by erosion.	Roads improved	Ongoing
Strategy F	Consider opportunities to remove silvicultural beds from timber harvest areas if restoration is feasible.	Silvicultural beds removed	10 Years
Strategy G	Rehabilitate wildfire suppression lines in order to restore hydrology.	Lines rehabilitated	10 Years
Strategy H	Identify and map locations of shallow ditches/swales; incorporate into regional database for restoration needs and/or mitigation.	Ditches mapped	10 Years
Strategy I	Continue Halfmile Creek FDOT Mitigation Monitoring.	Monitoring completed	Ongoing
Strategy J	As appropriate, work with Regulatory staff to identify and pursue opportunities to fulfill mitigation needs within regulatory basin 12.	Mitigation needs met	Ongoing

Forest Management and Restoration

Goal	Maintain, improve, and restore forest resources	Measure	Planning Period
Strategy A	Manage the Rayonier parcel to meet objectives of Forest Legacy Program funding requirements, maintain ≥75% forested land cover.	% of Rayonier parcel in forested land cover	Ongoing
Strategy B	As resources allow, incrementally implement the Silver Springs Forest Conservation Area Mesic Hammock Restoration Plan utilizing the principles of adaptive management (Appendix D).	Acres mesic hammock restoration	10 Year

Strategy C	Where appropriate, based on soil type and hydrology, consider managing planted loblolly pine stands without conversion to other pine species.	Forest management adapted	1-5 years
Strategy D	Evaluate the opportunity to reforest upland portions of Halfmile parcel that are not a part of mitigation plan, conduct reforestation efforts if appropriate.	Acres of reforestation	5-10 Years
Strategy E	Identify specific areas in which to maintain basal area of 60-70 sq ft to control invasive populations and reduce loblolly regeneration, incorporate this strategy into master harvest plan.	Master harvest plan adapted	1-5 years
Strategy F	Restore groundcover where appropriate.	Acres of groundcover restoration	5-10 years
Strategy G	Maintain up-to-date information within forest management database.	Forest management database updated	Ongoing
Strategy H	Harvest/thin timber from 2,575 acres, alter harvest plans to facilitate with conversion of pine stands to reflect historic land cover as appropriate.	Acres of timber harvested	5-10 years

Fire Management

Goal	**Implement a prescribed burning program in accordance with District's Fire Management Plan**	**Measure**	**Planning Period**
Strategy A	Where needed modify FMU configuration and establish adequate fire control and boundary lines as funding is available.	FMU and boundary improvements	1-5 years
Strategy B	Develop annual burn plans.	Burn plans developed	Annually
Strategy C	Conduct dormant season burns in pine plantations and areas of high fuel loading and/or extended fire exclusion.	Acres of dormant season burns	Ongoing
Strategy D	Conduct growing season burns as appropriate.	Acres of growing season burns	Ongoing
Strategy E	Continue to populate fire management database on an annual basis.	Fire management database updated	Annually
Strategy F	Use mechanical fuel reduction as a fire surrogate in areas where it is difficult to burn due to high fuel loads or proximity to highways	Acres treated mechanically	1-5 years

Flora and Fauna

Goal	**Maintain, improve, or restore native and listed species populations**	**Measure**	**Planning Period**
Strategy A	Continue to collect baseline data at established locations to be used for possible future restoration progress tracking.	Baseline data collected	Ongoing
Strategy B	Conduct plant and wildlife surveys and build upon species lists.	Species lists updated	Ongoing
Strategy C	Monitor for the presence of listed species and adjust management actions appropriately.	Listed species monitoring conducted	Ongoing
Goal	**Manage invasive and/or exotic plants and animals**	**Measure**	**Planning Period**
Strategy A	Conduct feral hog removal activities as needed.	Number of hogs removed	Ongoing
Strategy B	Locate, map, and treat any new infestations of invasive and/or exotic plant species.	Mapping and treatment of new infestations	Ongoing

Cultural Resource Protection

Goal	**Identify, protect, and maintain any cultural resources found on the property**	**Measure**	**Planning Period**
Strategy A	Identify and report sites to the Florida Department of Historical Resources (DHR).	Sites identified and reported	Ongoing
Strategy B	Identify and report any detrimental activities to the sites to the DHR and law enforcement.	Activities identified and reported	Ongoing

LAND USE MANAGEMENT

Access

Goal	**Provide public access to District lands**	**Measure**	**Planning Period**
Strategy A	Retain the ability to close roads as necessary for a variety of reasons including, but not limited to, hydrologic conditions.	Ability to close roads retained	Ongoing
Strategy B	Maintain parking areas, signs, gates, trails, roads, and other recreational facilities.	Parking areas, signs, gates, trails, and roads maintained	Ongoing

Strategy C	Update District database on maintenance of existing and creation of new parking areas, signs, gates, trails, and roads.	Database updated	Ongoing
Recreation			
Goal	**Provide recreational opportunities consistent with the ecological needs of the property**	**Measure**	**Planning Period**
Strategy A	Maintain parking areas, picnic area, kiosks, and trails.	Recreational sites maintained	Ongoing
Strategy B	Update the District's online *Recreation and Lands* interactive site with recreation improvements.	Up-to-date online site	Ongoing
Strategy C	Create trail linkage between Indian Lake State Forest and Silver Springs State Park.	Linkage created	5-10 years
Security			
Goal	**Provide and maintain the site's security**	**Measure**	**Planning Period**
Strategy A	Maintain signage, fencing, gates, and locks.	Signs, fences, gates, and locks maintained	Ongoing
Strategy B	Continue coordination with private security firm, FWC, and local law enforcement.	Secure property	Ongoing

ADMINISTRATION

Real Estate Administration			
Goal	**Explore opportunities for adjacent property acquisition**	**Measure**	**Planning Period**
Strategy A	Evaluate adjacent properties for potential acquisition.	Properties evaluated	Ongoing
Cooperative Agreements, Leases, Easements, and Special Use Authorizations (SUA)			
Goal	**Evaluate, pursue, and manage cooperative opportunities**	**Measure**	**Planning Period**
Strategy A	Continue to cooperate with researchers and universities as appropriate.	Cooperative agreements and SUAs administered	Ongoing

Strategy B	Incorporate any new acquisitions into existing cooperative management agreements as needed.	Properties incorporated into cooperative management agreements	Ongoing
Strategy C	Evaluate lease and Special Use Authorization opportunities for compatibility with conservation and management goals.	Leases and SUAs administered	Ongoing

Management Revenues and Costs

Goal	**Analyze and report projected and actual costs and revenues**	**Measure**	**Planning Period**
Strategy A	Analyze and report revenues.	Annual report	Annually by Nov.
Strategy B	Analyze and report land management costs.	Annual report	Annually by Nov.

Table 11: Land Management Plan Implementation Schedule

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APPENDIX A: FNAI NATURAL COMMUNITY MAPPING METHODOLOGY

2021 ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

The primary purpose of Natural Community Mapping is to inform land management staff about the type, composition, and structure of natural communities. ArcGIS polygon maps as well as supporting ground truthing GPS points form the basis of the product. Descriptive narratives accompany maps for clarification and additional information.

Up to eight products are typically provided for each natural community map:

(1) a point shapefile that identifies the natural community type observed at each point; a polygon shapefile containing the boundaries of the current natural communities on the study area with attributes that list the FNAI natural community type or an altered landcover type if the area is heavily disturbed as well as any natural communities or other landcover types that may occur as inclusions within the delineated polygon;
(2) a polygon shapefile containing the boundaries of the historical natural communities on the study area as determined from historical aerial photography, field evidence, or original public land survey notes;
(3) a brief written description of the natural communities that occur on site, including a list of the dominant or characteristic plant species;
(4) a point shapefile with locations and descriptions of FNAI-tracked or other rare plant occurrences;
(5) a point shapefile with locations and descriptions of FNAI-tracked or other rare animal occurrences;
(6) a point shapefile with locations and descriptions of invasive exotic plant occurrences.
(7) geo-referenced historical aerial photography.

PRELIMINARY METHODS

FNAI scientists developed preliminary natural community maps using these resources:

- natural community element occurrence records from the FNAI database
- Florida Land Use, Cover, and Forms Classification System (FLUCCS) shapefiles
- aerial photography from 1995 to present
- Soil Conservation Service county soil maps
- USGS 7.5 minute topographic quadrangles
- geo-referenced historical black and white DOT aerial photographs

For Silver Springs Forest Conservation Area (SSFCA), two 1940 aerial photographs were obtained through the University of Florida and geo-referenced for use in mapping. St. Johns Water Management District shared 1964 aerial photographs and a LiDAR elevation map. By 1940, the large hammock on SSFCA had been extensively cleared, so early land surveyor notes and a plat map from 1849 were obtained from the Land Boundary Information System website (www.labins.org). The plat map was geo-referenced by matching up section corners to a Township Range Section GIS layer. Selected surveyor notes were transcribed to a point GIS layer. The plat map shows the original hammock extent as estimated by the surveyor, and the

notes mark transitions between hammock and pine communities and provide general descriptions of the land and dominant canopy species.

Preliminary polygon maps of historical natural communities were created using ArcGIS. Natural community delineations were made based on visual inspection of the historical and current photographs as well as the other resources listed above. The typical minimum mapping unit is 0.5 acres; however, smaller communities (such as sinkholes, dome swamps, depression marshes, etc.) may be mapped to a finer scale, down to 0.1 acres.

Ground-truth field work aimed to observe as many historical polygons as possible to be able to describe current conditions and predict community composition from aerial photography. Preliminary maps with draft polygons and/or go-to points were printed for use and correction in the field. Digital maps were loaded onto dataloggers for navigation.

FIELD METHODS

FNAI scientists surveyed ("ground-truthed") a percentage of mapped natural community polygons on foot to assess the community type, and also to note variation in topography, hydrology, vegetation composition and structure, and to determine the types of disturbance present in each polygon. Each ground-truthed polygon should have at least one GPS point recorded inside the polygon, with, at a minimum, the FNAI Natural Community type recorded.

Ground-truth points are selected in an area determined to be representative of the polygon. If a polygon is large and heterogeneous, multiple ground-truth points may be collected to capture the variability. Temporary, circular data collection plots with a radius of 65.6 feet (20 meters) are estimated at each point. Scientists enter data on vegetation, hydrology, and other ecological and physical attributes within the plot and enter these data into field computers ("dataloggers"). For repetitive natural community types, a smaller data set may be recorded. A list of the attributes and their definitions is provided in Appendix 1.

Additional data regarding the extent of natural communities or other details may be recorded in miscellaneous GPS points or written on field maps to assist with production of the final map. Additionally, incidental observations of rare, FNAI-tracked plant and animal species are recorded using the dataloggers. The attributes for rare species are described in Appendix 2. Observations of non-native invasive plant species were also recorded; these attributes are described in Appendix 3.

MAPPING AND REPORTING METHODS

GPS Pathfinder Office software was used to design data dictionaries, transfer files to and from dataloggers, and export the data as ESRI shapefiles.

The natural community polygon boundaries were edited in ArcGIS based on field observations and data points. The attributes for current and historical natural community polygons are described in Appendices 4 and 5. All data are reviewed and corrected for consistency. Data values of "ZZ" indicate that data were not collected or were not applicable for that attribute. The projection parameters for all shapefiles are as follows:

NAD_1983_StatePlane_Florida_West_FIPS_0902_Feet
WKID: 2237 Authority: EPSG

Projection: Transverse_Mercator
False_Easting: 656166.6666666665
False_Northing: 0.0
Central_Meridian: -82.0
Scale_Factor: 0.9999411764705882
Latitude_Of_Origin: 24.33333333333333
Linear Unit: Foot_US (0.3048006096012192)

Map and point shapefiles were inspected for errors and consistency before products were finalized and metadata added to GIS files.

Brief descriptions of natural communities on the study area were written based on data points with detailed composition information and other observations made in the field. Acreage summaries for historical natural communities were created from the final map.

APPENDIX B: SILVER SPRINGS FOREST CONSERVATION AREA SOILS

Below is a description of the soils at Silver Springs Forest Conservation Area. See Figure 19 for a map of soil coverages at the property.

Adamsville
The Adamsville series consists of very deep, somewhat poorly drained, rapidly permeable soils on broad flats, low knolls, and lower side slopes. They formed in thick sandy marine or eolian sediments in central and southern Florida. Near the type location, the mean annual temperature is about 74 degrees F., and the mean annual precipitation is about 52 inches. Slopes range from 0 to 5 percent. With adequate water control, many areas are used for citrus. Some areas are in improved pasture. Natural vegetation consists of pines, laurel, and water oaks with a ground cover of saw palmetto, pineland threeawn, indiangrass, bluestem grasses, and several low panicums.

Bluff
The Bluff series consists of very deep, very poorly drained, slowly permeable soils in marshes and on broad low terraces along rivers. They formed in thick beds of alkaline loamy marine sediments. Near the type location, the mean annual temperature is about 72 degrees F., and the mean annual precipitation is about 59 inches. Slopes range from 0 to 2 percent. These soils are primarily used for woodland or wildlife habitat. The native vegetation consists of swamp white oak, tupelo gum, swamp maple, cypress, and palm, with scattered loblolly pine some areas. The understory vegetation consists of several bluestem species, hairy panicum, longleaf uniola, vines, and forbs.

Candler
The Candler series consists of very deep, excessively drained, very rapidly to rapidly permeable soils on uplands of Southern Florida Flatwoods (MLRA 155), South Central Florida Ridge (MLRA 154), Eastern Gulf Coast Flatwoods (MLRA 152A) and the Atlantic Coast Flatwoods (MLRA 153A. They formed in thick beds of eolian or sandy marine deposits. Near the type location, the mean annual temperature is about 72 degrees F., and the mean annual precipitation is about 55 inches. Slopes are primarily 0 to 12 percent but range up to 40 percent in the more dissected areas. Many areas are used for citrus crops and tame pasture. Native vegetation consists of bluejack oak, turkey oak, sand post oak and longleaf pine, sand pine, sand live oak, chapman oak and myrtle oak with a sparse understory of lopsided indiangrass, gopher apple, pineland threeawn, hairy panicum, and other annual forbs.

Eaton
The Eaton series consists of very deep, very poorly and poorly drained, slowly permeable soils on low uplands and depressions of Peninsular Florida. They formed in clayey marine sediments. Near the type location, the mean annual temperature is about 72 degrees F., and the mean annual precipitation is about 59 inches. Slopes range from 0 to 2 percent. Most areas of Easton soils have been cleared and are used principally for improved pasture and range. Small areas with adequate water control are used for potatoes and truck crops. The native vegetation is chiefly loblolly pine, longleaf pine, and slash pine, but includes magnolia, water oak, sweetgum, and bay. The understory vegetation consists of several bluestem species, hairy panicum, and pineland

threeawn. Woody plants include gallberry, blackberry, scattered sawpalmetto, myrtle, and fetterbush. In depressional areas, cypress trees are dominant. The understory includes sand cordgrass, bluestem, maidencane, southern wildrice, St. Johnswort, cutgrass, and waxmyrtle.

Electra
The Electra series consists of somewhat poorly drained soils that formed in thick beds of sandy and loamy marine sediments on slight ridges in the flatwoods areas of central and southern Florida. Slopes range from 0 to 5 percent. These soils are not used for cultivated crops. A few small areas are cleared and used for tame pasture. Most areas remain in native vegetation consisting of dwarf live oak, a few longleaf and sand pine, running oak, sawpalmetto, and blueberry. Creeping bluestem, chalky bluestem, lopsided indiangrass, low panicum, pineland threeawn, paspalum, and numerous forbs dominate the understory.

Eureka
The Eureka series consists of deep, poorly drained, slowly and very slowly permeable soils that formed in clayey and loamy marine sediments. These soils are on low, broad flat interstream divides and depressions of central and south Florida. Slopes range from 0 to 2 percent. Most areas are in native vegetation of longleaf and slash pines, sweetbay, magnolia, water oak, and sweetgum with an understory of inkberry, pineland threeawn, bluestems, indiangrass, and waxmyrtle. Cleared and drained areas are used for truck crops and improved pasture.

Lynne
The Lynne series consists of very deep, poorly drained, moderately slowly permeable soils on flats of Central Florida. They formed in sandy and loamy marine sediments. Near the type location, the mean annual temperature is about 72 degrees F., and the mean annual precipitation is about 59 inches. Slopes range from 0 to 2 percent. Most areas of Lynne soils remain in native woodland. A few areas are used for truck crops, pasture, and range. The native vegetation consists of slash pine, longleaf pine, creeping bluestem, chalky bluestem, indiangrass, panicum, pineland threeawn, saw palmetto, fetterbush, gallberry, and wax myrtle.

Paisley
The Paisley series consists of deep, poorly drained, slowly permeable soils that formed in clayey marine sediments influenced by underlying calcareous materials. These soils are on nearly level, low broad Coastal Plains. Slopes are less than 1 percent. Most areas of Paisley soils remain in native vegetation. A few cleared areas are used for improved pasture. Native vegetation consists of slash, longleaf, and loblolly pine, swamp white oak, swamp maple, and sweetgum with an understory of wax myrtle, cabbage palmetto, bluestem, and native grasses.

Placid
The Placid series consists of very deep, very poorly drained, rapidly permeable soils that formed in sandy marine sediments. These soils are on nearly level low broad flats, depressions, drainageways, and floodplains of the Southern Florida Flatwoods and South Central Florida Ridge. Major Uses: Water quality, forestry, rangeland, and wildlife habitat. Some areas are used for truck crops, citrus, and pasture. Dominant vegetation: Maidencane, sand cordgrass, pickerelweed, giant cutgrass, waxmyrtle, sedges, and rushes. Scattered cypress, bay, pond pine, blackgum, tupelo, and cabbage palm occur in some areas.

Pomona
The Pomona series consists of very deep, poorly and very poorly drained soils that formed in sandy and loamy marine sediments. Pomona soils are on flats and flatwoods on marine terraces. Slopes range from 0 to 2 percent. The mean annual temperature is about 23 degrees C (72 degrees F), and the mean annual precipitation is about 1397 millimeters (55 inches). Under natural conditions Pomona soils are used for water quality and wildlife habitat. Cultivated areas are used for truck crops and tame pasture. Potential native vegetation consists of slash pine, longleaf pine, and south Florida slash pine with an understory of sawpalmetto, waxmyrtle, gallberry, creeping bluestem, chalky bluestem, indiangrass, and pineland threeawn.

Sparr
The Sparr series consists of very deep, somewhat poorly drained, moderately slowly to slowly permeable soils on uplands of the coastal plain. They formed in thick beds of sandy and loamy marine sediments. Near the type location, the mean annual temperature is about 72 degrees F., and the mean annual precipitation is about 55 inches. Slopes range from 0 to 8 percent. Most areas of Sparr soils are used for corn, citrus, peanuts, watermelons, truck crops, and tame pasture. Native vegetation consists of longleaf pine, slash pine, loblolly pine, magnolia, dogwood, hickory, and live oak, laurel oak, and water oak.

Tavares
The Tavares series consists of very deep, moderately well drained soils that formed in sandy marine or eolian deposits. Tavares soils are on hills, ridges and knolls of the lower Coastal Plain. Slopes range from 0 to 8 percent. Mean annual temperature is about 22 degrees C (72 degrees F), and the mean annual precipitation is about 1397 millimeters (55 inches). Some areas of Tavares soils are used for citrus. A few areas are used for corn, vegetable crops, watermelons, and improved pasture. In most places the natural vegetation consists of slash pine, longleaf pine, a few scattered blackjack oak, turkey oak, and post oak with an undercover of pineland threeawn. In some places natural vegetation consists of turkey oak, blackjack oak, and post oak with scattered slash pine and longleaf pine.

APPENDIX C: MANAGEMENT PROCEDURES OF ARCHAEOLOGICAL AND HISTORICAL SITES ON STATE-OWNED OR CONTROLLED LANDS

Management Procedures for Archaeological and Historical Sites and Properties on State-Owned or Controlled Properties
(revised March 2013)

These procedures apply to state agencies, local governments, and non-profits that manage state-owned properties.

A. General Discussion

Historic resources are both archaeological sites and historic structures. Per Chapter 267, Florida Statutes, *'Historic property' or 'historic resource' means any prehistoric district, site, building, object, or other real or personal property of historical, architectural, or archaeological value, and folklife resources. These properties or resources may include, but are not limited to, monuments, memorials, Indian habitations, ceremonial sites, abandoned settlements, sunken or abandoned ships, engineering works, treasure trove, artifacts, or other objects with intrinsic historical or archaeological value, or any part thereof, relating to the history, government, and culture of the state."*

B. Agency Responsibilities

Per State Policy relative to historic properties, state agencies of the executive branch must allow the Division of Historical Resources (Division) the opportunity to comment on any undertakings, whether these undertakings directly involve the state agency, i.e., land management responsibilities, or the state agency has indirect jurisdiction, i.e. permitting authority, grants, etc. No state funds should be expended on the undertaking until the Division has the opportunity to review and comment on the project, permit, grant, etc.

State agencies shall preserve the historic resources which are owned or controlled by the agency.

Regarding proposed demolition or substantial alterations of historic properties, consultation with the Division must occur, and alternatives to demolition must be considered.

State agencies must consult with Division to establish a program to location, inventory and evaluate all historic properties under ownership or controlled by the agency.

C. Statutory Authority

Statutory Authority and more in depth information can be found at:

http://www.flheritage.com/preservation/compliance/guidelines.cfm

D. Management Implementation

Even though the Division sits on the Acquisition and Restoration Council and approves land management plans, these plans are conceptual. Specific information regarding individual projects must be submitted to the Division for review and recommendations.

Managers of state lands must coordinate any land clearing or ground disturbing activities with the Division to allow for review and comment on the proposed project. Recommendations may include, but are not limited to: approval of the project as submitted, cultural resource assessment survey by a qualified professional archaeologist, modifications to the proposed project to avoid or mitigate potential adverse effects.

Projects such as additions, exterior alteration, or related new construction regarding historic structures must also be submitted to the Division of Historical Resources for review and comment by the Division's architects. Projects involving structures fifty years of age or older, must be submitted to this agency for a significance determination. In rare cases, structures under fifty years of age may be deemed historically significant. These must be evaluated on a case by case basis.

Adverse impacts to significant sites, either archaeological sites or historic buildings, must be avoided. Furthermore, managers of state property should make preparations for locating and evaluating historic resources, both archaeological sites and historic structures.

E. Minimum Review Documentation Requirements

In order to have a proposed project reviewed by the Division, certain information must be submitted for comments and recommendations. The minimum review documentation requirements can be found at: http://www.flheritage.com/preservation/compliance/docs/minimum_review_documentation_requirements.pdf .

* * *

Questions relating to the treatment of archaeological and historic resources on state lands should be directed to:

Deena S. Woodward
Division of Historical Resources
Bureau of Historic Preservation
Compliance and Review Section
R. A. Gray Building
500 South Bronough Street
Tallahassee, FL 32399-0250

Phone: (850) 245-6425
Toll Free: (800) 847-7278
Fax: (850) 245-6435

APPENDIX D:

MESIC HAMMOCK RESTORATION PLAN
SILVER SPRINGS FOREST CONSERVATION AREA
AUGUST 2022

BACKGROUND

Mesic hammocks are upland, closed-canopy, evergreen forests of mainly live oak and cabbage palm. They are similar to the upland hardwood forests mostly found further north, but generally have a less diverse, more evergreen canopy. Early aerial photography and accounts of Florida's natural areas show that mesic hammocks typically existed in small, naturally fire-excluded pockets. Widespread fire suppression throughout the 20th century has made this community far more common. Despite this historic landscape pattern, at Silver Springs Forest Conservation Area (Silver Springs Forest or Property) the majority of uplands are believed to have historically been dominated by an approximately 2,892-acre mesic hammock.

This hammock was protected from fire between drainages to the east and west flowing into the Silver River floodplain to the south (Figure 1). Fires would have only entered this area from the north, providing an environment conducive to hardwood forest development. Soils are fairly productive loamy sands. Extensive clearing of the area for timber, grazing, and agriculture prior to the earliest available aerial imagery from the 1940s makes the historic imagery less useful for determining original community types. However, early land survey records from 1849 refer to this area as "2nd Hammock" and witness trees selected at section corners within it are mostly live oaks. Other trees mentioned by the surveyor include "cabbage palm, sweetgum, water oak, and swamp pine." The hammock contains pockets of hydric hammock or basin swamp in lower elevation areas, but these are very difficult to determine from imagery or even LiDAR elevation.

Most of the large historic mesic hammock was cleared many years ago and in more recent years has been planted with loblolly pine (*Pinus taeda*) and managed as a pine plantation. The St. Johns River Water Management District (District) forest management database contains geographically linked stand attributes, including the stand type. Examples of stand type include natural pine, pine plantation and upland hardwood (i.e., hammock). Currently, approximately 1,634 acres of the historic mesic hammock is occupied by pine plantation (Figure 2). Within stands of pine planation, intensive site preparation has removed much of the natural structure and composition of the hammock, but a few clues remain. Plantations often have some scattered large live oaks (*Quercus virginiana*) with abundant epiphytes of resurrection fern (*Pleopeltis michauxiana*) and Bartram's air-plant (*Tillandsia bartramii*), frequent cabbage palms (*Sabal palmetto*), and trumpet creeper (*Campsis radicans*) often climbs every pine in the planted stand. The 2022 Silver Springs Forest Land Management Plan establishes pursuit of mesic hammock restoration as an implementation strategy. The District has conducted both upland and wetland restoration across vast stretches of former agricultural land. District staff has documented the benefits of re-establishing healthy floodplain marshes and longleaf pine stands with biologically diverse groundcover. Conversion from managed pine to hardwood cover has potential to provide numerous benefits. Few stands of contiguous mesic hammock approach the scale that was historically present on the Property. Restoration of even a portion of the hammock will provide recognition to the unique resource at this site. In the long-term, hardwood hammock will require less active management on the Property. Decreasing management intensity will reduce the

frequency of infrastructure improvements/repairs and is likely to result in reduced transport of sediments off the site.

Although several potential benefits of mesic hammock restoration exist, certain potential negative implications are worth considering as this restoration plan is implemented. The District's Land Resources program is partially funded by revenue acquired through timber sales. Thus, converting the pine plantation land of Silver Springs Forest will impact potential future recurring revenue and in turn resources for land management activities. Another factor that will impact the Land Resources budget is the cost of implementing restoration. The monetary cost of ecological restoration projects can vary widely based on site specific conditions and restoration targets. The intensity of plantings, mechanical and/or chemical treatments necessary to maintain desirable vegetative composition could prove to exceed the available budget for this project. Additionally, although in the long-term an actively managed pine plantation typically requires more management interventions than an intact mesic hammock, one could expect in the short term the activities necessary for restoration could lead to ground surface disturbances and subsequent erosion and transport of sediment off property. Finally, the early stages of mesic hammock restoration will almost certainly produce a landscape that many people will subjectively consider aesthetically unpleasant – dominated by weedy early successional plants and lacking a developed tree canopy. For these reasons, as restoration is considered and implemented it is critical to monitor a range of budgetary and ecological variables, described below in the Monitoring section.

Mesic hammock restoration at Silver Springs Forest is truly a unique opportunity. Given the modern expansion of hardwood dominated forests throughout Central and North Florida, there are few situations where hardwood habitat restoration or enhancement is a desirable objective. A more typical project objective for land managers throughout the Southeastern United States is to conduct treatments aimed at reducing hardwood coverage and increasing coverage of pine – especially longleaf pine – dominated habitat. As a result, compared to pine dominated habitats – namely sandhill and the various forms of flatwoods – relatively little published material is available regarding restoration of mesic hammock and other hardwood dominated natural communities. Few guiding resources are available regarding hardwood vegetative community restoration in Florida natural systems. As a result, it is imperative that initial phases of mesic hammock restoration at Silver Springs Forest be conducted incrementally, experimentally and using the principles of adaptive management. Several considerations will be acknowledged when planning the restoration of mesic hammock natural communities on the Property. District-wide, forest management actions adhere to Florida's Silviculture Best Management Practices (BMP) and Florida Forestry Wildlife Best Management Practices for State Imperiled Species. Exceeding BMP requirements at Silver Springs Forest is especially important because the soil types are susceptible to sedimentation runoff into the Silver River. The remainder of this document will provide preliminary guidelines for Silver Springs Forest mesic hammock restoration including objectives, anticipated challenges, methods, timeline and monitoring.

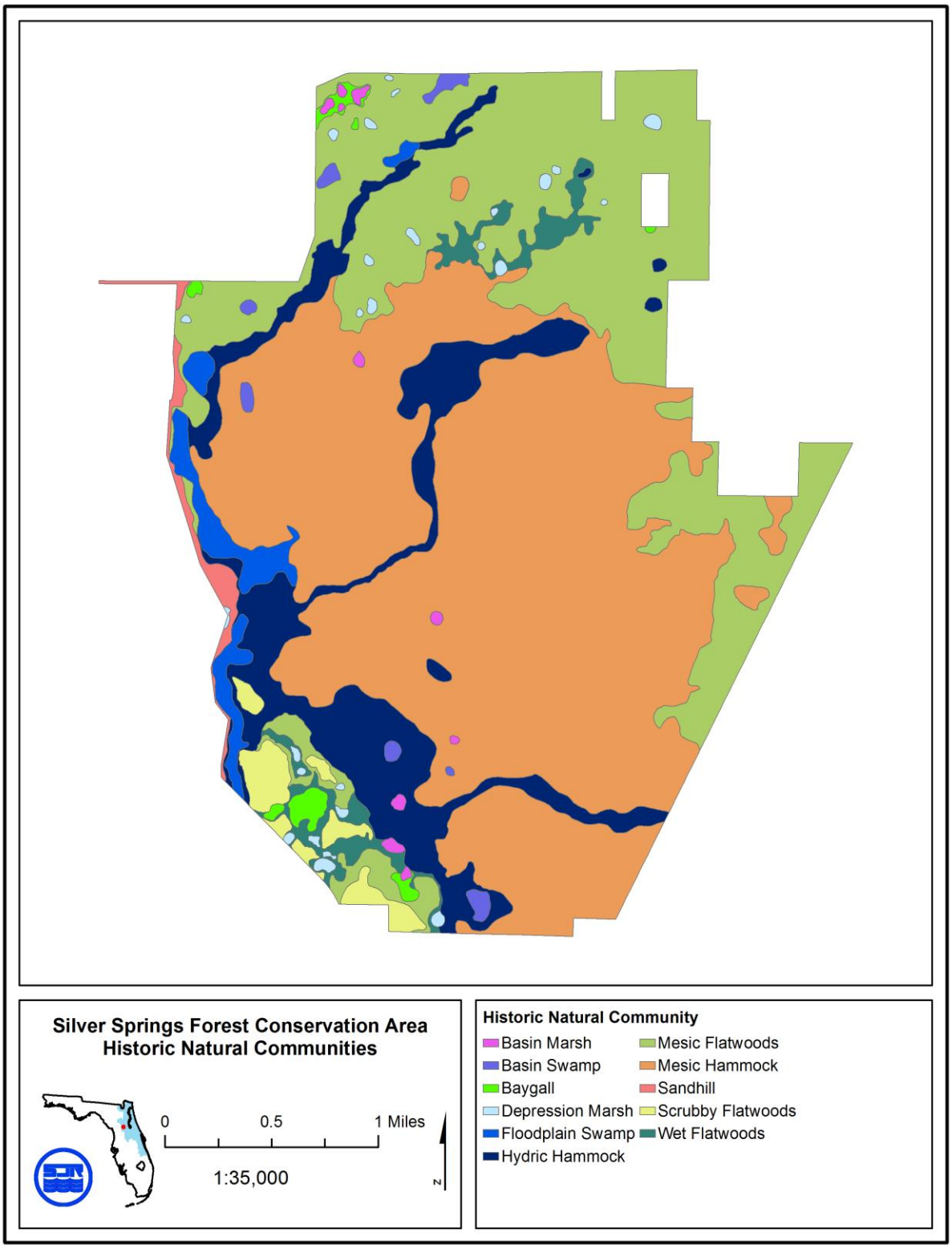

Figure 1: Historic Natural Communities.

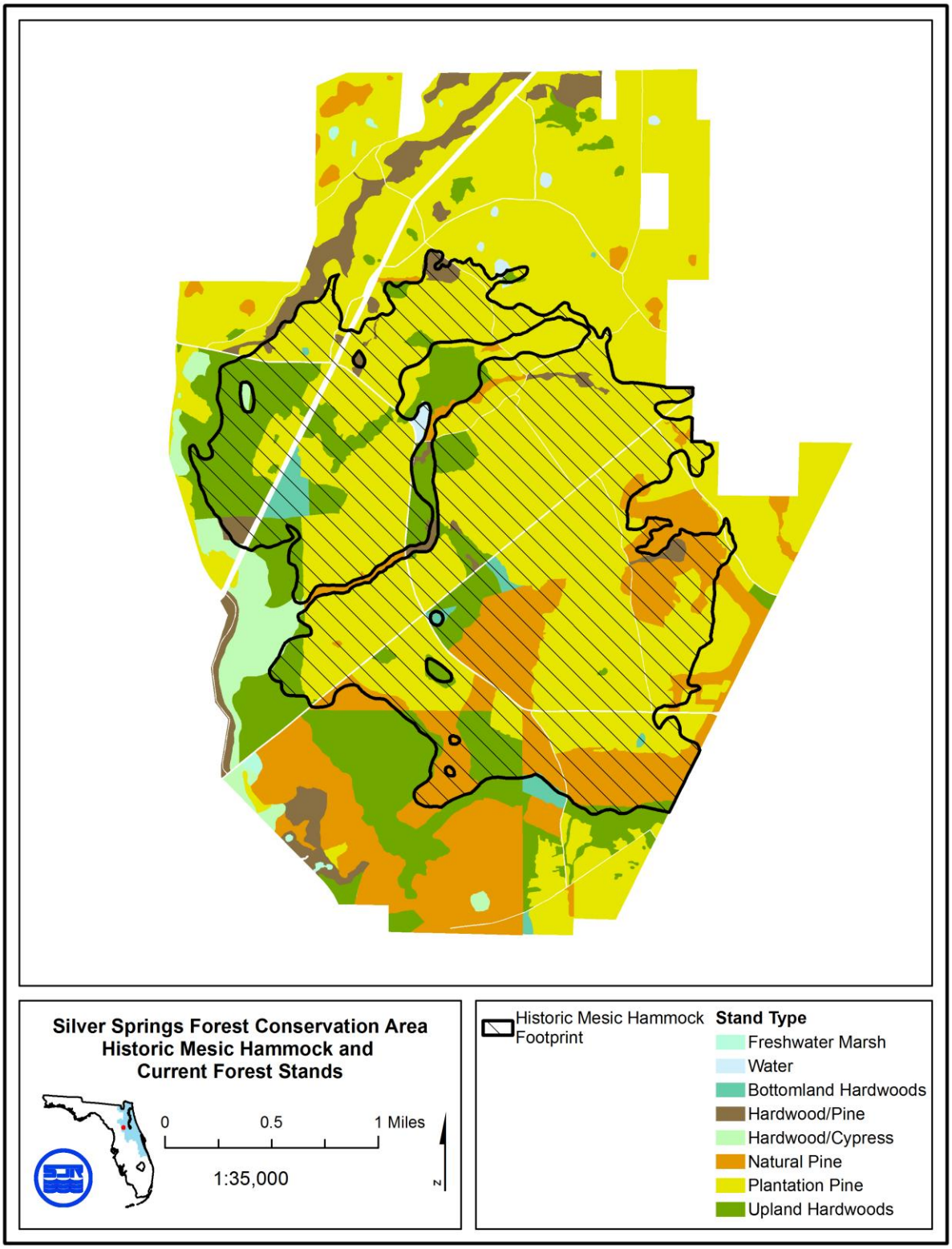

Figure 2: Historic Mesic Hammock and Current Forest Stands.

OBJECTIVES

The primary long-term mesic hammock restoration objective is the establishment of a closed canopy forest dominated by live oak. In the short-term, while working toward meeting the primary objective, it will be necessary to minimize negative water quality impacts by preventing and mitigating erosion and transportation of sediments that could result from actions taken within restoration sites. An additional significant long-term objective is to improve hydrologic conditions within the restoration area and across the Property. A suite of secondary management objectives will assist with mesic hammock development; control non-native invasive vegetation at less than 10% coverage; control aggressive native plant species, particularly sweetgum, cabbage palm, and loblolly pine, at less than 25% individual species coverage; maintain hammock diversity through supporting establishment of 25-50% combined coverage of associated hammock species, as identified by the Florida Natural Areas Inventory (FNAI) (Table 1). Mesic hammock restoration cost should not cause the total management cost for Silver Springs Forest to exceed revenues generated from the Property.

ANTICIPATED CHALLENGES

Lessons learned from previous restoration projects provide District staff with indications of what challenges to anticipate while planning and implementing mesic hammock restoration at Silver Springs Forest. Below is a list of foreseeable challenges. A preliminary set of methods – described in the subsequent section of this document – have been developed to address these challenges.

- Scale – The magnitude of restorable forest at the Property intensifies the effort required to address each of the following challenges.
- Vegetation management – Maintaining a desirable composition of plant species, as described in the Objectives section, is expected to be a significant challenge. A suite of undesirable native and non-native invasive plants have been documented and treated at Silver Springs Forest. Non-native invasive plants on the Property include cogongrass (*Imperata cylindrica*), Japanese climbing fern (*Lygodium japonicum*) and Chinese tallow tree (*Sapium sebiferum*). Native species that are known to be aggressive invaders of restoration areas at the site include: sweetgum (*Liquidambar styraciflua*), laurel oak (*Quercus laurifolia*), water oak (*Quercus nigra*), cabbage palm (*Sabal palmetto*) and muscadine (*Vitis rotundifolia*).
- Silvicultural bedding – Silvicultural bedding is a technique where a small ridge of surface soil is formed to provide an elevated planting or seedbed. It is used primarily in wet areas to improve soil drainage and aeration for seedlings. Many of the stands targeted for hardwood restoration on the Property contain silvicultural beds. These topographical features create an access challenge for managers that need to traverse sites to conduct management activities. The trough and ridge system created by beds also affect hydrology on the site by disrupting sheetflow and directing surface water into the troughs. These troughs can in turn act as conduits that channel the flow of water, exacerbate runoff, increase erosion and create sedimentation problems.
- Herbivory – Depredation of hardwood seedlings by a wide array of herbivores is widely known as a concern when planting these young, tender and palatable plants. Overcoming this challenge may require significant cost and effort to be successful.

Species	Common name	Characteristic	Structure	Status
Quercus virginiana	live oak	X	Canopy/Subcanopy	Dominant
Sabal palmetto	cabbage palm	X	Canopy/Subcanopy	Dominant
Carya glabra	pignut hickory	X	Subcanopy	Occasional
Magnolia grandiflora	Southern magnolia	X	Subcanopy	Occasional
Callicarpa americana	American beautyberry	X	Understory	Varies
Celtis laevigata	sugarberry		Canopy/Subcanopy	Found
Liquidambar styraciflua	sweetgum		Canopy/Subcanopy	Found
Quercus hemisphaerica	laurel oak		Canopy/Subcanopy	Frequent
Quercus nigra	water oak		Canopy/Subcanopy	Frequent
Pinus elliottii	slash pine		Emergent	Sparse
Pinus taeda	lobolly pine		Emergent	Sparse
Encyclia tampensis	Florida butterfly orchid		Epiphyte	Abundant
Epidendrum conopseum	green fly orchid		Epiphyte	Abundant
Phlebodium aureum	golden polypody		Epiphyte	Abundant
Pleopeltis polypodioides var. michauxiana	resurrection fern		Epiphyte	Abundant
Tillandsia spp.	other air-plants		Epiphyte	Abundant
Tillandsia usneoides	Spanish moss		Epiphyte	Abundant
Vittaria lineata	shoestring fern		Epiphyte	Abundant
Chasmanthium laxum var. sessiliflorum	longleaf woodoats		Herbaceous	Sparse/Patchy
Dichanthelium spp.	witchgrasses		Herbaceous	Sparse/Patchy
Mitchella repens	partridgeberry		Herbaceous	Sparse/Patchy
Oplismenus hirtellus	woodgrass		Herbaceous	Sparse/Patchy
Panicum spp.	panic grasses		Herbaceous	Sparse/Patchy
Pteridium aquilinum	bracken fern		Herbaceous	Sparse/Patchy
Scleria triglomerata	whip nutrush		Herbaceous	Sparse/Patchy
Diospyros virginiana	common persimmon		Understory	Varies
Ilex glabra	gallberry		Understory	Varies
Ilex opaca	American holly		Understory	Varies
Ilex vomitoria	yaupon		Understory	Varies
Myrica cerifera	wax myrtle		Understory	Varies
Osmanthus americanus	wild olive		Understory	Varies
Prunus caroliniana	Carolina laurelcherry		Understory	Varies
Serenoa repes	saw palmetto		Understory	Varies
Vaccinium arboreum	sparkleberry		Understory	Varies
Vaccinium corymbosum	highbush blueberry		Understory	Varies
Ximenia americana	hog plum		Understory	Varies
Bignonia capreolata	crossvine		Vine	Abundant
Gelsemium sempervirens	yellow jessamine		Vine	Abundant
Parthenocissus quinquefolia	Virginia creeper		Vine	Abundant
Smilax pumila	sarsaparilla vine		Vine	Abundant
Smilax spp.	greenbriers		Vine	Abundant
Toxicodendron radicans	eastern poison ivy		Vine	Abundant
Vitis rotundifolia	muscadine		Vine	Abundant

Table 1: Mesic Hammock Plant Species (FNAI).

METHODS

Mesic hammock restoration will be conducted experimentally and incrementally. The restoration timeline is described in the following 'Timeline & Budget' section of this plan. Phases of restoration will be initiated as resources and site conditions allow. The guiding principle of adaptive management will be utilized throughout the project timeline. Restoration monitoring will be conducted throughout the project. As necessary, restoration strategies and methods will be adapted to address restoration site conditions, vegetative composition and vegetative structure; with the focus on meeting project objectives described above. Below is a description of the initial restoration implementation strategies. Adaptive management allows for additional strategies and methods, not described in this section, to be utilized – as new methods and challenges are discovered.

- Timber harvest – Existing pine stands within the historic mesic hammock footprint will be managed pursuant to the District's Timber Management Plan and the Silver Springs Forest harvest plan (see Timeline & Budget). To accommodate for the conversion to hardwood dominance, pine stands will be clearcut within stands that are approximately 25 years old. This will allow for continued revenue generation, through thinning harvests and minimize the diminishing financial returns that accompany mature stands of pine that are managed for ecological functions. Utilizing clearcuts will facilitate silvicultural bed removal, as needed. In stands that have not been heavily modified by bedding, alternative timber harvest and planting strategies, such as underplanting hardwoods, will be considered. Conducting restoration planting and management as stands are harvested in phases over years will allow land managers to ration the resources and effort a project of this the scale requires.
- Site preparation – Following harvest of pine from stands that are targeted for restoration, a variety of site preparation techniques may be employed. The purposes of site preparation are to reduce competition of unwanted vegetation, increase survival and growth of desired vegetation, remove slash and logging debris and prepare or modify the soil. The exact site preparation techniques used will vary from site to site, based on the specific conditions present. Site preparation techniques that will be considered include, but are not limited to:
  - Silvicultural bed removal – As described above, the historic practice of establishing silvicultural beds is a significant anticipated challenge within the restoration stands at Silver Springs Forest. District staff has successfully completed projects to remove, degrade or level silvicultural beds on other properties. Various mechanical treatments may be used to remove beds.
  - Silviculture BMPs – Clay content of soils within the historic mesic hammock at Silver Springs Forest have the potential to exacerbate stormwater runoff and soil erosion. Site preparation activities, especially bed removal, will follow Florida's Silviculture BMP for Site Preparation and Planting, as outlined by the Florida Forest Service (Silviculture Best Management Practices). In certain situations, site conditions might necessitate utilizing strategies – such as planting of erosion control cover species (annual rye, millet, etc.) or installation of sediment transport prevention material (silt fencing, coir logs, etc.) – that provide protections beyond those

described in the BMP manual. If cover plants are to be used, minimizing the invasiveness of these species will be necessary.

- Vegetation management – To address the challenges posed by both native and non-native invasive plants, various chemical and mechanical vegetation management techniques may be employed when preparing sites for planting. Herbicide can be applied with hand sprayers, broadcast sprayers, or aerially from a helicopter, depending upon the species to be treated and site conditions. Disking, chopping and various forms of mowing may all be considered and employed as site conditions dictate. If appropriate, prescribed fire may also be applied to improve planting site conditions during site preparation.

- Colonization – Based on passive recruitment and colonization patterns within existing clearcut operations – conducted prior to District acquisition – at the Property, it appears that planting of desirable species will be necessary to achieve species composition objectives. That said, given the experimental nature of this project, District staff will designate an area to be set aside as a passive restoration site – to be managed for desirable composition in the absence of active planting.
  - Active – It is assumed that a majority of stands at Silver Springs Forest will require some level of active planting in order to meet restoration objectives within a ten-year timeframe. Additional details regarding planting methods are described below.
  - Passive – Areas designated as eligible for passive recruitment should contain indicators of potential for desirable species establishment. Examples of indicators include presence of significant mid- to upper-story coverage of live oak and adjacency to a significant live oak seed source.
- Planting – Initially a variety of tree species, nursery grown sizes and techniques will be considered to learn what type of planting material is most effective.
  - Species – Most plants installed will be live oak. However, an array of other hardwood and shrub species – as identified in Table 1 – will also be considered for inclusion in planting. Tree species that occur on-site, that are not listed in Table 1, but are documented to occur in associated natural communities will also be consider as eligible species to be actively introduced to the site; a prime example is swamp chestnut oak (*Quercus michauxii*).
  - Nursery stock size – Information provided by forestry professionals indicates success of planting hardwood seedlings is increased if plants are grown in nursery liners, as opposed to bare root stock. Given the scale of the project, the cost of installing larger containerized plants is considered impracticable. Therefore, plantings will be conducted using either liners or bare root stock. Results from restoration monitoring will provide future guidance on the most appropriate size nursery stock.
  - Tree guards – A wide variety of tree guards, protectors or cages are commercially available and used by growers in both the tree farm and fruit/nut tree industries. The purpose of tree guards is to reduce damage caused by herbivory and/or management activities. Use of tree guards will be analyzed experimentally. Installation and maintenance of these devices will significantly increase the cost and complexity of

restoration plantings. If survival and growth of unprotected plantings is acceptable, conducting plantings without the use of tree guards is preferred.

- Density – Initial information from professional forestry consultants is that planting hardwoods at a density of approximately 600 trees per acre is ideal. Various densities above and below this recommendation may be used experimentally to determine ideal planting density. Planting at higher densities, although more expensive, has the potential to create the desired closed canopy condition more rapidly. Conversely, planting at higher densities will reduce the ability to access the site with larger equipment.
- Spatial pattern – To allow for access through the site by equipment, trees will be planted in rows, with spacing wide enough to traverse the site with a farm tractor. In stands that have not been modified by silvicultural bedding in the past, clearcutting will not be necessary. Therefore, in un-bedded stands, alternative planting strategies – such as underplanting hardwoods within existing pine overstory, will be considered. Underplanting could provide benefits such as minimization of loblolly regeneration and competition from early successional plant species that typically colonize clearcut sites rapidly.

- Maintenance - To address the challenges posed by both native and non-native invasive plants, various chemical and mechanical vegetation management techniques may be employed to maintain restoration sites post-planting and/or as succession proceeds in passive restoration sites. Herbicide can be applied with hand sprayers, tank sprayers, or aerially from a helicopter, depending upon the species to be treated and site conditions. Disking, chopping and various forms of mowing may all be considered and employed as site conditions dictate. The goal of site maintenance activities will be to reduce competition from undesirable species and improve growth/survival of desirable species.
- Monitoring – Survival of plantings and vegetative canopy structure will be monitored annually using standard forestry procedures. Ground conditions, including erosion impacts, will be monitored regularly – especially following periods of high rainfall. If feasible, water quality will be monitored within drainages adjacent to restoration sites. Cost of hammock restoration will be monitored annually.

TIMELINE & BUDGET

The timber harvest plan (Figure 3) for Silver Springs Forest identifies clearcut operations that will occur within the historic mesic hammock footprint. As stands designated for hardwood restoration are clearcut, the restoration implementation timeline will initiate. Over the course of this ten-year plan, approximately 600 acres are targeted for conversion from pine to hardwood. Below is a general timeline for restoration areas, beginning with removal of existing pine canopy. Based on site specific conditions, timelines may vary from stand to stand.

- Year 1 – clearcut and site prep – bed removal
- Year 2 – site prep – vegetation management
- Year 3 – planting, monitoring and maintenance
- Years 4 - 10 – monitoring and maintenance

The projected ten-year cost for all restoration activities, as outlined in Table 2, is $3,746 per acre. When available, projected costs are based on previous District project expenses. Costs not previously experienced, such as hardwood seedling costs and tree guards, are based on best available industry estimates.

Mesic hammock restoration cost should not cause total management cost for Silver Springs Forest to exceed revenues generated from the Property. Cost of hammock restoration will be monitored annually. If necessary, restoration strategies, methods and objectives will be adapted to meet this budgetary goal.

Stage	Item	Cost/acre
Site preparation	Prescribed burn	$14
	Vegetation management	$122
	Bed removal	$300
	Erosion control	$75
Planting	Seedlings	$600
	Labor	$300
	Tree guards	$600
Maintenance	Vegetation management	$610
	Mowing	$1,000
Monitoring	Vegetation	$125
	Total	$3,746

Table 2: Itemized per acre costs of mesic hammock restoration over a ten-year restoration period.

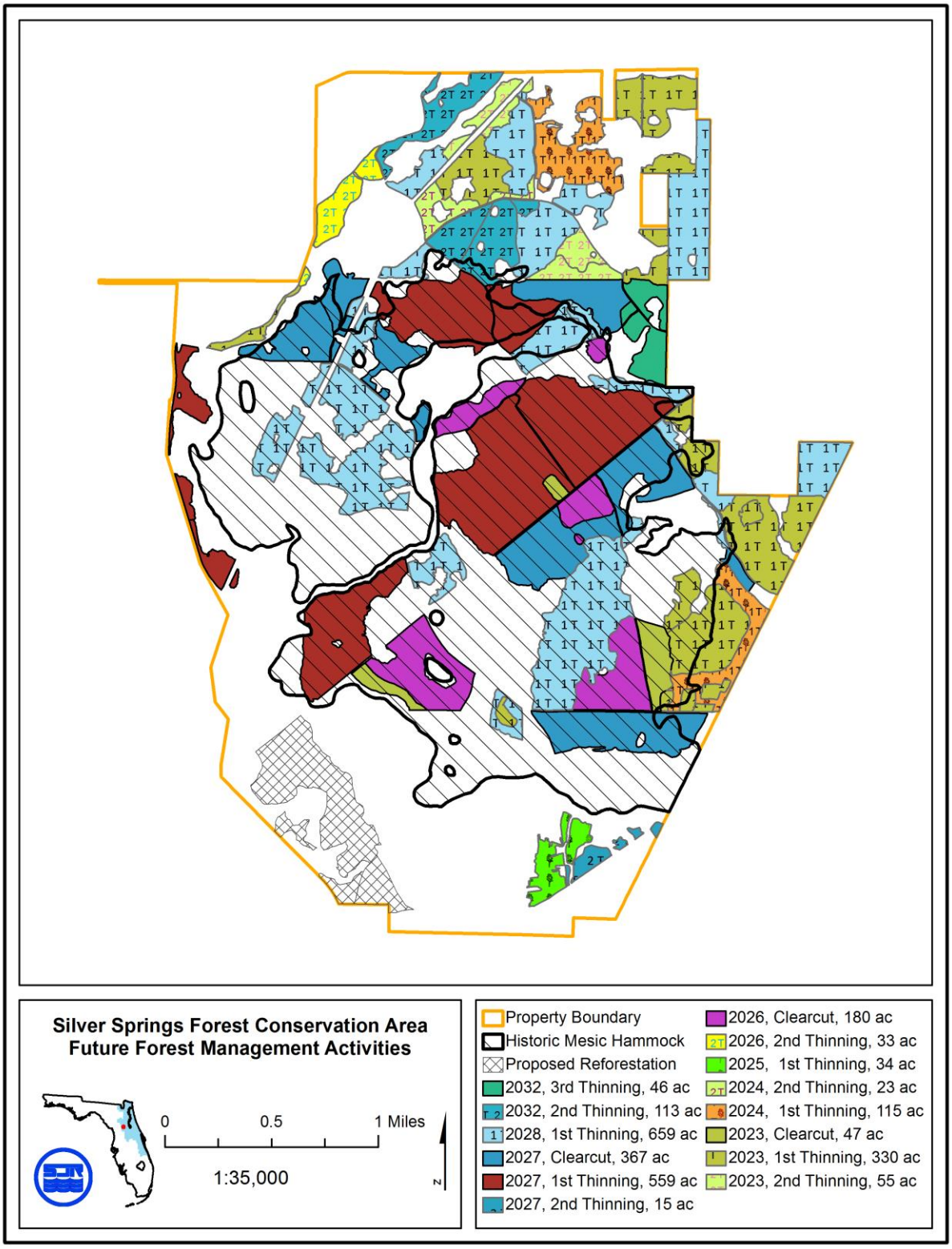

Figure 3: Future Forest Management Activities.

APPENDIX E: DISTRICT FOREST MANAGEMENT PLAN

In 1998 the Florida Legislature charged all state land management agencies with managing the forest resources on the lands they have acquired (253.036, Florida Statutes). To date, the St. Johns River Water Management District (District) has acquired nearly 621,000 acres of land. Approximately 46% of these acres are forested.

Even prior to the legislative directive, the District has been managing its forest resources. Timber sales began in 1991 with a salvage sale at Lake George Conservation Area following a wildfire. Since then, timber sales are conducted based upon the immediate needs of the natural communities and recommendations from individual area management plans. This plan provides guidance and coordination for the management of the District's forest resources.

PURPOSE OF FOREST MANAGEMENT

The District manages forest resources for the:

1) Restoration of natural communities.
2) Maintenance of the health and vigor of natural communities.
3) Generation of revenues to counterbalance the cost of land management activities
4) Reduce wildfire risks
5) Sustainable progress towards core missions

Restoring Natural Communities

The District acquires its land from a variety of private owners, and each owner had their own vision for the land. Many times in fulfilling their vision, private owners altered the natural communities by clearing for agricultural purposes or for planting trees. Whenever practicable, the District is charged with maintaining and/or restoring the land to its natural state and condition.

Thinning, clearcutting, invasive plant management and planting are all tools used to restore natural communities, but in almost all cases they are used in conjunction with fire. The combinations of overstory control and fire management are the primary restoration tools in forested communities.

In forested communities, controlling or manipulating the overstory serves as the primary tool to maintain or restore the natural community. The density of the overstory dictates the health and diversity of understory species. If the overstory becomes too dense, both the overstory and understory species begin to suffer. In cases where the overstory remains crowded too long, individual understory plants begin to disappear. Often seeds of these plants will remain dormant in the soil. Thinning individual trees from an overcrowded stand allows more light, moisture and nutrients to be available for groundcover plants. This allows dormant plants to reoccupy their former sites, thereby restoring the natural state and condition.

In some cases, private owners planted a species of tree that did not naturally occupy the site. In these cases, the District will clearcut the undesired tree species and replant with the more appropriate species.

In cases where the previous owner cleared the site, the District will prepare the site and plant the appropriate tree species. Since longleaf pine (*Pinus palustris*) occupies approximately 5% of the area it did in 1900, and since longleaf offers a suite of wildlife benefits greater than most other pines, the District will emphasize planting of longleaf on all sites where longleaf is suited for the site.

Maintenance of the Health and Vigor of the Natural Communities

The health or quality of a forested natural community is maintained by three primary factors: 1) the availability of water, 2) the frequency of fire, and 3) the density and species composition of the overstory.

In few cases do the activities of the District affect the availability of water on District forestlands. Exceptions are where sites are restored through rehydration of historically wetland systems or managing vegetation for water yield benefits. Weather is the primary factor influencing the availability of water.

Fire influences the health of forested communities by altering the process of succession. Fire holds natural communities in an intermediate stage of succession that is referred to as a fire climax community. If fire is removed, these natural communities follow the path of succession to become some other community. In Florida, most natural communities historically experienced fire on a frequent basis. In fact, most communities are dependent upon frequent fire for their continued existence. Because of its importance as a management tool, fire is specifically addressed in detail in the District's Fire Management Plan.

The third factor influencing the health and/or quality of forested natural communities is the overstory density and species composition. In a truly natural system, wildfire, climatic disturbances, along with insects and diseases combined to control the composition of the overstory, which in turn controls the composition of the understory. Wildfire, insects and disease kill trees as individuals or groups, which reduces the density of the overstory and alters the species composition. These events or outbreaks would often impact large areas, especially areas where the stand density was high, weakening the overstory trees and increasing their susceptibility to pathogens. Prior to human intervention, there were huge expanses of natural land that could easily absorb large-scale alterations of the overstory so that no plant or animal species could be extirpated. Today, Florida is fast approaching a condition where natural areas are becoming islands. Plants and animals have fewer areas to populate and it is more difficult to transfer their genetic material between isolated areas of ideal habitat. Therefore, conservation land managers no longer rely entirely on large-scale disturbances to control overstory density and species composition. By managing the overstory with selective harvesting, the density and species composition can be controlled to maintain a healthy natural community while minimizing the potential for large-scale impacts.

As land managers, the District also has an obligation to protect neighboring landowners from any large-scale wildfire, insect, non-native invasive plant or disease outbreaks that may originate on District land and spread to adjacent lands. This obligation prohibits the District from employing a truly natural management system to control overstory species, density, and composition and requires the District to utilize a more interactive management program.

Generation of Revenues

The Florida legislature has directed public land managers to manage forest resources for an economic return (253.036, Florida Statutes). The District generates revenue when implementing sound overstory management practices to maintain the health of the natural community. These practices include but are not limited to thinning operations, removal of undesired species (clearcuts), and salvage cuts to remove trees damaged from wildfires, insect infestations, non-native invasive plant species and/or disease outbreaks. The revenue generated from these operations can be used to fund land acquisition, restoration and other land management activities.

FOREST RESOURCES INVENTORY

Following legislative directive, and seeking to keep its land management efficient, the District has sought management partners. The following chart illustrates the lead manager status of District owned lands (Figure 1).

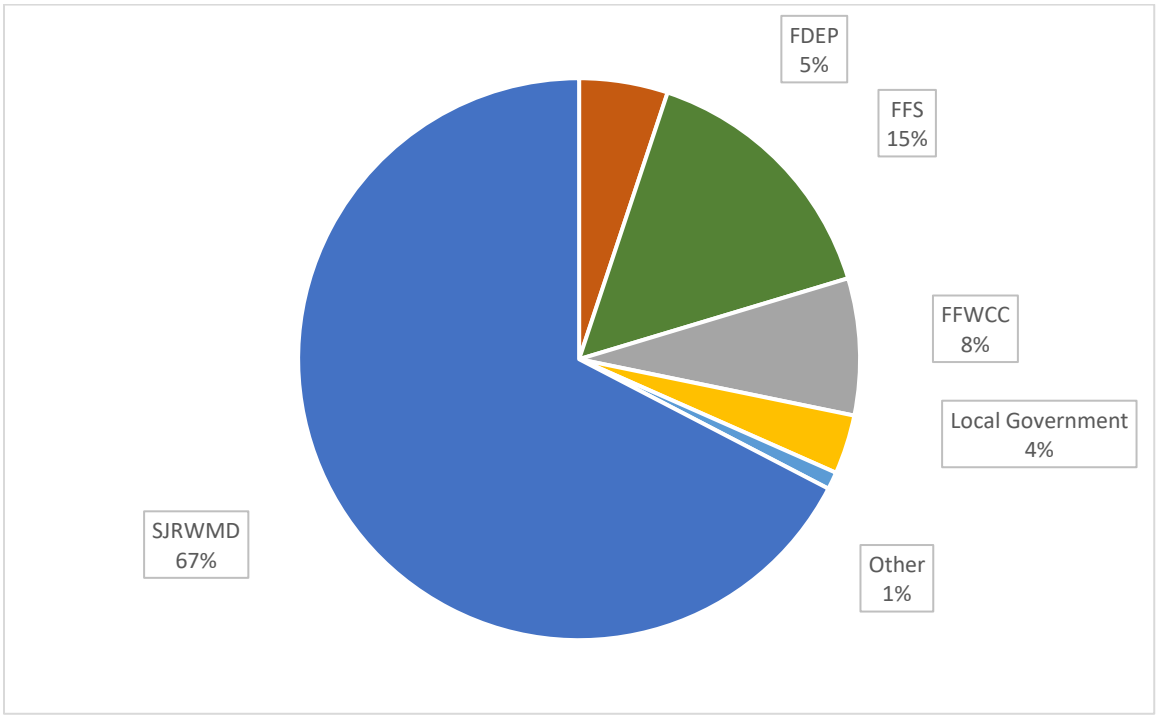

Figure 1: District Owned Land by Lead Manager.

The District's Land Management Rule, agreements and philosophy call for the lead manager's rules and policies to direct the management of the affected lands, therefore this plan will be focused on the lands where the District is identified as the lead manager. The District serves as the lead manager on 374,796 acres. These acres managed by the District are broken down as follows (Figure 2).

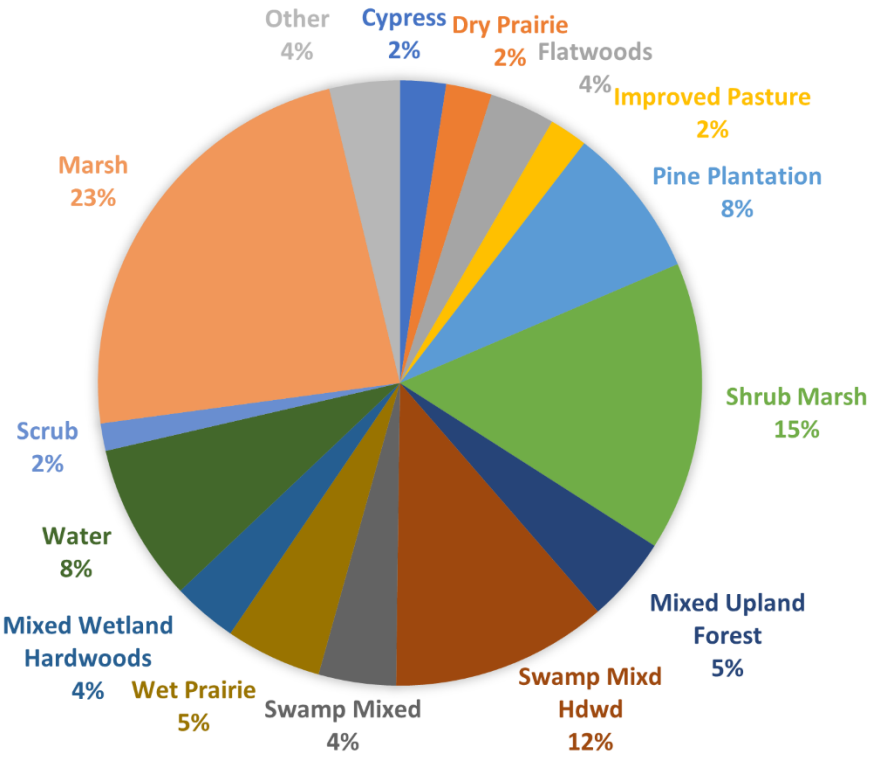

Figure 2: Percentage acres SJRWMD Managed Lands by Land Type.

Thirty-seven percent of the District Managed Lands are forested, with 16% being forested uplands and 21% forested wetlands.

OBJECTIVES OF FOREST MANAGEMENT

The District's forest management objectives are to:

- Maintain the health and diversity of forested communities on District lands.
- Provide for older aged forest conditions. As public landowners we have the opportunity to provide habitat for species requiring older age classed trees.
- Provide for an array of forest stand structures and age classes. Each species of plant and animal has an age-class of forest stand that is most desirable. By providing the array of structures and age-classes, the District can provide habitat for a wide variety of species.
- Implement activities which sustainably advance the District's core missions.

Techniques of Forest Management

Inventory

The District developed a GIS Forestry database that links timber attribute information, inventory plots, and timber volume information with its spatial location. The database incorporated with annually collected inventory data will track forest changes over time. Changes resulting from harvests, wildfires, insect infestations, disease outbreaks and reforestation efforts can be updated quickly and easily. Periodic updates of volume and growth information is incorporated into the database. The database aids in determining natural community needs along with geographic distribution and appropriate management techniques to implement. The database is an intricate part in managing for community health and in developing future land management workplans.

Harvesting

To accomplish its goals the District employs a suite of harvesting systems.

Clearcutting is a silvicultural operation used to remove the entire overstory at one time. This tool will be used with limited application dependent upon the specific management needs. Those needs may include:

1. Insect or disease control. Forest pests occur naturally at low population densities and are a vital part of the forested community. When population densities reach epidemic levels control measures to remove the host and adjacent trees must be implemented to protect the remainder of the stand.
2. Salvage. If the overstory has been killed or severely damaged, removing (salvaging) the overstory will recover some financial value of the timber and will allow the District access necessary to replant the site.
3. Species conversion. If offsite species exist, clearcutting enables the District to replace the offsite species with one that is appropriate.

Thinning is a silvicultural operation where selected individual trees are removed from the stand to reduce the density of overstory trees to improve growing conditions for the remaining overstory trees and the understory plants. This method is not applied with a goal of establishing regeneration.

The seed tree system is a silvicultural operation where the entire overstory except 10-15 prime trees per acre are harvested at one time. These 10-15 trees serve as the seed source for the next generation. This technique is seldom used by the District. While the seed tree system is effective, it creates major change in the stand condition both visually to the public and biologically to the plants and animals in the stand.

Shelterwood is a silvicultural operation in which the overstory is removed in phases. When it is time to regenerate the stand, approximately 60-70 percent of the stand is removed either in one or two harvests. Again, the older trees serve as the seed source for the next generation. Once the younger trees are established the original overstory trees can be removed or they can remain on site and be subject to thinning at the same time as the younger generation. The major benefit of

this system is it results in a more gradual change from the mature trees to the next generation both visually to the public and biologically to the plants and animals.

A new modification of the shelterwood called an irregular shelterwood has been developed. An irregular shelterwood begins the same as shelterwood but portions of the original overstory remain on site. When the second-generation trees are thinned, a few of the first-generation trees are also thinned. o be established both the first- and second-generation trees are reduced to 30-40 square feet of basal area to make room for the third-generation trees. Once the third-generation trees are established the site has few first-generation trees, some second-generation trees and many third-generation trees. This provides for a variety of age classes in a single stand but is much easier to apply and requires much less staff time than uneven-aged selection management.

Uneven-aged selection is a silvicultural operation in which trees, either as individuals or in small ½ acre groups are harvested from throughout the stand every five - ten years. The holes left by the removal of these trees are filled with seedlings from adjacent trees thereby creating a patchwork stand composed of trees of all ages. While this system offers the greatest distribution of age within a stand, truly an uneven aged condition which some scientists think is best for wildlife, it also requires significant staff inputs and to date appears too labor intensive to employ on a large scale.

Site Preparation

When it is necessary to establish regeneration, either naturally or artificially the District may employ one or more of the site preparation techniques described below.

Herbicide will be used when staff has determined that it is the most effective means to control the competing vegetation. Herbicides will not be used if it adversely effects the desirable understory species within the planting site. The use of herbicide is necessary when attempting to restore native trees and groundcover to improved pasture areas. Herbicide can be applied with hand sprayers, tank sprayers, or aerially from a helicopter, depending upon the species to be treated and site conditions.

Disking/Scalping these techniques are most useful when trees are being planted in improved pasture areas. Both techniques protect the seedlings from grass competition but offer no benefit to groundcover restoration.

Drum Chopping is effective at reducing competition from shrub species, especially saw palmetto. If properly applied grasses within the treatment area will survive chopping and will often benefit from the choppers effect on the shrubs.

Bedding is a technique where a small ridge of surface soil is formed to provide an elevated planting or seedbed. It is used primarily in wet areas to improve soil drainage and aeration for seedlings. This type of site preparation technique is not utilized by the District because of the adverse effects it has on groundcover, sheetflow and thus water quality and availability. Therefore, the District’s planting costs are often higher than private industry’s because without bedding several plantings are often necessary to establish seedlings on wet sites.

Regeneration

Emphasis will be placed on natural regeneration to the extent practicable. In cases where species conversion is required or where no overstory exists to provide natural seed fall, planting will be necessary.

Hand planting is primarily method used by the District, because it offers the following benefits:

1. Trees can be placed on the best microsites (i.e., highest ground in wet areas, areas with the least competition.)
2. Groundcover disturbance is minimized.
3. Seedlings can be randomly spaced or planted in clusters to provide for a more natural appearance.

Machine planting is used primarily in old field conditions where scalping is employed and rows are suitable.

OVERALL METHODOLOGY

Forested natural communities can be lumped into three different groups with regards to forest management. These include Pine Forests, Upland Hardwoods, and Wetland Hardwood/Cypress. The management of each will differ and be described separately.

Pine Forests

Pine forests include flatwoods, plantations, sandhills and sand pine scrub. With the exception of sand pine scrub pine forests will be managed through thinning. Once the stand is established and trees have reached merchantable size (5 inches at diameter breast height) at approximately 15-20 years of age depending on tree species and sites, thinning will begin. Stands will be thinned as necessary to maintain an overstory basal area range of 60 to 90 square feet per acre. This range promotes good growth of understory plants and provides good habitat for most wildlife using forested natural communities. In order to maintain this basal area range harvests will occur in each stand approximately every ten years, depending on growth rates of the trees. Great care will be exercised during harvesting operations to minimize disturbance of the soil and groundcover. When properly performed, harvesting actually benefits groundcover regeneration by reducing shrub species and improving growing conditions, such as an increase in light availability.

The need for regeneration will be determined by an inventory of the health, vigor and species composition for the trees in each stand. Once the conditions of the overstory trees indicate the need, a regeneration harvest will be scheduled employing the appropriate silvicultural system described previously. Emphasis will be placed on making the most seamless transition from one generation to the next. Irregular shelterwood harvests will be employed frequently in loblolly, slash and longleaf pine stands.

Emphasis will be placed on having a wide array of age classes between stands and an array of different aged trees within stands. Included in the desired array of ages will be trees and stands significantly older than those typically found on private lands.

To ensure the wide array of age classes is met, the District will separate pine stands into four different types based upon general age and condition. These four types include:

1. Regeneration (age 0 - 10) The site is occupied primarily by tree seedlings and saplings, herbs and shrubs. Competition from the trees has not yet resulted in any reduction in herb or shrub layer. This type begins at planting and continues until crown closure. Herbs, shrubs and grasses occupy 20%-80% of the ground. This type offers benefits to early successional wildlife species such as quail, rabbits, gopher tortoises, deer, turkeys and their predators.
2. Closed Canopy (age 11 - 20) Trees fully occupy the site and form a single, main canopy layer. There is little understory development due to the lack of light passing through the canopy. Where understory exists it is dominated frequently by palmetto and/or gallberry. This type benefits fewer wildlife species but does offer bear and deer good escape cover.
3. Understory (age 21 - 60) The overstory density has been reduced through thinning and the understory is beginning to reinitiate. Adequate light is again available to the forest floor. Groundcover plant species and wildlife both begin to flourish again. Wildlife benefiting from this stand type include: deer, turkey, quail, gopher tortoises.
4. Older Forest Structure (age 60+) This stand type begins to develop a layered overstory. Trees are large, with diameters >12 inches. Snags will begin to appear and should be protected. The understory is diverse and healthy. Wildlife benefiting from this stand are fox squirrels, great horned owl, southeastern kestrel, turkeys, quail, gopher tortoises, red cockaded woodpeckers, eagles and ospreys (nesting trees).

The District will strive to keep 10-15% of its pine forests in type 1, 10-15% in type 2, 30-40% in type 3 and 40% in type 4. The present condition is shown below (Figure 3):

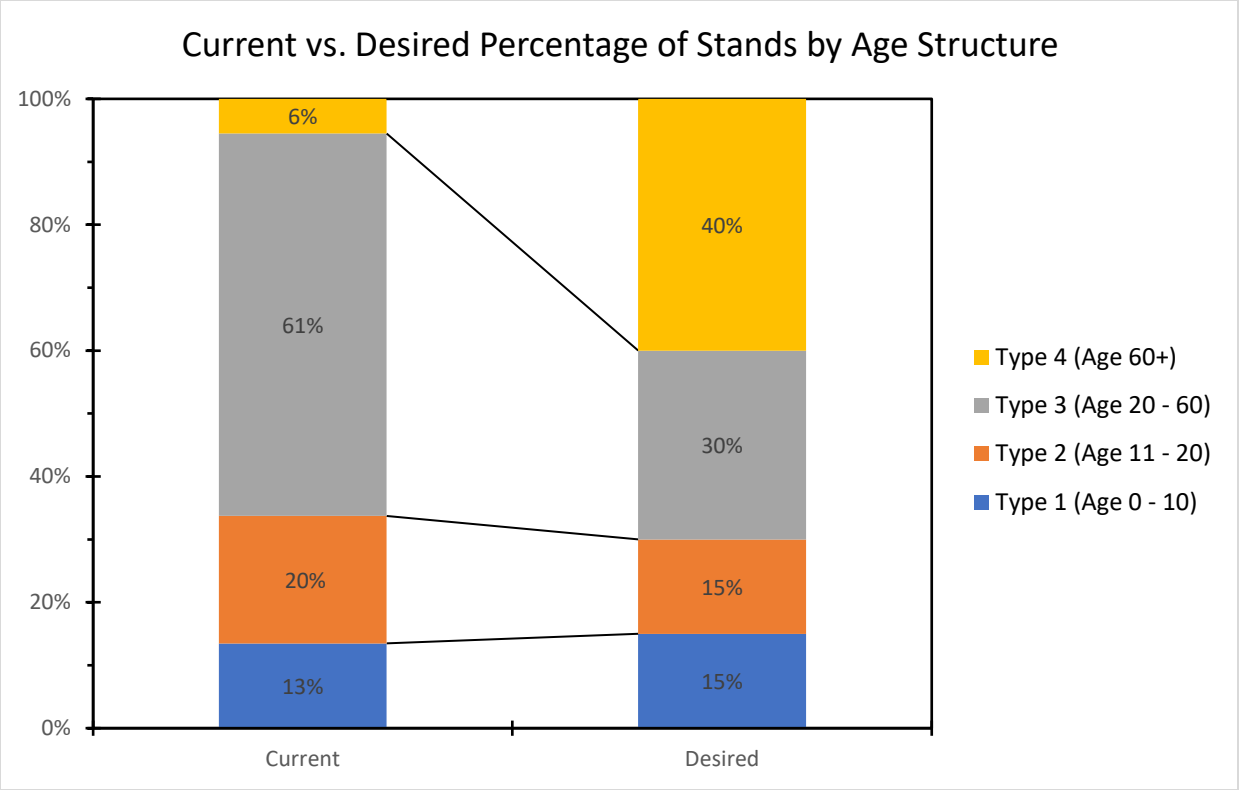

Figure 3: Current vs. Desired Percentage of Stands by Type.

Sand pine management will differ from other pine types because it is adapted to an even aged distribution. Sand pine characteristically grows in dense, even-aged, pure stands, which originated as a direct result of catastrophic fires or similar events. When a killing fire sweeps through a stand of cone-bearing trees, the serotinous cones (which remain tightly closed for many years unless opened by heat) open and release large quantities of seeds to naturally regenerate the area. These catastrophic fires are difficult to mimic with prescribed fire since they are difficult to control. Complete stand removal (clearcutting) is the preferred method available to mimic the natures stand replacing events. The natural cycle for stand replacing events are from 20 – 60 years. Sand pine stand will therefore be clearcut and regenerated on a similar cycle.

The primary forest management activities of the District will be within these pine stands.

UPLAND HARDWOODS

Currently Upland hardwoods constitute 2% of District managed lands. Typically, they are mesic and xeric hammocks with the dominant species being live oak. There is no ecological need for harvesting within these communities and no commercial value to be derived from harvesting live oak.

Limited areas of upland hardwoods have developed on former sand hills and flatwoods due to a lack of fire or other ownership priorities prior to acquisition. These areas can be returned to their original natural community by harvesting the overstory and planting the original specie appropriate to the site. Hardwood species encountered on such site include turkey oak, laurel oak, bays and sweetgum.

WETLAND HARDWOODS AND CYPRESS

As with State Forests, in an effort to protect water quality, the District has no plans to harvest timber from the swamps. However, the following may be situations where limited harvesting would offer the District benefits.

Following a catastrophic outbreak of insects, disease or wildfire harvesting the dead timber can create the growing space for the next generation. Most swamp species reproduce from both seed and sprouting. Removing the dead overstory will reduce the hazard from trees falling on people and young trees.

Twenty to 30 years following some catastrophic event the District may choose to selectively thin the hardwoods and cypress to accelerate the process of developing old-growth conditions. In a truly natural setting the development of old-growth conditions will take 75 - 100 years since the trees compete with one another until the weaker individuals die. Through thinning, the number of trees can be reduced and the growth concentrated on the remaining trees so that they become larger faster and old-growth habitat can be created earlier.

The sensitivity required to log wetland systems cannot be overly stressed. Any harvesting performed in wetlands must be carried out under the most stringent conditions to avoid damage to the site. Harvesting can only be done when rutting and damage to residual trees can be minimized. Harvesting must be closely monitored and shut down if conditions deteriorate.

This plan was approved by the Governing Board in February, 2000 with charts updated January 2020

APPENDIX F: SILVER SPRINGS FOREST CONSERVATION AREA FIRE MANAGEMENT PLAN

PREPARED BY

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

The District Fire Management Plan provides general fire management information relative to policy, procedure, and reporting. This document provides the guidelines for the implementation of prescribed fire activities on the Silver Springs Forest Conservation Area (Silver Springs Forest).

Introduction and Objectives

Silver Springs Forest covers approximately 5,618 acres in Marion county. This conservation area includes three parcels and is located in numerous sections of Township 14 and Range 23 East.

The property is located north of State Road (SR) 40 near the city of Ocala.

Historically, fires have played a vital role in the shaping and maintenance of many of the natural communities in Florida. As such, most vegetative communities and associated wildlife are fire adapted and in many instances fire dependent. Conversely, the exclusion of fire from an area allows for successional changes within the natural community. Fire exclusion leads to the excessive accumulation of fuel loads, which increases the risk for catastrophic wildfires. The goals for the implementation of fire management activities within the conservation area include:

- Reduction of fuel loads through the application of dormant season burns to decrease potential risk of damaging wildfires.
- Continuation of growing season burns to encourage the perpetuation of native fire adapted ground cover species.
- Mitigation of smoke management issues.
- Restoration and maintenance of a mosaic of natural plant communities and ecological diversity.
- Maintenance and restoration of ecotonal areas.

The achievement of these goals requires that the conservation area be partitioned into manageable burn units prior to the application of prescribed fire within those units. The following sections summarize the considerations necessary for the safe and effective use of prescribed fire as a land management tool within Silver Springs Forest.

Fire Return Interval

The general frequency to which fire returns to a community type is termed its fire return interval. Some communities require frequent pyric disturbances to perpetuate themselves while others are not fire adapted and subsequently do not require fire to maintain their characteristics. The following discussion of native plant communities occurring on Silver Springs Forest and optimal fire return intervals was characterized in part using information from the 2010 Florida Natural Areas Inventory's *Guide to the Natural Communities of Florida* (Table 1).

Natural Community Type	FNAI Fire Return Interval
Mesic Flatwoods (Pine Plantation*)	2-4 years
Wet Flatwoods (Pine Plantation*)	1-3 years in grass dominated systems; 5-7 years in shrubbier systems
Sandhill (Pine Plantation*)	1-3 years
Depression Marsh	This community burns in conjunction with adjacent pyric natural communities
Basin Marsh	5-7 years
Basin Swamp (edges)	This is not a fire-adapted community
Baygall	This is not a fire-adapted community
Floodplain Swamp	This is not a fire-adapted community
Hydric Hammock	This is not a fire-adapted community
Mesic Hammock	This is not a fire-adapted community
Scrubby Flatwoods (Pine Plantation*)	5-15 years

*Fire return intervals in planted pine stands vary depending on species and age.

The above referenced fire return intervals relate to high quality natural communities. The fire return interval within degraded systems is variable. Prescribed fire will be applied as necessary to achieve restoration and management goals.

Mesic flatwoods is the most prevalent fire adapted natural community type found within Silver Springs Forest. The plant communities within all parcels were utilized in commercial silviculture operations. As a result, much of the historic vegetation has been converted to planted slash pine (*Pinus elliottii*) and loblolly pine (*Pinus taeda*). Additionally, the mid-story and groundcover species within these pine plantations are altered and, in some areas, absent. The primary fuel for carrying fire across dense pine areas is needle litter. Shrub and groundcover components elsewhere on the conservation area include a more diverse and abundant coverage of herbaceous and shrub components including wiregrass and saw palmetto and will contribute to the spread of fire.

The sandhill communities at Silver Springs Forest are degraded with few areas exhibiting site appropriate and diverse groundcover. The primary carry of fire in these areas will be leaf litter and remnant wiregrass. These areas will likely require mechanical and chemical treatments to facilitate the implementation of prescribed fire.

Fire management within the remaining pyric plant communities (below) will be in conjunction with the associated flatwoods and sandhill communities. These plant communities will burn as site conditions permit during the implementation of controlled burns in adjacent plant communities. Additionally, these areas will not be excluded from fire activities unless warranted by safety or smoke management issues.

Depression and basin marsh are fire-adapted communities. Though fire may not carry entirely through each marsh during every burn, it is an important factor in the maintenance and serves to restrict encroachment of woody plant species. Natural fire regime coincides with that of the adjacent habitat. Depression marshes are embedded within in the uplands across the conservation

area. In general, depression marsh fires are carried through the herbaceous layer. Many of these marshy areas have been disturbed by past land use and are small, but all still occupy an important niche in providing habitat for numerous species of wildlife. Fire will be applied to these marshes any time surrounding natural communities are burned.

Seasonality and Type of Fire

Historically, most fires in Florida occurred in what is commonly referred to as the "growing season." The growing season usually spans from mid-March through July. Fires during the growing season generally have significant ecological benefits as most fire adapted flora is perpetuated by fire. Mimicking lightning ignited natural fires by implementing prescribed fire during the growing season provides benefits to natural systems by controlling shrub layers and encouraging diversity in groundcover species.

Dormant season burns, conducted from late November through mid-March, help to reduce fuel loads in overgrown areas or in areas of newly planted pines. Cooler conditions associated with dormant season burning are a consideration in areas of high fuel loads and where only minimal pine mortality is acceptable. Additionally, dormant season burning may result in fewer safety and smoke management issues due to higher fuel moisture and more consistent winds. District staff will continue to work to maintain fire return frequencies that are consistent with those identified by FNAI for the various communities within the property. While fuel loads are not exceptionally high in most areas of the conservation area, heavy duff and needle litter has accumulated in some areas. These fuel conditions may require that some of the initial applications of fire be in the form of dormant season burning. This will allow for the reduction of fuel loads while providing for the protection of desirable vegetation. The ultimate goal of this strategy will be to move the prescribed fire application into a growing season rotation. District staff anticipate the gradual increase of growing season burns.

The effects of long-term fire exclusion prior to the District purchase of Silver Springs Forest are still evident on the landscape. These effects include increased fuel loads, increased dominance of shrubby plants, decreased abundance of herbaceous plants, and shift in species. The District has worked towards restoration of the natural distribution and abundance of plant and animal species through the use of prescribed fire and mechanical manipulations. It may take several iterations of fire and likely the addition of mechanical and chemical treatments to improve natural habitat condition.

In many cases, fire management units with similar fire management needs may be burned simultaneously, either with crews igniting the areas by hand from the ground, or with the aid of aircraft. Because Silver Springs Forest is large with an ample smoke shed, the property is a candidate for implementing prescribed fire with the aid of a helicopter. Aerial ignition allows District staff to ignite fire management units quickly, which results in faster burnout and reduces smoke management concerns. Additionally, convection produced by igniting an area can help move the smoke up and away more quickly. Aerial ignition also allows staff to introduce fire into areas that may be inaccessible from the ground, ensuring that prescribed fire is introduced into even the most remote areas within the fire management units. Aerial ignition allows staff to burn more acres in a shorter period, which in time will aid District staff in maintaining optimal

fire return frequencies. An aerial burn safety plan (Exhibit 1) will accompany the individual burn prescriptions and be onsite and on the ground the day of any aerial burn.

Wildfire Policy
In the event of a wildfire, if conditions permit, suppression strategies will utilize existing fuel breaks to contain the wildfire. These fuel breaks may include previously burned areas, existing roads, trails, and firelines, and wetlands and other water bodies. This is only possible with the agreement of local fire rescue, Florida Forest Service, District staff, and when all the following conditions are met:

1) Fuels within the area have been managed
2) No extreme weather conditions are present or expected
3) There are no other wildfires that may require action
4) There are sufficient resources available to manage the fire to containment
5) The fire and the resulting smoke will not impact neighbors or smoke sensitive areas

If any of these conditions are not met, direct suppression action will be taken.

As soon as possible following a fire in which firelines are plowed, a plan for fireline rehabilitation shall be developed and implemented.

Persons discovering arson or wildfires on the conservation area should report them to the Florida Department of Agriculture and Consumer Services, Florida Forest Service, the St. Johns River Water Management District, or by dialing 911.

Post Burn Reports
Burn reports must be completed after each prescribed burn or wildfire. These reports include detailed information regarding the acreage, fuel models, staff and equipment hours, cooperator hours, contractor hours, weather (forecasted and observed) and fire behavior. The timely completion of these reports is necessary for the compilation of information relative to the entire District burn program. Additionally, these reports provide a documented account of site-specific conditions which are helpful in the planning of future burns.

Smoke Management
A significant challenge to the implementation of any prescribed burn program is smoke management (Figure 1). Since acquisition of the property in 2016, prescribed burns totaling 214 acres have occurred.

While Silver Springs Forest has an acceptable smoke shed in which to place a smoke column from a prescribed fire, there are smoke sensitive areas that surround the conservation area and may affect the smoke management of each burn unit. Smoke management is a limiting factor in the application of prescribed fire within the conservation area. Figure 1 illustrates the smoke management area for Silver Springs Forest. As development increases in the area, fire management will become more difficult. Increasing daily traffic on SR 40, SR 326, CR 315 and other local roads will further impair the District’s ability to implement prescribed burns at the appropriate fire return intervals within the conservation area.

Depending on the arrangement and composition of fuels, fire spread will be through grasses and/or needle litter, the shrub layer, or logging slash. Areas within the conservation area having heavier shrub and mid-story fuel accumulation or logging slash can burn for long periods of time causing additional smoke management issues.

A fire weather forecast is obtained and evaluated for suitable burning conditions and smoke management objectives. A wind direction is chosen that will transport smoke away from urbanized areas and/or pose the least possible impact on smoke sensitive areas. When possible, the smoke plume from burns should be directed back through the property when possible. Smoke can then mix and loft into the atmosphere over uninhabited or rural land adequately enough to minimize off-site impacts.

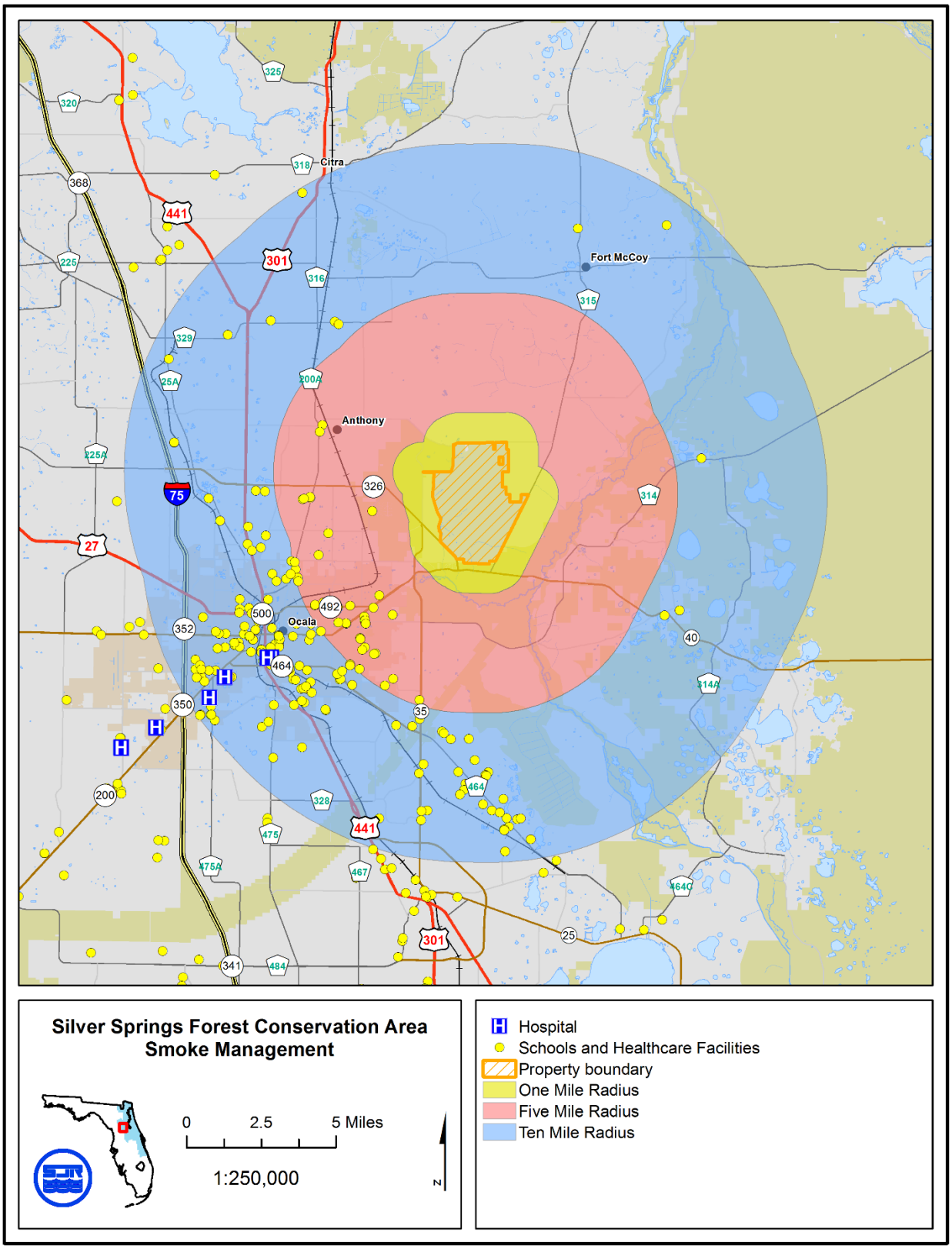

Figure 1: Fire management – smoke sensitive areas.

On burn day, the ability of smoke to mix and disperse into the atmosphere should be good. The Dispersion index is a value that indicates the atmosphere's ability to "absorb and disperse" smoke. The higher the index value, the more the smoke dissipates. Dispersion indices should be above 30. Dispersions of greater than 75 will not be utilized unless other weather conditions mitigate expected fire behavior. Forecast mixing heights should be above 1,700 ft. Transport winds should be at least 9 mph to effectively minimize residual smoke. Lower transport wind speeds can be utilized if dispersion index and mixing heights are above average. Burns will be conducted with a carefully plotted wind direction to limit and/or eliminate negative impacts from smoke to neighbors and urbanized areas.

Mechanical and Chemical Treatments
Short and long-term weather conditions and a fire management unit's proximity to urban areas become increasingly important when implementing a prescribed fire program. Should drought conditions become severe, or if smoke management becomes an insurmountable problem, the District may use mechanical methods, such as mowing or roller-chopping, as alternatives to prescribed fire.

Many of the pyric plant communities within the conservation area are dominated by pine plantations. An integral component to the implementation of a successful prescribed fire program within Silver Springs Forest is the harvesting of planted pine. Harvesting of pine trees will provide safer conditions for prescribed fire staff and decrease the potential for fire related mortality to the remaining pines and other desirable vegetation.

Hazards
Common hazards include heat stress, venomous snakes, trip hazards or falling trees. Individual prescriptions address the hazards to consider when burning each unit and are discussed during the pre-burn briefing.

Legal Considerations
Only burn managers certified by Florida Forest Service will approve the unit prescriptions and must be on site while the burn is being conducted. Certified burn managers adhering to the requirements of Section 590.125, Florida Statutes, are protected from liability for damage or injury caused by fire or resulting smoke, unless gross negligence is proven.

Fire Management Units
Fire management units (FMU) have been delineated on the property. Where logical, the District used existing roads and landscape features to delineate fire management units. Occasionally, multiple FMUs with similar fire needs will be burned simultaneously and roads and natural landscape features provide a break in fuels so that staff may burn smaller areas than initially planned if needed. District staff are in the process of updating the FMUs for Silver Springs Forest.

Ideally, District staff would thoroughly address and describe each fire management unit in terms of its fire management needs. All fire management units are categorized into one of several fuel model (FM) descriptions. The 13 standard fuel models (as described in Hal E. Anderson's *Aids to Determining Fuel Models for Estimating Fire Behavior*) were used as a basis for this

categorization. The factors considered in determining each FM are: amount, composition and arrangement of available fuels within units, predicted fire behavior within each unit (under conditions acceptable to implement a prescribed burn), and resources necessary to regain management of a fire in extenuating circumstances. District staff anticipates the change of vegetative assemblages over time due to growth and/or restoration and understand that fuel characteristics, models, and resulting fire behavior will also change.

Exhibit 1
Aerial Burn Safety Plan
Silver Springs Forest Conservation Area

The hazards associated with this type of burning are related to working with the helicopter, the sphere dispenser, and dealing with active fire. All helicopter safety procedures and all district fireline policies and procedures will be followed.

1. **BRIEFING -** During the operational briefing the safety plan will be reviewed with all personnel on the burn.
2. **HELICOPTER SAFETY -** The pilot will give a helicopter safety briefing at the morning operational briefing.
3. **AIDS SAFETY –** The operator will review the operation and cleaning procedures for the dispenser at the morning briefing.
4. **PERSONAL PROTECTIVE EQUIPMENT (PPE) –** The incident commander will ensure that all personnel have the required PPE.
5. **HIGH HAZARD AREAS –** All high hazard areas such as power lines shall be designated on the map and attached to the burn plan.
6. **EMERGENCY LANDING ZONES –** These should be confirmed with the pilot and indicated on the burn map.

Helispot 1 **There are currently no landing zones at Silver Springs Forest**

Crash Rescue Plan

In the event of an accident involving the helicopter the following procedures will be followed.

INCIDENT COMMANDER or BURN BOSS

1. **Notify 911**
2. Notify Marion County Fire Rescue (352) 694-6667.
3. Notify Marion Sheriff's Office (352) 732-9111
4. Assume responsibility of the Rescue Operation.
5. Notify National Transportation Safety Board (305) 957-4610 or (404) 462-1666.
6. Delegate responsibility of fire control to the second in command or the most qualified.

SECOND IN COMMAND

1. Assume responsibility of the burn.
2. Assist the IC or Burn Boss with resource and personnel needs for the rescue operation.
3. If the IC is in the helicopter, second in command will assume rescue operation responsibilities and assign the most qualified to fire control.

Emergency Phone Numbers

AIR RESCUE UNITS

1. Orlando Regional Medical Center
   Air Services — **407-843-5783 or 800-895-4615**
2. UF Shands Hospital
   ShandsCair Emergency Dispatch — **800-342-5365**

BURN UNIT LOCATIONS

1. Orlando Regional Medical Center – Burn Unit — **407-237-6398**
2. UF Shands Hospital, Gainesville — **352-265-0111**

FLORIDA FOREST SERVICE

1. Waccasassa District Dispatch — **352-955-2010**

NTSB

1. Southeast Regional Office — **305-957-4610**
2. Southeast Field Office — **404-462-1666**

MEDICAL PLAN	1. Incident Name	2. Date Prepared	3. Time Prepared	4. Operational Period

5. Incident Medical Aid Station			
Medical Aid Stations	Location	Paramedics Yes	No
Ocala Fire Department Station 5	2340 NE 25TH AVE, Ocala, Fl	X	
Marion County Fire Station 28	7098 HOLYOKE CT, Ocala, Fl	X	
Marion County Fire Station 1	3199 NE 70TH ST, Anthony, Fl	X	
Marion County Fire Station 4	16004 E HIGHWAY 40, Lynn, Fl	X	

6. Transportation

A. Ambulance Services

Name	Address	Phone	Paramedics Yes	No
Ocala Fire Department Station 5	2340 NE 25TH AVE, Ocala, Fl	911	X	
Marion County Fire Station 28	7098 HOLYOKE CT, Ocala, Fl	911	X	
Marion County Fire Station 1	3199 NE 70TH ST, Anthony, Fl	911	X	
Marion County Fire Station 4	16004 E HIGHWAY 40, Lynn, Fl	911	X	

B. Incident Ambulances

Name	Location	Paramedics Yes	No

7. Hospitals

Name	Address	Travel Time Air	Ground	Phone	Helipad Yes	No	Burn Center Yes	No
Orlando Regional Medical Center	52 W Underwood St., Orlando, FL 32806	30 minutes	1 hour	321-841-5111	X		X	
UF Shands Hospital	1600 SW Archer Rd Gainesville, Fl 32608	45 Minutes	2 hours	352-265-0111	X		X	

8. Medical Emergency Procedures

INCIDENT COMMANDER or BURN BOSS

1. Notify Marion County Fire Rescue (352-694-6667) or 911.
2. Assume responsibility of the Incident within an Incident.
3. Delegate responsibility of fire control to the second in command or the most qualified.

SECOND IN COMMAND

4. Assume responsibility of the burn.
5. Assist the IC or Burn Boss with resource and personnel needs for the emergency.
6. Notify Supervisor and or District Safety Officer

EMERGENCY LANDING ZONES –

Helispot 1 There are currently no landing zones at Silver Springs Forest

Emergency Phone Numbers

AIR RESCUE UNITS

1. Orlando Regional Medical Center
   Air Services **407-843-5783 or 800-895-4615**
2. UF Shands Hospital
   ShandsCair Emergency Dispatch **800-342-5365**

BURN UNIT LOCATIONS

1. Orlando Regional Medical Center – Burn Unit **407-237-6398**
2. UF Shands Hospital, Gainesville **352-265-0111**

DIVISION OF FORESTRY

1. Waccasassa District Dispatch **352-955-2010**

District Safety Officer
David Sielaff **386-643-1941**

Prepared by (Medical Unit Leader)	

APPENDIX G: SILVER SPRINGS FOREST CONSERVATION AREA SPECIES LIST

Plants

Genus species	Common Name (Conservation Status)
Acer rubrum	red maple
Agalinis purpurea	purple false foxglove
*Albizia julibrissin**	silktree (FLEPPC Cat I)
*Alternanthera philoxeroides**	Alligatorweed (FLEPPC Cat II)
Ambrosia artemisiifolia	common ragweed
Ampelopsis arborea	peppervine
Andropogon glomeratus	bushy bluestem
Andropogon virginicus	broomsedge bluestem
Asclepias lanceolata	fewflower milkweed
Asimina incana	wooly pawpaw
Asimina parviflora	smallflower pawpaw
Asimina sp.	pawpaw
Azolla caroliniana	Carolina mosquito fern
Baccharis halimifolia	groundsel tree
Bidens alba var. radiata	beggarticks
Bidens pilosa	black-jack
Blechnum serrulatum	swamp fern
*Broussonetia papyrifera**	paper mulberry (FLEPPC Cat II)
Buchnera americana	American bluehearts
Callicarpa americana	American beautyberry
Campsis radicans	trumpet creeper
Canna flaccida	bandana-of-the-Everglades
Carex gigantea	giant sedge
Carex longii	Long's sedge
Carex lupuliformis	false hop sedge
Carex stipata	owlfruit sedge
Carex verrucosa	warty sedge
Carphephorous odoratissimus	vanillaleaf
Carpinus caroliniana	American hornbeam
Carya aquatica	water hickory
Carya glabra	pignut hickory
Celtis laevigata	hackberry
Cenchrus echinatus	southern sandspur
Centella asiatica	spadeleaf
Centrosema sp.	butterfly pea
Cephalanthus occidentalis	common buttonbush

Ceratiola ericoides	Florida rosemary
Chasmanthium laxum	slender woodoats
Chasmanthium nitidum	shiny woodoats
Chasmanthium sessiliflorum	longleaf woodoats
Cinnamomum camphora	camphor tree
Cirsium nuttallii	Nuttall's thistle
Cladium jamaicense	Jamaica swamp sawgrass
Cnidoscolus stimulosus	tread softly
Commalina erecta	whitemouth dayflower
Conyza canadensis var. pusilla	dwarf Canadian horseweed
Coreopsis leavenworthii	Leavenworth's tickseed
Crisopsis sp.	goldenaster
Cryptothecia rubrocincta	Christmas lichen
Cyperus distinctus	swamp flat sedge
*Cyperus esculentus**	chufa flatsedge
Cyperus polystachyos	manyspike flatsedge
Cyperus surinamensis	tropical flatsedge
Dichanthelium ensifolium	cypress witchgrass
Dichanthelium erectifolium	erectleaf witchgrass
Dichanthelium laxiflorum	openflower witchgrass
Dichondra carolinensis	Carolina ponysfoot
Digitaria floridana	Florida crabgrass
Diodia virginiana	Virginia buttonweed
Diospyros virginiana	common persimmon
Eleocharis flavescens	yellow spikerush
Erechtites hieraciifolius	fireweed
Eremochloa ophiuroides	centipedegrass
Erigeron quercifolius	oakleaf fleabane
Eriocaulon sp.	pipewort
Eryngium baldwinii	Baldwin's eryngo
Eupatorium capillifolium	dogfennel
Eustachys glauca	saltmarsh fingergrass
Eustachys petraea	pinewoods fingergrass
Euthamia caroliniana	slender flattop goldenrod
Fraxinus caroliniana	Carolina ash
Galactia elliottii	Elliott's milkpea
Galium tinctorium	stiff marsh bedstraw
Gelsemium sempervirens	Carolina jessamine
Gleditsia aquatica	water locust
Gordonia lasianthus	loblolly bay
Gratiola hispida	rough hedgehyssop

Heterotheca subaxillaris	camphorweed
Hibiscus moscheutos	crimsoneyed rosemallow
Hymenachne amplexicaulis	West Indian marshgrass
Hypericum sp.	St.John's-wort
Ilex opaca	American holly
*Imperata cylindrica**	Cogongrass (FELPPC Cat I)
Indigofera hirsuta	hairy indigo
Ipomoea alba	moonflowers
Ipomoea cordatotriloba	tievine
Ipomoea pandurata	man-of-the-earth
Juncus effusus subsp. solutus	soft rush
Juncus marginatus	grassleaf rush
Juncus polycephalos	manyhead rush
Juniperus virginiana	red cedar
Kalmia hirsuta	hairy laurel
Lachnanthes caroliana	Carolina redroot
Leersia hexandra	southern cutgrass
Leersia virginica	whitegrass
Leucobryum albidum	moss
Leucobryum glaucum	moss
Liatris tenuifolia	shortleaf gayfeather
Licania michauxii	gopher apple
Limnobium spongia	frog's-bit
Linaria canadensis	Canadian toadflax
Liquidambar styraciflua	sweetgum
Ludwigia peruviana	Peruvian primrosewillow
Ludwigia repens	creeping primrosewillow
Lyonia ferruginea	rusty staggerbush
Lyonia lucida	fetterbush
Magnolia grandiflora	southern magnolia
Melothia pendula	wild cucumber
Mimosa strigillosa	powderpuff
Mitchella repens	partridgepea
Morella cerifera	wax myrtle
Myrcianthes fragrans	Simpson's stopper
Nephrolepis exaltata	sword fern
Nyssa sylvatica	blackgum
Oenothera simulans	southern beeblossom
Oplismenus hirtellus	basketgrass
Opuntia humifusa	pricklypear
Osmunda cinnamomea	cinnamon fern

Osmunda regalis	royal fern
Oxalis corniculata	creeping woodsorrel
Oxypolis filiformis	water cowbane
Panicum anceps	beaked panicum
Panicum hemitomon	maidencane
Parthenocissus quinquefolia	Virginia creeper
*Paspalum notatum**	bahiagrass
Paspalum repens	water paspalum
Paspalum setaceum	thin paspalum
*Paspalum urvillei**	vaseygrass
Passiflora sp	passionflower
Pediopsis grammifolia	narrowleaf silkgrass
Peltandra virginica	green arrow arum
Persea palustris	swamp bay
Persicaria punctata	dotted smartweed
Phanopyrum gymnocarpon	savannah panicum
Phlebodium aureum	golden polypody
Phyla nodiflora	turkey tangle fogfruit
Pinus clausa	sand pine
Pinus elliottii	slash pine
Pinus palustris	longleaf pine
Pinus taeda	loblolly pine
Pityopsis graminifolia	narrowleaf silkgrass
Pleopeltis polypodioides var. michauxiana	resurrection fern
Pluchea rosea	rosy camphorweed
Polygala lutea	orange milkwort
Polygonum hydropiperoides	swamp smartweed
Polygonum setaceum	bog smartweed
Polypremum procumbens	rustweed
Pontederia cordata	pickerelweed
Prunus serotina	black cherry
Pseudognaphalium obtusifolium	rabbit tobacco
Pteridium aquilinum var. pseudocaudatum	tailed bracken
Pterocaulon pycnostachyum	blackroot
Ptilimnium capillaceum	mock bishopweed
Pyrostegia venusta	flamevine
Quercus geminata	sand live oak
Quercus laurifolia	laurel oak
Quercus michauxii	swamp chestnut oak
Quercus minima	dwarf live oak
Quercus nigra	water oak

Quercus virginiana	live oak
Rhexia mariana	pale meadowbeauty
Rhexia virginica	Virginia meadow-beauty
Rubus sp.	blackberry
Rhus copallinum	winged sumac
Rhynchelytrum repens	natalgrass
Rhynchospora colorata	starrush whitetop
Rhynchospora corniculata	shortbristle horned beaksedge
Rhynchospora decurrens	swampforest beaksedge
Rhynchospora harperi	Harper's beaksedge
Rhynchospora inundata	narrowfruit horned beaksedge
Rhynchospora mixta	mingled beaksedge
Richardia brasilensis	wood sorrel
Rubus argutus	sawtooth blackberry
Rubus cuneifolius	sand blackberry
Ruellia caroliniensis	Carolina wild petunia
Rumex verticillatus	swamp dock
Russula emetica	emetic russula
Sabal palmetto	cabbage palm
Sacciolepis indica	Indian cupscale
Sagitaria latifolia	broadleaf arrowhead
Sagittaria graminea	grassy arrowhead
Sagittaria kurziana	springtape
Sagittaria lancifolia	bulltongue arrowhead
Sagittaria subulata	awl-leaf arrowhead
Salix caroliniana	Carolina willow
Salvia lyrata	lyreleaf sage
Saururus cernuus	lizard's tail
Scleria sp.	nutrush
Schoenoplectus pungens	threesquare bulrush
Serenoa repens	saw palmetto
Sesbania punicea	rattlebox
Sesbania sp.	riverhemp
Setaria parviflora	knotroot foxtail
Sisyrinchium angustifolium	narrowleaf blue-eyed grass
Smilax bona-nox	saw greenbrier
Smilax laurifolia	laurel greenbrier
Solidago canadensis L. var. scabra	Canada goldenrod
Solidago sp.	goldenrod
*Sporobolus indicus**	smutgrass
Stenotaphrum secundatum	St. Augustinegrass

Taxodium ascendens	pond cypress
Taxodium distichum	bald cypress
Thalia geniculata	alligatorflag
Thelypteris sp.	fern
Tilandsia bartramii	Bartram's airplant
Tillandsia sp.	airplant
Tillandsia usenoides	Spanish moss
Toxicodendron radicans	eastern poison ivy
Tradescantia sp.	spiderwort
Triadica sebifera	Chinese tallow
Trichostema dichotomum	blue curls
*Trifolium sp.**	clover
Tripsacum dactyloides	Fakahatcheegrass
Typha domingensis	southern cattail
Typha latifolia	broadleaf cattail
Ulmus americana	American elm
*Urena lobata**	Caesarweed (FLEPPC Cat II)
*Urtica dioica**	stinging nettle
Utricularia purpurea	eastern purple bladderwort
Vaccinium corymbosum	highbush blueberry
Vaccinium myrsinites	shiny blueberry
Verbena scabra	sandpaper vervain
Verbisinia virginica	white crownbeard
Vernonia gigantea	giant ironweed
Viburnum sp.	viburnum
Vitis rotundifolia	muscadine
Woodwardia areolata	netted chain fern
Woodwardia virginica	Virginia chain fern
Yucca filamentosa	Adam's needle

Birds

Specific Name	Common Name (Conservation Status)
Archilochus colubris	Ruby-throated Hummingbird
Ardea herodias	Great Blue Heron
Baeolophus bicolor	Tufted Titmouse
Buteo lineatus	Red-shouldered Hawk
Cardinalis cardinalis	Northern Cardinal
Cathartes aura	Turkey Vulture
Chaetura pelagica	Chimney Swift
Coragyps atratus	Black Vulture
Corvus brachyrhynchos	American Crow
Corvus ossifragus	Fish Crow
Cyanocitta cristata	Blue Jay
Dryocopus pileatus	Pileated Woodpecker
Elanoides forficatus	Swallow-tailed Kite
Megascops asio	Eastern Screech-Owl
Melanerpes carolinus	Red-bellied Woodpecker
Meleagris gallopavo	Wild Turkey
Mimus polyglottos	Northern Mockingbird
Myiarchus crinitus	Great Crested Flycatcher
Passerina caerulea	Blue Grosbeak
Passerina cyanea	Indigo Bunting
Picoides pubescens	Downy Woodpecker
Pipilo erythrophthalmus	Eastern Towhee
Piranga rubra	Summer Tanager
Plegadis falcinellus	Glossy Ibis
Poecile carolinensis	Carolina Chickadee
Polioptila caerulea	Blue-gray Gnatcatcher
Protonotaria citrea	Prothonotary Warbler
Quiscalus major	Boat-tailed Grackle
Setophaga americana	Northern Parula
Setophaga pinus	Pine Warbler
Strix varia	Barred Owl
Thryothorus ludovicianus	Carolina Wren
Toxostoma rufum	Brown Thrasher
Vireo flavifrons	Yellow-throated Vireo
Vireo griseus	White-eyed Vireo
Vireo griseus	White-eyed Vireo
Vireo olivaceus	Red-eyed Vireo
Zenaida macroura	Mourning Dove

Mammals

Specific Name	Common Name (Conservation Status)
Canis iatrans	Coyote

Dasypus novemcinctus	Nine-Banded Armadillo
Didelphis virginana	Opossum
Lynx rufus	Bobcat
Mephitis mephitis	Striped skunk
Odocoileus virginianus	White-Tail Deer
Procyon lotor	Racoon
Sciurus carolinensis	Eastern Grey Squirrel
Sus scrofa	Feral hog
Urocyon cinereoargenteus	Gray fox
Ursus americanus floridanus	Florida black bear (G5T4, S4, SN, FN)

Amphibians

Specific Name	Common Name (Conservation Status)
Acris gryllus dorsalis	Florida Cricket Frog
Bufo quercicus	Oak Toad
Bufo terrestris	Southern Toad
Hyla cinerea	American Green Treefrog
Hyla femoralis	Pinewoods Treefrog
Hyla squirella	Squirrel Treefrog
Lithobates catesbeianus	Bullfrog
Lithobates clamitans	Bronze Frog
Lithobates sphenocephalus	Southern Leopard Frog
Pseudacris sp.	Chorus Frog
Siren lacertina	Greater Siren
Acris gryllus dorsalis	Florida Cricket Frog

Reptiles

Specific Name	Common Name (Conservation Status)
Agkistrodon piscivorus	Cottonmouth
Alligator mississippiensis	American Alligator
Aspidoscelis sexlineata	Six-lined Race Runner
Coluber constrictor priapus	Southern Black Racer
Gopherus polyphemus	Gopher Tortoise
Scincella lateralis	Ground Skink
Thamnophis saurita	Eastern Ribbonsnake

Fish

Specific Name	Common Name
Lepomiss gulosus	Warmouth
Elassoma evergladei	Everglades Pigmy Sunfish
Enneacanthus gloriosus	Blue-spotted Sunfish
Gambusia holbrooki	Mosquitofish
Heterandria formosa	Least Killifish

Hoplosternum littorale	Brown Hoplo
Ictalurus nebulosus	Brown Bullhead
Lepisostenus platyrhinchus	Florida Gar
Lepomis macrochirus	Bluegill
Lepomis marginatus	Dollar Sunfish
Lepomis microlophus	Red-eared Sunfish
Lepomis punctatus punctatus	Spotted Sunfish
Micropterus salmoides	Largemouth Bass

Invertebrates

Specific Name	Common Name
Agraulis vanillae	Gulf Fritillary
Argiope aurantia	Black and Yellow Garden Spider
Bombus sp.	Bumblebee
Ceraticelus sp.	Dwarf Spider
Colias eurytheme	Orange Sulfur Butterfly
Copaeodes minima	Southern Skipperling
Copaeodes minimus	Southern Skipperling
Erynnis horatius	Horace's Duskywing
Eurema nicippe	Sleepy Orange
Eurytides marcellus	Zebra Swallowtail
Hylephila phyleus	Fiery Skipper
Leucauge venusta	Orchard Orbweaver
Libellula deplanata	Blue Corporal
Limenitis archippus	Viceroy
Misumena vatia	Goldenrod Crab Spider
Nephila clavipes	Golden Orb Weaver
Notonecta sp.	Backswimmer
Papilio glaucus	Eastern Tiger Swallowtail
Papilio polyxenes	Black Swallowtail

***Exotic**
**** Listed – Status descriptions below**
FNAI GLOBAL RANKING
G1 = Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
G2 = Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
G3 = Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.
G4 = Apparently secure globally (may be rare in parts of range).
G5 = Demonstrably secure globally.
G#T# = Rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species and the T portion refers to the specific subgroup; numbers have same definition as above (e.g., G3T1).

FNAI STATE RANKING

S1 = Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.

S2 = Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.

S3 = Either very rare and local in Florida (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors.

S4 = Apparently secure in Florida (may be rare in parts of range).

S5 = Demonstrably secure in Florida.

STATE LEGAL STATUS

FT(S/A) Threatened due to similarity of appearance

LE Endangered: species, subspecies, or isolated population so few or depleted in number or so restricted in range that it is in imminent danger of extinction.

LT Threatened: species, subspecies, or isolated population facing a very high risk of extinction in the future.

LS Species of Special Concern is a species, subspecies, or isolated population which is facing a moderate risk of extinction in the future.

PE Proposed for listing as Endangered.

PT Proposed for listing as Threatened.

PS Proposed for listing as Species of Special Concern.

SN Not currently listed, nor currently being considered for listing.

FEDERAL LEGAL STATUS

LE Endangered: species in danger of extinction throughout all or a significant portion of its range.

LT Threatened: species likely to become Endangered within the foreseeable future throughout all or a significant portion of its range.

LT,PDL Species currently listed threatened but has been proposed for delisting.

LT,PE Species currently listed Threatened but has been proposed for listing as Endangered.

SAT Treated as threatened due to similarity of appearance to a species which is federally listed such that enforcement personnel have difficulty in attempting to differentiate between the listed and unlisted species.

PE Proposed for listing as Endangered species.

PT Proposed for listing as Threatened species.

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.

XN Non-essential experimental population.

SC Not currently listed but considered a “species of concern” to USFWS.

FN Not currently listed, nor currently being considered for listing as Endangered or Threatened.