SAN FELASCO HAMMOCK PRESERVE STATE PARK
Park Chapter

NORTH FLORIDA HIGHLANDS REGION

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San Felasco Hammock Preserve State Park

Park Chapter

San Felasco Hammock Preserve State Park

Planning Region: North Florida Highlands

County: Alachua

Lease/Management Agreement Number: 2839

Overview: San Felasco Hammock Preserve State Park is comprised of 24 natural communities, including one of the largest contiguous upland hardwood forests in the state, and karst influenced wetland associations such as blackwater streams that drain into sinkholes. The park provides over 40 miles of extensive off-road biking, as well as equestrian and hiking trails.

Total Acreage: 7,353.39

Natural Communities	Acres
Alluvial Forest	226.05
Bottomland Forest	690.73
Baygall	8.67
Basin Marsh	33.69
Basin Swamp	62.75
Blackwater Stream	17.77
Clastic Upland Lake	48.17
Depression Marsh	6.32
Dome Swamp	3.89
Floodplain Marsh	6.00
Floodplain Swamp	74.78
Limestone Outcrop	0.15
Mesic Hammock	19.52
Mesic Flatwoods	70.00
Marsh Lake	1.28
Sandhill	197.10
Sinkhole	9.76
Sinkhole Lake	35.25
Seepage Stream	4.54
Sandhill Upland Lake	4.11
Swamp Lake	16.24
Upland Hardwood Forest	2,939.52
Upland Mixed Woodland	892.59
Upland Pine	617.95

Altered Landcovers	Acres
Abandoned Field/ Pasture	267.87
Artificial Pond	3.27
Borrow Area	3.46
Clearing/ Regeneration	3.97
Developed	6.00
Improved Pasture	322.25
Pine Plantation	9.16
Spoil Area	1.59

Successional Hardwood Forest	651.98
Utility Corridor	106.17

Acquisition: San Felasco Hammock Preserve State Park was initially acquired in 1974 under the Environmentally Endangered Lands (EEL) Program (see the appendix). Currently, the park is comprised of 7,353.40 acres. The Board of Trustees of the Internal Improvement Trust Fund (Trustees) hold fee simple title to the park and Aug. 31, 1974, the Trustees leased (Lease No. 2839) the property to the Division of Recreation and Parks (DRP) under a 60-year lease. The current lease will expire July 30, 2034.

Resource Management Component

Hydrology

- Assess the park's hydrological restoration needs.
- Restore natural hydrological conditions and functions to approximately 2 miles of blackwater stream and 10 acres of sinkhole lake natural community.
- Evaluate and mitigate the impacts of soil erosion in the park.
- Monitor and evaluate the impacts of historic cattle dipping operations at San Felasco.

Natural Communities

- Conduct floral and faunal surveys and update the park's baseline plant and animal list.
- Within 10 years, have 2000 acres of the park maintained within the optimum fire return interval.
- Conduct habitat/natural community restoration activities on 212 acres of upland mixed woodland and upland pine natural communities.
- Conduct natural community/habitat improvement activities on 218 acres of sandhill/upland pine natural communities.
- Conduct natural community/habitat improvement activities on 30 acres of sandhill and mesic flatwoods natural communities.
- Conduct natural community/habitat improvement activities on 245 acres of sandhill and upland mixed woodland natural communities.
- Conduct natural community/habitat improvement activities on 200 acres of sandhill and upland mixed woodland natural communities.

Imperiled Species

- Update baseline imperiled species occurrence inventory lists for plants and animals.
- Monitor and document 11 selected imperiled animal species in the park (striped newt, Holbrook's southern dusky salamander, tiger salamander, eastern indigo snake, Florida pine snake, short-tailed kingsnake, eastern diamondback rattlesnake, tricolored bat, Rafinesque's big-eared bat, Florida scorpionfly and imperiled butterfly species).
- Monitor and document 3 selected imperiled plant species in the park (woodland poppy mallow, Flyr's brickell-bush and nettleleaf sage).

Invasive and Nuisance Species

- Annually treat 1000 gross acres or approximately 120 infested acres of invasive plant species in the park.

- Prevent the introduction and spread of invasive plants into the park.
- Survey the entire park for invasives at least 3 times over 10 years.
- Implement control measures on 1 invasive animal species in the park.

Cultural Resources

- Assess and evaluate 57 of 57 recorded cultural resources in the park.
- Compile reliable documentation for all recorded historic and archaeological resources.
- Bring 1 of 57 recorded cultural resources into good condition (Agricultural Structure #1, AL4980).

Land Use Component

Conceptual Land Use

Northern Trailhead

- Provide directional signage and clearly demarcated driveways.
- Delineate and organize parking areas.
- Install a new restroom and connect it to the municipal sewage system.
- Develop a sensory trail with specialized interpretive materials.
- Plan and implement ecological and historic interpretation.

Millhopper Road Trailhead

- Reconfigure parking lot to provide at least six more parking spaces within the existing footprint.
- Install a permanent restroom and connect to the municipal sewage system.
- Improve interpretation.
- Provide a safer pedestrian crossing along Millhopper Road.

Support Area

- Conduct a historic structure assessment for the tobacco barn.

Turkey Creek

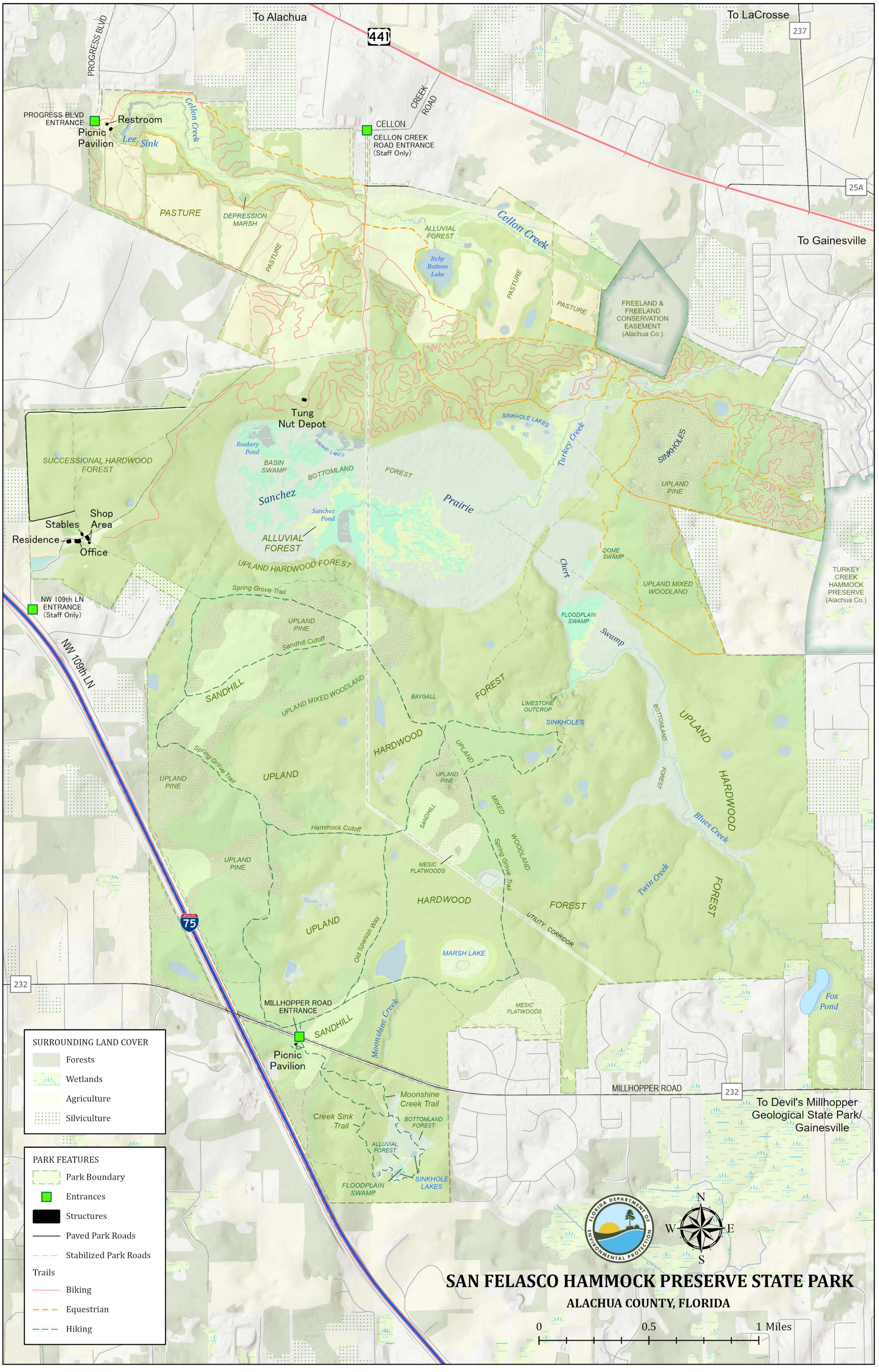
- Construct a bridge to improve management access.

Itchy Bottom Lake Picnic Area

- Construct a large rustic picnic pavilion with two picnic tables.
- Install interpretation pertaining to the significance of watershed protection.

Optimum Boundary

Several parcels, approximately 1,600 acres in total, are proposed for acquisition to support habitat connectivity in this majorly developed region, protect imperiled species from further development, and protect the park's significant natural communities from invasive species. Some properties within the parks optimum boundary include current and former pastureland. Acquiring these parcels would provide the Division an opportunity to protect valuable watersheds and karst features from nearby pollutants and restore natural ecological functions within these altered landcovers.


To Alachua
To LaCrosse
441
237
25A
To Gainesville
PROGRESS BLVD
PROGRESS BLVD ENTRANCE
Restroom
Picnic Pavilion
Lee Sink
Cellon Creek
CELLON CREEK ROAD
CELLON
CELLON CREEK ROAD ENTRANCE (Staff Only)
PASTURE
DEPRESSION MARSH
ALLUVIAL FOREST
Itchy Bottom Lake
FREELAND & FREELAND CONSERVATION EASEMENT (Alachua Co.)
Tung Nut Depot
SUCCESSIONAL HARDWOOD FOREST
Rookery Pond
SWAMP LAKES
BASIN SWAMP
BOTTOMLAND FOREST
Sanchez
Sanchez Pond
Prairie
SINKHOLE LAKES
Turkey Creek
SINKHOLES
UPLAND PINE
Shop Area
Stables
Residence
Office
UPLAND HARDWOOD FOREST
DOME SWAMP
Chert
UPLAND MIXED WOODLAND
TURKEY CREEK HAMMOCK PRESERVE (Alachua Co.)
NW 109th LN ENTRANCE (Staff Only)
Spring Grove Trail
Sandhill Cutoff
FLOODPLAIN SWAMP
Swamp
NW 109th LN
SANDHILL
BAYGALL
LIMESTONE OUTCROP
SINKHOLES
HARDWOOD FOREST
BOTTOMLAND FOREST
UPLAND
Hammock Cutoff
MIXED WOODLAND
Blues Creek
Twin Creek
MESIC FLATWOODS
UTILITY CORRIDOR
Old Spanish Way
MARSH LAKE
Fox Pond
MILLHOPPER ROAD ENTRANCE
Moonshine Creek
Picnic Pavilion
MILLHOPPER ROAD
Moonshine Creek Trail
Creek Sink Trail
ALLUVIAL FOREST
SINKHOLE LAKES
To Devil's Millhopper Geological State Park/ Gainesville
I-75
232
SURROUNDING LAND COVER
Forests
Wetlands
Agriculture
Silviculture
PARK FEATURES
Park Boundary
Entrances
Structures
Paved Park Roads
Stabilized Park Roads
Trails
Biking
Equestrian
Hiking
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
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S
SAN FELASCO HAMMOCK PRESERVE STATE PARK
ALACHUA COUNTY, FLORIDA
0
0.5
1 Miles

INTRODUCTION

LOCATION AND ACQUISITION HISTORY

San Felasco Hammock Preserve State Park is located in Alachua County just northwest of the city of Gainesville and south of the city of Alachua. Public access to the park is via Millhopper Road (State Road 232), about 5.5 miles west of State Road 121 and 7 miles west of U.S. Highway 441. A second entrance is located on Progress Center Boulevard via U.S. Highway 441. The North Florida Highlands Region Map also reflects significant land and water resources near the park.

San Felasco Hammock Preserve State Park was initially acquired in 1974 under the Environmentally Endangered Lands (EEL) Program (see the appendix). Currently, the park is comprised of 7,353.40 acres. The Board of Trustees of the Internal Improvement Trust Fund (Trustees) hold fee simple title to the park and Aug. 31, 1974, the Trustees leased (Lease No. 2839) the property to the Division of Recreation and Parks (DRP) under a 60-year lease. The current lease will expire July 30, 2034.

On February 8, 2010, DRP leased an approximately 208-acre property, 23-acre property, 21-acre property, and a 19-acre property from Alachua County, Florida, to manage it part of San Felasco Hammock Preserve State Park. The Trustees amended the lease to add new lands to the park. The term of this lease is coterminous with the term of Lease No. 2839.

San Felasco Hammock Preserve State Park is designated single-use to provide public outdoor recreation and conservation. There are no legislative or executive directives that constrain the use of this property (see the appendix). A legal description of the park property can be made available upon request to the Department of Environmental Protection.

SECONDARY AND INCOMPATIBLE USES

In accordance with 253.034(5) F.S., the potential of the park to accommodate secondary management purposes was analyzed. These secondary purposes were considered within the context of DRP's statutory responsibilities and resource values. This analysis considered the park's natural and cultural resources, management needs, aesthetic values, visitation and visitor experiences. It was determined that no secondary purposes could be accommodated in a manner that would not interfere with the primary purpose of resource-based outdoor recreation and conservation.

DRP has determined that uses such as, water resource development projects, water supply projects, stormwater management projects, linear facilities and sustainable agriculture and forestry (other than those management activities specifically identified in this plan) would not be consistent with the management purposes of the park.

In accordance with 253.034(5) F.S., the potential for generating revenue to enhance management was also analyzed. Visitor fees and charges are the principal source of revenue generated by the park. It was determined that multiple-use management activities would not be appropriate as a means of generating revenues for land management. Instead, techniques such as entrance fees, concessions and similar measures will be employed on a case-by-case basis as a means of supplementing park management funding. Generating revenue from consumptive uses or from activities that are not expressly related to resource management and conservation is not under consideration.

PURPOSE AND SIGNIFICANCE OF THE PARK

Park Purpose

The purpose of San Felasco Hammock Preserve State Park is to preserve one of the most diverse and complex upland ecosystems in north Florida including perhaps the largest upland hardwood forest in the state. The park is home to over 20 natural communities, including important karst elements such as sinkholes, springs, swallets and limestone outcrops.

Park Significance

- San Felasco Hammock Preserve State Park contains the largest remnant of high-quality upland hardwood forest within the region and large tracts of forest necessary for birds and other species known to require undisturbed woodlands for successful survival. The center of the preserve is designated a wilderness zone to protect the integrity of this habitat in an increasingly urbanized area.

- The park is home to over 20 natural communities, including important karst elements such as sinkholes, limestone outcrops, springs and swallets where streams flow directly into the Floridan aquifer.

- The park contains 53 recorded cultural sites that provide evidence of approximately 12,000 years of uninterrupted human occupation extending from the Paleoindian times through the 20th century. San Felasco is the site of a Spanish mission, San Francisco de Potano. Established in the early 1600s, it was the first Spanish mission in Florida's interior.

- The park offers remarkable resource-based outdoor recreation opportunities on its extensive trail network for hiking, biking and equestrians.

Central Park Theme

Beneath the shaded trails of San Felasco's mature hardwood forests is an intricate connection of seeps, sinks and streams in a complex karst landscape.

San Felasco Hammock Preserve State Park is classified as a preserve in the DRP unit classification system. In the management of a preserve, preservation and enhancement of natural conditions is all important. Resource considerations are given priority over user considerations and development is restricted to the minimum necessary for ensuring its protection and maintenance, limited access, user safety, user convenience and appropriate interpretation. Permitted uses are primarily of a passive nature, related to the aesthetic, educational and recreational enjoyment of the park, though other compatible uses are permitted in limited amounts. Program emphasis is placed on interpretation of the natural and cultural attributes of the park.

OTHER DESIGNATIONS

The unit is not within an Area of Critical State Concern as defined in Section 380.05, Florida Statutes, and it is not presently under study for such designation. The park is a component of the Florida Greenways and Trails System, administered by the Department's Office of Greenways and Trails.

All waters within the park have been designated as Outstanding Florida Waters, pursuant to Chapter 62-302, Florida Administrative Code. Surface waters in this park are also classified Class III waters by the Department. The park is not within or adjacent to an aquatic preserve as designated under the Florida Aquatic Preserve Act of 1975 (Section 258.35, Florida Statutes).

PARK ACCOMPLISHMENTS

- Met 100% of invasive/exotic plant treatment goals, for a total of 1,159 acres.
- Closed multiple inappropriate trails.
- Established fire lines throughout the unit.
- Improved the sandhill natural community via off-site hardwood removal.
- Added two running special events that highlight the parks unique ecosystems.

RESOURCE MANAGEMENT COMPONENT

San Felasco Hammock Preserve State Park Management Zones			
Management Zone	**Acreage**	**Managed with Prescribed Fire**	**Contains Known Cultural Resources**
SFH-5A	45.77	N	Y
SFH-5B	89.75	N	Y
SFH-2K	422.17	Y	Y
SFH-4J	56.37	N	Y
SFH-4G	102.16	N	Y
SFH-4H	50.71	N	Y
SFH-3K	66.69	N	Y
SFH-1An	169.01	Y	Y
SFH-1Aw	247.77	Y	Y
SFH-1C	166.73	Y	Y
SFH-2A	54.86	Y	N
SFH-2B	39.69	Y	N
SFH-2C	321.43	Y	Y
SFH-2D	563.67	Y	Y
SFH-2E	245.26	Y	N
SFH-2F	139.29	Y	Y
SFH-2G	295.84	Y	Y
SFH-2H	56.86	Y	N
SFH-2L	168	Y	Y
SFH-2M	101.24	Y	Y
SFH-2N	431.16	Y	Y
SFH-2P	96.41	Y	Y
SFH-2Q	289.9	Y	Y
SFH-2R	108.14	Y	N
SFH-2S	306.89	N	Y
SFH-3A	146.23	Y	Y
SFH-3B	128.39	Y	N
SFH-3C	216.8	Y	Y
SFH-3D	410.83	Y	Y
SFH-3E	130.96	Y	Y
SFH-3F	85.93	Y	Y
SFH-3G	247.01	Y	Y
SFH-3H	102.43	Y	Y
SFH-3J	305.15	Y	Y
SFH-4A	123.02	Y	Y
SFH-4Be	136.62	Y	Y

San Felasco Hammock Preserve State Park Management Zones			
Management Zone	**Acreage**	**Managed with Prescribed Fire**	**Contains Known Cultural Resources**
SFH-4Bw	56.85	Y	N
SFH-4C	205.86	Y	Y
SFH-4De	50.08	Y	Y
SFH-4Dw	97.89	Y	N
SFH-4E	87.98	Y	Y
SFH-4Fe	51.42	Y	Y
SFH-4Fw	83.65	Y	Y
SFH-1Bw	50.52	N	Y
SFH-1Be	9.16	N	N

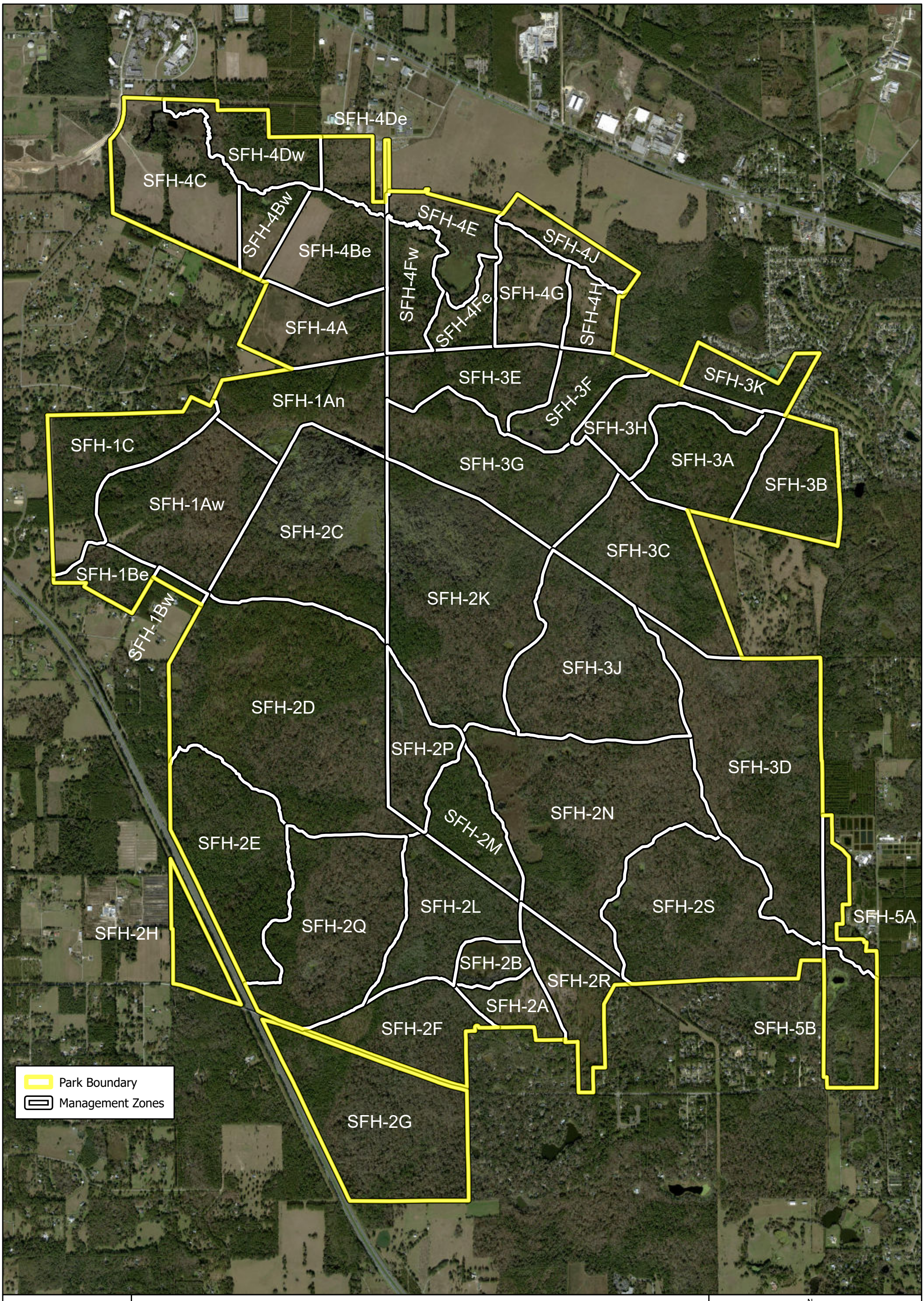
TOPOGRAPHY

San Felasco Hammock Preserve State Park is located in the Alachua Karst Hills within the larger Ocala Karst Geomorphological District. The Alachua Karst Hills consists of eroded hills of fairly impermeable, clay-rich sediments, with elevations typically greater than 150 feet mean sea level (msl). In this region, karst development is minor, and a high degree of surface drainage exists; consequently, these uplands have an extensive development of streams, lakes and wetlands (Champion and Upchurch 2003). The Western Valley is a relict coastal marine terrace with subtle relief, underlain by a thin veneer of sand over limestone, with elevations typically between 25 and 75 feet msl. Limestone deposits in the Western Valley form a mature karst plain characterized by rapid recharge and numerous sinkholes (Upchurch et al. 2011).

Underlying the Alachua Karst Hills is a moderately erosion-resistant sediment layer called the Hawthorn Group (Scott 1988; Martin and Dean 2001). At San Felasco Hammock, along the western edge of the upland plateau, ancient shoreline processes through geologic time have eroded limestone and soil deposits within the Hawthorn Group to create a distinct feature called the Cody Escarpment, familiarly known as the Cody Scarp (Upchurch 2002). This feature is a transitional area between the plateau and adjacent lowlands with topographic relief up to 80 feet and can vary from 1.5 to over 7 miles in width where it occurs (Puri and Vernon 1964; Williams et al. 1977).

The Cody Scarp constitutes one of the most persistent topographic breaks in the state, its continuity unbroken except by valleys of major streams. The abundance of sinkholes and stream-to-sink features (i.e. swallets) in this karst region profoundly influence the topographical and hydrological characteristics of the region (Butt et al. 2006). A large portion of the surface runoff from the Alachua Karst Hills drains across the Cody Scarp, rapidly infiltrates the subsurface limestone, and becomes groundwater as it reaches conduits in the Upper Floridan aquifer.

Topographic relief at San Felasco is characterized by gently rolling uplands interspersed with numerous karst features, depression wetlands, seepage creeks, and four prominent blackwater stream systems. Elevations range from about 200 feet msl at the southern portion of the preserve to about 52 feet msl near Lee Sink in the northwest corner. Sanchez Prairie, Turkey, Blues, Cellon and Moonshine Creeks are all among the most significant topographic features of the park. Numerous examples characteristic of karst topography can be found across the park including sinkholes, sinkhole lakes, enormous limestone



SAN FELASCO HAMMOCK PRESERVE STATE PARK
Management Zones

N

0 2,000 4,000 Feet

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Park Boundary
Contours (5 feet)
DEM (in feet)
200
60

SAN FELASCO HAMMOCK PRESERVE STATE PARK
Topography

N
0
2,000
4,000
Feet

This graphical representation is provided for informational purposes and should not be considered authoritative for navigational, engineering, legal, and other uses.

outcrops and large stream-incised ravines, some that terminate their entire streamflow directly underground via a karst window or swallet. As an example, Blues and Turkey Creek's both flow into two separate karst windows within the boundaries of San Felasco Hammock Preserve State Park, one called the Big Otter Ravine and the other the Split Rock Sink.

Artificial changes in the preserve's topography include drainage swales and borrow pits associated with the construction of Interstate 75, a tramway located in the southeastern portion of the preserve, numerous fire plow scars, roadways, powerline corridors, and hydrologic alterations such as canals, impoundments, and berms in the Cellon Creek system.

SOILS

Over 35 percent of the soil types recorded in Alachua County by the Natural Resources Conservation Service (NRCS) are present in San Felasco Hammock Preserve State Park (Thomas et al, 1985). This high degree of soil diversity can be attributed to north Florida's climate and to the complex geology and hydrology of the region. The NRCS soil survey classifies the preserve's soils in 26 map units consisting of 20 soil series (see Soils Map). In this plan, Addendum 4 contains detailed soil descriptions. Most soil disturbances identified in various parts of the preserve are the result of past agricultural and silvicultural practices. These practices included the cultivation of citrus and cotton, the production of tung oil and turpentine, and the harvesting of pines for pulpwood and saw logs. These activities depleted the soil of nutrients and increased the area's susceptibility to erosion.

Areas within the preserve that are prone to significant soil erosion include service roads, footpaths, and areas of high visitor use including the San Felasco Recreational Trail System. Some of San Felasco trails were created prior to 1999, but since that year the equestrian and bike trails have rapidly expanded their distances. The entire trail system accommodates multiple user groups including hikers, off-road mountain bikers and equestrians. As of 2016, these trails equaled a total of 64 miles for all user groups.

Many trails at the preserve follow gently undulating topography, however because of the high occurrence of karst features and rapid elevation changes throughout the preserve, the trail routes often utilize erosion-prone slopes. Topographic features such as wetland depressions, sinkholes, streams, and especially the slopes adjacent to Sanchez Prairie are highly vulnerable to increased rates of soil erosion. Trails are excluded from the most sensitive areas, especially within the preserve's wilderness zone.

Considering its age, the trail system remains in fairly good shape given the high erosion rate potential. However, it is well known that all trails, regardless of complexity, will eventually suffer from the effects of soil erosion (Bratton et al. 1979). The areas that experience increased rates of erosion are those sections that contain steep slopes, sensitive wetland and karst features, large trees with extensive root systems, and/or improper trail placement.

There are several areas where soil erosion has taken a significant toll and impacted the topography within the preserve. A considerable amount of natural community restoration will be necessary to repair disturbances from agricultural uses in the northern portion of the preserve. Past land uses include clearing for improved bahiagrass pastures, ditching and berming to drain wetlands, and cattle operations along Cellon Creek that eroded streambed and riparian areas.
Several upland areas, mainly those with steep slopes, continue to experience severe soil erosion. These include certain unpaved park service roads, multiple-use recreational trails, and areas with significant

SAN FELASCO HAMMOCK PRESERVE STATE PARK
Soils

Soils

- 2 - Candler fine sand, 0 to 5 percent slopes
- 3 - Arredondo fine sand, 0 to 5 percent slopes
- 5 - Fort meade fine sand, 0 to 5 percent slopes
- 7 - Kanapaha sand, 0 to 5 percent slopes
- 8 - Millhopper sand, 0 to 5 percent slopes
- 11 - Riviera sand
- 13 - Pelham sand
- 14 - Pomona sand, 0 to 2 percent slopes
- 16 - Surrency sand
- 17 - Wauchula sand
- 19 - Monteocha loamy sand
- 20 - Tavares sand, 0 to 5 percent slopes
- 21 - Newnan sand
- 23 - Mulat sand
- 26 - Samsula muck
- 28 - Chipley sand
- 29 - Lochloosa fine sand, 2 to 5 percent slopes
- 30 - Kendrick sand, 2 to 5 percent slopes
- 31 - Blichton sand, 0 to 2 percent slopes
- 32 - Bivans sand, 2 to 5 percent slopes
- 34 - Placid sand, depressional
- 35 - Gainesville sand, 0 to 5 percent slopes
- 68 - Candler fine sand, 5 to 8 percent slopes
- 69 - Arredondo fine sand, 5 to 8 percent slopes
- 71 - Millhopper sand, 5 to 8 percent slopes
- 72 - Lochloosa fine sand, 5 to 8 percent slopes
- 73 - Kendrick sand, 5 to 8 percent slopes
- 74 - Blichton sand, 2 to 5 percent slopes
- 75 - Blichton sand, 5 to 8 percent slopes
- 76 - Bivans sand, 5 to 8 percent slopes
- 77 - Bivans sand, 8 to 12 percent slopes
- 78 - Norfolk loamy fine sand, 5 to 8 percent slopes
- 99 - Water

N

0 2,000 4,000 Feet

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feral hog rooting. Logging activities to control southern pine beetles also caused erosion impacts to some steep slopes of the preserve. Management activities will follow generally accepted best management practices to prevent soil erosion and conserve soil and water resources on site.

San Felasco Hammock Preserve also contains a historic arsenic contamination site from a former cattle dipping operation on the property. The area that was affected by the dip vat sits on a 24-acre hillside parcel south of Cellon Creek. Constructed in the early 1900s, an in-ground dipping vat was used to immerse cattle in a chemical bath as a preventative for infectious insect-borne diseases at a time when Texas tick fever was a major problem in the cattle industry (Hope 2005). Soil cores and groundwater well monitoring have verified that the San Felasco dip vat site was contaminated with arsenic and chlorinated hydrocarbons originating from these former cattle operations. Soil deposits surrounding historic dip vat sites throughout the state have been identified as sources of arsenic and other poisons that have the potential to contaminate groundwater (CH2M Hill 1993). Additional discussion of this issue appears in the Hydrology section below.

HYDROLOGY

San Felasco Hammock Preserve State Park is situated in a hydrologically unique region of north-central Florida. The park's most prominent hydrological features are the Sanchez Prairie wetland system and several prominent stream-to-sink blackwater creek systems including Cellon, Blues, Turkey and Moonshine.

San Felasco Karst and Stream-to-Sink Features

The karst terrain of the park has encouraged the development of a diverse system of wetlands, ponds and streams within the unit. Sanchez Prairie and many associated drainage systems within the park are complex assemblages of creeks, ravines, sinks, swallets, floodplain swamps, alluvial forests and bottomland forests. Three of the unit's largest blackwater streams, Cellon Creek, Blues Creek and Turkey Creek, originate outside the park in separate headwater wetlands. Moonshine Creek, a fourth blackwater stream, lies entirely within the park. All four of these waterbodies are stream-to-sink creeks that terminate within the park at a recognized karst feature and funnel surface water directly into the Upper Floridan aquifer.

Sanchez Prairie, or "pond," located in the northern half of the park, is an 80-foot deep and 2-mile wide, elongated solution basin or karst prairie that captures the flow of a medium-sized blackwater stream called Turkey Creek. The term "prairie" may be somewhat of a misnomer since forests completely cover the basin except for a few open water areas. In one respect, however, prairie might be an appropriate identifier. According to one theory, Sanchez Prairie may represent an early stage in the formation of a basin marsh such as the huge one at Paynes Prairie (Williams et al. 1977; Dunn, 1982).

Smaller creeks within the park and especially along the steep slopes of Sanchez Prairie typically descend to a lowland area and can anastomose. Channeled flow from these creeks can also become sheetflow when sinks that drain the system cannot adequately convey their total discharge. Floodplain swamps have also formed because of creek flooding. Concentric rings of alluvial and bottomland forest communities are often associated with floodplain swamps in Sanchez Prairie.
Depression marshes, baygalls, and clastic upland lakes have developed in association with several of the park's seepage systems. All this wetland diversity, including the stream-to-sink features, is strongly defined by local karst geology, but more specifically by the Cody Scarp.

As mentioned, the park straddles a portion of the Cody Scarp, one of the most recognizable hydrogeologic and topographic features in the state (Puri and Vernon 1964; Upchurch 2002; White 1970). As with most stream systems that cross this scarp, a sizeable proportion of the surface water flow often disappears underground at sinks/swallets and reemerges at various resurgence points after mixing with groundwater in the Floridan aquifer (Copeland 2003; Martin and Dean 2001; Upchurch 2002). There are numerous stream-to-sink discharges and resurgence waterbody examples all throughout the Suwannee River Basin of north-central Florida, including large waterbodies like the Santa Fe River, Ichetucknee River and Peacock Springs River Slough. It important to note the high potential for surface water contaminants that pass through swallets directly into the Upper Floridan aquifer can degrade groundwater quality and have numerous significant implications that will be discussed below (Macesich 1988; Means and Scott 2005).

Because of dye trace evidence and extensive cave mapping, water scientists are now confident that a significant connectivity exists between surface water and groundwater sources in western Alachua County (i.e. Alachua Stream System) and the Lower Santa Fe River (Aley 1999; Meyer 1962; Martin and Screaton 2001; Moore et al. 2009). The Alachua Stream System includes karst features at the park and is one of the most recognizable and highly researched internally drained swallet regions in the state (Foose 1981; Williams et al. 1977). This region corresponds strongly with the underground parallel fault system of significantly fractured limestone that is often exposed along the Cody Scarp. These faulted formations make up the Cross-County Fracture Zone mentioned above in the geology section (Vernon 1951; Williams et al. 1977). The Santa Fe River is one of three major tributaries of the Suwannee River, drains nearly 1,400 square miles, and is designated as a "Special Water" under Florida's Outstanding Florida Water Administrative Code (Chapter. 62-302.700[9][i][34], F.A.C.) (Clark et al. 1964; Berndt et al. 1996). Additionally, Cellon, Turkey and Blues creeks are also designated Outstanding Florida Waters (OFW). These OFWs are those state waters with "exceptional recreational or ecological significance" (Chapter 62-302.700[3], F.A.C.). Portions of the Santa Fe River are impaired, and a Basin Management Action Plan (BMAP) has been developed for that water body (DEP 2012). One of the best documented examples of an internally drained system of the Lower Santa Fe River is Cellon Creek at San Felasco Hammock Preserve State Park.

Cellon Creek

The Cellon Creek watershed lies at the northern half of the park and occupies a total area of just over 11 square miles. Cellon Creek originates in three small headwater areas north of the town of Hague. Two of the headwaters are located on the University of Florida's Agriculture Experimental Farm, while the third one is a forested wetland located upstream from an industrial complex. Flows from these three headwaters converge just west of Hague to form the main stem of Cellon Creek. Cellon's flow moves south under U.S. Highway 441 and west for a short distance before it enters the park east of a large circular-shaped natural waterbody locally known as Itchy Bottom Lake. Many of the wetlands around the perimeter of Itchy Bottom Lake have undergone severe historic alterations.

The natural hydrology of the Cellon Creek/Itchy Bottom Lake complex is a unique combination of stream, lake and forested "sheetflow" wetlands, all of which are functionally dependent on both local aquifer levels and upstream discharge rates. All of the area between Itchy Bottom Lake and the northern extent of Cellon Creek is defined as the "Cellon sheetflow wetland". In the 1950s, landowners channelized and rerouted Cellon Creek directly into Itchy Bottom Lake via a berm/canal structure (i.e. Cellon Creek berm). This localized diversion of the historic stream course significantly changed the hydrology of the Cellon

sheetflow wetland. In 2003, the Suwannee River Water Management District (SRWMD) and park management implemented a phased wetland restoration project at the Cellon sheetflow wetland.

When the stream exits the Cellon Creek/Itchy Bottom Lake complex, it meanders through alluvial forest and marsh communities for nearly 2 miles before draining into a karst feature called Lee Sink. Aesthetically, Lee Sink appears to the untrained eye to simply be a large, 20-foot-deep disturbed depression, perhaps even artificial. Dye trace evidence in 2005 confirmed that the surface water entering Lee Sink funnels directly through a swallow hole into the Floridan aquifer and, as groundwater, then proceeds to the Santa Fe River near the Hornsby Spring complex in northwest Alachua County via the Cross-County Fracture Zone (Brooks 1967, Williams et al. 1977; Butt et al. 2006). The total stream length of Cellon Creek above Lee Sink is approximately 4.5 miles. The Cellon Creek/Itchy Bottom Lake to Lee Sink system is a stream-to-sink hydrologic feature quite like all three of the other prominent creeks found at the park, all equally important to the hydrology of the region (Williams et al. 1977).

Blues Creek

The Blues Creek to Big Otter Ravine is the second major stream-to-sink system in the park. Blues Creek headwaters are situated about 2 miles east of the park in northwest Gainesville in a large, forested wetland dominated by cypress, red maple and swamp black gum. The drainage from these eastern headwaters flows west under Northwest 43rd Street and through several subdivisions before entering the park at its southeast boundary near a wetland called Fox Pond. The Blues Creek watershed occupies a nearly 8-square-mile area, and, as of 2004, approximately 30% of this landscape was urbanized (Alachua County Environmental Protection Department 2004). Comparatively, only 13% of the Blues Creek watershed was urbanized in 1986 (Meier and Crisman 1986).

In the early 1980s, residential urbanization began within the landscape surrounding Upper Blues Creek headwaters. In 2016, this residential development consisted of twelve separate subdivisions throughout the area, each having a potential to impact the water resources of Blues Creek. The state of Florida requires stormwater management plans for all residential developments, but for those that discharge to OFWs, such as Blues Creek, the standards are even more stringent following legislation in Chapter 62-40 F.A.C. (DEP 2007).

A large portion of urban stormwater runoff from each subdivision is captured by a series of retention/detention control structures placed strategically throughout each development. Additionally, a United States Department of the Interior, National Fisheries Research Center (NFRC) also lies within a separate unnamed tributary that flows into the main channel of Blues Creek. Periodic discharges from this facility may affect Blues Creek. The water resources of the park could be adversely impacted by changes in quantity (i.e. rate of discharge) and/or quality of stormwater runoff into the Blues Creek watershed from these developments.

Impacts to streams associated with land-use changes will continue to intensify as the cities of Gainesville and Alachua encroach upon the park. Efforts will need be taken to improve the condition of all streams entering the park since, collectively, they provide significant recharge to the Floridan aquifer.

Once Blues Creek enters the park boundary, its flow continues in a northwesterly direction for about 2 miles before it enters a large floodplain swamp locally known as Chert Swamp. Blues Creek ultimately drops into a named swallow hole called Big Otter Ravine, and directly enters the Floridan aquifer. At least four smaller tributaries join the main channel of Blues Creek in the park. There is one named

tributary, Twin Creek, and three unnamed, including the NFRC stream mentioned above. The total length of Blues Creek is approximately 4.5 miles. The Blues Creek/Chert Swamp/Big Otter Ravine and Cellon/Itchy Bottom Lake/Lee Sink systems both appear to be slightly smaller versions of the largest stream-to-sink feature in the park, namely the Turkey Creek/Sanchez Pond/Split Rock system.

Turkey Creek

The Turkey Creek watershed extends southeast from the park for nearly 5 miles and occupies an area of nearly 12.5 square miles. The creek headwaters originate in extensive hardwood swamps that run parallel to U.S. 441 between Gainesville and the city of Alachua. There are at least eight well-defined tributaries in the Turkey Creek watershed. One has its origins as an unnamed small magnitude spring and a second receives a major anthropogenic influence from the Deerhaven industrial power plant (Breedlove and Associates 1976). Base flow discharge from the creek flows westerly through or adjacent to at least four subdivisions within its headwaters before entering the park at its northeast boundary. In the late 1970s, discharge (i.e. blowdown) from the Deerhaven Plant was generally considered to dominate the base flow of Turkey Creek. Once Turkey Creek enters the park, it then meanders southwest through the park for almost 2 miles before discharging to the Floridan aquifer at a sink known as Split Rock, located on the southern edge of Sanchez Prairie. The total length of this medium-sized blackwater stream is about 6 miles.

There are also numerous other stream systems scattered across the park that are located entirely within the boundary. Sometimes these waterbodies are named, such as Maple Branch, Twin Creek or Moonshine Creek, but most often they remain unnamed. Nevertheless, these small, permanent or intermittent streams comprise some of the park's most distinctive landscape features that help to define its unique character. Many of these watercourses originate as small seepage streams that emerge from the soil/bedrock, flow for a distance on the surface, sometimes creating ravines or gullies, and then disappear underground. Maple Branch, one of the larger seepage systems within the park, is typical of this type of seepage pattern.

A good number of the park's seepage streams have their headwaters within a perched wetland that overflows downslope. Moonshine Creek is an example of a larger ravine system that originates within the park from a large, perched wetland north of Millhopper Road. Moonshine then flows southward for about 1 mile, passes under Millhopper Road and eventually discharges into at least two unnamed swallets near the south boundary of the park. In 2015, it was observed that a new sinkhole had developed to the northwest of the swallets, capturing some of the flow from Moonshine Creek. Anthropogenic influences including stormwater runoff, erosion from foot traffic and feral hog damage have resulted in impacts to this water resource.

Water Issues

The three most important water quantity and quality issues that influence the water resources at San Felasco Hammock are erosion and sedimentation associated with creeks, wetlands or sensitive karst features, alteration of the natural hydroperiod of park stream systems and Sanchez Prairie, and regional surface and groundwater contamination. As described above, water issues tend to be the most severe in the three main waterbodies that originate from outside the park, namely Cellon, Turkey and Blues creeks. Urbanization such as industrial facilities, residential developments, as well as impervious roadways within the watershed of these stream systems can significantly influence stormwater effects on the park.

Erosion/Sedimentation

Because of its strategic position along the Cody Scarp, San Felasco Hammock Preserve State Park contains an incredibly high number of sensitive karst features scattered across its landscape. Within the park, swallets that have a direct aquifer connection, such as Split Rock Sink, Big Otter Ravine or Lee Sink, are all located within steeply sloped topography with variably wet soil conditions that create a very high potential for erosion. Park staff must continually be vigilant to protect these karst sites from any potential impacts from erosion. Many of these karst features are closed to access to preserve the soil stability and overall integrity of these sensitive resources. Historically, some karst features in the park were severely eroded because of issues associated with unrestricted access.

There are several erosion and sedimentation issues within the park that continue to challenge staff, including unpaved service roads and recreational trails in areas with intermittent seepage streams. When a road or trail is placed within a highly sloped landscape with wet soil conditions, the probability of erosion will substantially increase, while its long-term sustainability will generally decrease (Bratton et al. 1979). Several of the service roads in the park have been impacted by severe erosion, including some that have been abandoned because they can no longer be safely used for access. It is important to understand and use the best available management techniques, perhaps including a gradient/slope analysis, for sustainable road and trail development.

Heavy storm events can accelerate unnatural siltation into wetland communities. Increased stormwater runoff into park sinkholes or other depression wetlands will be identified and corrections made using the best available management practices. In some cases where service roads have been abandoned, such as at Twin Creeks Road or the old bridge crossing at Turkey Creek, additional restoration work may be necessary at stream crossings.

Staff frequently discover previously unmapped seepage wetland communities within the park, particularly during periods of high rainfall. Significant seepage wetlands, including newly discovered seeps, will be best protected from erosion and sedimentation by allowing temporary closures of affected roads and trails or even rerouting the road or trail around sensitive areas.

Hydroperiod Alteration

Urbanization can significantly modify the character and biological integrity of a wetland or stream ecosystem and associated riparian habitats (Suau 2005; White and Greer 2006). When the footprint of a development creates impervious surfaces within the boundary of a watershed, storage capacity and flow volumes may be altered (Fletcher et. al. 2013). Increased impervious surfaces can reduce the available surface area of a wetland, and therefore decrease its storage capacity and subsequently increase flow volumes. Changes to these physical attributes can affect the natural hydroperiod of a watershed. Stream characteristics and ecological function are modified and changes to downstream habitats can be expected.

During the late 1970s, for example, natural communities within Sanchez Prairie were impacted by a significant flood event that was triggered by large quantities of blowdown discharge that originated from the Deerhaven power plant. This upstream event altered the natural hydroperiod of Sanchez Prairie, created excessive flood conditions beyond the normal stream phenology, and caused a significant hardwoods mortality event to planer trees (*Planera aquatica*) adjacent to Sanchez Prairie. In order to correct the situation, Gainesville Regional Utilities (GRU) was required to build onsite wastewater treatment ponds on their property in order to dampen the hydroperiod and increase wetland storage capacity for a more controlled rate of discharge through the Turkey Creek system.

Excess flooding is similarly a concern for management of the Blues Creek stream-to-sink waterbody. The upper Blues Creek watershed has been subject to intense residential development since the early 1980s. The rate of discharge from the Blues Creek watershed has been a major permitting consideration to ensure downstream natural resources remain unaffected by stormwater discharge into the system. In addition to the use of stormwater ponds in the upper Blues Creek watershed, regulators also required a more stringent reduction of peak creek discharge by allowing a controlled-rate release weir structure to be constructed within the main upper basin branch below these developments.

Surface and Groundwater Contamination

The hydrogeological significance of San Felasco Hammock Preserve State Park's location along the Cody Scarp cannot be overstated. The highly porous geologic nature of the San Felasco landscape, as well as its regional surface water influence (i.e., Blues, Cellon and Turkey) is paramount at multiple ecological scales (Williams et al. 1977). As swallets in the park capture surface water and mix with the adjacent groundwater associated with the Alachua Stream System, limestone caverns that lie along the Santa Fe River are constantly being replenished via these interconnected watersheds.

Baseline assessments followed by routine monitoring of water levels (i.e. hydroperiod), surface/groundwater pollution loads, and land-use changes are essential components needed to understand changes and the magnitude of impact of these upgradient stream/wetland ecosystems on recipient downstream watersheds. The Alachua County Environmental Protection Department (ACEPD) has also long played a key role in watershed monitoring throughout the county, including Blues, Turkey and Cellon creeks. Since 1979, ACEPD has routinely conducted assessments to monitor a variety of water parameters at several permanent stations along each of these three stream systems. DRP staff have also collected water samples from these three major streams as part of the Florida LAKEWATCH program since 2008 (LAKEWATCH 2016). No water quality or quantity monitoring has ever occurred in Moonshine Creek. Much of the hydrological information that has been collected, stored and managed by state water management agencies can now be accessed through a variety of web-based filters (U.S. Geological Survey 2016; Suwanee River Water Management District 2016; DEP 2016a, DEP 2016b).

The first comprehensive assessment of the Blues Creek watershed was a one-year study from 1985 through 1986 (Meier and Crisman 1986). This in-stream biological and water chemistry study was put in place as a baseline assessment due to increased urbanization within the upper reaches of this sensitive watershed (Fletcher et al. 2013). During this study, water scientists analyzed data from five stations along the entire creek, including three within the park.

In their final assessment, researchers characterized this freshwater system as a healthy intermittent low discharge, well oxygenated and slightly alkaline waterbody with an extremely robust diversity of macroinvertebrates, especially at one particular study location (i.e. Station 3 on San Felasco near Fox Pond). In fact, the researchers recommended that station as the ideal location for future comparative assessments to monitor shifts in macroinvertebrate diversity in response to pollution.

The first long-term discharge/water level data analysis was conducted by the United States Geologic Survey (USGS) during the period from 1984-1994. During this period, USGS and DRP staff collected discharge/stage data (USGS No. 02322016) at several stations within the Blues Creek watershed (USGS 2016; District 2 files). Within this period, Blues Creek had an average annual flow of 3.43 cubic feet per second (CFS) and a harmonic mean of 0.72 CFS (N= 3762; Maximum= 147 CFS, Minimum= 0.1 CFS).

Similarly, ACEPD collected and analyzed flow measurements at Blues Creek during the period from 1998 to 2011 and reported discharge as an annual harmonic mean at 0.02 CFS (ACEPD 2012).

Given the periodic increases in fecal bacteria levels, decreased discharge and highly intermittent nature of Blues Creek, the overall habitat assessment of this stream ecosystem oddly enough still appears to remain healthy with an adequate suite of water quality parameters and continued robust macroinvertebrate diversity (ACEPD 2012).

The Cellon Creek watershed has also undergone a fairly extensive level of biological and water chemistry monitoring going back to at least 1980, primarily because of a rechargeable battery manufacturing facility (DEP Site ID No. FLD043860451) that is located in one of the upper tributaries of this stream's headwaters (Water and Air Research (WAR) 1980). This industrial facility was built in 1963, has changed ownership numerous times, and was declared a Hazardous Waste Management Area by DEP and the U.S. Environmental Protection Agency (EPA) in late 1980s due to its regular chemical releases into the Cellon watershed (WAR 2012; WAR 2015). Besides this facility and the previously mentioned Cellon sheetflow wetland, other significant urbanization influences in the Cellon basin comes from light industry, cattle grazing, and a large research complex (i.e. Progress Center Research and Technology Park) located adjacent to Lee Sink.

The battery manufacturing facility, mentioned above, was not even considered for inclusion into the EPA's National Pollution Discharge Elimination System (NPDES) permit system until after 1975 (EPA 1975). Interestingly, watershed science was only in its infancy at that time, and federal and state protections for isolated wetlands were not as stringent as they are today. During the first 20 years of operations at the facility, a suite of hazardous waste chemicals used in the battery manufacturing process were stored onsite in outdoor holding ponds and landfill locations adjacent to Cellon Creek and were periodically discharged into this waterbody.

One of the first known assessments of the effects on Cellon Creek occurred in August 1980 (WAR 1980). Even though this manufacturing plant used all the required protective precautions at its hazardous waste containment areas, significant soil and groundwater contamination occurred at this site. Cadmium and nickel are two of the primary inorganic compounds of concern at the site, but high levels of cobalt and nitrates were also present. This facility annually discharged from 1963-2004, substantial amounts of waste material into a drainage ditch that moved downstream into the Cellon Creek watershed (Geraughty and Miller Incorporated 1981). The EPA tracked all hazardous effluent releases from this facility (EPA TRI ID No. 32602GTSNRHIGHW) into Cellon Creek during the period from 1987-2004 (EPA 2016). In 1987, 2001 and 2002, for example, an annual maximum effluent release of 250 pounds of cadmium and 250 pounds of nickel occurred from the facility into the drainage ditch.
In 1998 and 1999, an annual maximum effluent release of 683 and 550 pounds of nitrate compounds similarly occurred. Perhaps in response to the large cadmium releases in 2001 and 2002, DEP conducted stream condition health assessment monitoring at the battery facility property (DEP 2004). From the conclusions of this work, researchers determined that Class III water quality standards were still being exceeded for both cadmium and nickel concentrations through the end of 2003. Additionally, DEP suggested that given the high detection level of cadmium in the creek during their sampling, any stream macroinvertebrates within the Cellon system were undoubtedly exposed to toxic concentrations.

In 1987, the battery facility was issued a hazardous waste Closure Permit (No. HF01- 149565) under the guidance of DEP and the EPA (WAR 2015; EPA 2016). During the period from 1991 through 2016, the facility has been required to undergo substantial soil and groundwater remediation cleanup efforts

(WAR 2015; DEP 2016c). The facility uses a groundwater recovery and treatment technology whereby water from the surficial, intermediate and Floridan aquifer is extracted, treated and subsequently discharged back via a surface spray field (EPA 2000). During a one-year period from June 2014 to June 2015, for example, this facility extracted and processed a total volume of contaminated groundwater of close to 2 million gallons (WAR 2015).

In 1987 the University of Florida (UF) Foundation began to develop a large research hub known as Progress Center Research and Technology Park on a piece of property adjacent to Cellon Creek near its terminus at Lee Sink. One condition of the 1987 City of Alachua Development Order for this Development of Regional Impact (DRI) was a requirement to monitor water quality of Cellon Creek. Annual surface water, groundwater and sediment monitoring from 1988-95 was conducted using five shallow water wells and two surface locations on Cellon Creek (CH2M Hill 1995).

During the initial 1988 baseline monitoring efforts for the Progress Center, DEP was informed that sediments in the lower sections of Cellon Creek were contaminated with heavy metals, including cadmium, very similar to those sampled upstream at the battery plant (CH2M Hill 1988). Much different from the battery plant facility, however, monitoring results for the lower Cellon Creek indicated that heavy metals were only present in the sediments and not detectable within the surface water or groundwater. Furthermore, the metals in the lower Cellon were determined to be much less toxic in their current state unless drastic pH changes were to occur in the water of the stream (DEP 1991).

Nonetheless, in the early 1990s, as DRP was acquiring a nearly 900-acre tract from the UF Foundation, the heavy metals issue of Cellon Creek became an important consideration to the state. Important waterbodies associated with the 900-acre acquisition included a large segment of the lower Cellon Creek, Lee Sink and Itchy Bottom Lake wetland complex. One condition of the purchase of this tract, was a DEP recommendation that future recreational activity along Cellon Creek be severely limited to ensure that the stream sediments would not be re-suspended because of visitor activities. The UF Foundation continues to hold easement rights for the development of stormwater treatment and discharge facilities in areas upslope of Cellon Creek and Lee Sink. As these research facilities are developed the hydrology of Cellon Creek may be further impacted.

Like Blues Creek, ACEPD collected and analyzed flow measurements at Cellon Creek during the period from 2002 to 2012 and reported discharge as an annual harmonic mean at 0.02 CFS (ACEPD 2012). Even with the frequent exceedances in fecal bacteria levels, high background level of heavy metals, and highly intermittent nature of Cellon Creek, the overall habitat assessment of this stream ecosystem does still appear to be healthy with a high abundance and diversity of benthic macroinvertebrates (ACEPD 2012).

Even though Turkey Creek has also undergone numerous biological and water chemistry monitoring efforts since 1979, there is a paucity of available assessments to evaluate the condition of this important stream to sink watershed. In addition to stormwater runoff, one other important surface and groundwater concern is the Deerhaven industrial power plant.

The Deerhaven power plant is a coal-fired industrial facility that operates under a DEP NPDES stormwater monitoring permit (FDEP NPDES Facility ID No. FLR05B392). In 1987, DEP outlined certification conditions for the facility (DEP 1987). The EPA also tracked all hazardous effluent releases onto land and surface waters within this facility (USEPA TRI ID No. 32653GNSVL10001) during the period from 1998-2014 (EPA 2016). The toxic waste chemicals produced by this plant are managed onsite within landfill and holding ponds, however there is an intricate connection between these contaminant

sites and a facility stormwater system which ultimately discharges into Turkey Creek (Innovative Waste Consultant Services (IWCS) LLC 2015; IWCS 2016). This facility undergoes periodic inspections for hazardous materials compliance (DEP 2009).

At this time, it is unclear from the available documents what percentage of stormwater runoff generated by this facility and subsequently discharged to Turkey Creek contained hazardous effluent contaminates, nonetheless, incidents have occurred periodically (GRU 1992). According to the EPA toxic release inventory, extremely large amounts of chemical waste are generated at this facility (EPA 2016). In 2012, one watchdog organization provided documented concerns about potential groundwater leaks within the containment system of at least two of the onsite holding ponds at this facility (Clean Water Action of Florida 2013).

ACEPD has conducted numerous chemical and biological assessments within the Turkey Creek watershed going as far back as 1979 (WAR 2004). ACEPD has collected and analyzed flow measurements at Turkey Creek during the period from 1999 to 2012 and reported discharge as an annual harmonic mean at 0.02 CFS (ACEPD 2012). According to the ACEPD assessments, fecal coliforms and in-stream erosion levels have caused some upper watershed sections of Turkey Creek to be classified as impaired up through 2012.

Water managers have long recognized that urbanized watersheds, especially in highly karst areas like Gainesville, can create serious water quality issues (Best et al 1995; Cichon et al. 2004; ACEPD 2007; ACEPD 2008). State water managers have monitored groundwater quality in numerous types of wells over the past 30 years.

Within Gainesville and near San Felasco Hammock Preserve State Park, over 450 different wells are used to track groundwater quality in the area (DEP 2016a). Some of the wells have served to document changes associated with known contaminated sites, while others are associated with a Very Intense Study Area (VISA) monitoring, (Maddox et al. 1998). In the city of Gainesville, there are at least 21 VISA wells that monitor contamination of Upper Floridan aquifer, with most of these sites near or west of the Interstate 75 corridor. There is also an EPA Superfund site within Gainesville city limits (EPA 2006; Mercer et al. 2007).

DEP monitors a significant number of groundwater wells within the region, including Background monitoring wells, VISA wells, Class V Non-ASR and Class I underground injection wells, Storage Tank Contamination wells, NPDES wells, hazardous waste site wells, industrial power plant wells and Superfund site wells.
Additionally, the Florida Geological Survey tracks the intermediate, upper and lower Floridan aquifers using over 150 groundwater monitoring wells that are scattered throughout the Gainesville region, including at least 11 that are located adjacent to the park. Potentiometric groundwater levels from wells situated near Big Otter Ravine (No. S091938002) at the park have also been collected by the SRWMD since 1980 (SRWMD 2016).

One specific subset of well and soil testing data important to San Felasco Hammock Preserve State Park is that associated with abandoned cattle dipping site at an old dairy site located in SFH-4A adjacent the power lines (CH2M Hill 1993). This is the only known cattle dip vat in the park. In 1993, DRP contracted out an assessment of the site and both groundwater and soils were found to be contaminated with arsenic, toxaphene, and other pesticides. This testing was completed prior to the final purchase of the UF Foundation addition. Additional environmental assessments were completed in 1992. The

recommendation made to DRP was to restrict access to this site with a fence. In 2017, DRP initiated a review of the SFH-4A dip vat site with the DEP Site Investigation Section to determine the contamination status of the site. As of 2023, portions of the site (Area of Concern (AOC) 3= sinkhole) have been released from further assessment due to the finding that it did not contain contaminants that exceeded applicable standards, however soil and groundwater is still being monitored at two AOCs.

Assessment of Needs

Objective: Assess the park's hydrological restoration needs.

Actions:

- Continue to cooperate with state and federal agencies and independent researchers regarding hydrological research and monitoring programs within the park.
- Continue to monitor, review and comment on proposed land-use/zoning changes that may influence the water resources of the park.
- Continue to seek expertise and funding opportunities for dye trace studies to determine the groundwater sources, especially additional groundwater connections to the Santa Fe River.
- Cooperate and seek expertise from SRWMD and ACEPD for continued implementation of water quality and quantity monitoring in the three significant blackwater stream systems of the park, including Cellon, Turkey and Blues creeks.
- Seek guidance from appropriate agencies and assess the feasibility of installing continuous stage recorders in Blues, Turkey and Cellon creeks to monitor flows.
- Seek guidance from SRWMD to develop and implement a water monitoring plan in Moonshine Creek.
- Continue to seek guidance and recommendations from DEP Site Investigation concerning the historic dip vat in SFH-4A.

The most significant hydrological features in the park include the Sanchez Prairie wetland system and several blackwater streams, including four prominent creek systems, namely Cellon, Blues, Turkey and Moonshine creeks. All four of these waterbodies are stream-to-sink creeks that terminate within the park at a recognized karst feature and funnel surface water directly into the Upper Floridan aquifer. Control of erosion and sedimentation along each of these important waterbodies, as well as preservation of surface water and groundwater quality and quantity at the park will remain top priorities for DRP. The following are the hydrological assessment actions recommended for the park.

DRP will continue its tradition of close cooperation with state and federal agencies and independent researchers engaged in hydrological research and monitoring in the park, and it will encourage and facilitate additional research in those areas. To facilitate that process, DRP will rely upon agencies such as ACEPD, SRWMD, USGS and DEP to keep it apprised of any declines in surface water quality or any additional suspected contamination of groundwater in the region. DRP will follow DEP guidance for remediation of soil contamination by historic dip vats.

District staff will continue to monitor environmental resource permit and water use permit requests for the region to provide timely and constructive comments that promote protection of the park's water resources. Additional cooperative efforts may include facilitating the review and approval of research permits and providing researchers with assistance in the field, including orientation to park resources. Recommendations derived from these monitoring and research activities will be essential to the

decision-making process during management planning. One activity worthy of DRP support is continued groundwater monitoring of all important wells and water bodies under the park's jurisdiction.

Staff will also continue to monitor land-use or zoning changes within lands bordering the park. Major ground disturbances on neighboring properties or inadequate treatment of runoff into local streams could ultimately cause significant degradation of park resources. When appropriate, DRP staff will provide comments to other agencies regarding proposed changes in land use or zoning that may affect the park. In addition, district staff will closely monitor any mining operations or large consumptive use permits in the Santa Fe River basins for significant changes that may adversely affect park resources.

For water managers to adequately protect water quality at the park and the downstream watersheds such as the Santa Fe River, they will have to know the extent of the interconnectedness of the Alachua Stream System as mentioned in the *Hydrology* section above. However, the proximal and distal sources of flow through the Floridan aquifer are still unknown. To remedy that, DRP will encourage hydrological research, including dye trace studies, designed to facilitate springshed delineation throughout the Santa Fe River basin.

Restoration

Objective: Restore natural hydrological conditions and functions to approximately 2 miles of blackwater stream and 10 acres of sinkhole lake natural community.

Action:

- Continue to seek expertise from the SRWMD and pursue funding to determine the degree of hydrological restoration that is needed in the Itchy Bottom Lake/Cellon Creek system, and, if necessary, to develop and implement additional restoration projects.

DRP will evaluate the condition of Itchy Bottom Lake/Cellon Creek sheetflow wetland system at the park by mapping, reconnaissance and determining their current ecological status. DRP staff will determine if it is possible to restore these wetland communities, specifically the removal of any old berms and canals. If staff determines that further restoration is possible, alternatives will be developed and implemented. Park staff will comply with best management practices to maintain the existing water quality on site and will take appropriate action to prevent soil erosion or other impacts to water resources.

Erosion Mitigation

Objective: Evaluate and mitigate the impacts of soil erosion in the park.

Actions:

- Implement the Trail Management Plan for the park's recreational trails.
- Regularly monitor all park service roads and trails that are subject to significant erosion, implement corrective measures as necessary, complying with best management practices for surface and ground water quality.

Several areas in the park continue to have erosion issues despite past corrective measures. The following are erosion control actions recommended for the park.

Staff will regularly monitor areas of the park that are prone to erosion. Wherever necessary, the park will adopt corrective measures to reduce the impacts of soil erosion on water resources.

DRP staff will investigate the best management options for additional mitigation of erosion in public use areas such as the San Felasco recreational trail system. DRP will implement a Trail Management Plan for this park's recreational trails. This plan will define expectations of a well-maintained and sustainable trail system by prioritizing impacts and educating all stakeholders concerning park resource protection.

Monitoring and Evaluation

Objective: Monitor and evaluate the impacts of historic cattle dipping operations at the park.

Action:

- Seek guidance from appropriate experts and implement a monitoring plan for the cattle dip vat site at the park.

A 900-acre tract managed DRP as part of San Felasco Hammock Preserve State Park was purchased from the UF Foundation because it contained an extremely important surface and groundwater linkage, namely Cellon Creek and Lee Sink. Prior to acquisition, DRP had identified a single significant area of concern within the tract where previous landowners had conducted intensive cattle dipping operations. Rigorous groundwater and soil sampling in the vicinity of the dip vat revealed that soils in the area were contaminated. According to the contamination experts, DRP was recommended to restrict access to the dip vat area by fencing.

DRP will continue to cooperate with appropriate experts within DEP or other agencies concerning the long-term monitoring of water quality and soils in the area where cattle dipping operations have occurred. DRP will mitigate impacts as needed, using the best available means of remediation.

NATURAL COMMUNITIES

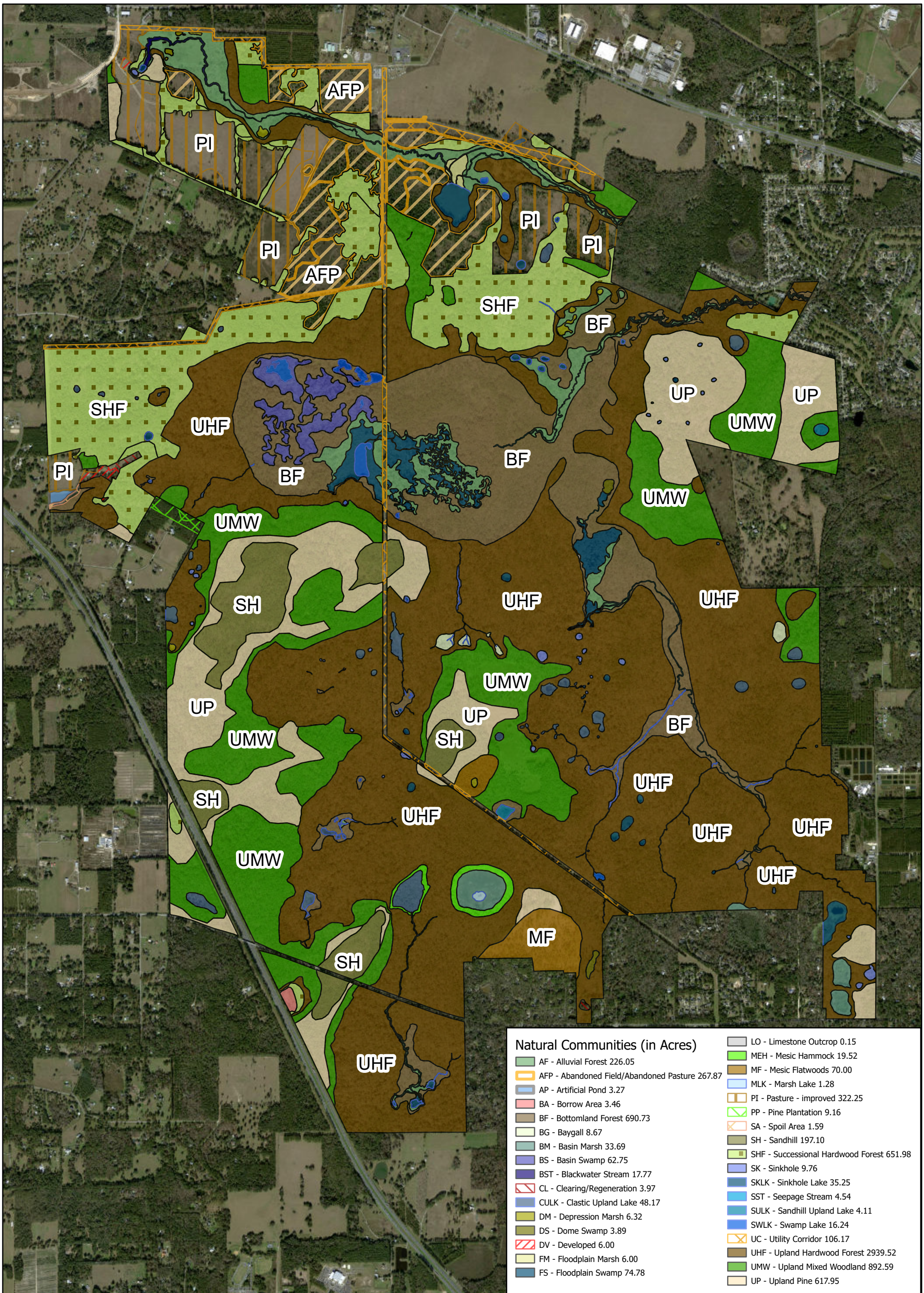
Limestone Outcrop

As might be expected given their location amidst the karst landscape of the Cody Scarp, San Felasco Hammock Preserve State Park contains numerous limestone exposures. These occur as limestone outcrops situated along the sides of sinkholes and as large limestone boulders associated with disappearing streams.

Due to their limited size and erratic distribution, only selected larger limestone outcrops and boulders are included on the natural community maps for the park. The most significant examples are located within Big Otter Ravine and Split Rock where Blues Creek and Turkey Creek enter sinks.

The limestone outcrops are in good to excellent condition. Most are located well away from trails or roads or are screened from public view by abundant vegetation or undulating terrain.

The invasive fern Japanese false spleenwort (*Deparia petersenii*) is a Florida Invasive Species Council (FISC) Category I invasive species and is established at Big Otter Ravine and other areas with exposed limestone in the park. Rare or imperiled plant species recorded at limestone outcrop or boulder sites include San Felasco spleenwort (*Asplenium monanthes*), although it has not been documented in the park in at least several decades.



SAN FELASCO HAMMOCK PRESERVE STATE PARK
Natural Communities - Existing Conditions

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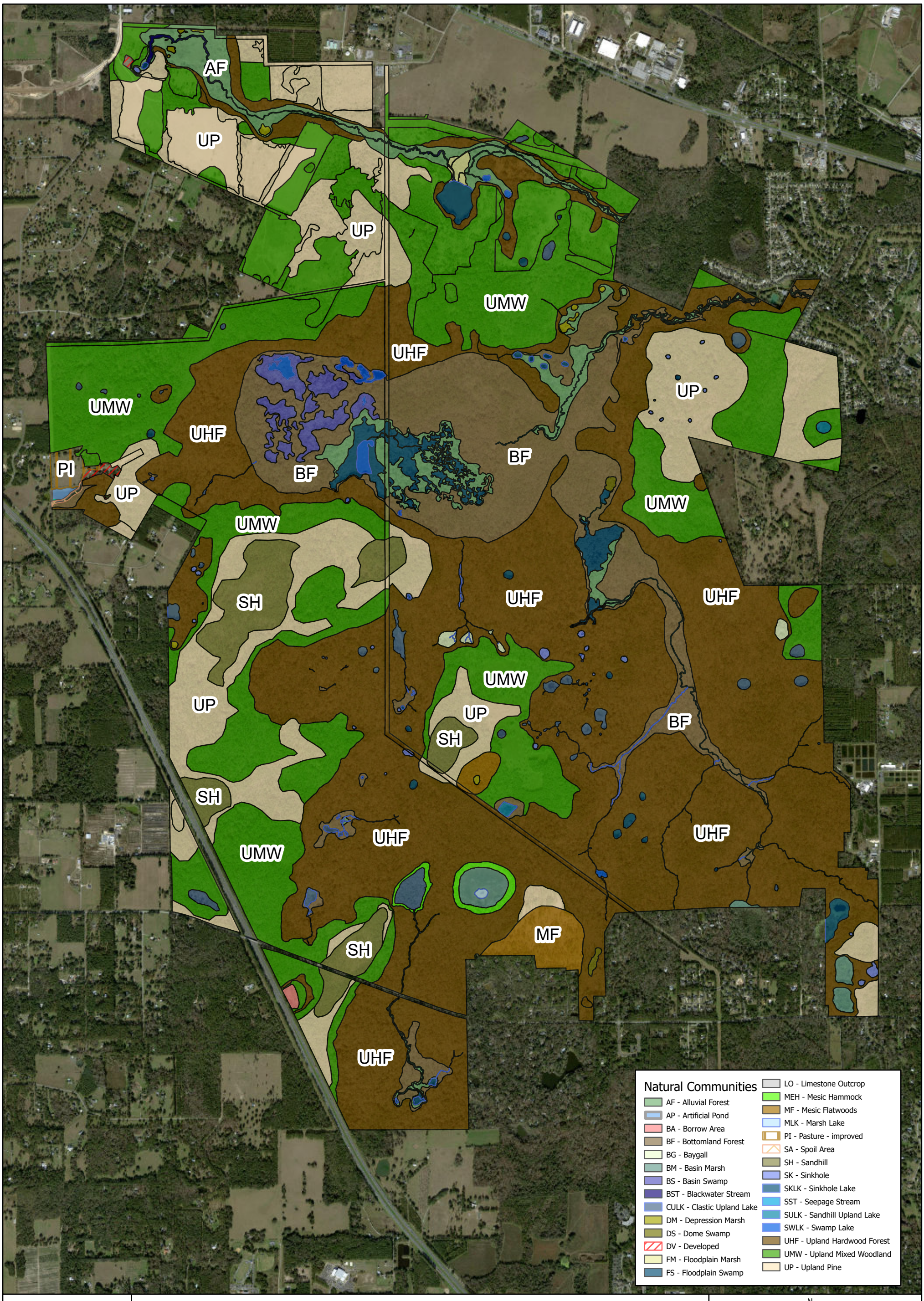
This graphical representation is provided for informational purposes and should not be considered authoritative for navigational, engineering, legal, and other uses.

SAN FELASCO HAMMOCK PRESERVE STATE PARK
Natural Communities - Desired Future Conditions



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Most of the outcrops are within areas where public access is already restricted. Still, the park should take measures to prevent runoff and erosion from degrading the limestone outcrops, particularly near existing trails or roadways. Personnel involved in the control of invasive plants in sinkholes and upland hardwood or bottomland forests should consider it likely that limestone outcrops or boulders harboring rare plants are nearby, and should minimize ground disturbance and overspray of herbicide as much as possible. Treatment of invasive plants on limestone outcroppings will require careful planning and caution to avoid impacts to native species.

Mapping of significant limestone outcrops, accompanied by surveys for imperiled plant species, will be necessary to ensure their long-term protection.

Mesic Flatwoods

The most extensive area of mesic flatwoods within the park lies north of Millhopper Road adjacent to The Hammock subdivision. This flatwood is relatively unique in that it occupies the highest elevations within the park. The existence of flatwoods at this site would seem to indicate the presence of an impermeable layer, or hardpan, in the soil, although Dunn (1982) states that the soils here typically lack such a layer. North of the flatwoods is a wide transition zone of upland pine that grades into an expanse of upland hardwood forest. Upland hardwood forest is also found to the west of the site, while to the east is a dome community.

Longleaf pine (*Pinus palustris*) originally dominated the flatwoods canopy. However, a southern pine beetle outbreak in 1994-95 decimated the longleaf pine forest on this site. In response to the pine beetle threat, nearly all the standing timber on about 40 acres of the mesic flatwoods was clear-cut, including hardwoods removed in the process of felling the infested pines. Before the beetle infestation, growing season fires had dramatically reduced the density and stature of invasive off-site hardwoods. The loss of the longleaf pines removed the major fuel source for growing season fires. As a result, this site is overgrown by species such as sweetgum, laurel oak and water oak. Herbaceous components are still present, and some younger longleaf pines are present, but they are suffering from competition from hardwoods and loblolly pines. Many hardwood sprouts have reached a size that may require mechanical or chemical control before prescribed fire can be successful at the site. Wiregrass (*Aristida beyrichiana*) persists in scattered patches and composites such as blazing star (*Liatris* spp.) are still present. The herbaceous layer is currently characterized by dwarf live oak (*Quercus minima*), bracken fern (*Pteridium aquilinum*), shiny blueberry (*Vaccinium myrsinites*), saw palmetto (*Serenoa repens*) and broomsedges. The initial round of longleaf pine planting occurred in 1999.

In 2015, a smaller infestation of southern pine beetles and other bark beetles was detected along the eastern border of the mesic flatwoods. A salvage cut was conducted in 2016 to control the infestation. As part of this timber operation, loblolly pines were thinned, and offsite hardwoods were removed in the overgrown portions of the mesic flatwoods. In 2019, the majority of the mesic flatwoods and upland pine in zones SFH-2A and SFH-2R were timbered for hardwood biomass to reopen the canopy. All longleaf and loblolly pines were retained, and prescribed fire will be applied to stimulate groundcover response and reduce fuel loading.

Another area of mesic flatwoods is located within an upland pine area just north of the powerline easement in the center of the park. It occurs as a transitional band between a small depressional wetland and the surrounding upland pine.

Before clear-cutting to control southern pine beetles in 1995, this area was thought to be overgrown upland pine or upland hardwood forest. Removal of the tree canopy stimulated the growth of many

plant species more typical of mesic flatwoods. These include gallberry (*Ilex glabra*), and fetterbush (*Lyonia lucida*).

Rarer species that appeared after the disturbance included pine lily (*Lilium catesbaei*) and yellow-fringed orchid (*Platanthera ciliaris*). Restoration of these mesic flatwoods will continue with periodic prescribed fires.

Mesic Hammock

Mesic hammocks occur in isolated basins within the park. The delineation of mesic hammock, upland hardwood forest and bottomland forest is difficult due to similar vegetative characteristics and topography. In general, bottomland forests are low plateaus and are influenced by the flooding of blackwater streams, while mesic hammocks occur as bands of vegetation on the low slopes above wetlands. Mesic hammocks grade into upland hardwood forests upslope.

The mesic hammock community within the park is in good to very good condition, depending on past logging impacts. As with the bottomland forests, these areas were timbered for live oak and other valuable hardwoods. In most cases, these areas have restored naturally, and trees are beginning to approach their former stature.

Sandhill

The sandhill community occurs on four sites in the western half of the park. It occurs at slightly higher elevations along ridge tops within the upland pine community. Sandhill is often distinguished from upland pine by the presence of turkey oaks (*Quercus laevis*). Both communities are characterized by the presence of longleaf pine and wiregrass. The transition between sandhill and upland pine is often subtle, although soil differences, mainly in drainage characteristics, play a role.

Most of the sandhill within the park is in fair to good condition despite the harvesting of longleaf pines in the distant past. Several areas were impacted by southern pine beetle infestations in 1994-95 and in 2001. Longleaf pines and loblolly pines (*Pinus taeda*) infested with beetles were felled or harvested. About 23 acres of sandhill were clear-cut. The cutting of clusters of infested pines (group selection harvesting) significantly impacted additional areas. In addition, most of the remaining sandhills in the park suffered some level of impact from the felling of scattered pines that were threatened by beetles. Prior to the southern pine beetle outbreak, prescribed fires had succeeded in reducing hardwood encroachment in most areas of sandhill. The suspension of prescribed burning in the park during the beetle outbreaks slowed the restoration of some of these areas.

Several sandhill areas were only in fair condition due to extensive hardwood invasion caused by a lack of adequate fire. Most of these areas have now been burned since 2016 and are expected to further improve with the resumption of regular prescribed fire. In some areas, it will be necessary to mechanically and chemically treat invasive offsite hardwoods that have become established due to the long fire return intervals in the sandhills.

Sinkhole

San Felasco Hammock is located in a geologically active karst region. It contains numerous karst depressions, sinkholes and sinkhole lakes. Since many sinkholes periodically hold water or dry out, there is often an artificial dichotomy between them and sinkhole lakes. Mapping of many of the sinkholes was possible using a GIS-based digital elevation model derived from LIDAR data. Sinkholes in the park range from older depressions with gentle slopes and established vegetation, to smaller, steep sided sinkholes

that are relatively young and still actively expanding in size. The most significant impact to sinkholes in the park is primarily soil disturbance from the rooting of feral hogs.

Upland Hardwood Forest

The upland hardwood forest is the most extensive community within the park and is one of the finest examples of its kind in the state. This community has very high species diversity and includes locally uncommon species such as bluff oak (*Quercus austrina*), shumard oak (*Quercus shumardii*) and spruce pine (*Pinus glabra*). Dominant canopy species include pignut hickory (*Carya glabra*), southern magnolia (*Magnolia grandiflora*), Florida maple (*Acer saccharum* subsp. *floridanum*) and swamp chestnut oak (*Quercus michauxii*). The majority of this community is in excellent condition despite selective logging during the past two centuries. Traces of past timbering have all but disappeared. For example, several areas in the southeastern part of the park that were logged prior to 1937 have naturally regenerated to upland hardwood forest (Dunn, 1982).

Unfortunately, the loblolly and spruce pines in the upland hardwood forest were not spared by the southern pine beetle outbreak. Over 40 acres at several locations were cleared of pines. Many of the other areas were impacted by group selection harvesting of pines. Restoration of the upland hardwood forest at these sites will proceed naturally as native hardwoods and pines gradually recolonize the disturbed patches.

Other disturbances of the park's upland hardwood forest in the past included the conversion of woods to pasture. Such was the fate of an area in the northern part of the park west of Turkey Creek. Aerial photographs from 1937 show that extensive clearing had already taken place. According to more recent aerial photographs, the cleared areas were apparently converted to improved pasture sometime between 1949 and 1955. The 165-acre site is currently dominated by hardwoods interspersed with clearings of bahiagrass (*Paspalum notatum*).

Many small household dumpsites can still be found within the upland hardwood forest, although they are considered relatively inert. Fire plow scars are also located within the upland hardwood forest, primarily near fire-adapted and wetland communities. Two powerline rights-of-way pass through the upland hardwood forest within the park, one active and one abandoned. The active easement is maintained by Duke Energy (formerly Florida Power Corporation). The abandoned right-of-way is expected to continue its natural succession to upland hardwood forest. Additional utility easements within the park will be actively discouraged, particularly within upland hardwood forest.

The upland hardwood forest includes small areas of other natural communities such as sinkholes, blackwater streams and seepage streams. In most cases, the upland hardwood forest grades into upland pine on the higher elevations. Decades of fire suppression have further blurred the subtle transition zones between these two communities.

The greatest threats to the upland hardwood forest are invasive species. Coral ardisia (*Ardisia crenata*) is expanding throughout the upland hardwood forest. Although the densest infestations are south of Millhopper Road, dispersal of the edible fruits by birds and mammals has created scattered clumps throughout the park, particularly in the fertile soils of the upland hardwood forest. From 2008 to 2011, manual removal was done during organized volunteer workdays, but this failed to contain the spread. Intensive herbicide treatment projects began in 2015.

Another impact to the upland hardwood forest was the loss of the adult red bays (*Persea borbonia*) from the tree canopy. The red bay ambrosia beetle (*Xyloborus glabratus*) was first detected in the United States in southeast Georgia. The beetle carries the fungal pathogen (*Raffaelea lauricola*) which it

transmits to red bay trees and other species in the Lauraceae family, causing laurel wilt disease and death. The beetle and its associated pathogen spread rapidly, and by 2005 it had appeared in Duval County. In 2007, the disease was discovered in Alachua County. Since that time, most of the adult red bays in the park have died. The beetle (and laurel wilt) has now spread throughout most of Florida and into many of the neighboring states. Although most of the adult red bays have been top-killed, the trees continue to resprout from their roots, and smaller saplings are usually not affected by the disease.

In 2017, park staff and visitors observed evidence of vine cutting in certain areas of the upland hardwood forest. Vines were cut off a few feet above the ground surface with some sort of cutter or saw and the vines had been left to die in the canopy. Multiple species of vines, including grapevine and Virginia creeper were affected. The rationale behind the cutting of the vines was not determined, but cut vines were located and mapped near the southern end of the park as well as deep within the central areas. The overall extent of the damage is still being assessed, and it is not known when the cutting began. By 2018, it appeared that the vandalism had been discontinued, but park staff will continue to monitor the upland hardwood forest for any evidence of further damage. Recovery from the loss of the older established canopy vines may take decades in the hardest hit areas.

Feral hogs and armadillos cause extensive damage to the upland hardwood forest through rooting up the soil layers and consuming all forms of plants, invertebrates and other small leaf litter animal species. Control of feral hogs continues to be a high priority.

Removal of invasive species will be the primary management measure in the upland hardwood forest. Natural succession will suffice in many cases to restore disturbed areas of upland hardwood forest. Control of southern pine beetle outbreaks may also be necessary to limit the loss of spruce and loblolly pines in upland hardwood areas.

Upland Mixed Woodland and Upland Pine

Upland pine and upland mixed woodland occur in relatively broad bands between the upland hardwood forest and sandhill. The distinction between upland mixed woodland and upland pine is difficult in fire-suppressed areas and is even more difficult in areas where the ground cover has been heavily altered or converted to pasture grasses. Within the park, the upland pine and upland mixed woodland occupy an intermediate elevation between the sandhill and upland hardwood forest. The upland pine and upland mixed woodland soils are more fertile and less well drained than the sandhill, contributing to the differences in flora. Both upland pine and upland mixed woodland are defined in part by the presence of southern red oak (*Quercus falcata*) and mockernut hickory (*Carya alba*) and the absence of turkey oak. Other diagnostic plant species include beargrass (*Yucca flaccida*), woodland poppy mallow (*Callirhoe papaver*), white wild indigo (*Baptisia alba*), sassafras (*Sassafras albidum*), sparkleberry (*Vaccinium arboreum*), and slim-leafed paw paw (*Asimina angustifolia*).

The groundcover of upland pine is typically dominated by wiregrass, but wiregrass may be absent in upland mixed woodland. In upland pine the longleaf pine dominates the canopy with the native hardwoods being somewhat suppressed by frequent fire. In upland mixed woodland, the tree canopy is made up of longleaf pine with native hardwoods as co-dominants. In fire-suppressed areas, upland pine may lose its characteristic wiregrass due to shading by offsite hardwoods, and the canopy may be dominated by hardwoods causing the upland pine to appear more like upland mixed woodland. Likewise, fire suppressed upland mixed woodland also becomes dominated by offsite hardwoods and both communities can appear superficially like a successional upland hardwood forest.

Most of the upland pine and upland mixed woodland areas in the core of the park south of Sanchez Prairie are in fair to good condition. About 1,000 acres remain in relatively good condition despite the past timbering of longleaf pines with subsequent heavy colonization of cutover sites by loblolly pines. Some of these cutover areas were used for pasturing cattle for a period, but the pastures were abandoned before 1949. Scattered longleaf pines remain in the less disturbed areas. Despite a long history of fire suppression in these forested areas, the herbaceous component is relatively intact except where extensive soil disturbances occurred. The implementation of regular prescribed fire helped restore most of these areas to a good condition, however recent lack of fire has allowed an increase in off-site hardwoods, primarily laurel oaks and sweetgums. Some areas are still only in fair condition due to insufficient burning, but habitat improvement is expected as the prescribed burn program progresses.

The upland pine and upland mixed woodland areas that were heavily colonized by loblolly pines more than 50 years ago served as the epicenter for the southern pine beetle outbreak in 1994-95 and again in 2001. The dense stands of mature loblolly pines provided an ideal site for the southern pine beetle population to expand to epidemic proportions. Once the beetle population reached a certain threshold, even healthy longleaf pines were susceptible to infestation. As a result, the upland pine and upland mixed woodland were the areas hardest hit by the clear-cutting and group selection harvesting of infested pines of all species. The largest clear-cut in 1994-95 encompassed about 80 acres, but virtually all the forested areas were impacted to some degree by pine beetle suppression efforts. Over 300 acres of upland pine and upland mixed woodland are estimated to have been cleared of pines during the two outbreaks. Restoration efforts in the clear-cuts included planting of longleaf pines and prescribed fire. In 2018, another southern pine beetle outbreak occurred in some of the same areas infected in 1994-95 in zone SFH-2N. The infestation totaled about 22 acres and was cleared along with a buffer area of about 18 acres. An additional 39 acres of pines were thinned, and hardwoods were harvested for biomass.

Much of the original upland mixed woodland and upland pine in Alachua County was cut over for the valuable longleaf pines and converted to agricultural uses. The northern end of the park was heavily timbered long ago and then converted to pastures. In one of these areas southeast of Turkey Creek, scattered canopy trees were left in the pasture to provide shade. The eastern portion of this area was timbered and converted to pasture before 1937, while the western portion appears to have been cut after 1937 and converted to pasture sometime after 1949. The center part of this area, which retained a relatively dense canopy, seemed to have been spared any heavy logging. In the pasture areas southeast of Turkey Creek, there has been some natural regeneration of canopy species such as southern red oak and longleaf pine. However, in 2001, about 100 acres of this site were clear-cut to suppress Southern pine beetles. Longleaf pine seedlings have been planted in many of these areas. The herbaceous component, however, is still overwhelmed by Bahiagrass, but some persistent native species such as beargrass and longleaf pawpaw remain. This area also supports a large population of woodland poppy mallow. This area as a whole is in fair to poor condition.

The other large area of highly degraded upland pine and upland mixed woodland lies northwest of Turkey Creek. It consists of over 1,000 acres of Bahiagrass pastures that are virtually devoid of any upland pine or upland mixed woodland remnants. Much of this area is in the 1995 and 2011 additions to the park, although an extensive amount lies within former park boundaries. Most of these areas were cleared and converted to agricultural fields and pastures prior to 1937. Some were cleared perhaps as long ago as the mid-19th century (Buchholz, 1929 in Dunn, 1982). Between 1937 and 1949, most of the pastures were converted to tung tree (*Aleurites fordii*) plantations. These plantations were active until the early 1960s. By 1968, most of the plantations had been converted back to pastures (Dunn, 1982).

These areas have since been invaded to varying degrees by loblolly pine, sweetgum (*Liquidambar styraciflua*), laurel oaks, and sand blackberry (*Rubus cuneifolius*). Tropical soda apple (*Solanum viarum*) was discovered in the pastures on the 1995 addition of the park. Fortunately, eradication efforts have been successful in controlling this species. Most of these former or current pastures are mapped as altered landcover types. Gainesville Regional Utilities and Duke Energy maintain active powerline rights-of-way that pass through this area that are mapped as utility corridors. Some of the western pastures were used as hay fields up until at least 2013. The haying operation provided hay for state park livestock at several parks and arrested successional processes by preventing the establishment of offsite hardwoods. These are classified as improved pastures. The pastures that are periodically burned are classified as abandoned field/abandoned pasture. The older pastures areas, mostly within the original park boundary, have succeeded rapidly to closed canopy stands of loblolly pines and hardwoods. Some stands are mostly hardwoods, with sweetgum usually the dominant species, and others are nearly pure stands of loblolly pines. These stands are all mapped as successional hardwood forest. While the loblolly stands are atypical for successional hardwood forest, the lack of site preparation and other silvicultural alterations preclude classifying them as pine plantations.

The lack of fire, historically and recently, has led to dense, closed-canopy stands that will require substantial efforts to reintroduce natural fire regimes. Supplemental planting of longleaf pines will be necessary in some areas. Certain zones will also require supplemental planting or seeding of groundcover species. Control of cogongrass and other fire-adapted invasive plants will also be required. Feral hog control will also be essential to protecting the native groundcover.

Alluvial Forest

Alluvial forest occurs below the bottomland forest and may be associated with floodplain swamps along the major stream systems within the park. Alluvial forest is distinguished from floodplain swamp by the relative absence of bald cypress (*Taxodium distichum*), partly due to a shorter hydroperiod. However, alluvial forest does flood more frequently than bottomland forest.

Stream/floodplain systems within the park are complicated by the active nature of the local geology. The four streams involved (Blues Creek, Turkey Creek, Cellon Creek and Moonshine Creek) all discharge at a swallow or sink. During periods of high precipitation and increased stream discharge, these sinks cannot accept stream flow quickly enough to prevent overflowing of banks and backing up of water into adjacent floodplain. Sanchez Prairie is the largest of these stream/floodplain systems, while Moonshine Creek is the smallest. These systems are considered by some geologists to represent an early stage in the formation of large wetland depression systems such as Paynes Prairie and Levy Prairie, both located south of Gainesville.

Like the bottomland forest, the rooting of feral hogs has impacted much of the alluvial forest.

Basin Marsh

A large basin marsh is located in the southern half of the park. The marsh is surrounded by mesic hammock and upland hardwood forest. A woody transition zone, dominated by dahoon holly (*Ilex cassine*) encircles the marsh, hence its name, Dahoon Pond. The small area of open water within the marsh is classified as a marsh lake. This area may be kept open by alligator activity.

Although logging once occurred in the upland hardwood forest nearby, the marsh appears to have experienced little impact and is in very good condition. The marsh has not burned in recent years, which is expected since it is surrounded by non-pyrogenic natural communities. During severe droughts, the marsh lake may dry up almost completely.

Basin Swamp

Basin swamps occur within the park but are often difficult to distinguish from floodplain swamp due to a high degree of species overlap. In general, basin swamps are not associated with rivers or streams and do not normally receive channelized flow, though there may be outflow. Most of the swamp associated with Sanchez Prairie has been classified as floodplain swamp due to the influence of Turkey Creek. The swamps surrounding Rookery Pond located northwest of Split Rock, however, are relatively unaffected by the Turkey Creek system and may be classified as true basin swamps. The Rookery Pond sub-basin is normally hydrologically isolated from the Turkey Creek floodplain swamp to the east by a low ridge of bottomland forest. However, following excessive rainfall events, the capacity of the Split Rock sink can be exceeded, and the entire Sanchez Prairie may flood.

The basin swamps associated with Rookery Pond are in good condition. It is likely that the area was logged within the last century. No other impacts to this area are currently recognized.

Baygall

Baygalls are formed by seepage and are usually found on the edges or bottoms of slopes. Baygalls are scattered through the park, with several located south of Sanchez Prairie on slopes within the upland hardwood forest. These baygalls are associated with small seepage streams which may spread out as they flow across terraces, forming braided flows that create additional baygalls downslope. Flow from these baygalls often coalesces again before continuing downslope. Many of the clastic upland lakes in the park are also formed by seepage over a clay subsurface. The shallower clastic upland lakes often share vegetative characteristics with baygalls and distinguishing them may be difficult. All the baygalls within the park are considered to be in good condition. Feral hog rooting within the baygalls and in the adjacent seepage areas is a current threat.

Bottomland Forest

Bottomland forest, usually found at a slightly higher elevation than alluvial forest, is not inundated on an annual basis. Bottomland forest in the park is found paralleling stream systems, including Turkey, Blues, and Moonshine creeks, and on the low flats within Sanchez Prairie and north of Chert Swamp. Thin bands of bottomland forest may also occur in the transition zone between upland communities and isolated wetlands. In many cases, it is difficult to distinguish bottomland forest from the superficially similar hydric hammock. In general, stream flooding heavily influences bottomland forests, while hydric hammocks receive hydrologic inputs from a variety of sources.

The largest area of bottomland forest in the park is associated with the Sanchez Prairie/Turkey Creek drainage. Generally, the bottomland along the creek is a relatively thin strip lying just above the floodplain. At Sanchez Prairie, however, the bottomland forest broadens to occupy a wide flat plain above the floodplain of Turkey Creek.

Here the bottomland forest is dominated by laurel oak (*Quercus laurifolia*), live oak (*Quercus virginiana*), sweetgum and loblolly pine. The herbaceous layer is better developed than in the floodplain and is dominated by greenbriers (*Smilax* spp.). A thin isthmus of bottomland forest connects Sanchez Prairie to the Blues Creek/Chert Swamp drainage, which itself contains a large area of bottomland forest north of Chert Swamp.

The condition of the bottomland forest ranges from fair to very good depending on the intensity of past logging activities. Rapid regeneration in these fertile forests has obliterated most traces of logging, but the reduced stature of many of the trees attests to past disturbances. The bottomland forest has also been impacted by Deerhaven power plant discharge, which greatly exaggerated the hydroperiod of Sanchez Prairie during the mid-1970s and affected the plant species composition of several natural communities. More recently, the rooting of feral hogs, particularly within Sanchez Prairie, has impacted the bottomland forests.

Depression Marsh

Several depression marshes are in the park. They are in fair to good condition depending on the extent of hardwood invasion due to lack of sufficient fire. Depression marshes are important breeding sites for upland amphibian species. At San Felasco Hammock Preserve State Park, the shallow clay layers create numerous perched wetlands. At times, it may be difficult to distinguish more permanent depression marshes from shallow clastic upland lakes. Typically, depression marshes are found within fire-adapted natural communities such as mesic flatwoods, sandhills or upland pine and upland mixed woodland. In addition, they are usually dominated by herbaceous vegetation. Similar wetlands within the upland hardwood forest tend to be ephemeral or semi-permanent ponds with more shading and less emergent vegetation. These are classified as clastic upland lakes in most cases.

Dome Swamp

Two dome swamps occur within the park. The first dome is located north of Millhopper Road just east of the mesic flatwoods. It is dominated by black gum and sweetgum. Cypress is conspicuously absent. Close inspection reveals signs that the cypress component was probably logged out many years ago. Due to the lack of cypress regeneration and disturbance of the adjacent uplands, this dome is in fair condition. The second dome community lies north of Chert Swamp surrounded by bottomland forest. This area was also logged for cypress, but it has regenerated relatively well. It is in very good condition.

Floodplain Marsh

An area of floodplain marsh occurs along the drainage way between Cellon Creek and the large sinkhole lake located south and upslope of the creek. This area was manipulated extensively in the past, presumably for drainage or water retention purposes. A hydrological restoration project in 2003 removed some of the artificial berms from this area and removed many of the invasive plants. It is in fair to good condition.

Floodplain Swamp

Floodplain swamps are found within the park and are associated with the major stream systems. The largest area of floodplain swamp is in the Turkey Creek floodplain where the creek enters Sanchez Prairie and becomes a poorly defined, braided stream before emptying into Sanchez Pond. Portions of this swamp were once dominated by bald cypress and planer-tree. Sulfate-rich discharge from the Deerhaven power plant into Turkey Creek was responsible for the abnormally high mortality of these trees in Sanchez Prairie in the mid-1970s (Simons et al, 1989). These areas are presently considered to be in good condition, and they are expected to continue their slow recovery. The remainder of the floodplain swamp along Turkey Creek is in good to very good condition.

The Blues Creek system also has floodplain swamp, which is located upstream from the sink at Big Otter Ravine. Most of the swamp in this system is located within Chert Swamp, whose flooding occurs primarily when Blues Creek "backs up" from the sink during periods of high discharge. Chert Swamp is recovering from the extensive cutting of cypress over the last century and is now considered to be in

good condition. Several large, hollow cypress trunks attest to past logging activity. The floodplain swamp along Blues Creek and in Chert Swamp is one of the southernmost known localities for the sensitive fern (*Onoclea sensibilis*).

The Cellon Creek system also contains some areas of floodplain swamp near the entry point of the creek into the park. Finally, the Moonshine Creek stream/floodplain system, which lies wholly within the park, also has some floodplain swamp. Moonshine Creek empties into two or three unnamed sinks located south of Millhopper Road. The floodplain swamp is in a large depression just northeast of the sinks and along the creek itself.

The rooting of feral hogs has impacted many of the floodplain swamps in the park.

Clastic Upland Lake

Many of the lakes within the park are classified as clastic upland lakes. These lakes tend to have a clay layer underneath and are more irregular in shape than typical sandhill upland lakes. Most of these lakes occur within the upland hardwood forest where soils may have a higher clay content. In many cases, it is difficult to distinguish clastic upland lakes from sinkhole lakes since the former may have a connection to the aquifer while the latter may be plugged with clay. The clastic upland lakes vary greatly in size, and many are fed by seepage streams from surrounding slopes. In many cases, the lakes also have an overflow channel that feeds downslope seepages when groundwater levels are high. Shallow clastic upland lakes with emergent woody shrubs may appear like baygalls. Most of the clastic upland lakes within the park are surrounded by a ring of buttressed swamp tupelos.

The clastic upland lakes are in good to very good condition. One of these lakes straddles the western boundary and is partially on private land. Runoff from the private residence on the site may impact the lake, especially if fertilizers or other pollutants are present. Feral hog rooting along the perimeter of the lakes is also a potential impact.

Marsh Lake

A small marsh lake occurs within the large basin marsh in the southern part of the park. A small open water zone is surrounded by floating aquatic vegetation. The marsh lake has remained consistent in size and location since 1937 and is in very good condition. The lake is surrounded by the emergent vegetation of the basin marsh.

Sandhill Upland Lake

Sandhill upland lakes are scattered within the sandhill, upland pine and upland mixed woodland communities within the park. Most of these lakes are in fair to good condition due to a lack of fire in the surrounding uplands. Many have been invaded by shrubby hardwoods. Some examples that held water as recently as the 1970s are now dry. Like the clastic upland lakes within the upland hardwood forest, the sandhill upland lakes typically have an organic or clay substrate that retains water derived from seepage from surrounding slopes.

Sinkhole Lake

Numerous sinkhole lakes occur within the upland hardwood forests of San Felasco Hammock. Mapping of many of the sinkhole lakes was possible using a GIS-based digital elevation model derived from LIDAR data. Four sinkholes within the park receive direct flow from blackwater streams and serve as direct inputs to the Floridan aquifer. Split Rock drains the Turkey Creek/Sanchez Prairie system, Big Otter drains the Blues Creek/Chert Swamp system, Lee Sink drains the Cellon Creek system, and an unnamed sink drains the Moonshine Creek system. Many other smaller sinkholes receive input from seepage

streams and drain into the Floridan aquifer on a smaller scale. The large sinkhole lake known as Itchy Bottom Lake is located south of Cellon Creek near the east boundary of the new addition. It is linked to Cellon Creek by way of several manmade dikes and ditches, but it may have served as the main drain for the Cellon Creek system when it was an active sink. Although there is no evidence that it is currently active, it appears physically very similar to other sinkhole lakes that serve as inputs to the Floridan aquifer.

Most of the sinkhole lakes within the original park boundary are in very good to excellent condition. Lee Sink and Itchy Bottom Lake, however, were impacted in the past by cattle ranching activities, and water quality issues with Cellon Creek may affect them as well. Several areas, notably Big Otter Ravine, were severely eroded by foot traffic and off-road motorcycles prior to state acquisition. Big Otter Ravine is currently a restricted zone. Erosion continues to occur at low levels, however. Although these areas have recovered from previous abuses, any increase in visitation to sensitive sink areas can be expected to have adverse effects. An additional concern for the static sinkhole lakes is the proliferation of water spangles, an aquatic fern (*Salvinia minima*), which is considered an invasive plant within Florida. Management of sinkhole lakes will emphasize protection from erosion and protection of water quality of associated streams and seepage areas.

Swamp Lake

Several swamp lakes occur within the park, some of considerable size. The two largest are Sanchez Pond and Rookery Pond. Both are located within the Sanchez Prairie basin along with numerous other smaller swamp lakes. A series of swamp lakes occurs along Turkey Creek where it enters the Sanchez Prairie basin. Smaller swamp lakes are associated with Blues and Cellon creeks.

All the swamp lakes are considered to be in good to excellent condition, although Sanchez and Rookery ponds may have been impacted by the artificially extended hydroperiods caused by the Deerhaven power plant in the mid-1970s. These lakes are expected to receive few or no additional impacts as long as natural hydroperiods are maintained in the surrounding wetlands and streams.

Blackwater Stream

Several blackwater streams occur either partially or wholly within the park. These include Turkey, Blues, Cellon and Moonshine creeks. In general, these streams begin within swamp systems and then flow through well-defined channels. Near the discharge point, the streams often widen and become braided as they enter floodplain swamps before entering the Floridan aquifer via a sink or swallow.

Turkey Creek has a history of impacts from outside the park. Between mid-1972 and the early 1980s, the creek received cooling water flow from a power plant located near its headwaters. The artificially lengthened hydroperiod resulted in the death of many acres of trees within Sanchez Prairie. The creek also passes through or near residential areas and may be prone to erosion or contamination as a result. The creek is in good condition at present.

The water quality and hydroperiod of Blues Creek may be threatened by several potential impacts. The U.S. Fish and Wildlife Service facility adjacent to the park periodically releases water from fishponds that may negatively affect the creek, especially if the frequency of release increases. The possibility of accidental escape of invasive fish species is also a concern. Blues Creek also passes directly through a residential subdivision, which creates the potential for contamination by fertilizers, pesticides, sewage, silt and other pollutants. The creek is currently in good condition.

Cellon Creek is known to be impacted directly from several sources, including a former cattle ranching operation upstream. Portions of the stream bank have been seriously eroded and water quality is poor in some stretches. The creek passes near industrial facilities and the University of Florida's Dairy Research Unit near its headwaters. The streambed is known to contain heavy metal contamination. The present course of action is to prevent any disturbance of those sediments. Between 1949 and 1956, the main channel of the creek was ditched, diked and diverted into Itchy Bottom Lake. Over time, the original channel appears to have become reestablished so that flow continued to Lee Sink. Additional restoration efforts were conducted by the SRWMD to remove several berms near Itchy Bottom Lake and restore a more natural flow pattern. Based on all these factors, the creek is in poor condition.

Moonshine Creek is located entirely within the park and is in good condition. It has been somewhat impacted by erosion from foot traffic along the public trail system. Runoff carrying pollutants from Millhopper Road may become a concern in the future. Many of the seepage areas that feed Moonshine Creek are also infested with dense stands of coral ardisia. Treatment contracts were initiated in 2015 to control the infestation in the Moonshine Creek floodplain and surrounding uplands.

Seepage Stream

Numerous seepage streams of varying size and length occur within the park. Most if not all the seepage streams are entirely within the park and are in good to excellent condition. Recent advances in LIDAR have allowed mapping of numerous seepage areas using a digital elevation model. Maple Branch is probably the most well-developed seepage and ravine system in the park. Many others exist along the south and north rims of Sanchez Prairie. Several have well-developed baygall communities around the heads of seeps while others are located completely within upland hardwood forest. The west side of the park has several areas of seepage near Interstate 75 that originate along the edges of upland pine, upland mixed woodland or sandhill.

One seepage area south of Millhopper Road near I-75 is above a borrow pit excavated during construction of the interstate. Although it was probably once a natural seepage area, the soil disturbance has altered it severely. That, along with the presence of numerous fire plow scars and clearcutting in the surrounding uplands in 2001 to suppress southern pine beetles, has downgraded the condition of the latter seeps to poor. Several seepage areas north of Sanchez Prairie have been impacted by the placement of off-road bicycle and equestrian trails. Many of the trails were established during dry periods when the intermittent seepage streams were not flowing.

Seepages are prone to invasion by coral ardisia and other invasive plants. Prudent re-routing of recreational trails and service roads that are impacting seepage areas should suffice to project impacted seepage streams.

Aquatic and Terrestrial Cave

The extent of the aquatic and terrestrial caves within the park is unknown since the openings to the surface are relatively small and inaccessible to humans. Caves exist in at least two locations where streams go underground. Blues Creek submerges into a series of small openings within the Big Otter Ravine near the center of the park.

After passing through Sanchez Pond, the flow from Turkey Creek is channeled into a stream that enters the ground at an opening named Split Rock, also known as Moose’s Echo. Since these caves are inaccessible to humans, they are likely to be in good to excellent condition.

Altered Land Cover Types

Abandoned Field/Abandoned Pasture

The abandoned pastures are primarily located in the northern end of the park. These are dominated by broomsedges, sand blackberries, and other woody shrubs along with the remaining bahiagrass. Most of these areas are included in the prescribed fire program to reduce the influence of off-site hardwoods like sweetgum, laurel oak, black cherry and persimmon. Several areas were replanted with longleaf pines as early as the 1980s. Recent efforts have been coupled with herbiciding of hardwoods prior to longleaf plantings. The desired future condition for these areas is either upland pine or upland mixed woodland. Like the improved pasture areas, restoration will be a long term and intensive process. Management of these areas will include removal of all priority invasive plants (FISC Category I and II species).

Artificial Pond

The pond located along the shop entrance road in the northwest part of the park receives runoff from I-75 via a ditch. It appears to have been recontoured and is significantly larger than it was prior to the construction of the interstate in 1963-64. The shop entrance road is built on artificial berm that passes through the original footprint of the pond. A second berm was constructed around 2004 west of the park boundary on private land effectively dividing the pond. Stormwater from I- 75 now appears to flow only into the private half of the pond. The pond functions as a natural water body, particularly since the pulses of stormwater from I-75 are now excluded. The desired future condition is clastic upland lake, but no special restoration efforts should be required.

Borrow Area

During the construction of I-75, a low-lying area east of the highway right-of-way south of Millhopper Road was used as a borrow site. Although appearing like a natural pond, it does not appear on any aerial photos before the construction of the interstate. The area adjacent to the interstate periodically holds water. Aerial photos from 1964 suggest that the slopes to the east appear were scraped during construction of the highway. The desired future condition for this area is upland hardwood forest on the slopes above the pond. There are no plans to fill in the borrow area due to the continuing stormwater runoff from I-75.

Clearing/Regeneration

A clearing is located adjacent to and east of the shop complex.

Developed

Very little acreage is developed within the park. The only developments are a small parking lot on Millhopper Road, a park residence, a small shop and office complex, a pole barn, a citizen support organization (CSO) building, and a horse stable on the west side of the park, a former park residence site along Millhopper Road and a trail-head parking area in the northwest corner for access to the hiking, equestrian and biking trails north of Sanchez Prairie.

Management of the developed areas will include removal of all priority invasive plants (Florida Exotic Pest Plant Council Category I and II species).

Other management measures will include proper stormwater management and the designing of future development so that it is compatible with prescribed fire management in adjacent natural areas.

Pasture – Improved

Improved pastures are located in portions of resource management zones SFH-4A, SFH-4B and SFH-4C. These areas were improved pastures when added to the state preserve in 1995. Since that time, they have been utilized as hay fields in order to arrest succession and prevent the establishment of off-site hardwoods. The desired future condition for these pastures is either upland pine or upland mixed woodland. Given the near complete loss of all native groundcovers, restoration will be a long term and intensive process. In the meantime, if they are not used for haying operations, they should be periodically burned to exclude offsite hardwoods. Management of these areas will include removal of all priority invasive plants (FISC Category I and II species).

Pine Plantation

A small area of planted pines was donated to the park in 2022 by an adjacent landowner near the western end of Sanchez Prairie. The planted pines will eventually be removed, and the area restored to upland mixed woodland and upland hardwood forest.

Spoil Area

The road leading into the shop complex adjacent to an artificial pond is built upon spoil presumably excavated onsite.

Successional Hardwood Forest

Most of the successional hardwood forests occur on abandoned pastures that were acquired in the original land purchase in 1974. Some areas are dominated by sweetgums, while most areas are dominated by loblolly pines with scattered hardwoods. Bahiagrass persists in many of these areas, and native groundcover species are rare to non-existent. The desired future condition for the successional hardwood forest is either upland pine or upland mixed woodland. Restoration efforts will require removal of the offsite loblolly and hardwoods and control of the remaining bahiagrass prior to replanting with longleaf pines, native hardwoods and native groundcovers. It will be a long-term and intensive project. Management of these areas will include removal of all priority invasive plants (FISC Category I and II species). Selective timber harvesting and hardwood chipping/biomass production may be appropriate in this altered land cover type.

Utility Corridor

Utility corridors are located along the north boundary of the park, along the west side of I-75, and through the center of the park. While the utility corridors have little impact on the surrounding pastures at the north end of the park, the central powerline that runs through the center of the park bisects Sanchez Prairie and significant areas of upland hardwood forest. The easement through the center of the park is 100 feet in width and is maintained through mowing and herbicide application by Duke Energy. Where the easement passes through upland pine, sandhill and upland mixed woodland areas, gopher tortoises are common. In 2015 Duke Energy began a project to replace the power poles which will require temporary relocation of gopher tortoises and construction of low water crossings in wetland areas within the easement. Given that abandonment of any of the utility corridors is unlikely, there are no restoration plans for these areas. DRP staff will continue to work with the utility companies to mitigate the impact of their activities on the park. Management of these areas will include removal of all priority invasive plants (FISC Category I and II species).

Inventory

Objective: Conduct floral and faunal surveys and update the park's baseline plant and animal list.

Since the last management plan update, several properties have been purchased and added to the park. The Fox Pond addition in the southeast corner was purchased and includes additional land formerly managed by the University of Florida. Other additions include properties in the northeast portion of the park purchased by Alachua County Forever and leased to DRP for management.

Additional floral and faunal surveys should be conducted on these additions to update the park's plant and animal species lists. DRP staff will also continue to work with researchers working in the park to supplement the plant and animal species lists.

Prescribed Fire

Objective: Within 10 years, have 2,000 acres of the park maintained within the optimum fire return interval.

Actions:

- Develop/update prescribed fire plan.
- Manage fire-dependent communities by burning 600-1,530 acres annually.

Prescribed Fire Management		
Natural Community	**Acres**	**Optimal Fire Return Interval (Years)**
Upland Mixed Woodland	893	2-5
Upland Pine	618	2-3
Sandhill	197	2-3
Mesic Flatwoods	70	2-3
Basin Marsh	34	10-20
Depression Marsh	6	2-5
Successional Hardwood Forest	652	2-10
Pasture – Improved	322	2-10
Abandoned Field/Abandoned Pasture	268	2-10
Annual Target Acreage	600 - 1530	

Fire return intervals follow those generally recommended by the Florida Natural Areas Inventory (FNAI 2010). Sandhills and upland pine should be burned every 2-3 years with upland mixed woodland burning somewhat less frequently at 2-5 years. However, the upland mixed woodland needs more frequent fires to speed restoration. Ideally, it should be burned as frequently as it will carry fire. Mesic flatwoods should be burned every 2-3 years, although patchy or low fuel conditions may prevent shorter fire return intervals during the restoration phase. Fire return intervals for marsh systems are quite variable depending on water levels and the frequency of fire in surrounding communities.
Natural fires in basin and depression marshes often consumed some of the accumulated peat deposits during drought periods. Such fires are difficult to mimic with prescribed fire due to smoke management concerns. The target fire acreage for the park is 600 to 1,530 acres per year.

Most of the management zones in the park contain significant burn habitat. Firebreaks consist of existing features such as service roads, trails and park boundary lines, as well as natural firebreaks such as mesic woods or watercourses. Construction of additional internal firebreaks, other than temporary hand or wet lines, is discouraged, and will occur only after a thorough review of all options. Maintenance or expansion of perimeter firebreaks, particularly in wildland/urban interface areas, may be needed in certain areas. Where significant archaeological sites occur, soil disturbance in the preparation of firebreaks will be minimized. Careful planning and execution of prescribed fires is essential due to the proximity of Interstate 75, U.S. 441, and State Road 232, along with numerous residential communities.

Much of the burn habitat is in the southwestern part of the park. This includes the sandhills, upland mixed woodland and upland pine on the west side in the center of the unit, and the sandhills, upland mixed woodland, upland pine, depression marsh and mesic flatwoods that occur toward the south of the unit. The majority of this habitat is in fair to good condition. Prior to the outbreaks of southern pine beetles, the main impact on this area was several decades of fire exclusion before the property was acquired. Significant progress toward restoration had been made in most of the zones. The clear-cuts and selectively cut-over areas that resulted from southern pine beetle control efforts required special fire management to account for logging slash and to prevent invasive hardwoods from expanding into the disturbed areas. Prescribed fire is the most effective restoration tool in most of these impacted areas. However, some of these areas will require other restoration methods such as offsite hardwood removal and thinning or clearcutting of remaining loblolly stands to reduce the threat of southern pine beetles, release longleaf pines and stimulate herbaceous growth. The most difficult zones to burn are those immediately along I-75. These require a very narrow burn prescription due to smoke management concerns. Prescribed fires cannot be conducted in these tracts during variable or easterly wind conditions. Top priority needs to be given to burning these areas when conditions permit since appropriate burn days are so restricted.

The zones northwest of Sanchez Prairie are comprised of a combination of abandoned pastures and successional hardwood forests that were once upland pine or upland mixed woodland. Prescribed fire will be an integral part of the restoration of the upland pine and upland mixed woodland areas.

Abandoned pastures and overgrown upland pine and upland mixed woodland areas dominate the burn habitat in the northeastern portion of the park. Selective cutting of pines for control of southern pine beetles has also affected these areas. Burning in the old pastures is coordinated with reforestation efforts. The more overgrown forested areas may require some removal of offsite hardwoods and loblolly pine thinning.

Late winter and early spring burns are often more successful in penetrating overgrown areas when canopy trees have lost their leaves, fuels are drier and burn better since more sunlight reaches the forest floor. The ultimate goal, however, is to restore natural lightning season fires to all zones.

The UF Foundation addition at the north end of the park consists of improved pastures, abandoned pastures and upland pine/upland mixed woodland remnants. Prescribed fire and haying of improved pastures are used to maintain the pastures free of invasive woody plant species until restoration efforts can begin. Fire is also used in the control and elimination of tropical soda apple. Ultimately, the majority of these pastures will be restored to upland pine and upland mixed woodland.

Many wildlife species in the park are dependent on frequent natural fires. The gopher tortoise prefers open canopied areas of sandy soils with dense herbaceous groundcover. Burrow commensals include the eastern indigo snake, Florida pine snake, eastern diamondback rattlesnake, gopher frog, Florida

mouse and hundreds of other species. Likewise, many rare plant species like the woodland poppy mallow and Flyr's brickell-bush require periodic fires and respond quickly after fires.

Restoration

Objective: Conduct habitat/natural community restoration activities on 212 acres of upland mixed woodland and upland pine natural communities.

Actions:

- Increase fire frequency and chemically or mechanically remove off-site hardwoods and loblolly pines in the upland mixed woodland and upland pine in zones SFH-3A and SFH-3B.
- Plant additional longleaf pines.
- Assess the need for groundcover restoration and implement if necessary.

The objective is to move the habitat closer to the desired future condition for upland pine and upland mixed woodland by removing loblolly pines, laurel oaks, sweetgums and other off-site hardwoods and replanting longleaf pines. These zones also contain one of the few populations of the state endangered poppy mallow, which must be protected during any community improvement actions. Portions of these zones were once improved or semi-improved pastures and may need groundcover restoration once the canopy is open and a natural fire regime is in place. Restoration of zones SFH-3A and 3B are a higher priority than the abandoned pastures north of Sanchez Prairie since Zones SFH-3A and 3B retain patches of remnant groundcover species.

Improvement

Objective: Conduct natural community/habitat improvement activities on 218 acres of sandhill/upland pine natural communities, 30 acres of sandhill and mesic flatwoods natural communities, 445 acres of sandhill and upland mixed woodland natural communities.

Actions:

- Increase fire frequency and chemically or mechanically remove offsite hardwoods and loblolly pines in a portion of the sandhill in portions of zone 2D and 2C.
- Supplement remaining longleaf pines with additional planting.
- Control hardwood regrowth by chemical and/ or mechanical methods.
- Replant with longleaf pines.
- Chemically or mechanically remove offsite hardwoods in the sandhill and upland mixed woodland communities in zone SFH-2E.
- Plant additional longleaf pines as necessary.
- Control off-site hardwoods in zones SFH-2M and SFH-2N through increased fire frequency and chemical/mechanical methods.
- Plant additional longleaf pines after reintroduction of prescribed fire and hardwood control.

This area contains sandhill that was invaded by loblolly pines and hardwoods due to fire exclusion. Fire frequency needs to be increased in these zones. Native groundcover in the zone has historically been very good and its protection should be a consideration during any management actions.

Loblolly pines and off-site hardwoods in zone SFH-2R were removed due to a pine beetle infestation. Mechanical and/or chemical treatment is needed to prepare the zone for planting longleaf pines. Fire frequency needs to be increased in this zone.

Off-site hardwoods have increased in zone SFH-2E due to infrequent fire. Laurel oaks, water oaks and sweetgums are the primary species that need to be removed. Due to the small diameter of the hardwood stems, mowing or other mechanical methods followed by chemical treatment will be necessary.

Off-site hardwoods and loblolly pines have increased in zone SFH-2M and SFH-2N due to infrequent fire and southern pine beetle outbreaks and control. Laurel oaks, water oaks and sweetgums are the primary hardwood species that need to be removed. Loblolly pines were thinned in 2018 and additional longleaf pines should be planted to reduce future susceptibility to southern pine beetles. Prescribed fire should be the initial tool to remove off-site hardwoods. Staff will then evaluate the zone and determine if additional treatment methods are needed. Mechanical treatment of hardwoods will need follow-up chemical control.

IMPERILED SPECIES

San Felasco Hammock Preserve State Park, by virtue of its large size and high diversity of pristine natural communities, contains numerous imperiled plant and animal species. Some of the significant plant species protected within the park include upland pine and upland mixed woodland species such as Flyr's brickell-bush (*Brickellia cordifolia*), Woodland poppymallow (*Callirhoe papaver*), Florida milkvine (*Matelea floridana*), nettleleaf sage (*Salvia urticifolia*) and many orchid species. Big Otter Ravine is also one of the only known locations for the San Felasco spleenwort (*Asplenium monanthes*) within the state. This species has not been observed since 1983, however, and may be extirpated.

The Florida black bear (*Ursus americanus floridanus*) historically occurred within the park and occasionally passes through. Many of the other imperiled vertebrate species are associated with the sandhill and upland pine communities.

Years of fire suppression have altered much of this habitat statewide, resulting in the endangerment of several species that depend on these areas. These species include the Southern fox squirrel (*Sciurus niger*), Florida mouse (*Podomys floridanus*), gopher tortoise (*Gopherus polyphemus*), eastern indigo snake (*Drymarchon couperi*), short-tailed kingsnake (*Lampropeltis extenuata*), Florida pine snake (*Pituophis melanoleucus mugitus*), and southeastern kestrel (*Falco sparverius paulus*). The gopher tortoises and their commensals are concentrated within the sandhills, upland pine, and upland mixed woodland that remain in good condition as well as the sandy soil areas within the utility corridors and abandoned pastures. Staff will continue to refer to the Florida Fish and Wildlife Conservation Commission (FWC) Gopher Tortoise Management Plan (FWC 2012) to guide management of this imperiled species.

Imperiled bird species recorded within the park include several species of herons, egrets and raptors. Wood storks (*Mycteria americana*) are known to roost and forage in the park. The little blue heron (*Egretta caerulea*) is known to nest within the park in a mixed species rookery within Sanchez Prairie. These populations are probably not seriously threatened at present, although continued habitat loss outside the park and human disturbance may ultimately change that situation.

The heron rookery located at Rookery Pond within Sanchez Prairie must be shielded from human disturbance during the nesting season. Visitation to the site should be restricted from April through July.

Many of the wetlands within the park have suffered from altered hydroperiods due to external manipulations of the streams that ultimately discharge within the park. Some of these same areas have suffered from soil erosion due to foot traffic and motorcycle traffic. Many of the areas most prone to damage from hydroperiod changes and direct human impact are also the preferred sites of several listed plant species. Big Otter Ravine is a prime example. Increased siltation and discharge within the Blues Creek watershed may have caused the extirpation of the San Felasco spleenwort according to Dr. Daniel Ward of the University of Florida Botany Department. Careful monitoring of the creeks within the park, and their headwaters outside the park, is essential to detecting and preventing such detrimental events. In addition, sensitive areas like Big Otter Ravine, and other ravine systems and sinks, must be classified as restricted zones within the protected zones of the park. Access to these sites must be limited to infrequent ranger-guided tours only.

The guidance of local botanists should be solicited to identify and protect fragile plant populations. Additional surveys for imperiled species should also be encouraged. The recruitment of researchers from the University of Florida and other institutions is encouraged to provide baseline data on the occurrence and status of species. Assistance from FNAI will also be sought to update the rare plant element occurrence records.

At San Felasco Hammock Preserve State Park, the continuation of an active prescribed fire program will benefit many of the imperiled species that require large tracts of fire-adapted natural communities. As more sandhills, upland pine and upland mixed woodland are restored through fire, species such as gopher tortoises, indigo snakes, short-tailed kingsnakes, Florida mice and southeastern kestrels are expected to increase. Pastures, which will be restored to upland pine and upland mixed woodland, are expected to be recolonized from adjacent natural areas.

Surveys of Florida mice date back to the 1950s when Jim Layne of the Archbold Biological Station began range-wide trapping of Florida mice (Layne 1992). DRP staff trapped two locations over the course of one year in and documented good populations of Florida mice in the early 1990s. More recent research by the University of Florida has centered on relocating Layne's original trap sites for genetic analysis. Analysis of genetic heterozygosity comparing DNA samples from the 1950s to recent samples (2009) has shown a reduction in genetic variability, probably due to a decrease in population size (Rivadeneira 2010; Reed 2012).

A Southern fox squirrel reintroduction project was initiated in the fall of 1995. The project was a cooperative venture between FWC and DRP and was funded by the Nongame Wildlife Program. Squirrels were trapped from Alachua or surrounding counties and transported to the park where they were placed in large holding cages for several days prior to being released and radio tracked. Unfortunately, all the squirrels released eventually dispersed out of the park and the project was curtailed. Fox squirrels have been sporadically sighted within the park in the mesic flatwoods along the south boundary, and in degraded upland pine areas in the northwest section of the park. Sightings of fox squirrels are recorded by staff.

In 2012, District 2 staff initiated surveys for the southern dusky salamander (*Desmognathus auriculatus*). There are historical records from the 1970s and before at nearby Devil's Millhopper Geological State Park and from 1937 at San Felasco Hammock. However, this species has suffered dramatic declines in Florida over recent decades (Dodd 1998; Means and Travis 2007). Park surveys for striped newts (*Notophthalmus perstriatus*), Florida gopher frogs (*Lithobates capito*), and tiger salamanders (*Ambystoma tigrinum*) are also ongoing in cooperation with FWC.

District and park staff also contribute sightings of imperiled upland snake species to FWC online databases. Primary species tracked are eastern indigo snake, Florida pine snake, southern hognose, short-tailed kingsnake and eastern diamondback rattlesnake. Gopher tortoise surveys were conducted in 2015 along the entire length of the Duke Energy utility corridor and those data were provided to DRP in ArcGIS shapefile format. Any future gopher tortoise surveys conducted at the park by DRP staff will follow the LTDS protocols recommended by FWC (Smith et al. 2009). FWC lists San Felasco Hammock as Tier 1, or highest priority, for LTDS surveys (FWC 2018). In 2021, FNAI conducted a pilot survey under contract to FWC. Based on the low encounter rate, it was determined that a full survey was not warranted.

Several rare and imperiled invertebrates are known from San Felasco Hammock Preserve State Park, including Say's spiketail dragonfly (*Cordulegaster sayi*) and the Florida scorpionfly (*Panorpa floridana*). The Say's spiketail adults fly for a few short weeks in the spring in sandhill habitats but the larvae persist for many years in adjacent seepage areas. Prescribed fire in the sandhills and protection of seepage areas are both necessary for the persistence of this rare species. The Florida scorpionfly is known from only a few sites in Alachua and Clay counties. A specimen was collected in 1982 at Mike Roess Gold Head Branch State Park and the species was not seen again until a single individual was photographed at that location in 2010 (Somma et al 2013). In November of 2014, a specimen was collected at San Felasco Hammock Preserve State Park by a researcher, the first since 1970 (Bicha 2015). Annual surveys by DRP staff have documented Say's spiketail at the park but have not yet documented the Florida scorpionfly.

Imperiled Species Inventory						
Common and *Scientific* Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
PLANTS						
San Felasco spleenwort *Asplenium monanthes*			E	G4,S1	9,10	Tier 1
Southern lady fern *Athyrium filix- femina asplenioides*			T		9,10	Tier 1
Flyr's brickell-bush *Brickellia cordifolia*			E	G3,S2	1,6,7	Tier 2
Woodland poppymallow *Callirhoe papaver*			E	G5,S2	1,6,7,10	Tier 1
Godfrey's Swampprivet *Forestiera godfreyi*			E	G2,S2	10	Tier 1
Crested coralroot			E		10	Tier 1

Imperiled Species Inventory						
Common and *Scientific* Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
Hexalectris spicata						
Pine lily *Lilium catesbaei*			T		1,6,7	Tier 1
Southern twayblade orchid *Listera australis*			T		9,10	Tier 1
Cardinal flower *Lobelia cardinalis*			T		9,10	Tier 1
Green adder's- mouth orchid *Malaxis unifolia*			E	G5,S3	9,10	Tier 1
Southern crabapple *Malus angustifolia*			T			Tier 1
Florida milkvine *Matelea floridana*			E	G2,S2	1,6,7	Tier 1
Yellow butterwort *Pinguicula lutea*			T		1,4,6,7	Tier 1
Yellow fringed orchid *Platanthera ciliaris*			T		1,6,7	Tier 1
Florida mountain mint *Pycnanthemum floridanum*			T	G3,S3	1,6,7	Tier 1
Nettleleaf sage *Salvia urticifolia*			E	G5,S1	1,6,7,10	Tier 2
Oval ladies'- tresses *Spiranthes ovalis*			E		10	Tier 1
Crane-fly orchid *Tipularia discolor*			T		10	Tier 1
Three-birds orchid *Triphora trianthophora*			T		10	Tier 1

Imperiled Species Inventory						
Common and *Scientific* Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
INVERTEBRATES						
Shining Ball Scarab Beetle *Ceratocanthus aeneus*				G2G3,S2		Tier 1
Cofaqui Giant- Skipper *Megathymus cofaqui cofaqui*				G3G4T3, S2S4	10	Tier 2
Florida Scorpionfly *Panorpa floridana*				G1,S1	4,10	Tier 2
Yehl Skipper *Poanes yehl*				G4,S2S3	10	Tier 2
King's hairstreak *Satyrium kingi*				G3G4,S2	1	Tier 2
Florida Cebrionid Beetle *Selonodon floridensis*				G2G4, S2S4		Tier 1
Alachua Pleasing Fungus Beetle *Triplax alachuae*				G2G4, S2S4		Tier 1
AMPHIBIANS						
Holbrook's southern dusky salamander *Desmognathus auriculatus*				G3,S1		Tier 2
Striped newt *Notophthalmus perstriatus*	ST	C		G2G3,S2		Tier 2
REPTILES						
American alligator *Alligator mississippiensis*	FT(S/A)	SAT		G5,S4	4,10,13	Tier 1
Eastern indigo snake *Drymarchon couperi*	FT	LT		G3,S2?	1,6,7,13	Tier 1

Imperiled Species Inventory						
Common and *Scientific* Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
Gopher tortoise *Gopherus polyphemus*	ST			G3,S3	1,6,7,10,13	Tier 1
Southern hognose snake *Heterodon simus*				G2,S2S3	1,6	Tier 1
Short-tailed kingsnake *Lampropeltis extenuata*	ST	UR		G3,S3	1.6	Tier 1
Florida pine snake *Pituophis melanoleucus mugitus*	ST	UR		G4,S3	1,6	Tier 1
BIRDS						
Florida sandhill crane *Antigone canadensis pratensis*	ST			G5T2,S2	1,10	Tier 1
Little blue heron *Egretta caerulea*	ST			G5,S4	4	Tier 1
Tricolored heron *Egretta tricolor*	ST			G5,S4	4	Tier 1
Swallow-tailed kite *Elanoides forficatus*				G5,S2	1	Tier 1
Southeastern American kestrel *Falco sparverius paulus*	ST			G5T4,S3	1,5,6,7	Tier 1
Wood stork *Mycteria americana*	FT	DL		G4,S2	4	Tier 1
Painted bunting *Passerina ciris*				G5T3QS1 S2	10	Tier 1
Kirtland's Warbler *Setophaga kirtlandii*				G3G4,S1	10	Tier 1
MAMMALS						

Imperiled Species Inventory						
Common and *Scientific* Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
Rafinesque's Big-eared Bat *Corynorhinus rafinesquii*				G3G4,S1	10,13	Tier 3
Tricolored Bat *Perimyotis subflavus*		PE		G3G4, S2S3	9,10,13	Tier 3

Management Actions:

1. Prescribed Fire
2. Exotic Plant Removal
3. Population Translocation/Augmentation/Restocking
4. Hydrological Maintenance/Restoration
5. Nest Boxes/Artificial Cavities
6. Hardwood Removal
7. Mechanical Treatment
8. Predator Control
9. Erosion Control
10. Protection from Visitor Impacts (establish buffers)/law enforcement
11. Decoys (shorebirds)
12. Vegetation Planting
13. Outreach and Education
14. Other

Monitoring Level:

Tier 1. Non-Targeted Observation/Documentation: includes documentation of species presence through casual/passive observation during routine park activities (i.e. not conducting species-specific searches). Documentation may be in the form of Wildlife Observation Forms, or other district specific methods used to communicate observations.
Tier 2. Targeted Presence/Absence: includes monitoring methods/activities that are specifically intended to document presence/absence of a particular species or suite of species.
Tier 3. Population Estimate/Index: an approximation of the true population size or population index based on a widely accepted method of sampling.
Tier 4. Population Census: A complete count of an entire population with demographic analysis, including mortality, reproduction, emigration, and immigration.
Tier 5. Other: may include habitat assessments for a particular species or suite of species or any other specific methods used as indicators to gather information about a particular species.

Inventory

Objective: Update baseline imperiled species occurrence inventory lists for plants and animals.

Fauna

Objective: Monitor and document eleven selected imperiled animal species in the park.

Action:

- Implement monitoring protocols for nine imperiled animal species including striped newt, Holbrook's southern dusky salamander, tiger salamander, eastern indigo snake, Florida pine snake, short-tailed kingsnake, eastern diamondback rattlesnake, tricolored bat, Rafinesque's big-eared bat, Florida scorpionfly and imperiled butterfly species.

Surveys for amphibians at breeding ponds, including the striped newt, gopher frog and tiger salamander, are conducted in cooperation with ongoing FWC research projects. Upland snake species are

documented on a park form and records are entered on an FWC online database. Southern fox squirrel sightings are also documented in a park imperiled species tracking form.

The tricolored bat and Rafinesque's big-eared bat are monitored at two locations within the park as part of FWC's Long Term Bat Monitoring Program which deploys ultrasonic bat detectors on a quarterly basis to track bat activity and infer population status. DRP staff have assisted FWC with this study since 2019 by deploying the bat detectors and have committed to supporting the project into the future.

Flora

Objective: Monitor and document three selected imperiled plant species in the park.

Actions:

- Develop monitoring protocols for three selected imperiled plant species, including woodland poppy mallow, Flyr's brickell-bush and nettleleaf sage.
- Implement monitoring protocols for three imperiled plant species, including those listed in the action above.

Woodland poppy mallow and Flyr's brickell-bush are rare plants that seem to be endemic to the upland mixed woodland and upland pine natural communities in north-central Florida. Both require periodic fires.

While the poppy mallow appears to persist in several areas in the park, the Flyr's brickell-bush is often not apparent until after certain disturbances that open up the canopy, including removal of off-site hardwoods and relatively intense fires. Monitoring protocols will be developed to track existing populations of poppy mallow and Flyr's brickell-bush, and to detect new populations that may arise during upland pine and upland mixed woodland restoration actions. The nettleleaf sage has not been recently observed despite coordinated efforts with FNAI staff to locate the plants. A monitoring protocol will be developed, and attempts will be made to locate the species.

INVASIVE SPECIES

San Felasco Hammock Preserve State Park has a diversity of invasive plants in part because it has a diversity of natural communities as well as an ever-increasing urban interface. Some species like tung oil tree (*Aleurites fordii*) and hardy orange (*Poncirus trifoliata*) are relicts of past agricultural activities. Cogongrass (*Imperata cylindrica*) was introduced by logging activities in the park either during southern pine beetle outbreaks or prior to the property becoming a preserve. Other species like *Ardisia crenata* and *Ardisia japonica* are ornamental plants that moved in from neighbors' yards.

The worst coral ardisia infestation occurred on the south side of the road in zone 2G. This area has been treated with FWC-funded projects. The eastern edge of this zone is also a hotspot for new invasive species entering the park due to the landscaping of the adjacent neighborhood. Chinese tallow can be found in wetlands and creeks throughout the park. It is scattered along Cellon Creek. Recently a new invasive fern, Japanese false spleenwort (*Deparia petersenii*) was found within. It appears to be replacing native ferns on limestone outcroppings and along creeks. Further information on the extent of colonization in by this species is needed, particularly in areas of high fern diversity. Control of this species will be very difficult if not unfeasible. It is not easily identified by the observer or herbicide applicator. Before control measures can be initiated, researchers and FWC should be consulted to determine feasibility and methods to protect native ferns. If feasible, it will require precise methods to limit damage to adjacent native species.

The relatively large size of the park and the extensive urban interface increase the difficulty of controlling invasives in this park. Regular surveys are conducted. Treatments and surveys are tracked in a statewide database. A combination of Florida Conservation Corps (FLCC) AmeriCorps and in-house labor, contracts and targeted treatment areas are used to control the invasive plants. Primary control efforts focus on specific species and areas. Contractors, FLCC members and staff work to keep *Ardisa crenata* contained as much as possible. Cellon Creek and other wetlands are targeted for Chinese tallow (*Sapium sebiferum*) and hardy orange (*Citrus trifoliata*) treatment. Silverthorn is primarily contained to the northeast area of the park and cogongrass and Japanese climbing fern (*Lygodium japonicum*) are regularly treated. Air potato (*Dioscorea bulbifera*) is controlled by the biological control leaf beetle *Lilioceris cheni,* which has been spreading throughout the area. Despite these efforts, much more work to control invasives is needed. Since many plants cross into the park from adjacent neighborhoods, a concerted outreach and education effort could help reduce the number of species and individual plants entering the park. Staff will continue to seek funding for additional invasive control.

Three plant species that are not FISC Category I or II need management action. Hardy orange (*Poncirus trifoliata*) is widespread along Cellon Creek and in fields at the north end of the park. Along the creek it formed an almost impenetrable hedge and displaced native species. The park is treating this species both in-house and with contractors and will continue to do so. With a concerted effort, it may be possible to eliminate it.

Centipede grass (*Eremochloa ophiuroides*) was previously planted along woods roads to stabilize them. In sandhill, upland mixed woodland and other fire-type communities, the grass can suppress the native groundcover if it gets established. Care should be taken to not move this grass into these natural communities with equipment. It should be treated where it is found within native groundcover. In recent years the widely used ornamental *Liriope* sp. has been found in San Felasco Hammock Preserve State Park and other parks. Park staff should learn to recognize this genus and remove plants as they are found.

By far the greatest threat to natural communities from invasive animals in the park is the presence of feral hogs (*Sus scrofa*). In the past, hogs were virtually extirpated from the park. Beginning around 1999, feral hogs began dispersing into the park. By 2000, they had spread rapidly throughout the Sanchez and Chert Swamp basins. By the end of 2001, they had expanded into the Moonshine Creek system. The damage caused by their rooting activities is well documented, and many rare plant populations in the park will be impacted if the hogs continue to increase. The removal of feral hogs remains a high priority considering the real threat to the park's wetlands and upland hardwood forests. The park has utilized the U.S. Department of Agriculture Wildlife Services, as well as private hog contractors, volunteers and staff to remove feral hogs. Formal trapping agreements are in place to supplement staff efforts. Trapping efforts should focus on removal of whole groups of hogs or sounders using larger traps instead of trapping single hogs or partial groups.

There are relatively few other invasive animals in the park. Nine-banded armadillo (*Dasypus novemcinctus*) populations, however, abound. Armadillos cause extensive erosional damage along sinkhole and ravine slopes and are a significant predator on ground nests of native reptiles. Armadillos are so pervasive throughout the park that it is doubtful that the species may ever be eradicated. However, the current policy of removal as opportunity permits should continue as this practice may at least keep populations down to a less damaging level. Coyotes (*Canis latrans*) and capybara (*Hydrochoerus hydrochoerus*) have been sighted within the park. No control measures are recommended for coyotes at this time. Capybaras will be removed if possible.

Due to the increasing number of residential areas bordering the park, the incidences of free-ranging or feral dogs and cats within the park are likely to increase. Dogs and cats will be removed according to DRP guidelines in cooperation with Alachua County Animal Services.

Invasive Plant Species			
Species Name ***Scientific Name* - Common Name**	**FISC Category**	**Distribution**	**Zone ID**
Albizia julibrissin - Mimosa	I	Single Plant or Clump, Scattered Plants or Clumps	SFH-2H, SFH-3D, SFH-4H, SFH-1C, SFH-2Q, SFH-3E, SFH-5B
Aleurites fordii - Tung oil tree	II	Scattered Plants or Clumps, Scattered Dense Patches	SFH-1Aw, SFH-1B, SFH-4G, SFH-4J, SFH-1An, SFH-1C, SFH-3E, SFH-3G, SFH-4A, SFH-4E, SFH-4Fw, SFH-4H
Ardisia crenata - Coral ardisia	I	Single Plant or Clump, Scattered Dense Patches, Scattered Plants or Clumps	SFH-1An, SFH-3D, SFH-4E, SFH-4G, SFH-4H, SFH-1Aw, SFH-2D, SFH-2E, SFH-2F, SFH-2G, SFH-2H, SFH-2K, SFH-2L, SFH-2N, SFH-2P, SFH-2Q, SFH-2R, SFH-2S, SFH-3A, SFH-3B, SFH-3D, SFH-3E, SFH-3F, SFH-3J, SFH-3K, SFH-5A, SFH-5B, SFH-1C
Ardisia japonica - Japanese ardisia	II	Single Plant or Clump, Scattered Dense Patches	SFH-5B, SFH-2G
Cinnamomum camphora - Camphor-tree	I	Single Plant or Clump, Scattered Plants or Clumps, Dominant Cover	SFH-2F, SFH-3D, SFH-3G, SFH-4Dw, SFH-4E, SFH-4G, SFH-4H, SFH-1Aw, SFH-1B, SFH-1C, SFH-2D, SFH-2R, SFH-3E, SFH-3F, SFH-3K, SFH-4C, SFH-4Fw, SFH-4A
Colocasia esculenta - Wild taro	I	Single Plant or Clump, Dominant Cover, Scattered Plants or Clumps	SFH-2R, SFH-3A, SFH-3H, SFH-2N, SFH-3G, SFH-3K, SFH-3J
Deparia petersenii - Japanese false spleenwort	I	Single Plant or Clump	SFH-2Q
Dioscorea bulbifera - Air-potato	I	Single Plant or Clump	SFH-2H
Elaeagnus pungens - Silverthorn	II	Single Plant or Clump, Scattered Plants or Clumps	SFH-1Aw, SFH-1C, SFH-2N, SFH-4E, SFH-

Invasive Plant Species			
Species Name ***Scientific Name* - Common Name**	**FISC Category**	**Distribution**	**Zone ID**
			5B, SFH-3B, SFH-3K, SFH-5B
Imperata cylindrica - Cogon grass	I	Scattered Plants or Clumps	SFH-2E, SFH-2G, SFH-5B
Koelreuteria elegans - Flamegold tree	II	Scattered Plants or Clumps	SFH-5B
Lantana camara - Lantana	I	Scattered Plants or Clumps	SFH-1C
Ligustrum lucidum - Glossy privet	I	Single Plant or Clump, Scattered Plants or Clumps	SFH-5B
Lygodium japonicum - Japanese climbing fern	I	Single Plant or Clump, Scattered Plants or Clumps, Scattered Dense Patches	SFH-2H, SFH-3A, SFH-3G, SFH-3K, SFH-2G, SFH-2N, SFH-2Q, SFH-2S, SFH-3B, SFH-3E, SFH-1C, SFH-2G, SFH-4H
Melia azedarach - Chinaberry	II	Single Plant or Clump, Scattered Plants or Clumps	SFH-1An, SFH-2G, SFH-4A, SFH-4Dw, SFH-4E, SFH-4H, SFH-1Aw, SFH-1B, SFH-1C, SFH-3B, SFH-4Be, SFH-4Bw, SFH-4C, SFH-4De, SFH-4Dw, SFH-4Fe, SFH-4Fw, SFH-4G, SFH-4J
Nandina domestica - Nandina	I	Single Plant or Clump, Scattered Plants or Clumps	SFH-4G, SFH-2G
Nephrolepis cordifolia - Tuberous sword fern	I	Single Plant or Clump	SFH-1C, SFH-2G
Paederia foetida - Skunk vine	I	Single Plant or Clump, Scattered Dense Patches	SFH-1C, SFH-4H
Phoenix reclinata - Senegal date palm	II	Single Plant or Clump	SFH-1C
Pueraria montana - Kudzu	I	Single Plant or Clump	SFH-4C
Sapium sebiferum - Chinese tallow tree	I	Single Plant or Clump, Scattered Plants or Clumps, Scattered Dense Patches	SFH-1Aw, SFH-2H, SFH-2K, SFH-3C, SFH-4De, SFH-4Dw, SFH-4Fe, SFH-4G, SFH-4H, SFH-1An, SFH-1C, SFH-2C, SFH-2D, SFH-2N, SFH-2Q, SFH-2R, SFH-2S, SFH-3A, SFH-3D, SFH-3E, SFH-3F, SFH-3G, SFH-3H,

Invasive Plant Species			
Species Name ***Scientific Name* - Common Name**	**FISC Category**	**Distribution**	**Zone ID**
			SFH-3K, SFH-4E, SFH-2K, SFH-2Q, SFH-3J
Solanum viarum - Tropical soda apple	I	Single Plant or Clump, Scattered Plants or Clumps	SFH-1An, SFH-2H, SFH-4Be, SFH-4Fe, SFH-4J, SFH-1Aw, SFH-1B, SFH-1C, SFH-2G, SFH-2R, SFH-3F, SFH-3G, SFH-3H, SFH-4G, SFH-4H
Tradescantia fluminensis - Small-leaf spiderwort	I	Single Plant or Clump, Scattered Dense Patches	SFH-4G, SFH-3K
Wisteria sinensis - Chinese wisteria	II	Single Plant or Clump	SFH-5B

Invasive Plant Treatment

Objective: Annually treat 1,000 gross acres or approximately 120 infested acres of invasive plant species in the park.

Actions:

- Annually develop/update invasive plant management work plan.
- Implement annual work plan by treating 120 infested acres in the park annually and continuing maintenance and follow-up treatments as needed.

To achieve these goals, the park will need to use several strategies. In recent years the park has successfully obtained several FWC invasive plant control projects and should continue to annually apply for FWC invasive plant control projects. In addition, staff should host a 2-3 person FLCC invasive plant control member team in the park, seek funding from the CSO for invasive plant control projects, recruit volunteers, reach out to neighbors to encourage control from the private property side of the fence and seek additional funding from the district office. Staff should also seek collaboration with researchers. Previously, a control experiment was conducted by the University of Florida. These types of activities could continue with the proper research and collecting permit review and monitoring.

Invasive Plant Preventative Measures

Objectives: Prevent the introduction and spread of invasive plants into the park and survey the entire park for invasives at least three times over 10 years.

Actions:

- Develop and adopt preventative measures to avoid the introduction and spread of invasive plants into the park.

- Develop and implement a method to survey the entire park for invasive plants three times over the course of 10 years.

Invasive plants are often introduced or spread to natural areas on equipment, in fill dirt or mulch, and in ornamental plantings. The park should develop and implement a protocol to inspect equipment and fill dirt source or donor site and ensure that whatever equipment or materials entering the park are invasive free. In addition, the park should develop an invasive plant outreach and education program for the adjacent neighbors that encourages them to remove invasive species and replace them with native plants.

In areas with high urban interface such as San Felasco Hammock Preserve State Park, it is important to quickly detect new and possibly unrecognized invasive plant species. Early detection of invasives through surveying becomes very important. Park surveys should be conducted with the goal of preventing heavy infestations occurring from neighboring properties and finding any new infestations, particularly of unrecognized invasive species, quickly so that they can be treated promptly. Surveys of the park boundary, particularly along urban interfaces, should occur annually and be part of normal patrols.

Invasive and Nuisance Animal Control

Objective: Implement control measures on one invasive animal species in the park.

Action:

- Continue to remove feral hogs from the park.

The feral hog rooting has caused observable damage to native groundcover species and wetlands in the park. The park should continue to evaluate current methods of controlling hogs and implement additional methods where possible to increase the number of hogs removed. Efforts should focus on finding methods that capture the entire sounder.

CULTURAL RESOURCES

Prehistoric and Historic Archaeological Sites

Fifty-six archaeological sites, of which one is National Register-listed, and one historic structure are recorded with the Florida Master Site File (FMSF). The cultural periods represented by sites within the park span all cultural periods except the Second Seminole War. While there is documentary evidence suggesting that an early battle of the Second Seminole War occurred in San Felasco Hammock, likely within what would become the park (Wheeler and Newman 1997), no sites have been found. Many of the archaeological sites at the park are multi-component with features that range from the Paleoindian period (10,000–8,000 B.C.) through historic times including the 20th Century. Most sites are prehistoric or have a prehistoric component. Historic sites at the park encompass the Spanish mission period, the 19th Century Spanish land grant era and the mid-20th century.

During the period of initial Native American–European contact, the Potano-Timucua Indians inhabited San Felasco (Collins et al. 2012). In the second half of the 16th century and early part of the 17th century, the Spanish established missions in north Florida and Georgia in four regions. One of these regions was known as Timucua and encompassed the area between the St. Johns River and the Suwannee River. The first mission (AL272) in the Florida interior was established in San Felasco in 1606. Subsequent conflicts between the Native Americans, the Spanish and other Europeans, as well as the effects of introduced disease and forced labor on the native inhabitants, resulted in a decline in

population in Florida in the 1700s. In 1790, the Spanish offered land grants in Florida to encourage settlement. An initial grant of 6,000 acres to S.D. Fernandez occurred in what is now the park.

Additional land grants in San Felasco occurred later (Collins et al. 2012). Florida became a U.S. territory in 1822 and a state in 1845. In the early 20th century, tung nuts were grown for oil and a dairy was present within the current park boundary.

Several prehistoric sites are habitations (AL272, AL276, AL288, AL304, AL305, AL307, AL309, AL310, AL447, AL461, AL3393, AL3395, AL3399, AL3412, AL3414 and AL3417) or quarry sites (AL155, AL306, AL446, AL447, AL448 and AL449).

Lithic components rather than ceramics are more often represented in these sites. One prehistoric mound occurs within the park (AL3403). Recent efforts to relocate the site have been unsuccessful.

The park's most significant historic period site is the National Register-listed (NRL) Mission San Francisco de Potano (AL272). It encompasses what was the primary town of the Potano-Timucua at the time of Spanish contact, as well as the location of the mission that was built in 1606. It included a Spanish military encampment and a school for children. It survived until 1706, the last mission in the Florida system to be abandoned. Four National Register Eligible sites (AL310, AL3412, AL3413, AL3417) are associated with development following the creation of the Sanchez and Fernandez Spanish lands and indicate early 19th century occupation of the modern park. They may have been part of a settlement from the 1830s to the 1840s known as Spring Grove, which was abandoned due to conflicts with Native Americans. Chert Swamp Rock Trough (AL5770) may date from the 19th or early 20th century. Its function is unknown and needs further investigation. Other historic sites represent 20th-century activities including moonshine stills (AL3397, AL3421), ruins of farm buildings (AL3398), the remains of a dairy and tung oil operation from the 1920s to the 1950s (AL3411), and 19th- and 20th-century habitation and commune remains (AL3401). The commune remains were once visited by one a Gainesville citizen who would go on to play an instrumental role in convincing the state to acquire and preserve San Felasco Hammock (Simons personal communication).

More archaeological sites certainly exist within the park and need to be recorded with the FMSF. Examples include old roads like Ray's Trail. It is possible that portions of the Florida Santa Fe Trail and the road to Fort King pass through the park. A predictive model for the park was completed in 2011 (Collins et al. 2012).

All sites are currently in good condition. Historically, some looting has occurred, but no recent looting has been observed. The primary threat to archaeological sites currently is the impact of roads, firebreaks, feral hogs and incidental collection by park visitors if they encounter exposed artifacts.

All cultural sites should be visited on a regular basis to ensure protection from looting, feral hog damage, erosion and trail impacts. The park should devise and implement a method and schedule to visit, monitor and document any changes in the condition of cultural sites.

Historic Structures

The Park has one recorded historic structure, AL04980 Agricultural Structure No. 1, also known as the Tung Nut Depot. The structure is thought to have been the depot where tung nuts (*Aleurites fordii*) were gathered from nearby groves during the 1930s. Tung trees, originally from China, were grown for oil produced by the nuts. By 1927, 10,000 acres of tung plantations existed in Alachua County (Brown and Keeler 2005). Just prior to World War II, the oil was declared a strategic item for defense.

It is not completely clear that the Tung Nut Depot existed in its current location in the 1930s. During historic structure testing in 2004, Bland and Associates, Inc., examined aerial photos from 1937 through 1956. From those photos, it is not clear that the structure existed at its current site. Topographic maps from 1966 onward show the depot building in its current location.

One unrecorded historic structure also exists at the park, the park shop and office. This structure was constructed between 1964 and 1968 according to aerial photography and needs to be recorded with the FMSF. The original use of this structure is uncertain.

The condition of AL4980 is fair. The condition of the unrecorded historic shop structure is considered fair because it needs a new roof. AL04980 should be stabilized as needed. A new building has been built nearby to serve as the park shop and office.

Cultural Sites Listed in the Florida Master Site File

Site Name and FMSF #	Culture/Period	Description	Significance	Condition	Treatment
AL00137 Cellon Fence Line	Prehistoric/Unspecified	Archaeological Site	NE	G	P
AL00141 NN	Alachua A.D., 1250- A.D. 1600	Archaeological Site	NE	G	P
AL00155 Flint Sink	Prehistoric/Unspecified	Archaeological Site	NE	G	P
AL00272 San Francisco De Potano	Alachua A.D., 1250- A.D. 1600; Archaic, 8500 B.C.- 1000 B.C.; Potano; First Spanish, Early 1600-1699	Archaeological Site	NRL	G	P
AL00275 NN	Prehistoric/Unspecified	Archaeological Site	NE	G	P
AL00276 NN	Alachua A.D., 1250- A.D. 1600; Archaic, 8500 B.C.- 1000 B.C.	Archaeological Site	NE	G	P
AL00288 NN	Prehistoric/Unspecified	Archaeological Site	NE	G	P
AL00304 Old Road	Prehistoric/Unspecified	Archaeological Site	NE	G	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
AL00305 Sandhill Cutoff	Alachua A.D., 1250- A.D. 1600; Weeden Island, A.D. 450-1000	Archaeological Site	NE	G	P
AL00306 Chert Swamp	Archaic, 8500 B.C.- 1000 B.C.	Archaeological Site	NE	G	P
AL00307 NN	Archaic, 8500 B.C.- 1000 B.C.	Archaeological Site	NE	G	P
AL00309 NN	Alachua A.D., 1250- A.D. 1600; Cades Pond, 300 B.C.-A.D. 800; Deptford, 700 B.C.-300 B.C.	Archaeological Site	NE	G	P
AL00310 Colding	Alachua A.D., 1250- A.D. 1600; American Acquisition/Territorial Development 1821-45; Hickory Pond, A.D. 800-1250	Archaeological Site	NE	G	P
AL00446 Hargraves	Archaic, 8500 B.C.- 1000 B.C.; Deptford, 700 B.C.-300 B.C.	Archaeological Site	NS	G	P
AL00447 Cellon	Archaic, 8500 B.C.- 1000 B.C.; Deptford, 700 B.C.-300 B.C.	Archaeological Site	NE	G	P
AL00448 NN	Archaic, 8500 B.C.- 1000 B.C.	Archaeological Site	NE	G	P
AL00449 NN	Archaic, 8500 B.C.- 1000 B.C.	Archaeological Site	NE	G	P
AL00461 San Felasco Hammock	Early Archaic	Archaeological Site	NE	G	P
AL02471 Twin Ponds Site	Prehistoric/Unspecified	Archaeological Site	NS	G	P
AL02472 Cellon Creek Site	Prehistoric/Unspecified	Archaeological Site	NE	G	P
AL03127 Sandhill	Unspecified	Archaeological Site	NE	G	P
AL03128 Mesic Hammock	Unspecified	Archaeological Site	NE	G	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
AL03393 Itchy Bottom	Prehistoric/Unspecified	Archaeological Site	NE	G	P
AL03394 West Cut	Prehistoric/Unspecified	Archaeological Site	NE	G	P
AL03395 Sanchez Pond	Prehistoric/Unspecified	Archaeological Site	NE	G	P
AL03396 Culvert	Prehistoric/Unspecified; First Spanish, 1513-1599	Archaeological Site	NE	G	P
AL03397 Moonshine Creek Still	Twentieth century American, 1900- present	Archaeological Site	NE	G	P
AL03398 Bucket	Twentieth century American, 1900- present	Archaeological Site	NE	G	P
AL03399 Depot	Prehistoric/Unspecified	Archaeological Site	NE	G	P
AL03400 North Prairie	Early Archaic; Paleoindian, 10,000 B.C.-8500 B.C.	Archaeological Site	NE	G	P
AL03401 Commune	Nineteenth century American, 1821-1899; Twentieth century American, 1900-present; Prehistoric/Unspecified	Archaeological Site	NE	G	P
AL03402 Inholding Road	Prehistoric/Unspecified	Archaeological Site	NE	G	P
AL03403 Big Oak Mound	Prehistoric	Archaeological Site	NE	G	P
AL03411 Dairy Barn	Twentieth century American, 1900- present	Archaeological Site	NE	G	P
AL03412 J M Sanchez Place	American Acquisition/Territorial Development 1821-45; Prehistoric	Archaeological Site	NE	G	P
AL03413 Headquarters	American Acquisition/Territorial Development 1821-45; Prehistoric	Archaeological Site	NE	G	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
AL03414 Big Magnolia	Alachua A.D., 1250- A.D. 1600; Leon- Jefferson	Archaeological Site	NE	G	P
AL03415 Blues Creek Road	Prehistoric	Archaeological Site	NE	G	P
AL03416 Turkey Creek	Prehistoric	Archaeological Site	NE	G	P
AL03417 F. R. Sanchez	American Acquisition/Territorial Development 1821-45	Archaeological Site	NE	G	P
AL03421 Blues Creek Still	Twentieth century American, 1900- present	Archaeological Site	NE	G	P
AL03422 Old Tractor	Twentieth century American, 1900- present	Archaeological Site	NE	G	P
AL03519 South Side	Archaic, 8500 B.C.- 1000 B.C.	Archaeological Site	NE	G	P
AL04980 Agricultural Structure #1	c. 1925	Historic Structure	NE	F	P
AL05160 A-13	Other	Archaeological Site	NS	G	P
AL05161 A-11	Prehistoric	Archaeological Site	NS	G	P
AL05162 A-15	Other	Archaeological Site	NS	G	P
AL05163 A-16	Prehistoric	Archaeological Site	NS	G	P
AL05164 A-17	Prehistoric	Archaeological Site	NS	G	P
AL05165 A-18	Prehistoric	Archaeological Site	NS	G	P
AL05166 A-22	Other	Archaeological Site	NS	G	P
AL05167 A-14	Prehistoric	Archaeological Site	NS	G	P
AL05743 GH-115	Cades Pond, 300 B.C.	Archaeological Site	NE	G	P
AL05744 GH-115	Prehistoric	Archaeological Site	NE	G	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
AL05745 GH130/131	Middle Archaic	Archaeological Site	NE	G	P
AL05770 Chert Swamp Rock Trough	Probably 19th or early 20th Century	Archaeological Site	NE	G	P
AL05803 Mill Hopper Station	Prehistoric; Weeden Island, A.D. 450-1000	Archaeological Site	NE	G	P

Significance:
NRL-National Register Listed
NRE-National Register Eligible
LS-Locally Significant
NE-Not Evaluated
NS-Not Significant

Condition:
G-Good
F-Fair
P-Poor

Recommended Treatment:
RS-Restoration
RH-Rehabilitation
ST-Stabilization
P-Preservation
R-Removal

Condition Assessment

Objective: Assess and evaluate 57 of 57 recorded cultural resources in the park.

Action:

- Complete 57 assessments of archaeological sites.

All cultural sites should ideally be assessed annually and include both archaeological sites and historical structures. If there are issues like erosion, looting or other negative impacts the sites, should be assessed more frequently. Any changes or impacts should be documented.

If any site evaluations are needed, they will be conducted by a professional archaeologist.

No Historic Structures Reports (HSR) area needed unless structural changes are planned for AL4980.

Documentation of Recorded Sites

Objective: Compile reliable documentation for all recorded historic and archaeological resources.

Actions:

- Ensure all known sites are recorded or updated in the Florida Master Site File.
- Develop and adopt a Scope of Collections Statement.

The existing office and shop structure needs to be recorded with the FMSF. All other known sites are recorded but as new sites are found they also should be recorded with the FMSF.

According to the predictability model prepared in 2011, most of San Felasco Hammock has a high probability of archaeological sites. The DRP matrix should be followed for any area where ground disturbing activities are planned. A high probability area would need a cultural resource survey if ground disturbing activities are planned, and no previous survey had been conducted.

Develop a scope of collections statement indicating that the park does not have any collections and that they are not appropriate for the park.

Preservation Measures

Objective: Bring one of 57 recorded cultural resources into good condition.

Actions:

- Design and implement regular monitoring programs for all cultural sites.
- Create and implement a cyclical maintenance program for each cultural resource.
- Stabilize historic structure AL4980 as needed.

Develop and implement a program to monitor all sites at least once every two years. Keep a record of each site and the impacts affecting each site.

San Felasco Hammock has only one recorded structure that needs cyclical maintenance. A clear method for determining maintenance needs should be documented. Any maintenance needs should be implemented in a timely fashion. The park does not have any collections which need cyclical maintenance.

All known sites are in good condition with the exception of historic structure AL4980 which is in fair condition. It should be stabilized to prevent further deterioration.

SPECIAL MANAGEMENT CONSIDERATIONS

Arthropod Control Plan

All DRP lands are designated as “environmentally sensitive and biologically highly productive” in accordance with Ch. 388 and Ch. 388.4111 Florida Statutes. If a local mosquito control district proposes a treatment plan, the DRP works with the local mosquito control district to achieve consensus. By policy of DEP since 1987, aerial adulticiding is not allowed, but larviciding and ground adulticiding (truck spraying in public use areas) is typically allowed. The DRP does not authorize new physical alterations of marshes through ditching or water control structures.

San Felasco Hammock Preserve State Park does not have an Arthropod Control Plan. Mosquito control plans temporarily may be set aside under declared threats to public or animal health, or during a Governor’s Emergency Declaration.

LAND USE COMPONENT

VISITATION

Surrounded by ongoing development, San Felasco Hammock Preserve State Park is a local haven for outdoor recreation. The park is a regional destination for off-road biking. Hiking, horseback riding, horse carriage events, picnicking and nature study are also available. The 50-mile *Tour de Felasco* trail bike race and periodic invasive plant species identification workshops are popular seasonal visitor events.

Recreational infrastructure includes more than 60 miles of multiuse trails, including 32 miles of challenging cycling trails. Trails are concentrated in the northern third of the park and accessible from U.S. Highway 441. The trail system traverses a variety of natural landscapes, including some of the most extensive upland hardwood forest in Florida. The majority of the designated hiking trails are in the southern portion of the park, where they wind through karst features such as sinkholes and limestone outcrops.

San Felasco Hammock Preserve State Park's natural communities juxtapose the hammock's extensive biking trails, presenting a dichotomy of passive versus intensive use and a commitment to balance public recreation and resource protection.

Trends

The park sees the heaviest visitation during a five-month stretch in the winter from December through April. San Felasco is heavily visited in January for the *Tour de Felasco* trail biking event. This 50-mile endurance event has been held for 20 years and has consistently attracted high visitation.

Economic Impact

San Felasco Hammock Preserve State Park recorded 29,010 visitors in FY 2022/2023. By DRP estimates, the FY 2022/2023 visitors contributed $3,649,423 in direct economic impact, the equivalent of adding 51 jobs to the local economy (FDEP 2023).

EXISTING FACILITIES AND INFRASTRUCTURE

The northern trailhead is accessible via U.S. 441 and Progress Boulevard, about 2 miles southeast of the city of Alachua. The northern trailhead features a restroom, a large picnic pavilion and a large parking area that serves hikers, trail bikers and equestrians. From the northern trailhead, visitors may access 13.2 miles of equestrian trails and 32.5 miles of single-track bike trails.

The northern portion of the park features an extensive system of mountain bike trails, including the 4-mile Cellon Creek Loop, 1-mile Cotton Tail Trail, 8-mile Tung Nut Loop Trail, and the 2-mile Hammock Hub. From Hammock Hub, there are multiple connected trails, including the 1.6-mile Sweet Gum Loop, 1.3-mile Ravine Creek Trail, 1-mile Cane Break Trail, and 0.6-mile Live Oak Loop. Tung Nut Loop leads to the historic Tung Nut Depot structure which is currently closed to the public until further notice.

The southern park entrance is off State Highway 232 (Millhopper Road). A stabilized, unpaved parking area is available on the south side of Millhopper Road. From this parking area, six hiking trails totaling more than 15 miles in length are available on either side of Millhopper Road. An un-signaled crosswalk connects the parking lot to the trail system on the north side of Millhopper Road.

A support area located in the western portion of the park includes a staff residence, an office and four-bay shop, two equipment shelters, a pumphouse, a flammable storage building, and a storage shed.

Facilities Inventory

North Trailhead	
Parking Areas	3
Restroom	1
Picnic Pavilion	1
Biking Trails (Mileage)	32.5
Equestrian Trails (Mileage)	13.2
Millhopper Road Trailhead	
Parking Area (20 spaces)	1
Portable Restroom	1
Picnic Pavilion	1
Interpretive Panel	1
Hiking Trails (Mileage)	15.9
Support Area	
Residence	1
Stables	1
Shop	1
Office	1
CSO Building	1
Pole Barn	1
Volunteer Campsite	1

CONCEPTUAL LAND USE PLAN

Northern Trailhead

Objective: Enhance trailhead entrance through infrastructure and interpretation improvements.

Actions:

- Provide directional signage and clearly demarcated driveways.
- Delineate and organize parking areas.
- Install a new restroom.
- Develop a sensory trail.
- Plan and implement interpretation.

Upon entering the park, improved wayfinding is needed as visitors immediately enter what is best described as a large open field. Signage and clearly demarcated driveways are necessary to direct trail users to their respective hiking, biking, or equestrian trailheads. Duplicative driveways need to be eliminated to avoid confusion and erosion. Organization of the combined parking area should include the delineation of individual parking spaces with parking curbs. Given the high use capacity of the biking trails and the frequency of special events, space for up to 100 vehicles is recommended. Proportionate to the modest equestrian use, space for approximately eight equestrian trailers is recommended.

The park should retain the existing undersized restroom to serve the proposed sensory trail and special events area. A new, larger restroom facility with capacity for periodic high use should be constructed. The new restroom should be more centrally located within the parking area to equitably serve the three

1. Northern Trailhead - Provide directional signage and demarcated driveways. Delineate and organize parking areas. Install a new restroom. Develop a sensory trail and install interpretation.
2. Itchy Bottom Picnic Area - Construct a picnic pavilion. Provide interpretation.
3. Turkey Creek - Construct a bridge.
4. Support Area - Conduct a historic structure assessment.
5. Millhopper Road Trailhead - Reconfigure parking lot. Install a permanent restroom. Improve interpretation and visitor safety.

441

INTERSTATE 75

ALACHUA 232 COUNTY

- Proposals
- Structures
- Parking Lots
- Wilderness Zone
- Turkey Creek
- Itchy Bottom Lake
- Biking Trails
- Equestrian Trails
- Hiking Trails
- Unpaved Park Roads

San Felasco Hammock Preserve State Park

Conceptual Land Use Plan

0 1,000 2,000 Feet

N

user groups. Considering that the park is a closed watershed and karst sensitive, both the existing and proposed restrooms should be connected to the municipal sewage system as feasible.

A sensory trail should be provided at this trailhead to help serve community members with developmental disabilities and sensory processing disorders, providing an alternative interpretive and recreational opportunity apart from the park's other trails. This trail, stretching from the current picnic area to Lee Sink, will provide for a sensory experience via specialized interpretive materials. Effective isolation will rely largely on configuration, including natural buffering from other trails. Interpretive planning will be essential to provide this experience.

Throughout the park, there is a lack of ecological and historical interpretation. The northern part of the park was previously utilized for cattle ranching and haying operations. Describing these and other previous uses is integral to placing the land, now protected within the park, into historical context.

Millhopper Road Trailhead

Objective: Enhance trailhead entrance and safety measures through infrastructure and facility improvements.

Actions:

- Reconfigure parking lot.
- Install a permanent restroom.
- Improve interpretation.

At least six more spaces should be added to the existing parking area to relieve shoulder parking from Millhopper Road. The parking lot's existing footprint is large enough to accommodate the new spaces. All spaces should be delineated with parking curbs.

A permanent restroom, with an accessible path from the parking area, and a picnic pavilion should be constructed to better serve and accommodate all visitors. This restroom should be located at the site of the existing portable toilets. If feasible, the restroom should be connected to the municipal sewage system.

There is currently only one interpretive panel at the parking and picnic area. Additional interpretive elements are needed to convey the park's hydrological significance and to adequately orient visitors to the complex trail system. Interpretation could describe how surrounding streams funnel surface waters into the Floridan aquifer and the park's corresponding role in protecting the region's watershed.

Traffic along Millhopper Road has increased in recent years, necessitating an improved pedestrian crossing. An appropriate traffic control device and reduced speed limit signs should be considered. Enhancements should include a pedestrian hybrid beacon to help trail users safely cross the highway. This need should be communicated to the Florida Department of Transportation.

Support Area

Objective: Conduct a historic structure assessment.

A dilapidated tobacco barn formerly used as the park office and shop is located in the support area just west of the equipment shelters along the tree line. A historic structure assessment should be performed in accordance with the Division of Historic Resources to determine appropriate management actions.

Turkey Creek

Objective: Improve trail system and management access.

Action:

- Construct a bridge.

In the northeast corner of the park, Turkey Creek overlaps with two biking trails, Creekside and Ravine. A durable bridge should be constructed at an appropriate location across Turkey Creek to improve staff operations.

Itchy Bottom Lake Picnic Area

Objective: Update and add interpretation and infrastructure.

Action:

- Construct a large picnic pavilion.

Currently, Itchy Bottom Lake does not have any surrounding visitor infrastructure, except for a segment of the 4-mile Turkey Creek equestrian trail. A large picnic pavilion should be constructed on the south side of the lake along with two more picnic tables for a scenic resting and picnicking area. This picnic pavilion should be a rustic pole barn structure with a stabilized base and include interpretation of the adjacent sinkhole lake as a segue into the park's purpose and significance regarding watershed protection.

VISITOR USE MANAGEMENT

Wilderness Zone Designation

San Felasco Hammock Preserve State Park was originally proposed for acquisition because it contains not only the largest remnant of high quality upland hardwood forest within the region but also a fine example of the rare southern red oak (upland pine and upland mixed woodland) forest. It also harbors an incredible diversity of natural communities and is relatively pristine, considering its close proximity to a major urban area. The initial purchase was through the Environmentally Endangered Lands Program (EEL); the express purpose of the acquisition was to preserve San Felasco Hammock's valuable natural and cultural resources.

San Felasco Hammock is a haven for many plant and animal species that fare poorly outside large, undisturbed tracts of forest. Certain vertebrate species require vast acreages of undisturbed forest to survive and reproduce. Wide-ranging species like the bobcat persist within San Felasco Hammock.

Several local bird species are known to require undisturbed, contiguous woodlands for successful reproduction.

Noss (1988) showed that hooded warblers, red-eyed vireos, Acadian flycatchers, and wood thrushes all breed in San Felasco Hammock and avoid habitat edges, preferring the more remote areas of the park. Research at the Ding Darling National Wildlife Refuge on Sanibel Island, Florida, has shown that human presence can have negative impacts on bird species (Klein, 1993). Even infrequent human disturbance can affect certain animal species, especially during the breeding season.

Unfortunately, the Cities of Gainesville and Alachua have been rapidly expanding toward the park and threaten to engulf it with development. As the human population near the park has increased, visitor use has also increased correspondingly. Some of the very attributes that make the park so unique and invaluable may now be threatened. Even within current restricted areas in the park, visitor use impacts are apparent. The large expanse of the park and the remoteness of many areas make it very difficult to enforce restricted area designations. Restricted areas such as Big Otter Ravine and Split Rock contain several rare or endangered plant species that are relatively cryptic. These areas have been damaged by unauthorized footpaths in the past and have always been vulnerable to erosion on the steep slopes. Many smaller sites, just as fragile as Big Otter Ravine, are scattered throughout the park, particularly in seepage areas and steeply sloped ravines.

In some areas of the park, looting of artifacts has occurred in the past, in part due to the few restrictions placed on visitor access. The Maple Branch area includes a significant archaeological site that has been looted repeatedly, with erosion resulting in the ravine and stream. Numerous other areas within the park's stream systems contain artifacts that can easily be removed or disturbed.

In order to protect the unit's resources from overuse, it is necessary to seek a proper balance between recreational use and preservation. Relatively low carrying capacities should be assigned for the more sensitive portions of the park, while activity that is more intensive should be concentrated in the less sensitive areas.

Accordingly, the center of the park where most of the sensitive areas are located, namely that portion of the park located north of Millhopper Road and south of the north rim of Sanchez Prairie, is designated a wilderness zone. San Felasco Hammock meets the criteria for a wilderness zone. The west boundary of the zone parallels Interstate 75, while the east boundary is the current property line at the University of Florida Agricultural Experiment Station.

Visitor use in this core area is controlled through traditional limits such as parking lot size and number of public access points. Staff-guided tours allow public access to the few areas that have traditionally been restricted. Although the core of the park continues to face increased recreational pressure, other less fragile areas of the park have been developed for increased recreational access. These areas, encompassing several thousand acres, consist of large expanses of the park north and east of Sanchez Prairie, including the University of Florida Foundation addition, as well as the tract south of Millhopper Road. These have been developed to accommodate an increased level of hiking, jogging, and other passive recreational activities.

Recreational opportunities within the park were expanded in 2001 when equestrian, biking, and hiking trails were opened on the University of Florida Foundation addition and portions of the original park north and east of Sanchez Prairie. Because of the steady increase in use of this trail system, staff have developed a trail management plan to help mitigate soil erosion and prevent water quality impacts near Cellon Creek, Turkey Creek, and numerous seepage areas on the rim of Sanchez Prairie.

The spirit of the public campaign to purchase San Felasco Hammock during the 1970s was to protect and preserve this unique and special place for future generations to enjoy. Keeping a portion of the unit as a wilderness zone will help to ensure that the fragile core of the park is properly protected, while more resilient portions of the park experience increased public use.

OPTIMUM BOUNDARY

Many minimally developed properties surrounding the park should be acquired for enhanced natural resource protection and improved recreational opportunities. Acquiring these parcels will support habitat connectivity and reduce fragmentation from existing and future development. Staff can also protect imperiled species and protect the park from invasive species. DEP will work with the Division of State Lands to acquire the parcels listed below. These parcels total approximately 1,391 acres.

The Florida Forever San Felasco Conservation Corridor north of the park totals 376 acres and would help form significant connections between existing conservation lands, help protect and connect forests and wetlands to San Felasco Hammock Preserve State Park and the Santa Fe River and preserve significant cultural resources that have commonly been found around this area.

Several other parcels of land are contiguous with the northern park boundary which could sufficiently buffer the park from U.S. Highway 441. A 160-acre property is owned by San Felasco Research Ventures LLC and used for improved pasture. The land is used as pastureland, like many other nearby parcels. Pastures can be susceptible to soil erosion and can cause sedimentation and sheet flow toward waterways. By acquiring these former and existing pastures, DEP can restore and rehabilitate these altered landcovers to their historic, desired natural communities.

The northeastern-most parcel for optimum boundary is 209 acres. About half of the parcel has a conservation easement and the other half is used for pine and timber operations. This parcel borders Turkey Creek subdivision to the east and commercial development to the north. By acquiring this parcel, DRP will be able to protect significant wetland and hydrological functions and alleviate habitat fragmentation.

There are several properties along the park's eastern boundary that should be considered for acquisition. Many of these parcels provide a direct connection to adjacent conservation lands, including Alachua County's Turkey Creek Hammock Preserve, Alachua Conservation Trust's Blues Creek Ravine, and the city of Gainesville's San Felasco Park. If these parcels are acquired, a conservation corridor will be created which will reconnect this area of fragmented land and prevent future residential development.

Acquiring several parcels on the park's western boundary, approximately 130 acres in total, could support staff by providing them a convenient access point along the park's western boundary and protect nearby karst features from polluted agricultural and residential runoff. There are also many structures on several of these properties that, if acquired, could be repurposed as another staff residence or a support area.

Park Boundary
Optimum Boundary
Other Existing Conservation Lands
Florida Forever BOT Projects

SAN FELASCO HAMMOCK PRESERVE STATE PARK
Optimum Boundary

N

0 2,500 5,000 Feet

This graphical representation is provided for informational purposes and should not be considered authoritative for navigational, engineering, legal, and other uses.