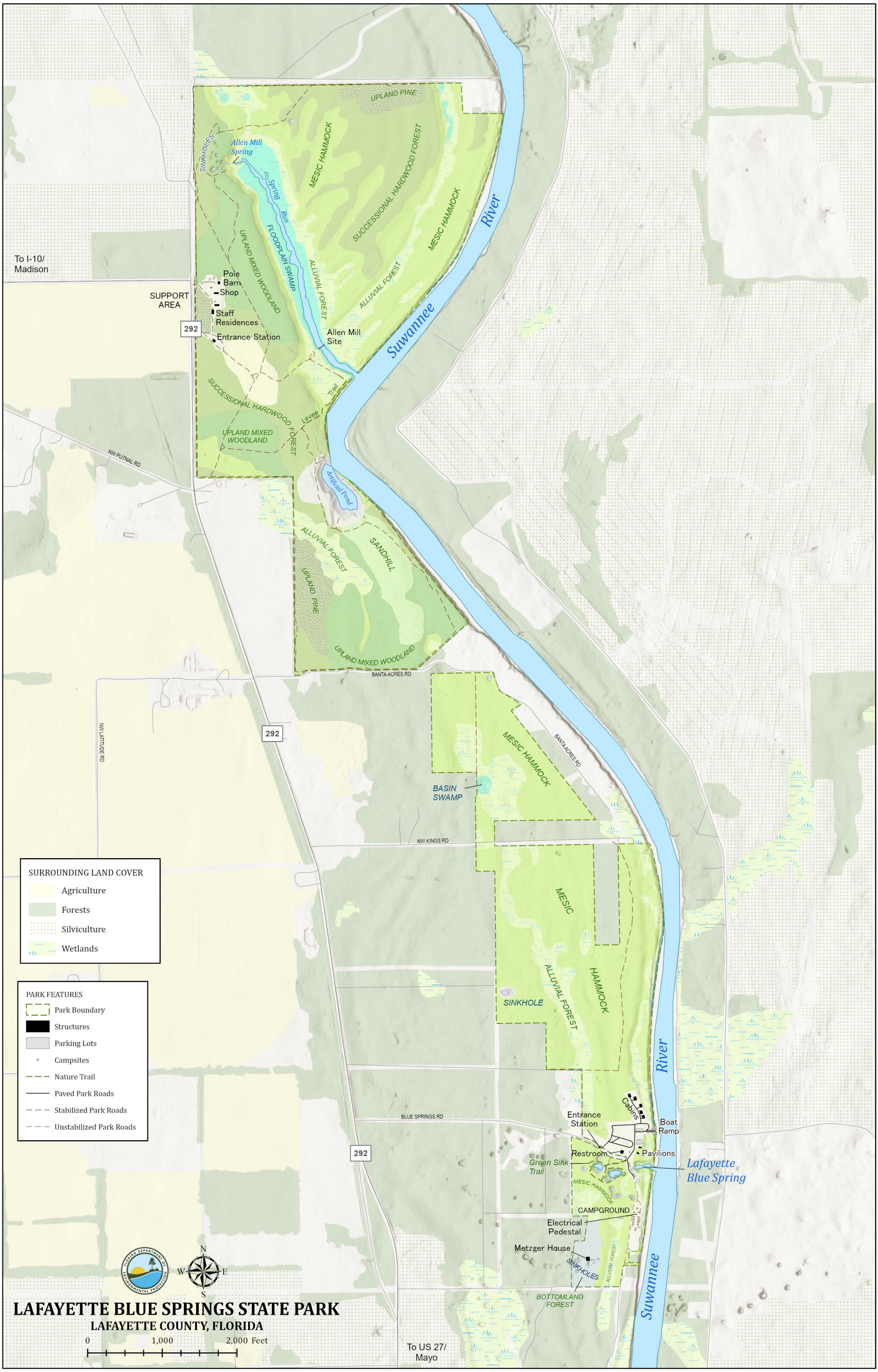
# LAFAYETTE BLUE SPRINGS STATE PARK

Park Chapter

SUWANNEE RIVER REGION


UPLAND PINE
SINKHOLES
Allen Mill Spring
MESIC HAMMOCK
SUCCESSIONAL HARDWOOD FOREST
MESIC HAMMOCK
Spring Run
FLOODPLAIN SWAMP
ALLUVIAL FOREST
ALLUVIAL FOREST
UPLAND MIXED WOODLAND
Suwannee River
To I-10/ Madison
Pole Barn
Shop
SUPPORT AREA
Staff Residences
292
Entrance Station
Allen Mill Site
SUCCESSIONAL HARDWOOD FOREST
Trail
Levee
UPLAND MIXED WOODLAND
Artificial Pond
NW PUTNAL RD
ALLUVIAL FOREST
SANDHILL
UPLAND PINE
UPLAND MIXED WOODLAND
BANTA ACRES RD
NW LATITUDE RD
292
MESIC HAMMOCK
BANTA ACRES RD
BASIN SWAMP
NW KINGS RD
MESIC HAMMOCK
ALLUVIAL FOREST
SINKHOLE
River
Cabins
BLUE SPRINGS RD
Entrance Station
Boat Ramp
292
Restroom
Pavilions
Green Sink Trail
Lafayette Blue Spring
MESIC HAMMOCK
CAMPGROUND
Electrical Pedestal
Metzger House
SINKHOLES
ALLUVIAL FOREST
BOTTOMLAND FOREST
Suwannee
To US 27/ Mayo
SURROUNDING LAND COVER
Agriculture
Forests
Silviculture
Wetlands
PARK FEATURES
Park Boundary
Structures
Parking Lots
Campsites
Nature Trail
Paved Park Roads
Stabilized Park Roads
Unstabilized Park Roads
N
W
E
S
LAFAYETTE BLUE SPRINGS STATE PARK
LAFAYETTE COUNTY, FLORIDA
0
1,000
2,000 Feet

# INTRODUCTION

## LOCATION AND ACQUISITION HISTORY

Lafayette Blue Springs State Park is located in Lafayette County. Access to the park is from Blue Springs Road via County Road 292. The Vicinity Map also reflects significant land and water resources existing near the park.

Lafayette Blue Springs State Park was initially acquired by the Trustees on Feb. 8, 1977, through funding provided under the Land and Water Conservation Fund / Florida Recreation Development Assistance Program. Currently, the park comprises 714.63 acres. The Board of Trustees of the Internal Improvement Trust Fund (Trustees) hold fee simple title to the park and on June 1, 2005, the Trustees leased (Lease No. 4501) the property to the Division of Recreation and Parks (DRP) under a 50-year lease. The current lease will expire on May 31, 2055.

Lafayette Blue Springs 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 Appendix). A legal description of the park property can be made available upon request to the Florida Department of Environmental Protection (DEP).

## 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 no additional revenue generating activities are appropriate during this planning cycle. 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 Lafayette Blue Springs State Park is to manage the property in such a way as to protect and restore the natural and cultural values of the property and provide the greatest benefit to the citizens of the state.

**Park Significance**

- Lafayette Blue Springs State Park is associated with an extensive aquatic cave network, known as the Green Sink cave system, that is well documented by the local diving community. Over 12,000 feet of cavern passageways have been surveyed.

- The park is home to one of Florida's first-magnitude springs which runs into the world-famous Suwannee River.

- The natural limestone bridge that spans the spring run is a stunning example of the karst limestone geography of the area.

- The past cultures of native people, the Spanish and early settlers utilized the Suwannee River's abundant resources and corridor for transportation. Signs of these activities remain visible on the landscape today including missing longleaf pine, remnants of the mill site, and the historic route of the Bellamy Road as it crossed the river.

**Central Park Theme**

Flowing beneath the land bridge that straddles its main spring run, the secluded waters of Lafayette Blue Springs are hidden among shaded hammocks and dynamic sinkholes.

Lafayette Blue Springs State Park is classified as a state park in the DRP unit classification system. In the management of a state park, balance is sought between the goals of maintaining and enhancing natural conditions and providing various recreational opportunities. Natural resource management activities are aimed at management of natural systems. Development in the park is directed toward providing public access to and within the park and to providing recreational facilities, in a reasonable balance, that are both convenient and safe. Program emphasis is on interpretation of the park's natural, aesthetic and educational attributes.

## OTHER DESIGNATIONS

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

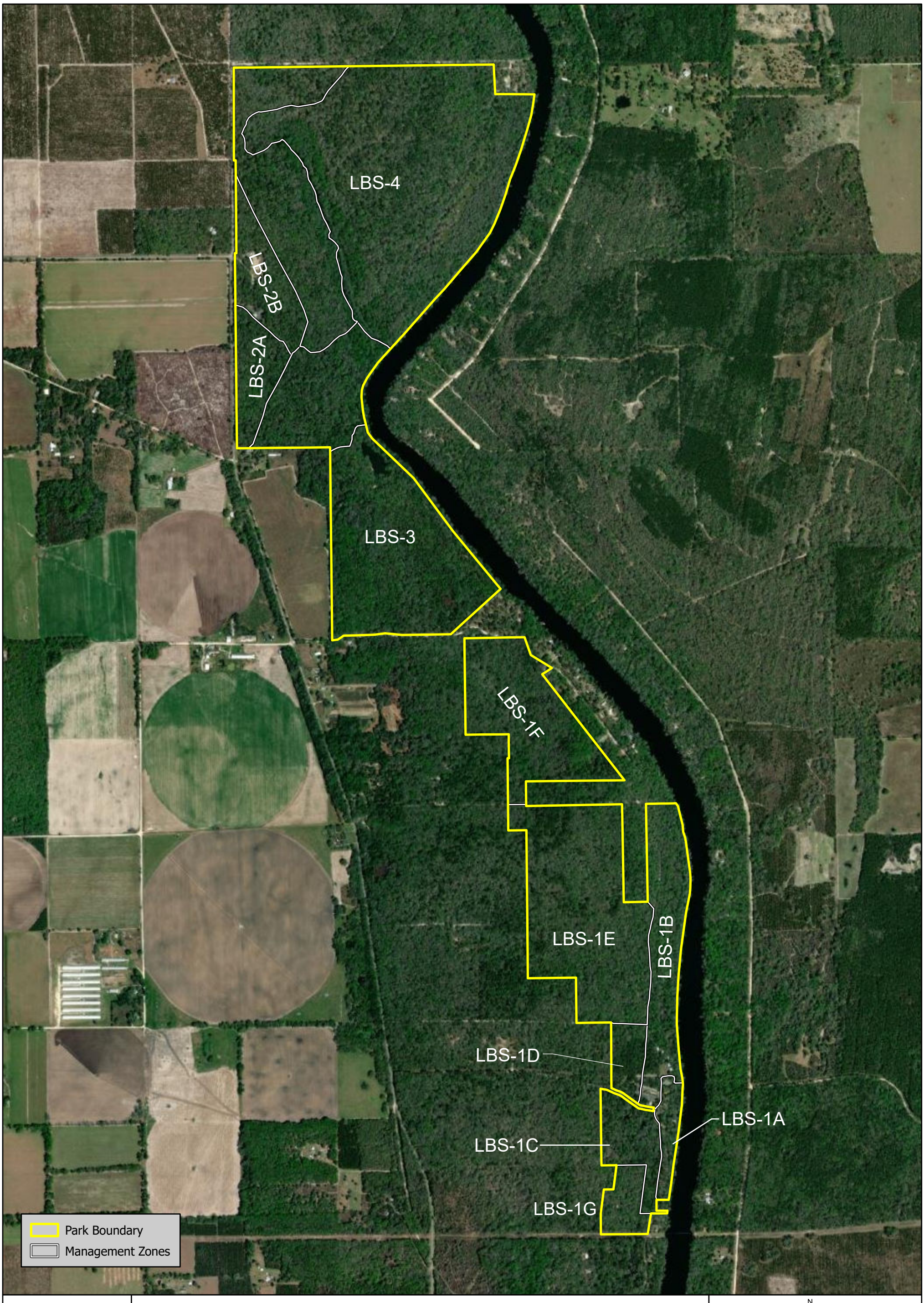
All waters within the park have been designated as Outstanding Florida Waters, pursuant to Chapter 62-302, Florida Administrative Code. Surface waters in this park are also classified as Class III (suitable for fish consumption and recreation) waters by DEP. The park is not adjacent to an aquatic preserve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

**PARK ACCOMPLISHMENTS**

- Conducted prescribed fire on Zones 2A, 2B and 3A.
- Completed 100% of goals for invasive species management.
- Completed interpretive nature trail, including the installation of signage.
- Installed new mattresses and couches in all five cabins.
- Painted all parking lot stripes.

## RESOURCE MANAGEMENT COMPONENT

| Lafayette Blue Springs State Park Management Zones | | | | |
|---|---|---|---|---|
| **Zone ID** | **Zone Acres** | **Fire-Type Acres** | **Burn Zone Indicator** | **Cultural/Historical Indicator** |
| LBS-1A | 9.44 | | N | Y |
| LBS-1B | 43.85 | | N | Y |
| LBS-1C | 19.34 | | N | N |
| LBS-1D | 10.29 | | N | N |
| LBS-1E | 97.9 | | N | N |
| LBS-1F | 59.55 | | N | N |
| LBS-2A | 20.47 | 3.67 | Y | N |
| LBS-2B | 26.26 | 10.2 | Y | N |
| LBS-1G | 11.68 | | N | N |
| LBS-3A | 43.91 | 28.54 | Y | Y |
| LBS-4A | 70.73 | 40.6 | Y | N |
| LBS-3B | 100.07 | 81.13 | Y | N |
| LBS-4B | 200.41 | 65.16 | Y | Y |




LAFAYETTE BLUE SPRINGS STATE PARK
Management Zones

N

0 1,000 2,000 Feet

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

Highest Point : 63.2 ft

**Elevation Range**

High : 87.2 ft

Mid : 53.4 ft

Low : 19.5 ft

N

0 500 1,000 2,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial; 2011

# LAFAYETTE BLUE SPRINGS STATE PARK

# TOPOGRAPHIC MAP

## TOPOGRAPHY

Lafayette Blue Springs State Park is situated in the Gulf Coastal Lowlands geomorphologic region, within the Suwannee River Lowlands, located in the Northern Physiographic Zone and on the Wicomico marine terrace. The Gulf Coastal Lowlands are described as gently sloping terraces that originate in the highlands and extend towards the coast. Limestone is typically at or near the surface throughout most of this region, with sand or sandy clay overlying (Crane 1986).

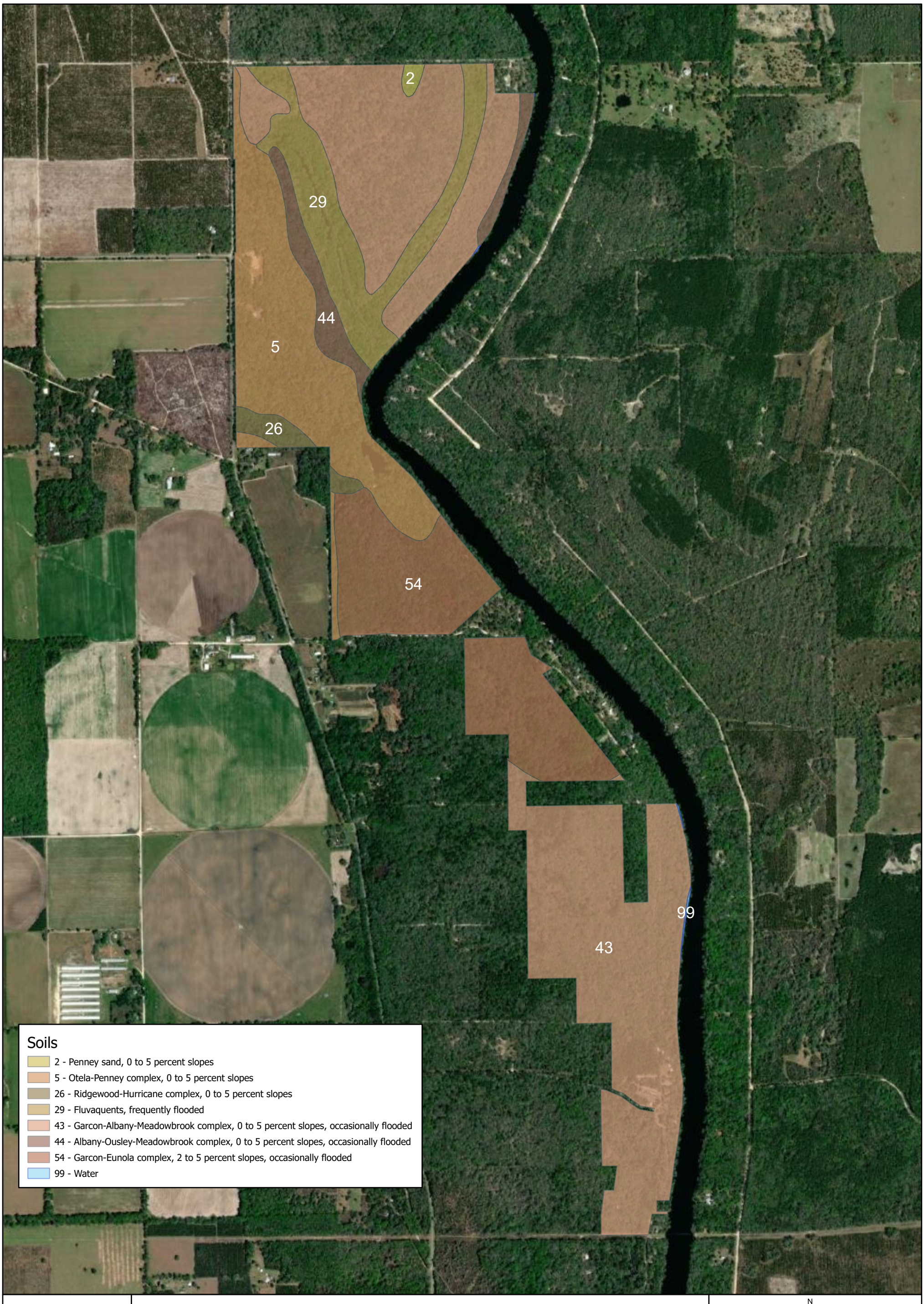
Elevations within the park, according to U.S. Geological Survey quadrangle maps, range from less than 20 feet above mean sea level (msl) along the Suwannee River to over 50 feet above msl in the central-western area of the property. The park lies completely within the 100-year and the 10-year flood plains, as determined by the Suwannee River Water Management District (SRWMD), for this reach of the Suwannee River.

Topographic relief in the park is most noticeable on the slopes surrounding the springs and sinkholes, and along the secondary flow channel of the river, located behind the primary river bluff. Elevation changes within these features reach as much as 30 feet. Alterations of natural topography within the park are few, and are limited primarily to an abandoned, mounded septic drain field, stormwater swales between the parking area and the headsprings, and roads.

## SOILS

The Soil Survey of Lafayette County, Florida indicates that two different soil types occur within Lafayette Blue Springs State Park - Garcon - Albany - Meadowbrook complex, and Garcon - Eunola complex (Weatherspoon *et al.* 1998). Descriptions of these soils are provided in the Appendix.

The sandy, well-drained soils along the riverbanks and spring slopes in the park are susceptible to erosion which, while occurring naturally when the river floods, is often accelerated due to the intrusion of heavily used trails. Management activities will follow generally accepted best management practices to prevent additional soil erosion and conserve soil and water resources on site.




# LAFAYETTE BLUE SPRINGS STATE PARK
## Soils

N

0 1000 2000 Feet

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

## HYDROLOGY

Lafayette Blue Springs State Park is situated in northeastern Lafayette County within the third reach of the Middle Suwannee River basin (Hornsby et al. 2002). The park's most prominent hydrological features include the Suwannee River, two major spring vents (Lafayette Blue and Allen Millpond), several karst windows directly connected to the Upper Floridan aquifer, and a vast system of aquatic caves within an underground labyrinth of interconnected limestone fractures.

### Lafayette Blue and Allen Millpond Springs

The two major springs in the park, Lafayette Blue in the south portion and Allen Millpond in the north, discharge to the Suwannee River. Both springs apparently share the same springshed, but ongoing cave mapping has not yet established that any physical connections exist between their aquatic cave systems. The surface water/groundwater contributing area for the Lafayette Blue/Allen Millpond springshed has only recently been delineated based on dye trace evidence (See Lafayette Blue Springs and Middle Suwannee Springshed Delineation Map). Early interpretation of the data has confirmed that the springshed extends into eastern Lafayette County and western Suwannee County (Greenhalgh et al. 2016). The springshed encompasses a total area of at least 150 square miles, most of it in Suwannee County.

Lafayette Blue Spring is classified as one of Florida's 33 historic first-magnitude springs (Scott et al. 2004). Several large karst windows that are hydraulically connected to Lafayette Blue occur up-gradient of the head spring. When spring discharge is normal or high, groundwater flow through these karst features is in the direction of the headspring. For the period of record, groundwater discharge from the Lafayette Blue headspring ranges from a maximum negative flow of minus-179 cubic feet per second during inflow events to a maximum positive outflow of 260 cubic feet per second (Rosenau et al. 1977; Hornsby and Ceryak 1998, Suwannee River Water Management District (SRWMD) 2021). It is important to note that the negative discharge rates which are sometimes measured at this spring generally reflect flood conditions in the Suwannee River and are not representative of true spring discharge.

The Allen Millpond headspring is classified as a historic second-magnitude spring (Scott et al. 2004). This spring's discharge ranges from a maximum negative flow of minus-32.5 cubic feet per second during inflow events to a maximum positive outflow of 51.27 cubic feet per second for the period of record (Rosenau et al. 1977; Hornsby and Ceryak 1998; SRWMD 2021). As with Lafayette Blue, the negative discharge rates measured at Allen Millpond generally reflect flood conditions in the Suwannee River and are not representative of actual spring discharge.

### Flooding

One watershed-level process that seldom receives adequate consideration during studies of river hydrology is flooding. Flood events on the Suwannee River are naturally occurring since the river is unobstructed by artificial dams.

The stretch of the Suwannee River between River Miles 103 and 106, which includes Lafayette Blue Springs State Park, floods often. The Suwannee River Water Management District has calculated the following flood elevations for this section of the river during two-, 10- and 100-year events.

Most of the park lies below 50 feet mean sea level, making it subject to frequent river flooding.

The area between the Allen Millpond spring run and the Suwannee River and the entire southern half of the park lies within the 10-year floodplain as determined by the SRWMD for this reach of the Suwannee River. Only the westernmost part of the Allen Millpond tract is above the 100-year floodplain.

Three of the natural communities along the river are often completely inundated (spring-run stream, floodplain swamp and alluvial forest). Based upon historic elevation data from the U.S. Geological Survey (USGS) Luraville gage, which is located on the Suwannee about five 5 downstream of the park, the Suwannee River reached or exceeded 40 feet mean sea level in that area as many as 15 times during the 1927-2004 period. These data indicate that the park has a one-in-five chance of flooding in any given year (USGS 2021).

An especially important relationship exists between downstream flooding in a major river and episodic inundation of adjacent floodplain communities (Pringle 1997; Diehl 2000; Light et al. 2002). Within Lafayette Blue Springs State Park, the alluvial forest and floodplain swamp communities significantly benefit from this flooding phenomenon. These communities are highly dependent on the ephemeral nature of the flooding regime. If intermittent flooding of the Suwannee River did not occur, adjacent floodplain communities would experience major changes in soils and species composition. In fact, any alteration of the normal flooding regime of the Suwannee, especially in conjunction with reductions in base flow of springs along the middle reach of the river, could cause significant changes in the character of these wetlands (Light et al. 2002; Sepulveda 2002).

During flood events, there is often an insurgence of the Suwannee River's tannin-stained waters into the aquatic cave systems of Lafayette Blue and Allen Millpond springs. Rather rapid, large-scale changes in the usually stable environment of these caves may occur. One frequent consequence of insurgence events may be a noticeable die-off of troglobitic fauna (Streever 1991). Previously documented flow reversals at Lafayette Blue and other similar aquatic cave systems (e.g., Peacock Springs) have provided an early understanding of cyclic troglobite die-off and recovery episodes (Streever 1991, 1992a, and 1992b; District 2 files).

## Water Quality

The park has documented numerous significant brownout incidents at Lafayette Blue and Allen Millpond springs since the inception of daily spring-clarity monitoring in 2009. The brownout monitoring has clearly revealed that each spring can act as an estavelle, a type of spring whose fluctuations in discharge reflect the direct relationship between groundwater potential and stream stage (Scott et al. 2004). From 2009 to 2016, reverse flow into spring vents occurred as often as 14 times at Lafayette Blue and 11 times at Allen Millpond, based on DRP records of flood-induced brownouts (District 2 files).

Lafayette Blue Springs State Park lies within an area of significant karst activity containing numerous surface waterbodies (i.e., freshwater springs and karst windows) that are connected to the Upper Floridan aquifer. Both Lafayette Blue Spring and Allen Millpond springs have extensive aquatic cave systems. As mentioned above, no connection has yet been established between the two systems, perhaps because most of the local cave mapping and research efforts have concentrated on Lafayette Blue.

The three main water quality issues affecting Lafayette Blue Springs State Park are: 1) erosion of slopes above the Suwannee River and around the Lafayette Blue and Allen Millpond headsprings, which may produce excessive sedimentation within those waterbodies, 2) local and regional groundwater

contamination, and 3) a decline in ecological health of the springs and spring-run streams. A modest amount of water quality data is available for Lafayette Blue Spring, but very little similar data exists for Allen Millpond Spring (Hornsby and Ceryak 1998; Scott et al. 2004; SRWMD 2021; DEP 2021a; DEP 2021b; Florida Springs Institute (FSI) 2021). Many water management agencies collect store, and manage hydrological information that is accessible to all in a variety of web-based databases (USGS 2021; SRWMD 2021; DEP 2021a; DEP 2021b).

**Erosion**

Most of the erosion that once contributed excessive sediment loads to surface waters in the park has been successfully mitigated. However, there are still some areas on the steep banks of Lafayette Blue and Allen Mill Pond springs and along the Suwannee River where additional erosion control measures may be needed. The Floridan aquifer in the area is unconfined and contaminated surface waters can potentially funnel through karst features directly into high-quality groundwater resources (Cichon et al. 2004). Consequently, DRP staff should constantly watch for signs of increased erosion, sedimentation, and stormwater runoff within the park.

**Local Groundwater Contamination**

Recent research has indicated that substantial nitrate loading and other related water quality issues are associated with the mixing of river water and groundwater along this reach of the Suwannee River (Katz et al. 1999; Katz and Hornsby 1998; Berndt et al. 1998; Pittman et al. 1997). Currently, silviculture and agriculture are the two most common land-use practices in much of the middle and lower basins of the Suwannee River, although development and land-use issues are increasing at a moderate pace, with several small towns within the river corridor gradually increasing in size and a number of weekend/retirement homes along the river. Since the Floridan aquifer is unconfined in the region, there may be cause for concern. The aquifer is highly vulnerable to anthropogenic eutrophication by surface runoff (e.g., agriculture fertilizers and/or concentrated animal feeding operation (CAFO) waste) or by malfunctioning septic or sewage systems, especially near karst features.

Deterioration of groundwater quality throughout the Lafayette/Allen Millpond springshed (i.e., Lafayette and Suwannee counties) may affect water resources within the park. Numerous non-point sources of groundwater contamination exist within the complex and incompletely defined Lafayette Blue springshed (Harrington et al. 2010). Agriculture is the predominant land use in rural Suwannee and Lafayette counties. Over 85% of the nutrient inputs into the Floridan aquifer in this region originate from lands used for pasture, row crops, or CAFO (i.e., dairy cattle and commercial poultry) (DEP 2013; DEP 2018). Specifically, nitrogen levels in the Floridan aquifer in north Florida have increased by an order of magnitude over the past 50 years (Cohen et al. 2007; Upchurch et al. 2007).

Agricultural activities, especially those using inorganic fertilizer, have long been linked with nutrient enrichment of regional groundwater within the Middle Suwannee River basin (Obreza and Means 1986; SRWMD 2005; DEP 2013; DEP 2018). Scientists have conducted nitrogen isotope studies at numerous waterbodies throughout the Middle Suwannee River, including Lafayette Blue Spring, which confirm that the primary cause of the inorganic/organic nitrogen contamination of groundwater in the Lafayette/Allen Millpond springshed is heavy fertilizer use (Katz et al. 1999; Albertin et al. 2007; DEP 2013; DEP 2018).

Statewide, Lafayette Blue Spring has the 10th-highest level of nitrate-nitrogen that has been measured for any Florida spring (Harrington et. al. 2010; District 2 files; DEP 2013; FSI 2021; SRWMD 2021).

Prior to 2000, available water quality data is sporadic for both Lafayette Blue and Allen Millpond springs, with the earliest recorded sampling occurring in 1973 (Rosenau et al. 1977; Scott et al. 2004). Since 2000, the SRWMD has conducted quarterly monitoring for numerous parameters including nitrate and phosphate concentrations and specific conductivity (SRWMD 2021). Additional monitoring has been underway since 2012, as North Florida Springs Alliance cave divers have recorded supplemental in situ water quality data within the vast network of underground conduits at Lafayette Blue Spring (District 2 files). In 2015, the SRWMD implemented a real-time monitoring project at Lafayette Blue Spring using continuous data recording equipment installed at the spring. This monitoring project has targeted nitrates, but there are numerous other parameters that are sampled and analyzed (SRWMD 2021).

For the period of record, nitrate concentrations in the Lafayette Blue headspring have ranged from 0.81 to 4.79 milligrams per liter. A subset of the available data for Lafayette Blue Spring is listed below (Hornsby and Ceryak 1998, SRWMD 2021).

| **Sample Date** | **$NO_3$-N (mg/L)** | | **Sample Date** | **$NO_3$-N (mg/L)** |
|---|---|---|---|---|
| 21-Jul-1980 | 2.00 | | 18-Mar-2009 | 1.20 |
| 6-Jun-1995 | 1.23 | | 11-Nov-2009 | 2.30 |
| 18-Sep-1996 | 1.41 | | 27-Apr-2010 | 2.40 |
| 22-Jul-1996 | 2.12 | | 7-Jun-2010 | 2.70 |
| 16-Jul-1997 | 1.87 | | 15-Sep-2011 | 2.90 |
| 20-Jul-1998 | 2.32 | | 14-Dec-2011 | 2.10 |
| 20-Apr-1999 | 2.32 | | 26-Mar-2012 | 1.50 |
| 15-Dec-1999 | 1.58 | | 13-Sep-2012 | 3.00 |
| 11-Jan-2000 | 1.58 | | 28-May-2013 | 2.50 |
| 17-May-2000 | 0.98 | | 17-Dec-2013 | 3.30 |
| 19-Jul-2001 | 1.76 | | 20-Aug-2014 | 3.35 |
| 12-Sep-2001 | 2.11 | | 23-Mar-2015 | 2.62 |
| 21-Feb-2002 | 1.25 | | 22-Sep-2015 | 3.29 |
| 16-Jul-2002 | 2.76 | | 15-Mar-2016 | 2.25 |
| 18-Feb-2003 | 2.20 | | 27-Sep-2016 | 3.47 |
| 4-Nov-2003 | 2.99 | | 26-Jul-2017 | 3.20 |
| 13-Jul-2004 | 1.90 | | 17-Nov-2017 | 3.21 |
| 22-Dec-2004 | 2.36 | | 2-Oct-2018 | 3.61 |
| 6-Mar-2005 | 1.79 | | 26-Aug-2018 | 3.56 |
| 15-Oct-2005 | 2.78 | | 24-Aug-2019 | 4.22 |
| 18-May-2006 | 2.36 | | 14-Dec-2019 | 3.91 |
| 20-Dec-2006 | 1.58 | | 14-Jul-2020 | **4.79** |

| | | | | |
|---|---|---|---|---|
| 10-Apr-2007 | 1.49 | | 1-Oct-2020 | 4.12 |
| 19-Dec-2007 | 1.02 | | 7-Feb-2021 | 4.20 |
| 21-Jan-2008 | **0.81** | | 4-Jul-2021 | 3.68 |
| 24-Sep-2008 | 2.64 | | | |

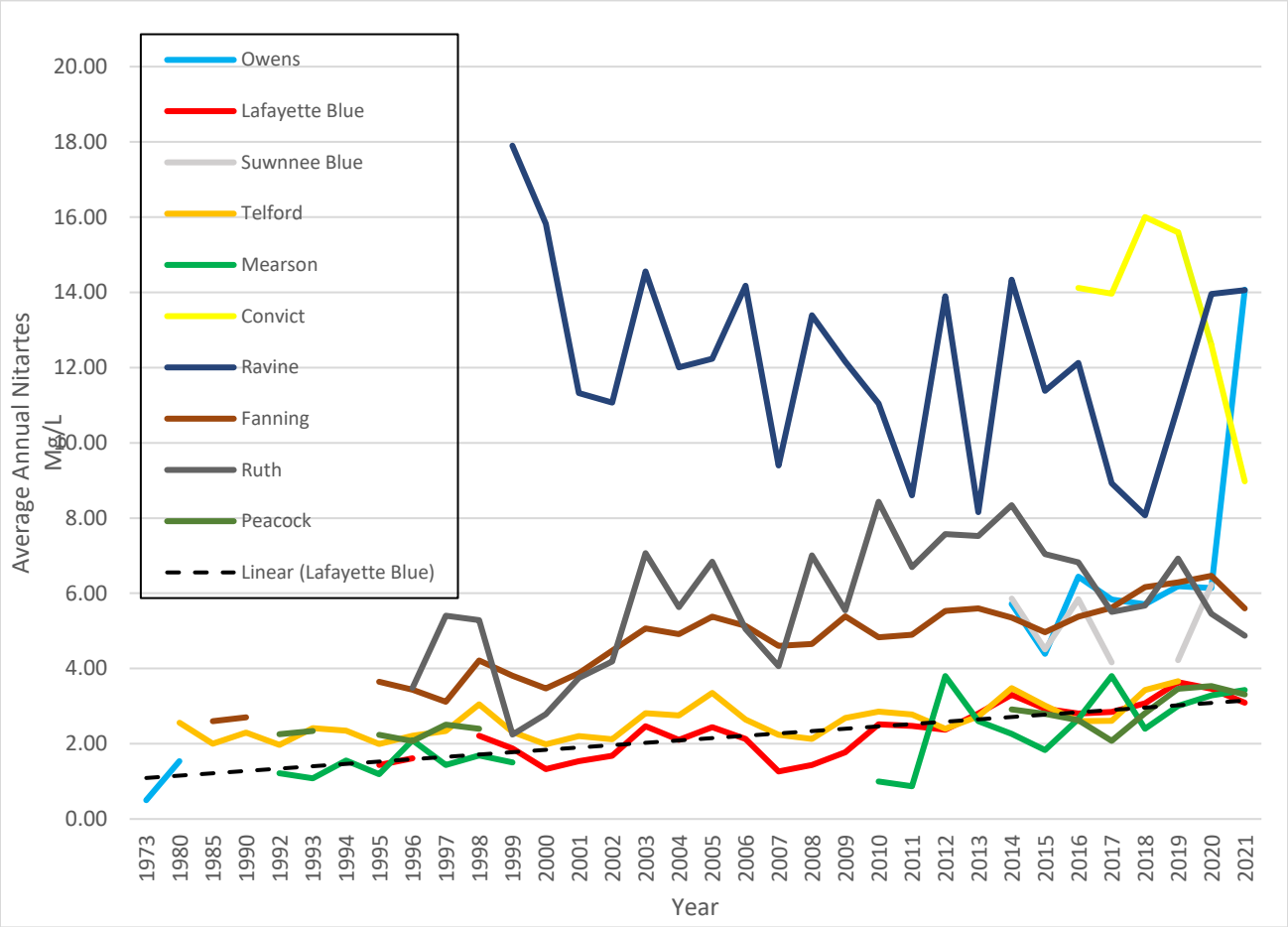
Interestingly, nitrate concentrations at the Allen Millpond headspring appear to be substantially lower than at Lafayette Blue Spring, ranging from 0.28 to 2.78 milligrams per liter for the period of record. A subset of the available nitrate concentration data for Allen Millpond is listed below (Hornsby and Ceryak 1998, SRWMD 2021).

| **Sample Date** | **$NO_3$-N (mg/L)** | | **Sample Date** | **$NO_3$-N (mg/L)** |
|---|---|---|---|---|
| 12-Nov-1992 | 0.65 | | 25-Jul-2006 | 1.40 |
| 10-Dec-1992 | 0.42 | | 22-Aug-2006 | 1.30 |
| 11-Jun-1993 | 0.84 | | 19-Sep-2006 | 1.30 |
| 16-Jul-1993 | 0.93 | | 24-Oct-2006 | 1.20 |
| 12-Aug-1993 | 0.98 | | 15-Nov-2006 | 0.96 |
| 10-Sep-1993 | 0.63 | | 14-Jun-2007 | 0.36 |
| 23-Sep-1997 | 1.23 | | 19-Jun-2007 | 0.34 |
| 23-Sep-1997 | 1.24 | | 13-Jul-2007 | 0.23 |
| 17-Jun-1998 | 1.97 | | 1-Mar-2016 | 1.50 |
| 20-Jul-1998 | 1.90 | | 1-Mar-2016 | 0.00 |
| 18-Aug-1998 | 1.72 | | 9-Feb-2017 | 1.22 |
| 8-Sep-1999 | 0.77 | | 8-Nov-2017 | 2.14 |
| 21-Jul-2000 | **0.28** | | 5-Apr-2018 | 1.60 |
| 25-Mar-2002 | 0.52 | | 18-Oct-2018 | 2.49 |
| 25-Jan-2006 | 1.40 | | 18-Apr-2019 | 2.41 |
| 22-Feb-2006 | 1.30 | | 18-Jul-2019 | **2.78** |
| 22-Mar-2006 | 0.03 | | 22-Jan-2020 | 2.32 |
| 19-Apr-2006 | 1.40 | | 23-Jul-2020 | 2.71 |
| 23-May-2006 | 1.40 | | 18-Jan-2021 | 2.44 |
| 20-Jun-2006 | 1.30 | | 26-Apr-2021 | 2.56 |

## Regional Groundwater Contamination

Water quality appears to be declining in many springs of the middle and lower Suwannee River region. Within this area of the Suwannee River basin, groundwater contamination primarily attributed to agricultural activities continues to elevate the nutrient load as eutrophication threatens numerous spring ecosystems. The top 10 springs in this region with the highest nitrate-nitrite levels from highest to

lowest are Convict, Ravine, Fanning, Owens, Ruth, Suwannee Blue, Lafayette Blue, Peacock, Telford and Mearson (District 2 files).




Top 10 springs in the Suwannee River Basin with the highest nitrate nitrogen levels.

Unfortunately, elevated nutrients in groundwater appear to have contributed to significant declines in the ecological health of several spring systems across north Florida, including Lafayette Blue (Jones et al. 1996; Munch et al. 2006; Cohen et al. 2007; Albertin 2007; Wetland Solutions Inc. 2010; FSI 2018b). Manatee and Fanning springs in Levy County are two other first-magnitude springs that have experienced marked declines in ecosystem health. At each of these springs, nutrient enrichment has fueled an explosion of nuisance aquatic macroalgae to excessive levels. At both Manatee and Fanning springs, ecological health has declined dramatically, precipitated by a near total collapse of the submerged aquatic vegetation (SAV) that dominated each ecosystem even as late as the 1990s (District 2 files).

Scientific studies suggest that the visible presence of nuisance algal biomass in a spring ecosystem is an indicator of an imbalanced distribution of aquatic flora. These observations prompted Florida to develop Rule 62-302.500 (48) (b) F.A.C., which follows the guidance of the U.S. Environmental Protection Agency (EPA) in acknowledging that water bodies with periphyton levels exceeding 150 milligrams per meter squared may be biologically impaired and may experience a decline in ecosystem health. It is now widely recognized that nutrient enrichment is causing periphyton levels to increase in nearly all Florida springs

and that this is symptomatic of the declining ecological health of those springs (Kolasa and Pickett 1992; Hornsby et al. 2000; Stevenson et al. 2007; Brown et al. 2008).

In 1996, DEP initiated a formal statewide program for monitoring surface waters and groundwater, including those within the Suwannee River basin (Maddox et al. 1992; DEP 2009). This Integrated Water Resource Monitoring Program (IWRMP) followed a comprehensive watershed approach based on natural hydrologic units. The 52 hydrologic basins in Florida were placed on a five-year rotating schedule, allowing water-resource issues to be addressed at different geographic scales (Livingston 2003). In addition, the IWRMP assigned a waterbody identification number (WBID) to each waterbody. The WBID for Lafayette Blue Spring is 3528Z. For Allen Millpond Spring it is 3525. This watershed approach provides a framework for implementing Total Maximum Daily Load (TMDL) requirements that will attempt to restore and protect waterbodies that have been declared impaired (Clark and DeBusk 2008).

DEP basin status and water quality reports for north Florida indicate that several springs, including Lafayette Blue, became potentially impaired waterbodies in 2003 because of one or more of the following factors: excessive nutrients, total coliform bacteria, high mercury levels or low dissolved oxygen (Copeland et al. 1999; Silvanima et al. 2008; DEP 2001; DEP 2003). Based on the Impaired Waters Rule (IWR), the EPA in 2003 verified that those waterbodies were impaired, which meant that their surface water quality did not meet applicable state water quality standards (IWR, Chapter 62-303 F.A.C). This designation triggered a long chain of mandatory requirements that Florida would have to accomplish to achieve compliance with EPA regulations concerning polluted water bodies. For Lafayette Blue Spring, the compliance process started in 2008 with the assignment of a TMDL (Hallas and Magley 2008) and the initiation of a Basin Management Action Planning (BMAP). In 2018, DEP completed a BMAP for the lower and middle Suwannee River basins (DEP 2018).

It is important to note that DEP also has a water quality monitoring program called Very Intense Study Area (VISA). This program was implemented in the 1990s to monitor groundwater contamination on a long-term basis at strategic locations in the state where land-use activities were thought to be contributing to water quality issues (DEP 2021c). Two VISA sites, one in each of the largest cities in Suwannee (Mayo) and Lafayette (Live Oak) counties, are potentially important to the Lafayette Blue/Allen Millpond springshed.

The Lafayette County VISA contains 19 wells and seven springs (Perry, Telford, Running, Convict, Royal, Owen and Mearson springs) that encompass an area of 28 square miles, while the Suwannee County VISA contains 17 wells that cover an area of approximately 25 square miles (DEP 2021b). Groundwater samples that were collected and analyzed during the 1990-97 period indicated that nitrate levels within the Lafayette VISA were significantly elevated above background levels compared to elsewhere in the state (Maddox et al. 1998). No additional analyses of water quality data from the Lafayette VISA have formally been written up as an assessment document since 1998, but DEP/SRWMD/USGS data collection at wells and springs has continued (SRWMD 2021b; DEP 21c; USGS 2021). Regarding the VISA in neighboring Suwannee County, water scientists who have conducted groundwater dye trace research within the middle Suwannee region indicate that the Suwannee VISA still plays an important role within the region (Greenhalgh et al. 2016).

## Water Withdrawals

Water resources within the park may also be threatened by large-scale withdrawals from surface water or groundwater systems that are hydraulically connected to wetlands within the park. Many water management experts acknowledge that the two most recent long-term droughts (2000-01 and 2010-12) and increased consumptive use of groundwater have combined to cause a significant lowering of water tables and decreased spring flows across the entire state (Mirti 2001; Swihart 2011; Still 2010; Copeland et al. 2011; Knight and Clarke 2016; FSI 2018a). As many as seven springs within the Southwest Florida Water Management District (SWFWMD) no longer flow (Champion and Starks 2001) and at least 13 SRWMD springs have either stopped flowing or have only intermittent discharge (FSI 2018a). Additionally, water managers can now correlate specific regional drawdowns of the aquifer with shrinking springsheds and declining spring flows (Mirti 2001; Grubbs and Crandall 2007; Grubbs 2011; Knight and Clarke 2016). Given the projected water supply needs for the area, the USGS predicts that groundwater levels throughout Florida, including those in the Lafayette/Allen Millpond springshed, will continue to decline (Sepulveda 2002).

## Submerged Aquatic Vegetation

Inland freshwater Florida spring ecosystems like Lafayette and Allen Millpond springs were historically characterized by thick beds of five dominant submerged aquatic plants, including spring-tape (*Sagittaria kurziana*), American eelgrass (*Vallisneria americana*), southern waternymph (*Najas guadalupensis*), creeping primrosewillow (*Ludwigia repens*) and muskgrass (*Chara* sp.) (Whitford 1956). The presence of these five dominant SAV taxa have long characterized an ecologically healthy "underwater forest" within Florida's spring ecosystems (Odum 1957; Wetland Solutions Incorporated 2010; Heffernan et al. 2010).

Currently there has been no known history or mapping of any SAV beds at either major spring at the park. Flooding associated with the Suwannee River that creates brownout conditions of the springs poses a challenging issue for determining any future restoration of SAV at these springs. Additionally, recreation use at Lafayette Blue Spring is a concern of any future restoration of the spring. Preliminary assessment of the spring run at Allen Millpond suggests that this spring system has a strong potential for sustaining submerged aquatic plants. The system should be further assessed as to SAV presence and potential future restoration.

***Objective A*:** Assess the park's hydrological restoration needs.

- Action 1 - Continue to coordinate with other agencies and independent researchers involved in hydrological research and monitoring within the park.
- Action 2 - Continue to monitor surface water and groundwater quality at Lafayette Blue and Allen Millpond springs and track changes.
- Action 3 - Seek funding for dye trace studies to delineate the Lafayette Blue/Allen Millpond springshed and to locate proximal groundwater sources for the springs.
- Action 4- Conduct dye trace studies as funding becomes available.
- Action 5 - Continue to monitor permit requests and land-use/zoning changes in the area and provide comments as appropriate.

- Action 6 - Continue to work closely with the SRWMD to ensure that MFLs established for the Middle Suwannee River basin (including Lafayette Blue Spring) are carefully monitored and that historic flows are protected.

Over the past 50 years, multiple factors have combined to cause a rapid decline in the ecological health of Lafayette Blue and Allen Millpond springs, which have both experienced dramatic increases in nuisance aquatic macroalgae. During the period of record for Lafayette Blue Spring, its nitrate levels have been the sixth-highest among all first-magnitude springs in Florida. Regulatory agencies have determined that the waters of Lafayette Blue Spring have become impaired because of high levels of nitrogen and an overabundance of nuisance aquatic macroalgae. Although the water quality/quantity issues at both springs are complex, genuine improvements are still achievable. The following are 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 on the Suwannee River, and it will encourage and facilitate additional research in those areas. DRP will rely upon agencies such as the SRWMD, USGS, and DEP to keep it apprised of any declines in surface water quality or any suspected contamination of groundwater in the region. DRP will continue to support brownout monitoring and clarity tracking in the park's two major spring systems as part of the documentation of ecological responses to decreased spring discharge and Suwannee River flooding.

DRP staff will continue to monitor Environmental Resource Permit/Water Use Permit requests for the region and will provide timely and constructive comments as needed to 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.

Even though partial delineation of the Lafayette Blue/Allen Millpond springshed was recently accomplished, gaps remain in our understanding of the proximal sources of groundwater flow to these springs. For water managers to be able to protect water quality and potentially restore spring flows to historic levels, they will need to know the full extent of the springshed. To that end, DRP will seek funding for dye trace studies that will more completely delineate groundwater sources for the park's springs. Previous dye trace studies in the region (e.g., delineation of the Middle Suwannee River basin) have provided DRP with invaluable information about the various groundwater sources of the springs and the timing of surface water/groundwater interactions that potentially affect water quality.

DRP staff will 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 or karst features could ultimately cause significant degradation of park resources. When appropriate, District 2 staff will provide comments to other agencies regarding proposed changes in land use or zoning that may affect the park. In addition, District 2 staff will closely monitor mining permits and large consumptive use permits in the Lafayette Blue/Allen Millpond springshed for significant changes that may adversely affect park resources. DRP will also continue to work closely with the SRWMD to ensure that the MFL developed for the Middle Suwannee River, including Lafayette Blue Spring, is carefully monitored and that historic river flows are protected, or restored if there is noncompliance with the MFL.

***Objective B*:** Restore natural hydrological conditions and functions to approximately 0.9 acres of spring-run stream natural community.

- Action 1 - Evaluate the major hydrological alterations that occurred at the borrow pit site in the Allen Millpond tract and determine the feasibility of restoring portions of the site.
- Action 2 - If appropriate, initiate at least a partial restoration of the natural communities and natural hydrology at the borrow pit site.
- Action 3 - Develop and implement a plan to monitor SAV within the Allen Millpond and Lafayette Blue spring-run streams.
- Action 4 - Develop a plan to conduct experimental SAV plantings within Allen Millpond spring-run stream.

Within the Allen Millpond section of the park, immediately adjacent to the Suwannee River, a significant topographic alteration (borrow pit) was created long before the state acquired the property. The extent to which excavation of the borrow pit and deposition of the spoil on adjacent lands may have altered natural hydrology and natural communities in the area remains unknown. The following hydrological restoration actions are recommended for the park.

DRP will investigate the history of the borrow pit area and will evaluate the feasibility of restoring at least part of it. If it is determined that some restoration is desirable, a restoration plan will be developed. Park staff will comply with best management practices to maintain the existing water quality onsite and will take appropriate action to prevent soil erosion or other impacts to water resources.

The history of aquatic plant beds at both major springs is unknown. A monitoring plan should be implemented to assess SAV in both springs. No swimming or foot traffic should be allowed into the sensitive Allen Millpond Spring and its spring-run stream.

Staff will examine the feasibility of conducting experimental plantings of key species of native SAV at Allen Millpond Spring and potentially at Lafayette Blue Spring.

Potential establishment of littoral and shoreline vegetation adjacent to swimming areas will be examined to reduce erosion along Lafayette Blue Spring shoreline. Designated water entry points may also help reduce erosion. Littoral areas along the spring run and within the main headspring may be roped of" or otherwise protected to facilitate vegetation restoration and limit accidental incursion into these areas by park visitors.

DRP staff will evaluate other alterations in the park that may have negatively affected natural hydrology. If necessary, staff will initiate corrective actions such as installing vegetated berms to slow stormwater runoff into wetlands or constructing low water crossings or culverts in appropriate locations.

***Objective C:*** Monitor impacts of visitor use on the aquatic cave system.

- Action 1 - Evaluate impacts of visitor use on the Lafayette Blue Springs aquatic cave system.
- Action 2 - Continue to monitor cave diving activities to determine the relationship between the intensity of visitor use and the ecological health of the aquatic cave system.
- Action 3 - Seek the expertise of cave divers in instituting a semiannual monitoring program for tracking troglobite populations and diver impacts within the Lafayette Blue aquatic cave system.

DRP staff will continue to coordinate with aquatic cave experts in monitoring disturbance issues and will pursue initiation of semiannual cave assessments. Cave assessment sites should include the Lafayette Blue headspring and the Green Sink and Snake Sink entry points, three entrances that endure higher levels of recreational use than the rest of the system. DRP will consult with an existing springs management team that has already provided numerous recommendations regarding use and management of the Lafayette Blue Springs cave system. The team consists of certified cave divers from the National Speleological Society Cave Diving Section and professionals who have relevant expertise in aquatic cave biology, as well as representatives from DEP. DRP will investigate all reports of vandalism discovered within the cave system.

With assistance from the springs management team, DRP will continue to develop and implement baseline survey and monitoring programs that assess biological and physical conditions in the Lafayette Blue Springs cave system. DRP staff will work closely with the team to establish standardized photo points in certain passages and rooms that are popular with cave divers and to monitor the points on a regular basis to track cave conditions. In order to protect sensitive cave fauna, assessments of the cave system must consider both natural and human impacts. If necessary, DRP will modify public access and establish science-based carrying capacities at the primary and secondary dive access points to the cave system. Hydrologic events will also be monitored to determine possible side effects on troglobite populations within the cave system.

The park will continue to use a diver check-in system to track daily cave use. Unauthorized access to the cave system by non-cave certified divers will be prevented, for both resource considerations and safety concerns. DRP will consult with cave diving organizations when making decisions about cave access.

DRP staff will coordinate with members of the National Speleological Society Cave Diving Section and the North Florida Springs Alliance in developing interpretive programs to educate cave divers about cave preservation and proper cave-diving etiquette. One objective should be the adoption of a series of guidelines for cave divers that identify detrimental activities within cave systems that should be forbidden or discouraged.

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

- Action 1 - Investigate best management options for additional erosion mitigation in public access areas.
- Action 2 - Monitor areas prone to erosion.
- Action 3 - Implement corrective measures where needed to reduce impacts of soil erosion on water resources (e.g., at Lafayette Blue Spring and Green Sink).

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

Mitigation of erosion and sedimentation sites in the park should continue to be a top priority. Staff will investigate best management options for additional mitigation of erosion in public access areas such as the slopes above Lafayette Blue Spring and Green Sink. Examples of specific areas include a concrete drain to the alluvial forest next to the river near Lafayette Blue Spring, a drain to the sink next to the spring and the sand which accumulates periodically on the boat ramp. Staff will also regularly monitor areas of the park that are prone to erosion. Additional water bars may need to be installed in problem

areas to minimize erosion during strong storm events by diverting storm water into surrounding woodlands and encouraging natural infiltration. Wherever necessary, the park will adopt corrective measures to reduce the impacts of soil erosion on water resources.

## NATURAL COMMUNITIES

Limestone Outcrop

Only one limestone outcrop of any size is currently known to occur within the park. It is a long, linear outcrop, close to the Suwannee River and not located on a trail or service road. It is not known if any rare or imperiled plant species occur there. This community is in good condition. Management of limestone outcrops mainly entails protecting them from disturbances such as human intrusion, feral hog rooting and invasive plant intrusion. The only known outcrop in the park is relatively inaccessible to the public. If additional limestone outcrops are found, the park will take measures to prevent degradation by runoff and erosion, 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.

Mesic Hammock

Mesic hammock at Lafayette Blue Springs State Park occurs primarily in the ecotone between wetland and upland natural communities. A typical example would be the strip of mesic hammock that separates upland pine or upland mixed woodland from alluvial forest or floodplain swamp along the Suwannee River and Allen Millpond spring runs. The fire shadow created by the convergence of the spring-run stream and the Suwannee River on the Allen Millpond tract appears to have fostered the development of mesic hammock. It may also occur in isolated islands in the floodplain swamp and alluvial forest associated with the Suwannee River and in small areas of natural river levee. It may be that some of the area currently mapped as mesic hammock is actually a fire-suppressed pyrogenic community. Regular application of prescribed fire will provide a better understanding of the matrix of fire type and mesic hammock communities.

Dominant canopy species include laurel oak, water oak, pignut hickory and live oak. Common understory species may include saw palmetto, ranging in density from moderate to high, sparkleberry, highbush blueberry (*Vaccinium corymbosum*), American holly, wild olive (*Cartrema americana*) and horse sugar (*Symplocos tinctoria*). Some cabbage palm may be present. Ground cover is sparse.

Areas of younger mesic hammock may be difficult to distinguish from successional hardwood forest that has developed because of fire exclusion and logging in the upland mixed woodland community. Canopy pines in the mesic hammock, however, are usually infrequent and are typically loblollies, not the remnant longleaf pine survivors that might be expected in fire-excluded upland mixed woodland or upland pine. Laurel oak, water oak and sweetgum (*Liquidambar styraciflua*), generally 25-35 years in age, and dense to moderately dense saw palmetto are the dominant species in young mesic hammock.

Management measures will be minimal except for ensuring that prescribed fires in adjacent pyrogenic communities penetrate the community ecotone. Fire penetration will keep volunteer loblolly pine seedlings thinned to natural background levels and in some areas will reduce the amount of mesic hammock that may have expanded into adjacent fire-type communities in the absence of fire. The penetration of fire will help determine the true extent of the fire-type communities. Additional natural

community mapping within this community is needed to determine the extent of relict fire-type communities.

Sandhill

Dominant canopy species in the Lafayette Blue Springs State Park sandhill community include longleaf pine, turkey oak, sand post oak, laurel oak and sand live oak (*Quercus geminata*). The understory consists of younger individuals of the same species as well as laurel oak. Sparkleberry is a representative shrub and saw palmetto is prevalent. The herbaceous groundcover is suppressed due to insufficient fire and wiregrass and pineywoods dropseed are sparse. Bracken fern is present. The sandhill community at the park often grades into upland pine or upland mixed woodland. While the dominance of turkey oaks over southern red oaks typically defines the boundary between sandhill and adjacent upland pine or upland mixed woodland, this division is often indistinct and confusing due to years of fire suppression, the impacts of a mine and spoil area, and the scarcity of wiregrass and other herbaceous species. The sandhill at the park is in poor condition due to the impacts of the mine spoil, historic logging and infrequent fire.

Off-site hardwoods dominate some of the sandhills that have experienced long-term fire exclusion. Although these areas have many adult longleaf pines present, some areas may need to have additional longleafs planted in the future. Hardwood reduction is needed to release suppressed herbaceous species, reduce competition with adult longleaf pines and encourage continued longleaf recruitment. In the zone interiors, chemical or mechanical treatment of off-site hardwoods will enhance the effects of prescribed fire. Regular fire with a fire return interval of two to three years is needed to restore this natural community.

Sinkhole

Sinkholes and depressions ranging from shallow depressions to deep sinks are numerous at Lafayette Blue Springs State Park. Several sinkholes and depressions in the park are superimposed over the subterranean cave system through which groundwater flows to the Lafayette Blue headspring (see Aquatic Cave section below for additional information). Sinkholes are also numerous above the Allen Millpond headspring. The slope-sided sinkholes contain mature vegetation typical of the surrounding natural communities. In general, they do not contain exposed limestone. Some sinkholes remain dry year-round, while others may hold water for a period after heavy rainfall events. Most of the park's sinkholes are in excellent condition, although a few have historic garbage deposits that should be removed.

Edges of sinkholes should be protected from disturbance, particularly that caused by feral hogs. Public access to sinkholes in general should be limited, and there should be no authorized access to the more sensitive sinkhole sites. Regular monitoring of sinkholes for the presence of invasive plants and animals will be necessary.

Upland Mixed Woodland

The upland mixed woodland community often serves as a transition zone between upland pine or sandhill and adjacent upland hardwood forest or mesic hammock. It is similar to upland pine in that it is fire-adapted, has longleaf pine as the dominant pine species, and has a strong presence of southern red oak and mockernut hickory in the canopy, along with scattered sand post oaks. Unlike the upland pine community, however, upland mixed woodland typically lacks wiregrass as a dominant groundcover, and the oaks and hickories may be co-dominant with the longleaf pines. Due to a history of past logging and

fire suppression at Lafayette Blue Springs, there are parts of this community that currently lack longleaf pines or are dominated by loblolly pines and off-site hardwoods rather than longleaf pine.

The groundcover of this community is currently sparse due to fire suppression. Cherokee bean (*Erythrina herbacea*) and early blue violet (*Viola palmata*) are common. Florida spiney-pod (*Matelea floridana*) and Florida mountainmint (*Pycnanthemum floridanum*) occur here too. This community will need prescribed fire on the shorter end of the fire return interval, as well as some off-site hardwood treatment and planting of longleaf pines in selected areas.

Since it is a transitional community, upland mixed woodland is susceptible to succession to upland hardwood forest when there is a lack of frequent fire. Because of its richer soils, it has often been converted to agriculture. Fortunately, such agricultural conversion was not the typical case at Lafayette Blue Springs, although in limited areas there were small agricultural fields that date back to at least the 1940s.

This natural community is fire-suppressed and lacks adequate numbers of longleaf pines. In some cases, the transition between upland mixed woodland and what was once probably sandhill, upland pine or mesic hammock has been blurred due to the lack of fire.

Analysis of historical aerial photographs of the area reveals that a decades-long exclusion of fire from most of this community has encouraged a gradual transformation from relatively open woodland to dense forest dominated by invasive off-site hardwoods. Those hardwoods have shaded out most of the herbaceous species. Sites that have reverted to such an extent may be in poor condition or they may have been reclassified as successional hardwood forest (as defined by the Florida Natural Areas Inventory (FNAI)) with the desired future condition being upland mixed woodland (see the Altered Landcover Types section below).

The condition of upland mixed woodland in the park ranges from fair to poor.

Restoration and improvement of the upland mixed woodland community will entail the reintroduction of frequent fire (return interval of two to four years), the removal of offsite hardwood species, and the planting of longleaf pines in some areas. Chemical treatment of off-site hardwoods will be critical to preparing overgrown upland mixed woodland sites for prescribed fire in fire-suppressed sites. This will allow the recovery of herbaceous species to begin. Initially, the community should be treated with fire on the shorter end of the fire return interval to promote the restoration of groundcover and the removal of laurel oaks and other off-site hardwoods. DRP will need to conduct additional field surveys to verify the historic extent of this community. Documentation of the distribution of remnant species will be needed as well.

<u>Upland Pine</u>

Upland pine typically functions as an ecotone between the sandhill community and upland mixed woodland. At Lafayette Blue Springs State Park, it is likely that areas of upland pine occur in higher elevations in the matrix of upland mixed woodland and mesic hammock between Allen Millpond and the Suwannee River, as well in areas west of the Allen Millpond spring. However, these areas are not easily defined. Areas of characteristic upland pine species, particularly longleaf pine, southern red oak and mockernut hickory, occur in the northern part of the park. Wiregrass is present in limited areas. Currently, much of this area is mapped as successional hardwood forest with a desired future condition as a mix of upland pine and upland mixed woodland. Both of these communities need restoration. Most

areas have off-site hardwoods such as laurel oak and sweetgum that need to be removed. Many areas lack sufficient longleaf pine. Evidence of human occupation by 19th-century homesteaders in this habitat in several areas of the park is known from early maps and surveys. In addition, the Spanish trail and Bellamy road passed close to or through the park. Use of timber in this area likely occurred in the 18th and 19th centuries. At the least, human occupation has resulted in the removal of longleaf pine for timber and the creation of a few small crop fields. With continued application of fire on a return interval of two to four years, the difference between upland pine and upland mixed woodland communities may become more apparent. The condition of this community in the park is difficult to determine but probably ranges from poor to fair.

Upland pine areas will require additional hardwood reduction to release suppressed herbaceous species and encourage longleaf pine recruitment. This will require some chemical treatment of off-site hardwoods, primarily laurel oaks and live oaks. Initially the community should be burned on the shorter end of the fire return interval to promote the restoration of groundcover and the removal of laurel oaks and other off-site hardwoods. The continued frequent use of prescribed fire in upland pine zones will be essential to maintaining community structure and ecological integrity. Longleaf pine planting is needed in multiple zones in the park.

Alluvial Forest

At Lafayette Blue Springs State, this community occurs as a band surrounding the Allen Millpond spring-run stream and along the Suwannee River. Topographic relief determines the community's frequency of inundation, which is the primary basis for distinguishing alluvial forest from floodplain swamp. Alluvial forests occur at slightly higher elevations than floodplain swamps and tend to flood annually. Floodplain swamps, on the other hand, are generally flooded for most of the year. In addition to the hardwood species mentioned above, some tupelo (*Nyssa spp.*) and bald cypress (*Taxodium distichum*) may be present in alluvial forests at the park. Atamasco lily (*Zephyranthes atamasca*) is frequent.

While selective logging likely occurred in the past, the alluvial forest in the park is currently in excellent condition. The primary threat is damage from feral hogs and invasive plants.

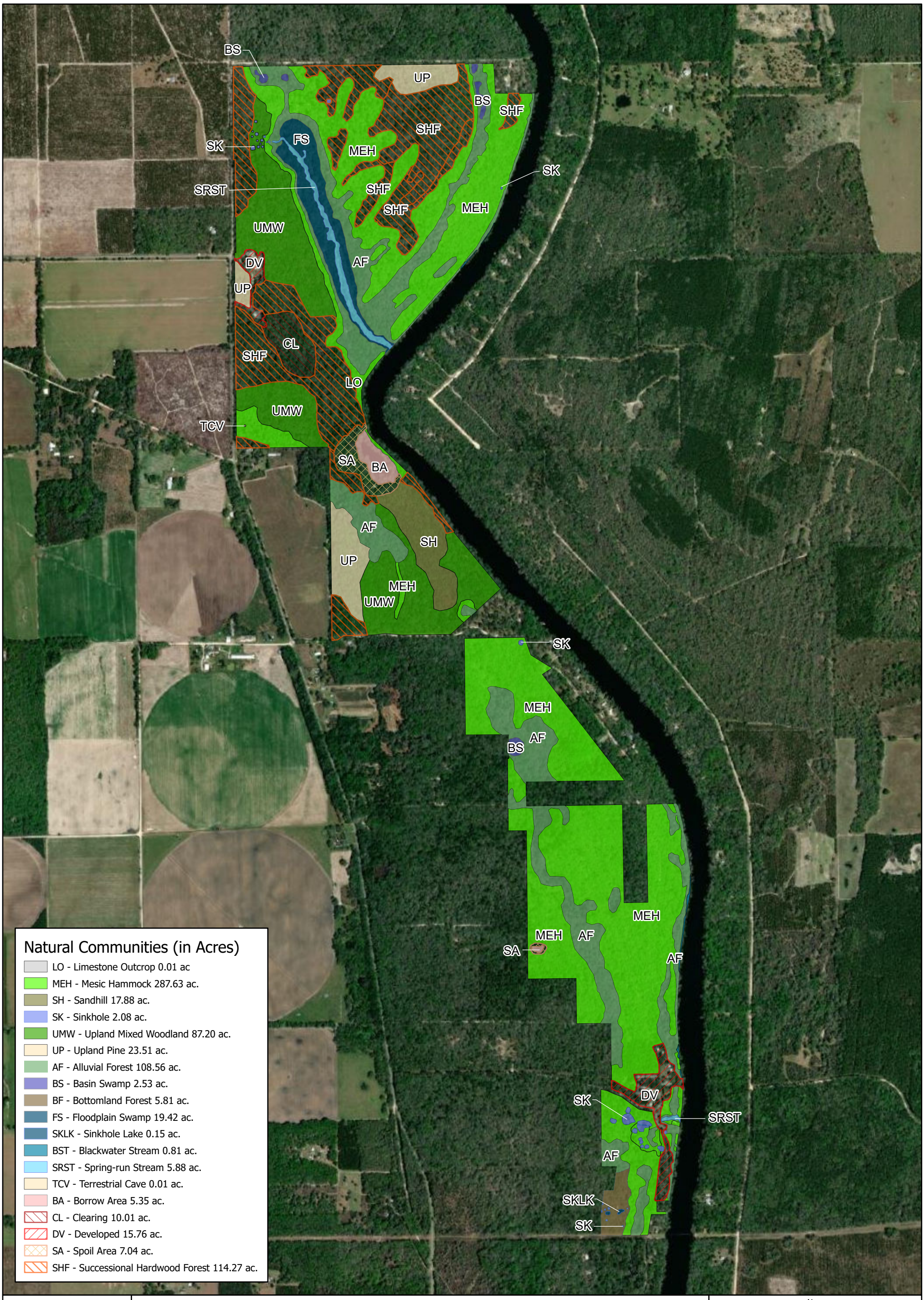
Park staff will regularly scout the forest for any occurrences of Chinese tallowtree (*Triadica sebiferum*) or Japanese climbing fern (*Lygodium japonicum*) and will promptly treat any populations discovered. Park staff will also periodically monitor roads and trails that pass through alluvial forest, checking for signs of erosion or feral hog rooting.

Basin Swamp

Basin swamps at Lafayette Blue Springs State Park occur primarily at the north end of the park. They often are surrounded by a fringe of alluvial forest that grades into mesic hammock and then to upland mixed woodland or upland pine as the elevation increases. One of the basin swamps is hydrologically connected to the floodplain swamp around the Allen Millpond spring-run stream. Cypress trees are dominant.

For the most part, the basin swamps in the park are in good condition, although at the northern end of the Allen Millpond their hydrology may be impacted by roads outside of the park.

Prescribed fires will be allowed to burn into the edges of basin swamps to maintain the natural ecotone between them and surrounding uplands.




# LAFAYETTE BLUE SPRINGS STATE PARK
## Natural Communities - Existing Conditions

N

0 1,000 2,000 Feet

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

# LAFAYETTE BLUE SPRINGS STATE PARK
## Natural Communities - Desired Future Conditions

Natural Communities
- LO - Limestone Outcrop
- MEH - Mesic Hammock
- SH - Sandhill
- SK - Sinkhole
- UMW - Upland Mixed Woodland
- UP - Upland Pine
- AF - Alluvial Forest
- BS - Basin Swamp
- BF - Bottomland Forest
- FS - Floodplain Swamp
- SKLK - Sinkhole Lake
- BST - Blackwater Stream
- SRST - Spring-run Stream
- TCV - Terrestrial Cave
- BA - Borrow Area
- DV - Developed
- SA - Spoil Area

N

0 1,000 2,000 Feet

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

Bottomland Forest

This community primarily occurs in an area around a series of sinkholes in the southern portion of the park. There may be yet unidentified additional areas as the uplands grade down to alluvial forest in the northern half of the park. Delineation of additional areas of this community between the uplands and the river and Allen Millpond spring-run stream may be beneficial to the understanding of the mosaic of natural communities at Lafayette Blue Springs State Park. The bottomland forests in the park are in good condition. Sweetgum, water oak, swamp chestnut oak, loblolly pine and live oak are characteristic species for this community.

Bottomland forests flood less frequently than alluvial forests (FNAI 2010). In some areas, bottomland forest may act as a transition zone between floodplain and upland community types. These transition zones may be too narrow to map depending on the relative slope of the terrain.

Prescribed fires will be allowed to burn into the edges of bottomland forests to help maintain the natural ecotone between them and adjacent uplands. Monitoring for signs of invasive plant species and feral hogs will be ongoing.

Floodplain Swamp

Floodplain swamps at Lafayette Blue Springs State Park occur adjacent to the Suwannee River and the Allen Millpond spring run. Bald cypress and swamp tupelo are the dominant tree species. Both are adapted to long-term flooding, which is the expected condition in Suwannee River floodplain swamps except during droughts. As in the basin swamps, large cypress trees were logged out many years ago. Today, the only indications of past logging activities are occasional stumps or logs. Reforestation of the community has progressed such that complete recovery is likely. Floodplain swamp is relatively resilient, and little additional management will be necessary for it to recover from historical impacts. The floodplain swamp is in good condition.

Park staff will continue to monitor visitor-use areas within the floodplain swamp for erosion issues and will mitigate impacts as needed. The swamps need to be monitored regularly for signs of invasive plants and animals, including feral hogs.

Sinkhole Lake

Because of the extent of underlying limestone, much of the park is dotted with sinks and depressions characteristic of karst topography. Sinkhole lakes are scattered throughout the park, and many of these karst windows have a direct groundwater connection. Within the park there are at least three large sinkhole lakes named by cave divers that have historically used them as access points into the extensive aquatic cave system, namely Green Sink, Snake Sink and Metzger's Sink. Due to the extreme variations in water levels of both the Suwannee River and the surficial aquifer, the sinkhole lakes hold water for varying lengths of time. Some are continuously flooded, but some may go dry as water levels drop. Most sinkhole lakes in the park are in good condition, however foot traffic on sinkhole slopes occasionally causes erosion, soil compaction and trampling of ground cover.

The edges of sinkhole lakes need to be protected from impacts that could accelerate erosion and sedimentation problems. Increased erosion can cause a decline in water quality, especially if a karst window is present. Access points to Green and Snake sinks are used by cave divers.

Blackwater Stream

The Suwannee River, a typical blackwater stream, forms the eastern boundary of the park and provides about 2.6 miles of river frontage. The Suwannee is renowned worldwide, having both scenic and historic significance. The river is undammed except for a low sill dam where it leaves the source waters of the Okefenokee Swamp in Georgia. Nutrients are of particular concern in the river since a significant increase in nitrate levels has been detected throughout the Suwannee River basin. Maintenance of historic flows and levels in the river is another top concern. Despite these issues, the blackwater stream within the park is considered to be in fair to good condition.

Hydrilla (*Hydrilla verticillata*), a noxious invasive plant, is established in the Suwannee River. Fortunately, it does not flourish in the dark, tannin-stained waters as well as it does in clearer waters. The hydrilla in the Suwannee, however, is almost impossible to eradicate completely, and the possibility of it spreading into clear spring runs is a constant threat.

The continuation of frequent water quality and quantity monitoring is a critical management priority. Monitoring will primarily be accomplished in cooperation with DEP and the SRWMD. The continued monitoring and mitigation of riverbank erosion will remain important management activities as well. An ongoing concern is sand deposition as a result of river flooding that occurs at the boat ramp just south of the cabins in the day use area. Periodic flooding of the river deposits sand on the boat ramp. Damage to the adjacent alluvial forest should be avoided during removal and disposal.

Spring-Run Stream

Two spring-run streams are located in the park, Lafayette Blue Spring and Allen Millpond Spring. Lafayette Blue Spring is fed by a single large spring vent, but Allen Millpond Spring is fed by a main spring conduit as well as by numerous smaller springs emerging from the sides throughout the spring-run stream. Toward the west of Lafayette Blue headspring, there are two large named karst windows (Green Sink and Snake Sink) that are directly connected to the main headspring by an underground aquatic cave conduit. The volume of flow from both spring-run streams fluctuates dramatically with groundwater levels and is largely dependent on the relationship between the river stage and the potentiometric surface of the aquifer. When the Suwannee River stage increases, there is a corresponding rise in the waters of the spring-run systems, and when the river stage exceeds the potentiometric surface of the aquifer, backflow of river water into the spring vent and aquatic cave systems occurs. The *Hydrology* section above describes further details of the spring-run streams in the park and the various factors that may negatively influence them.

Lafayette Blue Spring is one of Florida's 33 first-magnitude springs (Scott et al. 2004). The headspring pool is approximately 100 feet long, 60 feet wide and 20 feet deep, with a sandy substrate overlying a limestone base with frequent outcrops. The headspring discharges from a horizontal opening in the limestone located along the south side of the pool. From there it flows eastward along the spring run approximately 300 feet to its confluence with the Suwannee River. A unique, 20-foot-wide limestone land bridge spans the spring run just downstream of the headspring pool.

The Allen Millpond headspring is classified as a second-magnitude spring (Scott et al. 2004). The headspring pool contains at least three spring vents that lie along a nearly 200-foot elongated limestone fracture running on an east-west axis. The main spring vent is small, but the fracture below the surface is substantial. The headspring discharges through a shallow. 0.70-mile long, 40-foot-wide spring-run stream which flows southeasterly to the Suwannee River. Several smaller springs also feed the upper part of the Allen Millpond spring-run stream, including two springs about 100 feet downstream and one

nearly 200 feet downstream from the headspring vents. The latter spring flows into the Allen Millpond stream from the east through an 80-foot-long tributary.

Water quality and quantity problems are the two most problematic issues for these spring-run streams. A visible presence of an abundant amount of nuisance macroalgae can be seen in both spring-run streams. Based on these factors, as well as recently declining spring flows throughout Florida, both spring-run streams are considered to be in good to poor condition.

Protection of groundwater sources within the Lafayette Blue/Allen Millpond springshed will be a priority. Even though the springshed was recently delineated for this watershed, it will be important to further refine the boundary as new information is discovered. DRP staff will continue to work with the cave diving community and to coordinate the numerous research projects associated with the river, spring, and its springshed. Additionally, staff should document and track water clarity at select karst features of the park as a rapid response effort to identify significant changes that might occur in this natural community. DRP will continue to work with appropriate agencies such as the SRWMD in seeking ways to restore the ecological health of the spring systems in the park. Park staff will monitor and mitigate any erosion occurring on slopes above the springs and in communities adjacent to the springs.

Aquatic Cave and Terrestrial Cave

The Lafayette Blue Springs aquatic cave system has five named karst windows located within the park, including Snake Sink, Egg Sink, Green Sink, Manor Sink and Metzger Sink (National Speleological Society 1977). There are at least 18 other similar openings immediately outside the southern portion of the park. Lafayette Blue Springs' labyrinth of underground conduits is well known for its complexity, and it ranks among the 60 longest aquatic cave systems in the world (Gulden and Coke 2016). Certified cave divers have been exploring, mapping and researching the Lafayette Blue Springs cave system since the 1970s. By 2017, divers had mapped nearly 3.78 miles of passageways within the system. Many of those divers are now associated with the North Florida Springs Alliance (NFSA), which continues to map and help maintain the park's aquatic cave system and to promote it as a recreational, training and research destination.

The condition of the Lafayette Blue Springs aquatic cave system can best be described as stable but highly dynamic because of its proximity to the often-tannic Suwannee River, which is subject to dramatic shifts in flood stage. Cave researchers have described Lafayette Blue Springs as a shallow conduit system without any known deep connections. It might therefore be expected to contain a somewhat higher percentage of younger age, Upper Floridan groundwater. Instead, the Lafayette Blue discharge consists primarily of older groundwater ranging in age from 17 to 44 years (Katz et al. 1999). Higher levels of limestone-based analytes (e.g., calcium and bicarbonate) occur in this older, deeper groundwater than in the younger, shallower Upper Floridan or surficial aquifers.

The aquatic caves at Allen Millpond Spring have been described as fragile and silty. They appear to have undergone more significant changes than the Lafayette Blue Springs caves have experienced, likely because of lower maximum groundwater discharge and higher limestone dissolution rates. Similar chemical erosive processes occur in many estavelle springs along the Suwannee River (Gulley et al. 2011). Few professional dives have occurred within Allen Millpond Spring because of the poor condition of its aquatic caves.

One small terrestrial cave has been discovered within the park. The extent and stability of the system are unknown. Initial observation indicates a narrow entrance and limestone within the opening. The entrance opening angles sharply downward within 10 feet.

Protection of the aquatic and terrestrial caves from erosion and maintenance of a natural hydroperiod are the primary management measures. Partnership with the Suwannee River Water Management District and the North Florida Springs Alliance will benefit the protection of the springs.

Borrow Area

A low area adjacent to the Suwannee River in zone LBS-3 of the Allen Millpond tract is the site of a large excavation that existed long before the state of Florida acquired the property. It is possibly an old sand mine. Although the site may resemble a natural pond in aerial photographs, historic aerial photos from 1944 reveal that it was not a pond, but rather an area where the surface soils had been excavated or scraped away. The slopes west of the pond are covered with spoil from the excavation. On the east side, uplands along the Suwannee River drop steeply down to the pond. The desired future condition for the borrow area is a mix of upland pine and upland mixed woodland with sandhill on the slopes above the pond. There are no current plans to fill in the borrow area.

Another small borrow area occurs in the southern portion of the park in zone LBS-1E. This area also looks as if it may have been an extraction site, possibly for limestone. There are no current plans to restore this borrow area either.

Clearing

Historic aerial photos show a cleared area on the Allen Millpond tract. The clearing has regenerated with laurel oaks and other off-site hardwood species. Because of the historic clearing, it may not retain native groundcover species typical of its original pyrogenic community. For this reason, it is mapped separately from the successional hardwood forest. The desired future condition is upland pine, and it should be treated with prescribed fire along with the surrounding natural communities and successional hardwood forest. Additional groundcover planting may be needed in the future.

Developed

Two disjunct areas of development occur within the park. The day-use area is located around the Lafayette Blue Spring, and development there consists of a parking area, boat ramp, picnic pavilions and picnic sites, bathrooms, cabins, stairs and ramps to the spring, a mobile ranger station and a walk-in camping area. At the Allen Millpond entrance, additional developments are an office, shop and two residences.

Successional Hardwood Forest

The successional hardwood forests occur on the Allen Millpond tract in various areas that were previously cleared for agriculture, mine spoil areas and areas of historic logging and turpentining that were subsequently fire-suppressed. Some areas are dominated by laurel oaks and sweetgums, while both loblolly and longleaf pines are present in various amounts. Southern red oak, mockernut hickory and sand post oak are also present. Almost all areas need additional longleaf pines as well as off-site hardwood removal. Native groundcover species are present in some areas and will likely be more prevalent as the prescribed fire program proceeds. The desired future condition for the successional hardwood forest is either upland pine or upland mixed woodland. Restoration efforts will require removal of the off-site hardwoods through chemical and/or mechanical methods and planting with longleaf pines. It may be necessary to do supplemental plantings of the native groundcover at some

point that will only be known after several cycles of prescribed fire. Ongoing management of these areas will include removal of all priority invasive plants that are encountered.

Spoil Area

Spoil piles are associated with the two borrow areas. The spoil pile in the Allen Millpond tract is extensive and is spread through adjacent pyrogenic communities. The spoil pile around the southern borrow area is confined to a small footprint adjacent to the borrow/mine pit. Restoration of these areas is not currently planned.

***Objective A*:** Maintain 220 acres within the optimum fire return interval.

- Action 1 - Develop/update annual prescribed plan.
- Action 2 - Conduct prescribed fire on 68-150 acres annually.

| **Prescribed Fire Management** | | |
|---|---|---|
| **Natural Community** | **Acres** | **Optimal Fire Return Interval (Years)** |
| Sandhill | 18 | 1-3 |
| Upland Pine Forest | 24 | 1-3 |
| Upland Mixed Woodland | 87 | 2-4 |
| Successional Hardwood Forest | 114 | 2-4 |
| Clearing/Regeneration | 10 | 2-4 |
| Spoil Area | 6 | 2-4 |
| **Annual Target Acreage** | 68 - 150 | |

Most of the currently mapped fire adapted habitat at Lafayette Blue Springs State Park occurs in the Allen Millpond tract. The area between the Allen Millpond spring-run stream and the Suwannee River contains portions mapped as mesic hammock. It is possible that increased fire frequency will reveal some of this area to be flatwoods or other overgrown fire-type habitat. The park also includes a few basin swamps that are dependent on intermittent fire. Altered landcover types that are managed with fire include clearing/regeneration, spoil area and successional hardwood forest.

Fire-return intervals follow those generally recommended by the Florida Natural Areas Inventory (FNAI 2010). Sandhills and upland pine should be burned every one to three years, with upland mixed woodland burning somewhat less frequently at two to five 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, but at least every two to four years during the restoration phase, which will last at least through the duration of this plan. During the first rotations of fire in management zone 4B, fire should be encouraged to burn into the mesic hammock ecotone. This will help determine the actual boundaries of the fire-adapted natural communities.

Several 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. The eastern indigo snake occurs in the park and is a gopher tortoise burrow commensal, as are Florida pine snake, eastern

diamondback rattlesnake, gopher frog, Florida mice and hundreds of other species. Many of these species have not yet been documented at the park, but increased fire frequency will increase the likelihood of their survival. Likewise, rare plant species like incised agrimony and Florida mountainmint require periodic fires and respond quickly after fires.

***Objective B*:** Conduct natural community improvement activities on 259 acres.

- Action 1 - Remove off-site hardwoods in zones 2A, 2B, 3A, 3B, 4A and 4B through increased prescribed fire frequency and chemical/mechanical methods.
- Action 2 - Plant longleaf pines as needed throughout the area.
- Action 3 - Evaluate the successional hardwood forest areas to determine if supplemental planting of native groundcover species is needed.
- Action 4 - Further ground truth and map the natural communities south of Banta Acres Road to determine the footprint of any fire-type communities.

## IMPERILED SPECIES

At least four imperiled plants occur in the park. Atamasco lily (*Zephyranthes atamasca)* and angularfruit milkvine (*Gonolobus suberosus*) require minimal management other than protection from recreational or operational impacts and protection of the natural hydrology. The other two species, incised agrimony (*Agrimonia incisa*) and Florida mountainmint (*Pycnanthemum floridanum*), have been impacted by fire suppression and off-site hardwood encroachment. Upland restoration and the reintroduction of fire is necessary to protect the populations of these two species. Known occurrences of these species will be mapped and care will be taken to protect them during restoration activities. The Florida mountainmint appears in dense patches within apparently disturbed areas of the park, including within the mowed powerline right-of-way and along road shoulders. In some instances, the Florida mountainmint grows in close proximity to Japanese climbing fern (*Lygodium japonicum*). Treatments to control this noxious invasive vine must be performed carefully to avoid inadvertently impacting the mountainmint.

Several troglobitic invertebrates inhabit the Lafayette Blue Springs aquatic cave system, including the pallid cave crayfish (*Procambarus pallidus*). Surveys for troglobitic invertebrates are conducted by cave researchers. Management of diving activities in the caves will consider measures to protect the caves from degradation to preserve habitat for this and other rare aquatic species that are potentially present.

Gopher tortoises (*Gopherus polyphemus*) occur in the park, particularly in higher and drier portions of the north end of the park. There are also records for the eastern indigo snake (*Drymarchon couperi*) within the park. Additional prescribed fires and hardwood removal in the upland mixed woodland, upland pine and sandhill areas will benefit both species. The Suwannee River includes the primary habitats for the gulf sturgeon (*Acipenser oxyrinchus desotoi*) and Suwannee alligator snapping turtle (*Macrochelys suwanniensis*). While the Gulf sturgeon can be highly visible when jumping above the surface of the river, the alligator snapping turtles are cryptic and rarely observed.

| Imperiled Species Inventory | | | | | | |
|---|---|---|---|---|---|---|
| **Common and Scientific Name** | **Imperiled Species Status** | | | | **Management Actions** | **Monitoring Level** |
| | **FWC** | **USFWS** | **FDACS** | **FNAI** | | |
| **PLANTS** | | | | | | |
| Incised Agrimony *Agrimonia incisa* | | | LT | G3,S2 | 1, 2, 6 | Tier 2 |
| Angularfruit Milkvine *Gonolobus suberosus* | | | LT | | 2, 4 | Tier 1 |
| Florida Mountainmint *Pycnanthemum floridanum* | | | LT | G3,S3 | 2 | Tier 1 |
| Atamasco Lily *Zephyranthes atamasca* | | | LT | | 2, 4 | Tier 1 |
| **ARTHROPODS** | | | | | | |
| Pallid Cave Crayfish *Procambarus pallidus* | | UR | | G1G2, S1S2 | 4,9,10 | Tier 2 |
| **FISH** | | | | | | |
| Gulf Sturgeon *Acipenser oxyrinchus desotoi* | FT | LT | | G3T2T3, S2? | 4,9,10 | Tier 1 |
| **REPTILES** | | | | | | |
| American Alligator *Alligator mississippiensis* | FT(S/A) | SAT | | G5,S4 | 4,10 | Tier 1 |
| Eastern Indigo Snake *Drymarchon couperi* | FT | LT | | G3,S2? | 1,6,10 | Tier 1 |
| Gopher Tortoise *Gopherus polyphemus* | ST | | | G3,S3 | 1,6,13 | Tier 1 |
| Suwannee Alligator Snapping Turtle *Macrochelys suwanniensis* | ST | PT | | G2,S2 | 4 | Tier 1 |
| **BIRDS** | | | | | | |
| Swallow-tailed Kite *Elanoides forficatus* | | | | G5,S2 | | Tier 1 |

**Management Actions:**

1. Prescribed Fire
2. Invasive 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

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

***Objective B*:** Monitor and document three imperiled animal species in the park.

- Action 1 - Implement monitoring protocols for the gopher tortoise, eastern indigo snake and troglobitic arthropods.

While the gopher tortoise population at Lafayette Blue Springs State Park may be too low and too dispersed to warrant a complete survey using line transect distance sampling methods (Smith et al 2009), gopher tortoise burrows should be noted when they are found. Mapping of the burrows will allow identification of priority areas for habitat restoration and improvement. Staff will also report any additional sightings of eastern indigo snakes, preferably with photo documentation for submission to the Florida Fish and Wildlife Conservation Commission (FWC).

The pallid cave crayfish and other cave-dwelling arthropods, including amphipods and isopods, are currently being surveyed by cave researchers. These surveys will continue to provide baseline estimates of troglobite populations.

***Objective C:*** Monitor and document one imperiled plant species in the park.

- Action 1 - Implement monitoring protocol for incised agrimony.

Incised agrimony is typically associated with upland mixed woodland and upland pine natural communities. It responds well to off-site hardwood removal and prescribed fire. It is an excellent indicator species to track natural community restoration and improvement efforts. Staff will conduct periodic surveys for incised agrimony after prescribed fires or other habitat improvement efforts are implemented.

## INVASIVE SPECIES

Both cogongrass (*Impeprata cylindrical*) and Japanese climbing fern (*Lygodium japonicum*) occur at the park. The climbing fern is found primarily in sinkholes and along the river. Cogongrass is scattered in several upland areas of the park and is also present on adjacent private property. Cogongrass should be

treated twice annually, in the fall before frost and in the spring after regrowth. Climbing fern should be treated annually.

Two aspects of the park make invasive plant treatment difficult. During river flooding, many areas with invasive plants are inaccessible for treatment. The flood waters also disperse spores of Japanese climbing fern to create new infestations.

Fortunately, the park does not have many species of invasive plants. Regular surveying to detect and treat new infestations is important to keep the park as invasive free as possible. In addition, all equipment entering the park should be inspected to ensure that it is clean and free from soil and invasive species, and any fill dirt should come from an invasive-free site.

In 2002, the red bay ambrosia beetle (*Xyloborus glabratus*) was first detected in the United States in southeast Georgia. The beetle carries a fungal pathogen (*Raffaelea lauricola*) which it transmits to red bay trees (*Persea borbonia*) 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 2014, the disease was discovered in Lafayette County, and in 2015 it had been found in every county in Florida. The disease top-kills adult red bays, which then continue to re-sprout from their roots. It may be that members of the Lauraceae family will continue to survive in shrub form as the remnant tree root systems continue to re-sprout. At this point, much remains unknown about the long-term impacts of this disease on red bays and other Lauraceae. The park should continue to restrict the movement of firewood into and out of the park and educate visitors about the issue.

Feral hogs are seen infrequently in the park and are removed on an as-needed basis.

| **Species Name**<br>**Scientific Name - Common Name** | **FLEPPC Category** | **Distribution** | **Zone ID** |
|---|---|---|---|
| *Cinnamomum camphora* - Camphor-tree | I | Single Plant or Clump | LBS-4A |
| *Imperata cylindrica* - Cogongrass | I | Scattered Plants or Clumps<br>Scattered Dense Patches<br>Linearly Scattered | LBS-1B, LBS-3, LBS-1E, LBS-1F, LBS-3B |
| *Lygodium japonicum* - Japanese climbing fern | I | No Invasive Plants Present<br>Scattered Plants or Clumps<br>Scattered Dense Patches | LBS-1D, LBS-1A, LBS-1B, LBS-1C, LBS-1G, LBS-3, LBS-4B, LBS-1E |
| *Melia azedarach* - Chinaberry | II | Scattered Plants or Clumps | LBS-3A |
| *Nandina domestica* - Nandina | I | Scattered Plants or Clumps | LBS-2A |

***Objective A*:** Annually treat 20 gross acres or 1 infested acre of invasive plant species in the park.

- Action 1 - Annually develop/update invasive plant management work plan.
- Action 2 - Implement annual work plan by treating 20 gross acres or 1 infested acre in the park each year and continuing maintenance and follow-up treatments as needed.

The park should treat at least 20 gross acres or 1 infested acre of cogongrass and Japanese climbing fern annually, and the park should be surveyed for invasive plants every two years. All cogongrass infestations should be treated twice per year, in the spring and in the fall. Maps of invasive infestations should be updated during survey updates. In addition, the park should apply as needed for an FWC invasive project to help eradicate cogongrass.

***Objective B*:** Control one invasive animal species in the park.

- Action 1 - Remove feral hogs as needed.

## CULTURAL RESOURCES

### Prehistoric and Historic Archaeological Sites

Due to the absence of recorded sites, very little is known about the park's archaeology. The park falls geographically within what Milanich and Fairbanks (1980) defined as the North Florida Archaeological region. More specifically, Milanich (1994) defined various cultural periods ranging from Paleoindian to Spanish Mission and Seminole that occurred in this geographic region.

Two archaeological sites (LF4 and LF101) within the park are recorded in the Florida Master Site File (FMSF). One is immediately adjacent to the park boundary and one is in the river adjacent to the park. The adjacent archaeological site (SU258) is included here because it may provide additional information related to the park's Mosely Mill site (LF101). PEF Two (LF00095) is included because the bounds of the site may fall within the park.

LF4 Blue Spring is a prehistoric lithic scatter that may have been a campsite and extractive site. No diagnostic features were found during an initial survey, so it cannot be described more specifically.

LF101 Mosely Mill is the remains of a 19$^{th}$-century gristmill that occurred along the spring run stream. The mill may have been part of a larger mid-19$^{th}$ century community center that included a ferry and a trading post (Collins et al., 2012). A sawmill may have been built and operated in the same area in the latter half of the 1800s by William Hudson Allen. In 2015, park ranger Stan Christian met Allen's great-granddaughter, who indicated that the site of the family home was located near the mill site. According to the great-granddaughter, her grandmother, Nelle Allen, was born in 1892 in the family's house near the mill and overlooking the river (Stan Christian personal communication).

SU258 (Annin Wreck), while outside of the park, may be the remains of an old ferryboat associated with a ferry crossing, variously referred to as Mosely's Ferry, Allen's Ferry, Old McCall Ferry or Barrington Ferry, that was located on both banks of the Suwannee River. The location of the ferry crossing in the park has not yet been identified but is likely associated with the Mosely Mill area and the economic activity of the 19$^{th}$ century around the mill site.

In addition, there are other known, unrecorded sites in the park. Aerial photographs from between 1951 and 1966 show a large area of soil disturbance that was probably a sand or phosphate mine. To the west of the presumed mine are six concrete footers that may be associated with it. This site needs further investigation and needs to be recorded with the FMSF.

It is possible that a small segment of the Old Bellamy Road occurs within the Allen Millpond portion of the park. The 1826 survey of the territory of Florida shows a "Gread Road from Tallahassee to St.

Augustine" crossing the river at this location. If possible, this segment should be located and recorded with the FMSF.

Cultural sites opposite the park on the east bank of the river offer opportunities to interpret life along this part of the Suwannee in the early 1800s and earlier. A portion of the Old Bellamy Road occurs outside of the park on the east bank of the Suwannee and is associated with the Charles Ferry crossing from 1824 (now a boat ramp), the site of a trading post, a Spanish mission and Native American sites. The county boat ramp, on the west bank of the river and contiguous with the park, is the likely terminus of the Charles Ferry crossing.

A predictive model completed in 2011 (Collins et al.) indicates that 71% of the park is considered to be of high or medium archaeological sensitivity. Since so little is known about the archaeology of the park, a Level I survey should be conducted.

All known archaeological sites are in good condition.

The park should develop and implement a monitoring protocol to ensure that any threats to the sites are detected before they become a problem.

**Collections**

The park has a small collection housed in the park office. It consists of objects found onsite that are representative of the natural and cultural history of the park. Examples of native limestone, shells and anthropogenic artifacts such as chert flakes, as well as more recent material from the adjacent railroad and bottles from a 20th-century refuse site comprise the collection.

The condition is good. The collection is displayed in two cases in the climate-controlled ranger station.

Continue to maintain in climate-controlled conditions.

| **Cultural Sites Listed in the Florida Master Site File** | | | | | |
|---|---|---|---|---|---|
| **Site Name and FMSF #** | **Culture/Period** | **Description** | **Significance** | **Condition** | **Treatment** |
| LF4<br>Blue Springs | Prehistoric/Unspecified | Archaeological Site | NE | G | P |
| LF101<br>Moseley Mill | 19th Century Historic | Archaeological Site | NE | G | P |
| LF00094<br>PEF Two | Prehistoric Lithics | Archaeological | NE | G | P |
| SU258<br>Annin Wreck | Probably 19th Century Historic | Archaeological Site | NE | G | P |

***Objective A:*** Assess and evaluate two of two recorded cultural resources in the park.

- Action 1 - Complete two assessments of archaeological sites.

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

- Action 1 - Ensure all known sites are recorded or updated in the FMSF.
- Action 2 - Record the Bible Camp structures with the FMSF if they are 50 years old or older.
- Action 3 - Locate the portion of the "Gread Road from Tallahassee to St. Augustine" and record with the FMSF if possible.
- Action 4 - Conduct an archaeological survey in areas that are proposed for any development if no previous survey exists.
- Action 5 - Develop and adopt a Scope of Collections Statement.

New sites should be recorded with the FMSF as they are found.

The Alan Millpond mine site and associated concrete structures should be recorded with the FMSF.

The age and history of the Bible Camp structures within the park are unknown and should be investigated. If they are 50 years old or older, they should be recorded with the FMSF. Staff should develop and implement a plan for their management which includes the possibility of demolition.

The 1826 survey map indicates that the "Gread Road from Tallahassee to St. Augustine" occurs within or just outside the park boundary. Attempts to locate this segment of the road should be made. The site should be recorded with the FMSF even if it occurs outside the park property. The road exists on the east bank of the Suwannee River and is designated with a historic marker.

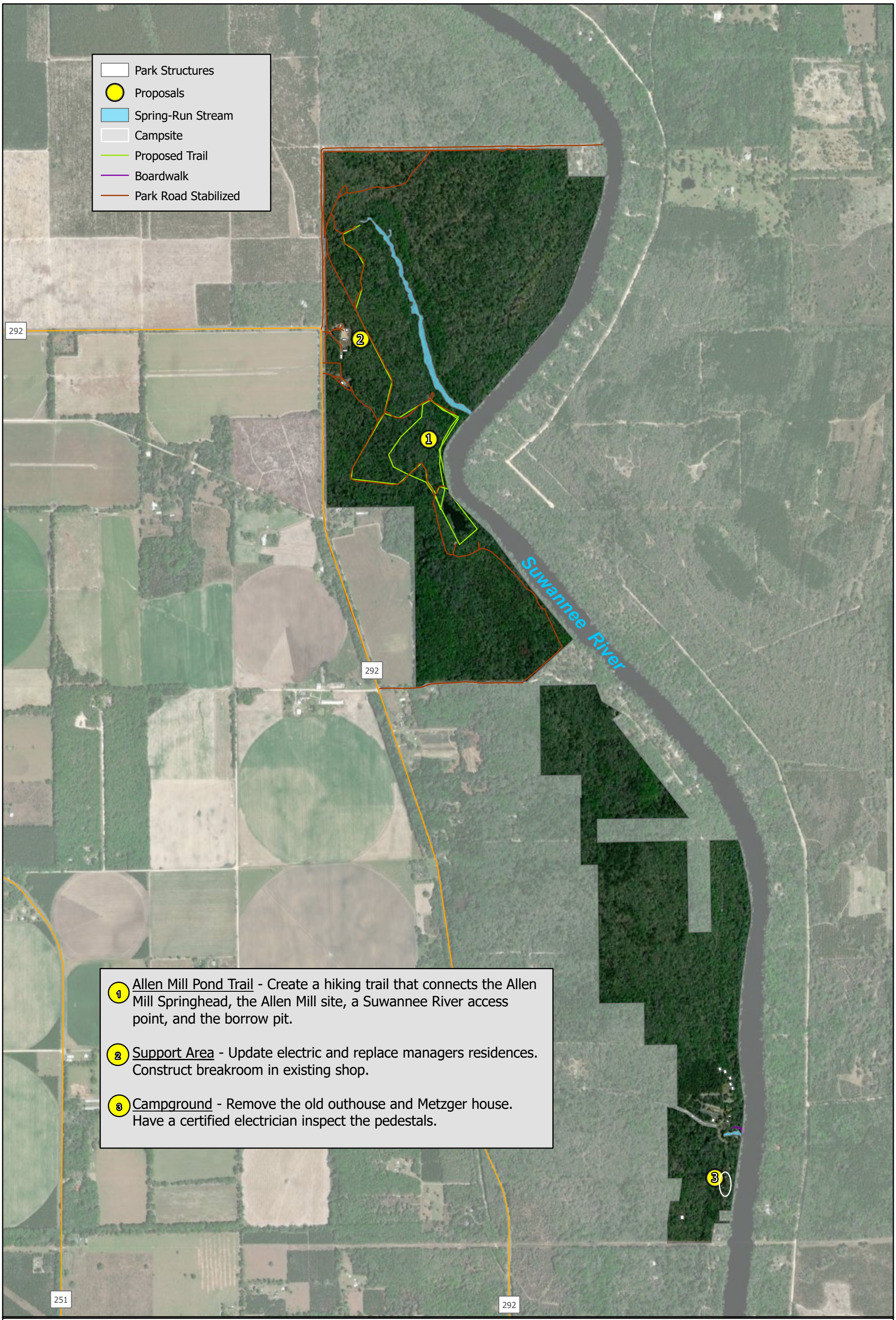
Instead of a Phase 1 survey, DRP staff should look at areas proposed for development or ground-disturbing activities. If areas are high probability for archaeological sites according to the predictive model and have not been previously surveyed, a cultural resource survey would be needed prior to any ground-disturbing activities. The Alan Millpond parcel particularly needs further archaeological investigation given its proximity to the Charles Ferry crossing, the mission site and the mill.

The park needs A Scope Of Collections Statement that describes the focus and purpose of their collection.

***Objective C*:** Bring two of two recorded cultural resources into good condition.

- Action 1 - Design and implement regular monitoring programs for all cultural sites.

The two known archaeological sites are in good condition. A regular monitoring program needs to be implemented by the park to detect any threats to the sites before they cause damage.




# Lafayette Blue Springs State Park

Conceptual Land Use Plan

0 1,250 2,500 Feet

N

# LAND USE COMPONENT

## VISITATION

Nestled alongside the historic Suwannee River, Lafayette Blue Springs State Park has exceptional outdoor recreation opportunities to offer visitors while also ensuring the conservation and protection of valuable habitat. This park is home to one of Florida's 33 first-magnitude springs, which attracts visitors from across the globe. Swimmers can enjoy the year-round 72-degree spring water, and certified divers have access to an extensive network of underwater caves. The unique geology of the Suwannee River basin can be observed walking across the natural limestone bridge, as well as in and around the sinkholes. Limestone outcroppings can be observed sprinkled along the Suwannee, emerging from the riverbank.

For visitors seeking overnight accommodation, the park offers cabin rentals as well as a campground area. Picnic tables and grills are available adjacent to the headspring and Suwannee River, where visitors can also launch a canoe or go fishing in designated areas along the riverbank. Lafayette Blue Springs State Park is a hub on the Suwannee River Wilderness Trail, where paddlers can stop and relax before continuing their journey along the river.

### Trends

Lafayette Blue Springs State Park experiences its highest visitation in the summer months, between Memorial Day and Labor Day, likely due to the enticement of cooling spring waters. The campground is usually full during holiday weekends and usage is sparse on weekdays. The majority of campground users are Suwannee River Wilderness Trail paddlers.

## EXISTING FACILITIES AND INFRASTRUCTURE

Most of the amenities in the park are located near the south entrance around the headspring. Facilities in this area include picnic pavilions, a restroom, a shower station, a paved parking area and a boat ramp. A short walk south of the headspring is a pack-in campground with 11 campsites. Each site features a picnic table, fire ring, charcoal grill, potable water and electricity. This area also features a portable restroom.

Five cabins, located just north of the headspring, are available for overnight guests. The cabins are elevated about 15 feet due to their location on the 10-year floodplain. Each cabin can accommodate up to six people and includes amenities such as an electric fireplace, dishwasher, picnic tables, fire ring and charcoal grill. One cabin is wheelchair accessible with an elevator.

Upon entrance into the northern part of the park, a stabilized road leads to a few features including a naturalized borrow pit, the old Allen Mill site and a Suwannee River access point.

About 500 feet north of the main entrance lies a support area service road that leads to the residence and maintenance area. This is where the park manager and assistant park manager live. There is also a pole barn, tool shed and a storage shed used by the park manager.

**Facilities Inventory**

| | |
|---|---|
| *Campground* | |
| Tent Site | 11 |
| Restroom | 1 |
| Electrical Station | 1 |
| Old Out House | 1 |
| *Residence and Maintenance Area* | |
| Pole Barn | 1 |
| Tool Shed | 1 |
| Shop | 1 |
| Park Manager Residence | 1 |
| Assistant Park Manager residence | 1 |
| Entrance Station | 1 |
| *Headspring Area* | |
| Parking Area (161 spaces) | 1 |
| Picnic Pavilion | 2 |
| Boardwalk | 1 |
| Restroom | 1 |
| Entrance Station | 1 |
| *Cabin Area* | |
| Cabins | 5 |
| Fire Ring | 5 |
| Charcoal Grill | 5 |
| Boat Ramp | 1 |
| Picnic Table | 5 |

## CONCEPTUAL LAND USE PLAN

### Detailed Conceptual Land Use Objectives

Three use areas at Lafayette Blue Springs State Park are listed below for improvements to be implemented within the 10-year planning cycle. Specific plan details are available in the next section.

**Allen Mill Pond Trail**
***Objective: Create a new recreational and interpretive opportunity in the Northern tract of the park.***
*Actions:*

- *Turn the service road into a hiking trail.*
- *Create and implement an interpretive trail plan.*

The northern tract of the park currently features a primary stabilized unpaved service road that connects the northern entrance station to the Suwannee riverfront. This existing road connects several natural and historic features at varying elevations that hold a high level of potential interest to park visitors while facilitating hiker immersion in pristine mesic hammock and bottomland forest natural communities. To provide access to these features, a single-track loop hiking trail is recommended.

Interpretive planning is necessary to determine the most effective way to connect visitors to the meaningful and relevant park themes along this proposed hiking trail. The type, design, quantity and placement of interpretive elements to deepen understanding will be specified during this additional planning process. The following are concepts and topics that may be considered.

The trail should form a full meandering loop that undulates in elevation and allows hiking access to the Allen Millpond springhead, the historic Allen Mill site, the Suwannee riverfront at the discharge site for the Allen Millpond spring run, the primary levee that parallels the Suwannee to the south of the spring run, and the borrow pit. Trail stops at each of these sites should include small but informative interpretive panels, and a trail map panel should be installed at the trailhead for geographic context and orientation.

Allowing visitor access to the sensitive Allen Millpond springhead would require special measures to protect the resource and avoid erosion to the site. A platform is recommended to be built atop the natural overlook above the springhead. This would allow for passive interpretation of the springhead and observation of the surrounding floodplain swamp while avoiding sedimentation to the spring. Educational panels attached to the platform would describe the second-magnitude spring and inform visitors that entering the spring is prohibited to protect the resource. The hiker would follow the current service road leading to the springhead until they reach the platform. The existing water quality tower is tucked away to the left of the proposed platform location, so it would not be in the visitor's line of sight. If it is determined that this site is too sensitive to allow visitor access, this stop can be excluded from the hiking trail.

A proposed loop trail route visualization is available in the Lafayette Blue Springs Conceptual Land Use Plan Map. To facilitate an immersive hiking experience, a single-track trail that solely allows foot traffic is recommended. The trail may intersect as needed with the existing management road but utilizing the road for the recreational purpose of hiking, especially in lengthy stretches, is not recommended. Ensuring adequate separation and buffering between the hiking trail and the management road will enhance aesthetics, sense of immersion and visitor safety.

This proposed trail will create a unique opportunity for interpretation of two main elements: the natural communities within the floodplain and the historic sites from 19$^{th}$-century life on the Suwannee River. The meandering habitat of the trail will allow hikers to trek through several natural communities including mesic hammock, alluvial forest and upland mixed woodland. The immersive, single-track experience is intended to bring hikers closer to nature and enhance interpretive opportunities. There are two historic sites along the trail that offer a glimpse into the life of the peoples inhabiting the site in the 1800s. The first historic site consists of the remnants of a 19$^{th}$-century grist mill that was built along the Allen Mill spring run. Interpretive signage will explain the history of the site and how it may have been part of a larger mid-19$^{th}$ century community center that included a ferry and a trading post. Further down the trail will reveal a borrow pit that is the site of a large excavation that existed long before the state of Florida acquired the property. This pit is adjacent to the Suwannee and fills with water and fish when the river floods. This site is currently used by locals for subsistence fishing. It is recommended that interpretive signage be placed here as well to explain how the pit came to be in existence.

**Support Area**

***Objective: Improve staff operations.***

*Actions:*

- *Upgrade electric.*
- *Replace staff residences.*
- *Reconfigure shop building.*

This area, located near the northern entrance of the park, includes the residences of both the park manager and assistant park manager, as well as the park maintenance complex, a three-site volunteer campground and additional storage structures. The three utility pedestals located at the volunteer campground are incapable of accommodating 50-amp RVs. This issue has forced the park to turn away qualified volunteers with higher amperage RVs. It is recommended that the pedestals be upgraded so that all can accommodate 50-amp RVs.

Both permanent residences need new roofs and insulation. Completely replacing the residences within a 10-year timeframe would be the ideal solution. It is recommended that a climate-controlled space for small staff meetings be constructed inside the existing three-bay shop.

**Campground**

***Objective: Improve infrastructure.***

*Actions:*

- *Inspect and renovate electric infrastructure.*
- *Remove outhouse and Metzger House*
- *Reconfigure campground layout.*

This campground is characterized by a roadless design that requires walk-in access. To preserve this unique camping experience, vehicles are not permitted in the campground, but wagons are available to transport camping equipment for the short walk from the parking lot. Also, a high percentage of campers are paddlers coming straight from the Suwannee River. The day-use bathroom is a walkable distance from this campground.

This campground was inherited with the park and could benefit from a more creative and natural layout. Currently the camp sites are in a linear format with a water/electric hookup at each site. The electric hookups are damaged due to periodic flooding and need to be replaced. It is recommended that all the current electrical wire and pedestals be removed, and one communal utility facility be installed in a universally accessible location. This facility would also provide potable water. Each tent pad should be delineated by a single row of wooden timbers forming a square that retains the fill. These tent pads should be spaced an adequate distance from neighboring sites for a semi-primitive experience while remaining in the current footprint. The tent pad should consist of native soil and sand with measures taken to improve drainage.

The campground and the adjoining area within short distance of the campground feature two structures that are no longer in working condition and should be removed with the next planning cycle. First, a small outhouse structure lies at the center of the campground. Second, a former private residence is situated in the wooded area to the west of the campground. Both structures should be removed.

## OPTIMUM BOUNDARY

Lafayette Blue Springs State Park has many proposed additions to its optimum boundary. To the north of the park, additions would put portions of the Suwannee riverbank and surrounding lands into conservation status. The addition of these parcels would increase wildlife habitat, act as recharge areas and further protect the Suwannee River watershed from the damaging agriculture practices surrounding the park.

There is a Lafayette County-managed boat ramp on the northern park boundary that is excluded from the optimum boundary because it is already in conservation status with an appropriate manager.

Moving further south, about midway through the park, there are individual parcels located in a neighborhood along the Suwannee riverbank that could be acquired to increase the overall boundary of the park. A home in this neighborhood could potentially be purchased for use as the manager's residence. A parcel in the center, between the Allen Millpond portion and the southern portion of the park, is essential for the continuity of recreation. Once these parcels are linked together, the Allen Millpond and southern portions of the park could be connected through a trail system.

Moving southwest of the park boundary there is an almost 500-acre Florida Forever First Magnitude Springs parcel. This conservation land has a vast aquatic cave system that appears to be accessible from multiple sinkholes. By preserving land around the springs, this project would aid in the protection of springs, karst windows and the Floridan Aquifer from the effects of commercial, residential and agricultural runoff, clearcutting and mining, and unsupervised recreation.

Continuing further south along the Suwannee is a large collection of parcels that would buffer the park from surrounding phosphate mines and agriculture. The acquisition of these parcels would expand wildlife habitat and continue to put portions of the Suwannee riverbank and surrounding land in conservation status.

Existing Park Boundary

Other Existing Conservation Lands

Optimum Boundary (ARC-Approved)

Florida Forever BOT Project

Optimum Boundary (Proposed Additions)

# Lafayette Blue Springs State Park

Optimum Boundary Map

0 0.5 1 Miles

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