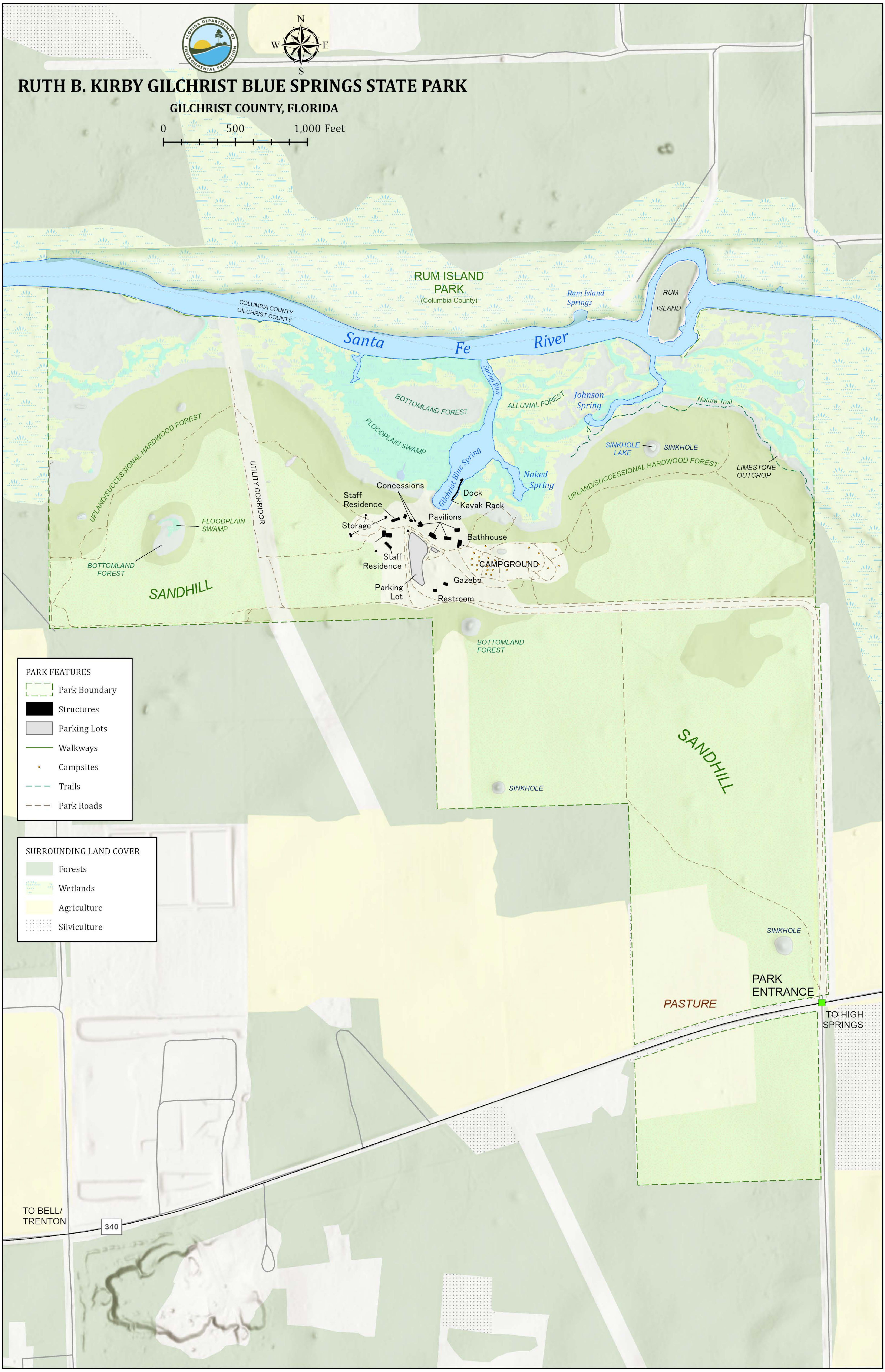
# RUTH B. KIRBY GILCHRIST BLUE SPRINGS STATE PARK

Park Chapter

SUWANNEE RIVER PLANNING REGION


FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
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W
E
S
RUTH B. KIRBY GILCHRIST BLUE SPRINGS STATE PARK
GILCHRIST COUNTY, FLORIDA
0
500
1,000 Feet
RUM ISLAND PARK
(Columbia County)
COLUMBIA COUNTY
GILCHRIST COUNTY
Santa Fe River
Rum Island Springs
RUM ISLAND
Spring Run
BOTTOMLAND FOREST
ALLUVIAL FOREST
Johnson Spring
Nature Trail
FLOODPLAIN SWAMP
UPLAND/SUCCESSIONAL HARDWOOD FOREST
SINKHOLE LAKE
SINKHOLE
Gilchrist Blue Spring
Naked Spring
UPLAND/SUCCESSIONAL HARDWOOD FOREST
LIMESTONE OUTCROP
UTILITY CORRIDOR
Concessions
Staff Residence
Dock
Kayak Rack
Pavilions
Storage
Bathhouse
FLOODPLAIN SWAMP
Staff Residence
CAMPGROUND
BOTTOMLAND FOREST
SANDHILL
Parking Lot
Gazebo
Restroom
BOTTOMLAND FOREST
PARK FEATURES
Park Boundary
Structures
Parking Lots
Walkways
Campsites
Trails
Park Roads
SANDHILL
SINKHOLE
SURROUNDING LAND COVER
Forests
Wetlands
Agriculture
Silviculture
SINKHOLE
PARK ENTRANCE
PASTURE
TO HIGH SPRINGS
TO BELL/ TRENTON
340

# INTRODUCTION

## LOCATION AND ACQUISITION HISTORY

Ruth B. Kirby Gilchrist Blue Springs State Park is located in Gilchrist County (see Vicinity Map). Access to the park is from State Highway 236 and Northeast 80$^{th}$ Avenue. The Vicinity Map also reflects significant land and water resources existing near the park.

Ruth B. Kirby Gilchrist Blue Springs State Park was initially acquired Oct. 6, 2017, with funds from the Florida Forever Trust Fund. Currently, the park comprises 402 acres. The Board of Trustees of the Internal Improvement Trust Fund (Trustees) hold fee simple title to the park and on Jan. 3, 2018, the Trustees leased (Lease No. 4814) the property to DRP under a 50-year lease. The current lease will expire on Jan. 2, 2068.

Ruth B. Kirby Gilchrist 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 Florda 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 timber harvesting as part of the park's natural community restoration and management activities could be accommodated in a manner that would be compatible and 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. 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 Gilchrist Blue Springs is to protect the water quality of Gilchrist Blue Spring and the park's other known springs, provide for the restoration and preservation of one of Florida's iconic natural spring ecosystems, and preserve these unique resources for the perpetual enjoyment of future generations.

## Park Significance

- The park protects a group of significant springs that lie along the Santa Fe River, including two second-magnitude springs, Gilchrist Blue Spring and Naked Spring.

- The Gilchrist Blue Spring run extends nearly one quarter mile in length and is one of the most significant spring runs in the Santa Fe basin. The Gilchrist Blue Spring run and Naked Spring run are often recognized for their diverse and substantial “underwater forest” of submerged aquatic vegetation.

- Gilchrist Blue Spring is well known for its outstanding water clarity and is renowned for its support of a diversity of wildlife species including turtles, fish and invertebrates. Gilchrist Blue Spring and spring-run provide important habitat for a diversity of freshwater turtle species, including the imperiled Suwannee alligator snapping turtle (*Macrochelys suwanniensis*).

- The park protects 1.5 miles of the shoreline of the Santa Fe River and supports a diversity of natural plant communities that characterize the Santa Fe River basin and the region’s underlying karst topography. This includes numerous limestone outcrops, sinkholes and a wide forested floodplain dominated by large bald cypress and swamp tupelo trees.

- The uplands contain some of the only remaining intact sandhill along the Sante Fe River in Gilchrist County.

## Central Park Theme

The turquoise waters and vibrant underwater forest of Gilchrist Blue Springs reveal how we all play a role in nourishing or altering the beauty and vitality of our springs.

Ruth B. Kirby Gilchrist Blue Spring 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 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

- Performed first prescribed fire since 2017 acquisition, burning within three management zones.
- Installed buoy lines along the perimeter of the spring to prevent erosion.
- Performed water quality monitoring in partnership with the Suwannee River Water Management District (SRWMD), Florida Springs Institute (FSI) and the University of Florida.
- Removed than 80 invasive feral hogs from the park.
- Developed monitoring plans for manatees.

# RESOURCE MANAGEMENT COMPONENT

| Management Zones | Acreage | Managed with Prescribed Fire | Contains Cultural Resources |
|---|---|---|---|
| GBS-4 | 39.91 | Y | Y |
| GBS-2 | 21.01 | N | Y |
| GBS-1e | 56.09 | N | Y |
| GBS-1w | 70.58 | Y | Y |
| GBS-5 | 88.27 | Y | Y |
| GBS-3 | 96.07 | Y | Y |
| GBS-6 | 30.49 | Y | N |

## TOPOGRAPHY

The park is located in the Gulf Coastal Lowlands geomorphologic region, and more specifically in the Suwannee River Lowlands (White 1970). 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 it.

Park elevations range from 20 feet at the north boundary along the Santa Fe River to approximately 75 feet above mean sea level (msl) at the south boundary (see Topographic Map). The property slopes up from the Santa Fe floodplain towards the uplands to the south. The 100-year floodplain (base flood elevation) as calculated by the Suwannee River Water Management District (SRWMD) for the Gilchrist Blue Spring reach of the Santa Fe River is 38.4 feet based on NAVD88.

Some alterations of natural topography have taken place in the park. The most obvious alterations are the large powerline easement bisecting the western side of the park, the park entrance road, parking area, and terraced areas on the slopes above the main spring boil. Limited disturbances are associated with the former old fields and pine plantations in portions of zones GBS-4, GBS-5, and GBS-6. Minor furrowing appears to have occurred in the old fields in the SW area of zone GBS-5 and the NW area of zone GBS-6 prior to pine planting in the 1990s. Native sandhill groundcover persists in the remaining uplands despite pine planting due to the lack of site preparation activities outside the old field areas. There is also a borrow pit located near the powerline in zone GBS-1e, as well as several deep gouges along the powerline where sand has been removed.

## SOILS

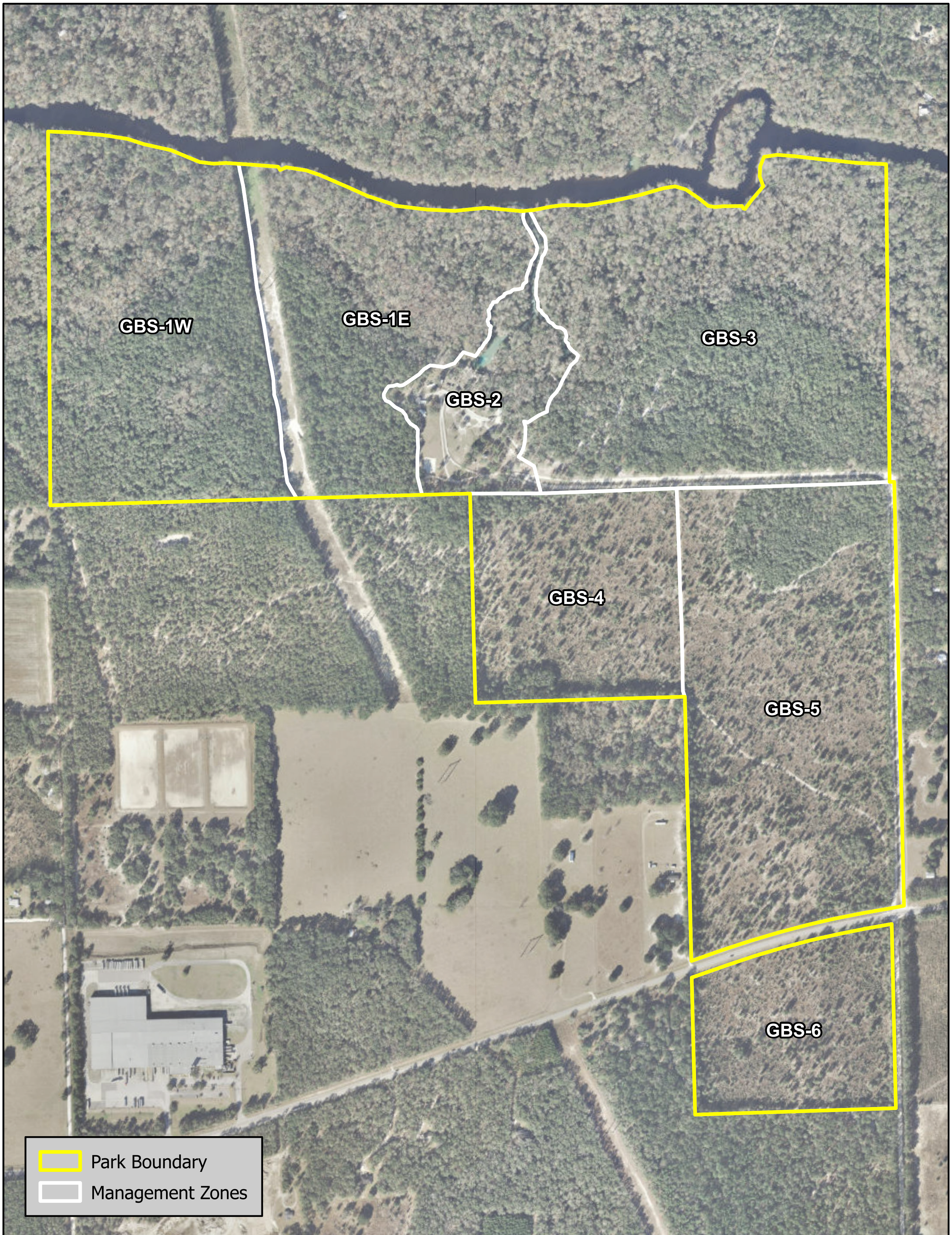
Six soil types (http://websoilsurvey.sc.egov.usda.gov), are found at the park (see Soils Map). For detailed information on soils, see Appendix .

The soil surface has undergone significant alterations and there are obvious signs that erosion and sedimentation have impacted several localized areas, including the entire upslope terrace around the Gilchrist Blue main headspring, the boil and spring run of both Gilchrist Blue and Naked springs, the campground, the main entrance road, and along the western powerline easement.

The vegetation on the slopes above the main headspring is nearly absent due to intensive trampling from foot and vehicle traffic, and soil erosion is commonplace. Numerous exposed wooden timbers are imbedded throughout the steep slopes of the spring bowl that appear to have been strategically arranged for soil stabilization, including a large wooden retaining wall around most of the main headspring. Unfortunately, the surface terraces in the main spring bowl are not slowing down stormwater runoff enough to prevent substantial soil erosion and sedimentation. Additionally, exposed roots from many large trees scattered across the main spring bowl, as well as the wooden timbers, can act as tripping hazards.

Visual observation of current conditions and a review of historic photos indicates that a significant level of erosion and sedimentation has occurred, over the years, within Gilchrist Blue Spring and Naked Spring and their associated spring run streams.

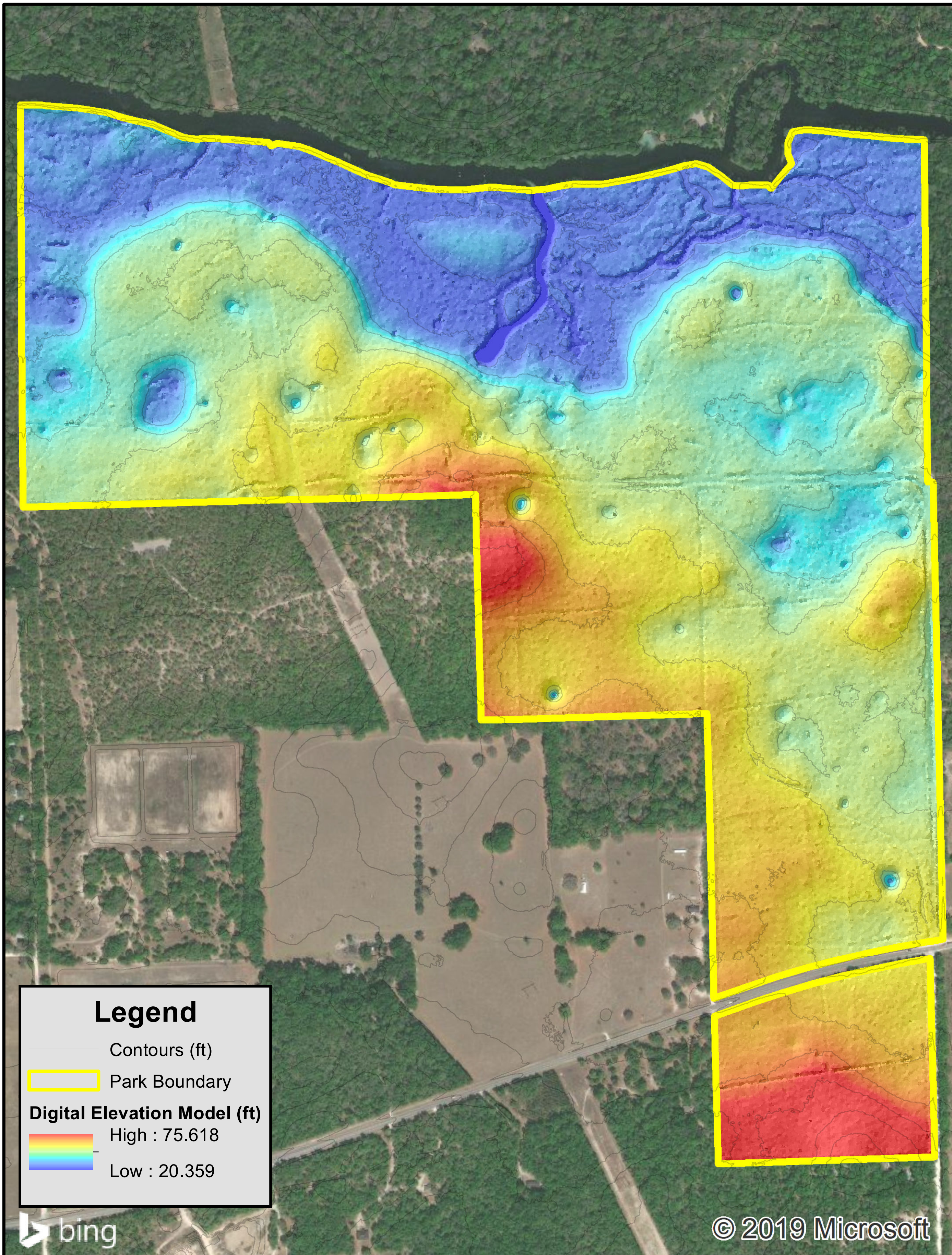
Evidence of significant erosion can be observed at the bottom of Gilchrist Blue Spring, with significant areas artificially devoid of submerged aquatic vegetation (SAV) and by the presence of a wide, deep, bare soil trench that continues along the center of the entire spring run stream out to the mouth at the Santa Fe River. Recreational pressure from swimming and wading undoubtedly contributes to the erosion and SAV impacts on the spring-run bottom, especially when water levels are low.




RUTH B. KIRBY GILCHRIST BLUE STATE PARK
Management Zones

N
Feet
0 500 1,000

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



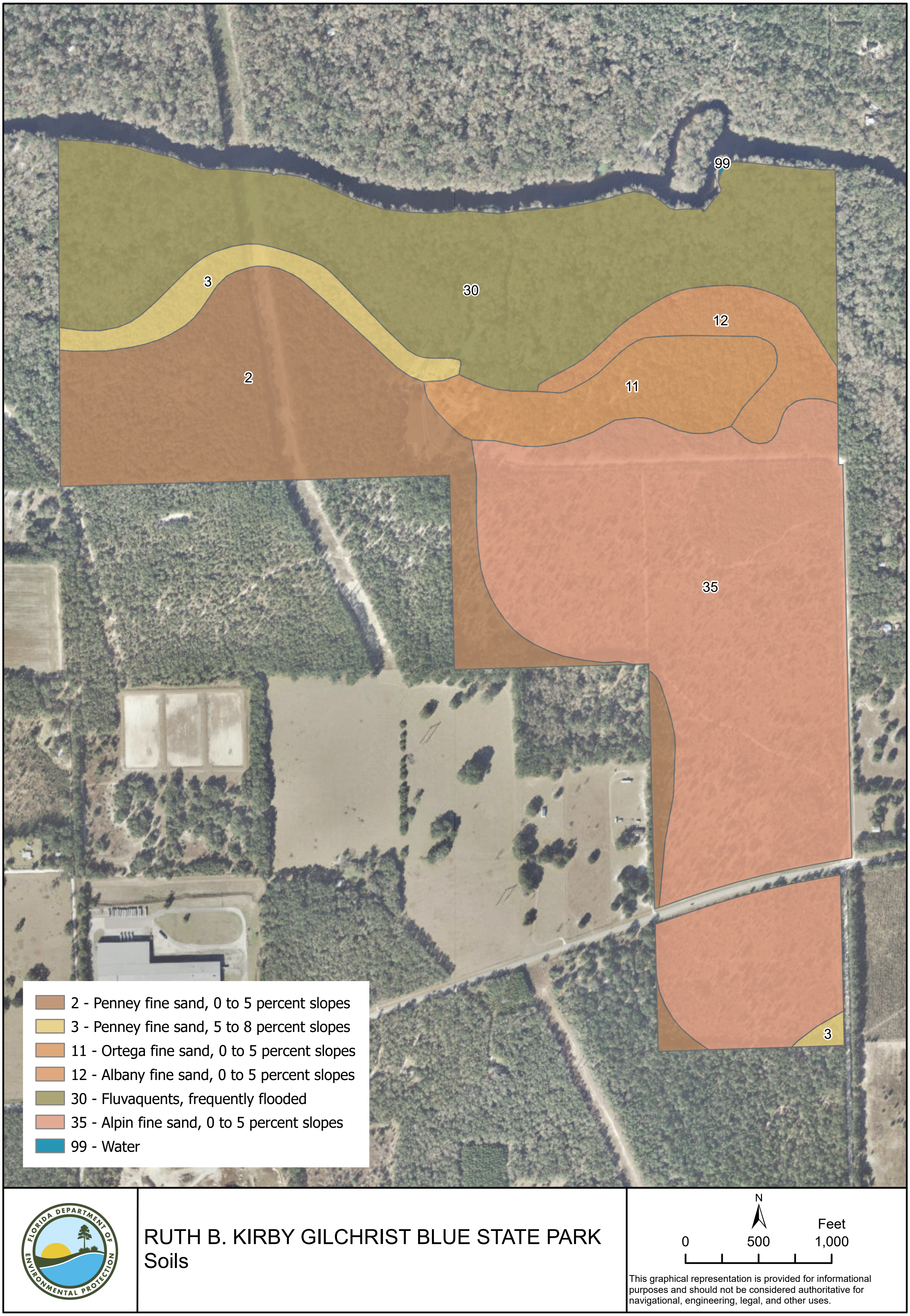

RUTH B. KIRBY
GILCHRIST BLUE SPRINGS
STATE PARK

N

0 250 500 1,000 Feet

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of aerial: 2016

TOPOGRAPHIC MAP


99
3
30
12
2
11
35
3
2 - Penney fine sand, 0 to 5 percent slopes
3 - Penney fine sand, 5 to 8 percent slopes
11 - Ortega fine sand, 0 to 5 percent slopes
12 - Albany fine sand, 0 to 5 percent slopes
30 - Fluvaquents, frequently flooded
35 - Alpin fine sand, 0 to 5 percent slopes
99 - Water
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
RUTH B. KIRBY GILCHRIST BLUE STATE PARK
Soils
N
Feet
0
500
1,000
This graphical representation is provided for informational purposes and should not be considered authoritative for navigational, engineering, legal, and other uses.

## HYDROLOGY

The park's northern boundary is located on the southern bank of the Lower Santa Fe River along the Columbia-Gilchrist county line (Upchurch et al. 2011). Gilchrist Blue Springs is a large, second-magnitude spring group that provides a significant source of groundwater to the adjacent Santa Fe River. The Santa Fe River, Gilchrist Blue Spring Group (including three major springs), and a unique basin swamp are the three most prominent hydrological features in the park.

The Santa Fe River is a 1,384-square mile surface watershed that occupies portions of nine north Florida counties, from Clay County in the east to Gilchrist and Suwannee counties in the west (Clark et al. 1964; Berndt et al. 1996). The overall flow of the Santa Fe is from east to west. The Santa Fe is also one of three major tributaries of the Suwannee River, encompassing nearly 14% of the entire Suwannee watershed (SRWMD 2006). The Suwannee River is a free-flowing (i.e. unaffected by dams) natural system that drains approximately 10,000 square miles of the Florida/Georgia region and ultimately discharges into the Gulf of Mexico through Florida's largest publicly managed estuary, Big Bend Seagrasses Aquatic Preserve (DEP 2014).

The Suwannee and Santa Fe rivers are both designated as Class III Outstanding Florida Waters (OFW) which is conferred to waterbodies with "exceptional recreational or ecological significance" (Chapter 62-302.700[3], F.A.C.). The average flow of the Santa Fe River contributes approximately 1 billion gallons per day to the Suwannee (Berndt et al. 1996; SRWMD 2013). Average annual rainfall for the Lower Santa Fe region approaches 60 inches per year (Fernald and Purdum 1998).

The Santa Fe River can be divided into an upper and lower reach based on distinctly different geological characteristics within each section (SRWMD 2007). Water scientists have described the Santa Fe River as one of Florida's most biologically diverse river systems because of its unique position in the ecological landscape.

The Upper Santa Fe River receives major surface water inputs from several significant tributaries such as Olustee Creek. Below the Olustee tributary, the Santa Fe River begins to cross the wide geologic transition known as the Cody Escarpment (White 1970; Upchurch 2002). As with most of the major streams that cross this scarp feature, a sizeable proportion of the river flow disappears underground into swallet openings and re-emerges at various resurgence points after mixing with groundwater in the Floridan aquifer (Martin and Dean 2001).

In the Upper Santa Fe, stream flow is highly dependent on surface runoff, but there is some seepage input from the surficial aquifer as well. The surficial aquifer in this region has a well-defined confining unit that separates it from the Floridan aquifer below (Miller 1986). In contrast, groundwater inputs heavily influence river discharge in the Lower Santa Fe basin (Clark et al. 1964). The Lower Santa Fe basin region, which includes Gilchrist Blue Springs State Park, is part of an extensive karst plain where the confining units are discontinuous or absent, especially within the western third of the watershed (Williams et al. 1977). In fact, during periods of low surface water flows, discharge from the western portion of this watershed consists almost entirely of groundwater with most of its water supply from springs such as Gilchrist Blue. In other words, the base flow of the Santa Fe is derived principally from the Floridan aquifer (Meyer 1962; Meyer et al. 2008). The SRWMD and DEP adopted a minimum flow and level (MFL) for the Lower Santa Fe in 2013 (SRWMD 2013). In 2014, the SRWMD and DEP developed an MFL recovery strategy for the Lower Santa Fe and Ichetucknee rivers because the current flows, as compared to historic flows in both systems, were undergoing unacceptable impacts due to regional groundwater withdrawals (Grubbs and Crandall 2007; Williams et al. 2011; SRWMD 2014). As of 2023, Gilchrist Blue Spring did not have a separate MFL, but the SRWMD has scheduled this spring for assessment in the near future. Spring flows from Gilchrist Blue have steadily declined since they were first recorded in the early 1970s (Johnston et al. 2016).

## Gilchrist Springshed and its Major Springs

Gilchrist Blue and Naked springs are two significant second-magnitude springs. The park also contains an abundance of smaller springs and seepages scattered across the property (Rosenau et al. 1977; Scott et al. 2004). Gilchrist Blue Spring is the largest spring in the park, and within its main headspring are several linear vents that discharge groundwater from beneath the base of a submerged limestone ledge. The Gilchrist Blue spring-run stream, which heads briefly northeast before turning northward to the Santa Fe River, is approximately 1,200 feet long, 20-60 feet wide, and 1-6 feet deep.

As the Gilchrist Blue spring-run stream flows northward through a forested floodplain canopy to the Santa Fe, two additional spring tributaries merge with the main spring-run. Little Blue Spring (a fourth-magnitude spring) enters from the west about 100 feet downstream from the main spring pool, and Naked Spring enters from the east about 500 feet downstream (Hornsby and Ceryak 1998). Naked spring-run is over 400 feet long, 10-15 feet wide and 1-3 feet deep. The spring-run of Little Blue is much shallower and not as clearly defined as the larger spring-run of Naked Spring.

The discharge of Gilchrist Blue Spring (combined with Naked Spring and Little Blue Spring at the mouth) was first measured in April 1975 with a flow of 42 cubic feet per second. The average recorded flow for Gilchrist Blue Spring is 45.16 cubic feet per second (N= 106), with a minimum 8.43 cubic feet per second (April 26, 2012) and maximum 89.4 cubic feet per second (Oct. 21, 2015).

Another prominent karst feature on the property with direct discharge into the Santa Fe River is Johnson Spring, currently classified as a third-magnitude vent (historic second-magnitude). There is also a unique basin swamp with scattered limestone outcrops situated west of the main spring in zone GBS-1w.

Hydrologic models have identified as many as 10 distinct springshed boundaries within the Santa Fe basin, with the three largest spring groups by area being Ichetucknee, Gilchrist Blue-Rum Island and Hornsby-Treehouse (Kincaid 2011; Upchurch and Champion 2004; Upchurch et al. 2011). The Gilchrist Blue-Rum Island springshed is a sub-basin of the Lower Santa Fe River, which ultimately flows into the Suwannee River. The Ginnie springshed lies immediately west of Gilchrist Blue Spring, and to its east is the Poe springshed. Gilchrist Blue-Rum Island, Ginnie and Poe springsheds are all complex cavern-dominated, and partially interrelated systems that should be treated as one until additional research can better delineate their boundaries (Upchurch et al. 2011).

Delineation of the Lower Santa Fe River springsheds, including Gilchrist Blue, began in the mid-1990s with dye trace studies that were conducted within the adjacent Ginnie springshed and more recently by groundwater modeling analyses (Kincaid 1998; Meyer et al. 2008; Upchurch et al. 2011). It is important to realize that determining the exact size of a groundwater basin is complicated because of the unconfined geology of the Lower Santa Fe region. At its greatest distance from north to south, the Gilchrist Blue springshed measures nearly 30 miles, and its surface and groundwater basins encompass more than 420 square miles. There has been very little aquatic cave system exploration conducted at Gilchrist Blue Springs. One portion of the Ginnie Springs cave system (Devils Ear) lies beneath the western park boundary. Gilchrist Blue lies within the Santa Fe River Basin Management Action Planning (BMAP) region and a Springs Priority Focus Area (PFA), both regulated by DEP (DEP 2023).

One watershed-level process that seldom receives adequate consideration during studies of river hydrology is flooding. Especially important is the relationship between downstream flooding in a major river and upstream back flooding in its tributaries (Pringle 1997; Diehl 2000; Garza and Mirti 2003). In the case of the spring-run streams at the park, back flooding occurs periodically when hydrologic conditions in the Suwannee River cause a reduction in outflow from the Santa Fe River. The back flooding can occur under at least two different scenarios: 1) when the flow of the Santa Fe generated within its own watershed is high enough for it to reach flood stage, 2) when the Suwannee River is at flood stage, causing its Santa Fe tributary to back flood. Under both circumstances, a specific resistance of the Gilchrist Blue spring-run to flow into the Santa Fe occurs at the confluence of the two tributaries. The full flow of the Gilchrist Blue spring-run is unable to penetrate the Santa Fe, and back flooding of the spring-run streams at the park is the result.

At least four of the park's natural communities significantly benefit from this phenomenon of ephemeral back flooding: alluvial forest, floodplain swamp, basin swamp and bottomland forest. These floodplain communities are highly dependent on the ephemeral nature of this flooding regime. If the back flooding did not occur periodically, major changes in the soils and the species compositions of these communities could ensue. Alteration of the back-flooding regime on the Santa Fe River, especially in conjunction with reductions in base flow of springs along the river, could cause significant changes in the character of these wetland communities (Light et al. 2002; Sepulveda 2002).

River stage has been recorded on the Suwannee River since 1906, and it is important to understand that this 100-plus year record has provided water scientists with a unique dataset that can be used to determine historic flows and flood events (Verdi and Tomlinson 2009). During that period, water scientists have closely documented every major flood and drought that has affected the Suwannee River. From 1942 to 2019, 15 significant floods and nine major droughts were recorded in north peninsular Florida (Verdi et al. 2006; Verdi and Tomlinson 2009). Three of the most extreme droughts in the Suwannee River basin during this period occurred in 1954-56, 1998-2002, and 2010-12 (SRWMD 2018; Verdi et al. 2006). Numerous gauges at unique locations along the Suwannee and Santa Fe rivers track not only river stage but discharge as well (USGS 2018; Verdi et al. 2006).

When the Suwannee River (and therefore the Santa Fe River) floods, the high river stage affects spring-run tributaries (e.g., Gilchrist Blue) along its reaches, gradually "pushing back" against the head pressure in the Floridan aquifer that causes springs to flow. As the Santa Fe back-floods into the Gilchrist Blue spring run when river flooding occurs, river and spring waters begin to mix (Katz et al. 1999). The extent of mixing, as determined by monitoring of water clarity in springs, can be a helpful tool in documenting changes in groundwater discharge in spring systems (Anastasiou 2006). Marked changes in water clarity can be observed within the Gilchrist Blue spring run depending on factors such as discharge, clarity of the Santa Fe River and height of river stage. Partial or complete brownouts of the Gilchrist Blue spring system may result. A complete brownout is considered to have occurred when tannic river water covers the entire spring run and headspring, with water clarity reduced to less than 4 feet of visibility. If the surface water pressure exceeds the groundwater head pressure, the springs at the park may even reverse flow and function as "siphons," or inflow points into the Upper Floridan aquifer (Gulley et al. 2011). In that respect, Gilchrist Blue Spring can act as an estavelle, a type of spring whose fluctuations in discharge reflect a direct relationship between groundwater potential and river stage (Copeland 2003).

## Water Quality

Another prominent ecosystem process occurring in the Gilchrist Blue springshed is the movement of contaminants and nutrients through surface and ground waters within the basin (Katz and Hornsby 1998; Heffernan et al. 2010). Deterioration of groundwater quality in the Gilchrist Blue springshed will ultimately threaten water resources within the park itself. There are numerous non-point sources of groundwater pollution in the region outside the park (Obreza and Means 2006).

Gilchrist County ranks among the top five largest counties in the Lower Santa Fe River basin with the predominant land use being devoted to agriculture (Obreza and Means 2006). Levy County and Gilchrist County, both ranked among the highest in the state in silage corn production, use more than 5,700 tons of nitrogen fertilizer per year combined. As a result, nitrate levels in the Floridan aquifer in north Florida have increased by an order of magnitude or more over the past 50 years (Cohen et al. 2007; Upchurch et al. 2007). Human activity, especially the use of inorganic fertilizer, has long been the leading cause of this enrichment.

Water quality measurements have been collected sporadically at Gilchrist Blue Springs since 2001 (SRWMD 2018; DEP 2018). During the period from 2001-2017 (N= 34), the average nitrate-nitrite level is nearly 2.2 milligrams per liter, placing Gilchrist Blue in the top five Florida springs with the poorest water quality based on that parameter. Naturally occurring background levels for nitrates in groundwater, for example, should be less than 0.01 milligrams per liter (Cohen et al. 2007). There have also been trace amounts of at least three toxic chemical substances detected within water samples at Gilchrist Blue Spring, including arsenic, atrazine and chromium (DEP 2018).

Hydrologists have also been measuring total nutrient loads dumped into the Gulf of Mexico via the Suwannee River for the past 50 years (Berndt et al. 1998; Hand et al. 1996; Kenner et al. 1991; Ham and Hatzell 1996; Pittman et al. 1997). Nitrogen and phosphorus are the two most common nutrient pollutants that regulate benthic macroalgae (periphyton) growth in marine and freshwater ecosystems (Stevenson et al. 2007; Lapointe et al. 2019). These pollutants play a key role in waterbody eutrophication and subsequent widespread macroalgae blooms. Excessive nitrogen, specifically in its nitrate form ($NO_3$), is partially responsible for the creation of unhealthy, polluted aquatic ecosystems worldwide (Quinlan 2003; Upchurch et al.2007).

As depicted in the table below, the Santa Fe River watershed contributes a significant proportion of the yearly nitrate-nitrogen ($NO_3$) input to the Suwannee system. In fact, the Santa Fe watershed rivals two other upstream Suwannee River sections in terms of total yearly input of nitrogen into the Suwannee system (District 2 files). Nutrient loading from the Suwannee into the Gulf of Mexico over an eight-year period from 1998 to 2005 totaled nearly 40,000 tons of nitrogen and 11,000 tons of phosphorus (District 2 files).

| Total % contribution per year ($NO_3$) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Suwannee River Sections and Tributaries** | | | | | | |
| | Upper | Middle | Lower | Alapaha | Withlacoochee | SantaFe | Ichetucknee |
| **Area (mi$^2$)** | **2873** | **824** | **686** | **1801** | **2382** | **1184** | **200** |
| **%Coverage** | 28.80% | 8.30% | 6.90% | 18.10% | 23.90% | 11.90% | 2.01% |
| **Year** | | | | | | | |
| **1998** | 18.1 | 46.0 | 2.4 | 3.0 | 13.1 | 16.8 | 1.9* |
| **1999** | 10.8 | 47.0 | 5.2 | 4.0 | 11.9 | 21.2 | 1.9* |
| **2000** | 14.0 | 36.0 | 3.0 | 6.0 | 11.0 | 22.6 | 7.4 |
| **2001** | 2.8 | 45.5 | 2.8 | 12.8 | 20.2 | 23.0 | 4.3 |
| **2002** | 7.2 | 29.3 | 31.4 | 3.6 | 8.9 | 19.7 | 2.5 |
| **2003** | 0.8 | 34.4 | 14.4 | 12.2 | 23.8 | 16.2 | 1.9 |
| **2004** | 3.6 | 34.7 | 19.2 | 9.7 | 18.6 | 21.5 | 2.4 |
| **2005** | 13.5 | 28.9 | 16.1 | 2.4 | 19.4 | 19.6 | 2.5 |
| **Mean total** | 8.9 | 37.7 | 20.3 | 6.7 | 15.9 | 20.1 | 3.5 |
| | * low estimate | | | | | | |

In most of Florida's springs, including Gilchrist Blue, increased nitrogen and phosphorus levels are now recognized as a significant driving force behind large-scale nuisance aquatic macroalgae blooms (Stevenson et al. 2007; Heffernan et al. 2010). The algae growth in many Florida springs is now so rampant that submerged plants are being smothered by periphyton, and, in fact, large-scale die-offs of submerged aquatic vegetation (SAV) have occurred (District 2 files; Wetland Solutions Inc. 2010). Water scientists suggest that eutrophication, spring velocity (Reaver et al. 2019; King 2014) and fluctuations in invertebrate grazer biomass (Liebowitz et al. 2014) all play important roles in influencing the spread of nuisance algae in spring ecosystems (Heffernan et al. 2010).

**Submerged Aquatic Vegetation**

The historical narrative and photographic records of Gilchrist Blue and Naked springs illustrate that through 2023 there has been a high diversity (at least 16 species) of native SAV covering a significant area of these two spring-run streams (Johnston et al. 2016; Johnston et al. 2018; Morris et al. 2017; Alder et al. 2018). Historically, Gilchrist Blue and the other inland freshwater Florida spring ecosystems have been characterized by thick beds of five dominant submerged aquatic plants, including spring-tape

(*Sagittaria kurtziana*), 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 a healthy "underwater forest" within Florida's spring ecosystems (Odum 1957; Wetland Solutions Incorporated 2010; Heffernan et al. 2010).

One of the earliest known assessments of the condition and SAV health of Gilchrist Blue Spring was completed by University of Florida researchers in 2008 (Dina Leibowitz, personal communication). During that work, researchers characterized the SAV as healthy with a high diversity relative to other springs in the Santa Fe River. The non-native hydrilla (*Hydrilla verticillata*) was also unfortunately present in portions of the spring system.

In March 2017, researchers from Alachua County Environmental Protection Department (ACEEPD) and Karst Environmental Services (KES) set up systematic SAV monitoring transects to quantify aquatic plant bed abundance throughout Gilchrist Blue Spring, Naked Spring and their associated spring-run streams (Morris et al. 2017). During that work, five of the 16 most dominant native SAV taxa that were documented in Gilchrist spring-run included spring-tape, eelgrass, creeping primrosewillow, southern waternymph, muskgrass.

Additionally, two non-native SAV species were documented in Gilchrist Blue Spring, namely hydrilla and Indian swampweed (*Hygrophila polysperma*), the former having been recorded as an extremely dense biomass, especially in the upper section of Gilchrist spring-run (District 2 files). Although SAV diversity of the Naked spring-run was slightly lower than Gilchrist Blue during the March 2017 study, five dominant native SAV taxa were documented, including southern waternymph, creeping primrosewillow, spring-tape, water pennywort (*Hydrocotle*) and eelgrass. Also like the Gilchrist Blue spring-run, non-native hydrilla was extremely dense in some portions of Naked spring-run. Other notable native SAV species in these two springs are Florida watercress (*Nasturtium floridanum*), herb-of grace (*Bacopa monnieri*), spring-run spiderlily (Hymenocallis rotata), water hemlock (*Cicuta maculata*) and creeping burrhead (*Echinodorus cordifolius*). One noteworthy mention from the March 2017 SAV work was the observation of a vegetation-free central channel within both the Gilchrist and Naked spring-runs that was attributed to recreational impacts "as visitors walk up and down the center of the [shallow] spring-run" (Morris et al. 2017).

ACEPD/Karst repeated annual SAV transect assessments at Gilchrist Blue Spring from 2017-22. Additionally, District 2 biological staff have conducted annual visual and video assessments of SAV throughout Gilchrist and Naked springs since 2017. From 2017-23, SAV in the Gilchrist Blue Spring ecosystem has undergone a number of phenology changes concerning presence/absence, density and abundance. During this period, of the five dominant SAV taxa mentioned above, the two species that have fluctuated (i.e. presence/absence) most widely were springtape and eelgrass, whereas other typical natives like creeping primrosewillow, southern waternymph, Florida watercress and muskgrass appear to have remained primarily unaffected and much more tolerant to changes. Eelgrass and springtape underwent a complete disappearance at least twice from 2017-22, but subsequently both species recovered to full density and abundance within Gilchrist Blue spring run. Within the main spring vent of Gilchrist Blue Spring where heavy recreation (i.e. swimming and wading) occurs, the only SAV recovery (including eelgrass and springtape) is along the west and east shorelines or deep areas around the spring boil. An intact root structure appears to have remained, allowing eventual recolonization of plant leaf sprouts following either natural or anthropogenic disturbance, and leading to this eelgrass and springtape recovery to have occurred, Three main disturbances suspected to cause SAV declines (especially eelgrass and springtape) include herbivory, recreation, and river flooding (i.e. brownouts) (Morris et al. 2018; District 2 files).

Recreational pressures on the SAV in the Gilchrist Blue system are discussed further in the Soils section above, below under "Spring-run Stream" in the *Natural Communities* section, and in the *Land Use Component.* Two other events after March 2017 have contributed to severe declines of the SAV. These include a significant herbivory event from a large aggregation of freshwater turtles and sustained spring brownouts associated with high water levels on the Santa Fe River from significant weather events (SRWMD 2018).

The negative effects of large-scale wildlife herbivory events are not an especially novel idea and have been documented by numerous studies in spring ecosystems, including within Gilchrist Blue (Hauxwell et al. 2004; Johnston et al. 2018; Alder et al. 2018). Large turtle aggregations and associated herbivory events have occurred at Gilchrist Blue Springs on multiple occasions since 2012 (Johnston et al. 2018). The most recent large-scale herbivory event from turtles at Gilchrist Blue Spring occurred after the March 2017 SAV study (District 2 files).

Some researchers have suspected that, over the past several years, a sustained-level of river flooding (ecosystem brownout) throughout the Lower Santa Fe River basin has contributed to significant declines in "river" SAV due to reduced sunlight, an essential requirement for SAV growth (Canfield and Hoyer 1988; Johnston et al. 2018). Since several of the Santa Fe River springs remained mostly clear during this extended period of Santa Fe brownout, their aquatic plant beds remained essentially intact, especially at Gilchrist Blue and Ichetucknee spring-run streams (Johnston et al. 2018). In recent years, significant increases in the number of freshwater turtles have been documented in both spring ecosystems (District 2 files). As a result, large turtle aggregations that have amassed into Gilchrist and Naked spring-run streams have completely grazed down a majority of the SAV above the root stock (Johnston et al. 2018; District 2 files). This loss of aboveground biomass coincided with an observed widening of the central foot path within the spring run, which may have contributed to the loss of a majority of the SAV root systems. Prior to 2018, Ichetucknee Springs and Gilchrist Blue Springs remained the two healthiest spring-run ecosystems in Lower Santa Fe River in terms of intact aquatic plant beds (Kurtz et al. 2004; Morris et al. 2017; Morris et al. 2018).

In Florida, prolonged spring ecosystem brownouts (i.e. a decrease in water clarity) may be occurring at a much-increased frequency due to increased groundwater withdrawals (Knight 2015; Hensley and Cohen 2017). With this combination of herbivory, decreased water clarity and foot traffic, as well as other unknown factors, there appears to have been an ecological tipping-point at Gilchrist Blue Springs, whereby SAV recovery since 2017 has not been able to occur. Since the 2017 mapping, there has been an overall increase in nuisance aquatic algae and no substantial positive changes to the SAV component in the springs and the spring-run streams of Gilchrist Blue and Naked springs (Morris et al. 2017; Morris et al. 2018).

Unfortunately, elevated groundwater nutrients have contributed to significant declines in the ecological health of spring systems across Florida (Jones et al. 1996; Munch et al. 2006; Cohen et al. 2007; Stevenson et al. 2007; Wetland Solutions Inc. 2010; Harrington et al. 2010). Studies suggest that the visible presence of nuisance algal biomass in a spring ecosystem is an indicator of an imbalanced distribution of aquatic flora (Rule 62-302.500 (48) (b) F.A.C.). The U.S. Environmental Protection Agency (EPA) states that water bodies with periphyton levels exceeding 150 milligrams per square meter may be biologically impaired and may experience a decline in ecosystem health. It is important to remember that benthic algae have historically been considered a vital natural component of spring ecosystems, however current nuisance levels can be attributed to a system imbalance (Whitford 1956). There is now widespread recognition that periphyton levels, in response to nutrient enrichment, are increasing in nearly all of Florida's springs, and that this is a symptom of the declining ecological health of springs (Kolasa and Pickett 1992; Hornsby et al. 2000; Stevenson et al. 2007; Brown et al. 2008; Copeland et al. 2011; Knight and Clarke 2016).

Groundwater within the Gilchrist Blue springshed moves through a complex matrix of disjointed, and sometimes linked, underground conduits that may return the water to the surface through spring vents. Exploration of major conduits by cave divers can help us gain knowledge about the workings of the underground conduit matrix. Unfortunately, there are no records of aquatic cave exploration for Gilchrist Blue Springs. Given the absence of data from cave exploration, a better understanding of the nature of the conduit connections within the Gilchrist Blue springshed will require additional research, particularly dye trace studies.

Dye trace research is an important tool in establishing the locations of definitive groundwater connections between surface water bodies (Aley 1999; Skiles et al. 1991). Dye tracing was conducted in the adjacent Ginnie springshed in the late 1990s, but no similar work has been done in the Gilchrist Blue springshed. Several past dye trace studies in the lower Santa Fe region have revealed a direct link between surface/groundwater connectivity and rapid transport of surface runoff through karst features to exit points at springs (Hisert 1994; Hirth 1995; Karst Environmental Services 1997; Kincaid 1998; Butt and Murphy 2003; Champion and Upchurch 2003; Butt 2005; Butt et al. 2006). The studies have also provided scientists with a better understanding of how surface contaminants can move through the Floridan aquifer (Macesich 1988; Martin and Gordon 2000).

***Objective A***: Evaluate and mitigate 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., around all springs).

Several areas in the park continue to have erosion issues despite past corrective measures. Mitigation of erosion and sedimentation sites, especially concerning spring and karst features in the park, is a top priority. Staff will investigate best management options for additional mitigation of erosion in public access areas such as the slopes above Gilchrist Blue, Little Blue, Naked and Johnson springs. 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. This may include the closure of sensitive areas to public access when necessary to perform restoration activities and promote soil recovery.

***Objective B***: Conduct/obtain an assessment of the park's hydrological restoration needs.

- Action 1 - Continue to cooperate with other agencies and independent researchers regarding hydrological research and monitoring programs.

- Action 2 - Continue monitoring of surface and groundwater quality at Gilchrist Blue Springs and track changes.
- Action 3 - Perform dye trace studies within the Gilchrist Blue springshed to determine the groundwater sources for the spring and karst systems in the park.
- Action 4 - Continue to monitor land-use or zoning changes around the park.
- Action 5 - Continue to cooperate with the SRWMD to ensure MFLs for the Santa Fe River are monitored for compliance to maintain historic river flows.

Over the past 50 years, multiple factors have combined to cause a rapid decline in the ecological health of most of Florida's spring ecosystems, which have all experienced dramatic increases in nuisance benthic macroalgae. Increased nutrient loading into the Floridan aquifer, especially within a springshed, has long been recognized as a contributing problem. During the period of record for Gilchrist Blue Spring, its nitrate levels have ranked among the highest of all springs in Florida. The mitigation of erosion and sedimentation sites in the park, restoration of Gilchrist Blue Spring and protection of the Gilchrist Blue springshed should remain top priorities for the Division.

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 Santa Fe River, and it will encourage and facilitate additional research in those areas. DRP will rely upon agencies such as the SRWMD, U.S. Geological Survey (USGS) and DEP to keep it apprised of any declines in surface water quality or any suspected contamination of groundwater in the region.

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 inform the resource management activities at the park.

Even though the Gilchrist Blue springshed has been partially delineated, significant gaps remain in our understanding of the proximal sources of groundwater flow to the park's 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 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 Gilchrist Blue 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 Santa Fe River, including Gilchrist Blue Spring, is carefully monitored and that historic river flows are protected, or restored, if there is noncompliance with the MFL.

***Objective C*:** Restore natural hydrological conditions and functions to approximately 2 acres of spring-run stream natural community.

- Action 1 - Close Naked Spring and the lower Gilchrist Blue spring-run stream and other sensitive features in the park to swimming and wading activity to allow SAV restoration. Limit swimming and wading to the currently designated swimming area within the Gilchrist Blue main headspring.
- Action 2 - Develop and implement a plan to re-establish littoral and shoreline vegetation adjacent to the swimming area and establish designated water entry points in the swimming area.
- Action 3 - Develop a plan to conduct experimental SAV plantings within Gilchrist Blue and Naked spring-run streams.
- Action 4 - Develop and implement monitoring protocols for semi-annual SAV assessments and continuous monitoring in Gilchrist Blue and Naked springs and their associated spring-run streams.
- Action 5 - Develop and implement a monitoring protocol to track brownouts, turbidity and changes in water clarity of Gilchrist Blue, Little Blue, Johnson and Naked springs.

Restoration of the aquatic plant beds adjacent to and downstream of the park's designated swimming area will be a high priority. These areas will also be monitored for negative impacts that might hamper successful restoration of the spring-run stream natural community. Removal of foot traffic from Naked Spring and the lower Gilchrist Blue spring-run will be necessary to allow recovery of the SAV. Staff will examine the feasibility of conducting experimental plantings of key species of native SAV at sites of significant damage. Re-establishment of littoral and shoreline vegetation adjacent to the swimming area will be a priority to reduce erosion around the main spring. Designated water entry points will also help reduce erosion. Experimental plantings will be required if the natural expansion of plants does not occur following closure. Littoral areas along the spring run and within the main headspring will be roped off or otherwise protected to facilitate SAV restoration and limit accidental incursion into these areas by park visitors.

DRP staff will collaborate with the Florida Fish and Wildlife Conservation Commission's (FWC) Wildlife and Invasive Plant Management bureau to understand the best management practices for controlling hydrilla in the park's springs. Hydrilla will be removed from the spring run as necessary.

DRP staff will design and implement a monitoring plan to track changes in the SAV health of the Gilchrist Blue and Naked springs and spring-run streams. If data indicate that the natural resources of the spring or karst features are becoming significantly degraded, additional recreational use limits may need to be implemented to protect them from further damage.

The monitoring plan implemented will be semi-annual assessments to document SAV diversity and coverage within Gilchrist Blue and Naked springs including SAV characterization along a known transect, spatial mapping of major aquatic plant beds and continuous monitoring by on-site staff for notable changes. Additional details of the semi-annual assessments are located below in the *Natural Communities* section under "Spring-run Stream."

It is important that DRP initiate an aggressive monitoring protocol to track all significant changes in aquatic plant beds, especially SAV diversity and brownouts within the park's major spring systems as part of documenting the ecological responses to recreational use, decreased spring discharge or Santa

Fe River flooding as described above under the *Hydrology* section and below in the *Natural Communities* section under “Spring-run Stream.”

In addition to the continuous monitoring by park staff, DRP will work with SRWMD to understand daily turbidity fluctuations of Gilchrist Blue Spring, especially any impacts that might be associated with recreational use. DRP will work with all stakeholders involved with water quality monitoring including DEP, SRWMD and other water scientists.

## NATURAL COMMUNITIES

### Limestone Outcrop

The park contains numerous limestone exposures. These occur as limestone outcrops along the sides of sinkholes and as large limestone boulders scattered within certain areas of hardwood and bottomland forest. A large outcrop is located near the eastern park boundary.

Limestone outcrops must be protected from disturbance, especially from erosion caused by foot traffic. The park should take measures to prevent runoff and erosion from degrading the limestone outcrops, particularly near existing trails or roadways. Rare plant species are often associated with limestone outcrops, so disturbance should be minimized and care must be taken if applying herbicides nearby.

### Sandhill

The sandhill community occurs on the higher elevations in the park on the deepest and most well-drained soils. Like much of the surrounding region, the sandhills were cleared of the original longleaf pines during the early 1900s or before. Natural regeneration of longleaf pines occurred to varying degrees in the landscape. Scattered mature longleaf are found within the sandhill in zones GBS-1e, GBS-1W and GBS-3. The sandhills of zones GBS-4, GBS- 5 and GBS-6 were cleared of pines before the planting of a pine plantation prior to 1993. The plantation was harvested in 2008-09.

Even though most of the sandhills at the park are in poor condition because they have been impacted by agriculture, silviculture and fire suppression, it is encouraging to see that large areas of native groundcover remain onsite. Scattered clumps of wiregrass (*Aristida stricta* var. *beyrichiana*) and other characteristic sandhill groundcover species are found in all areas that were not converted to pasture in the past. Aerial photography from 1937 shows that limited areas of zones GBS-4, GBS-5 and GBS-6 were converted to pasture prior to that date.

Nearly all areas of the sandhill community in the park have large pockets of off-site hardwoods due to the absence of fire on this property. The southern zones have scattered areas of young laurel oaks and sweetgums due to pine harvesting activities. The zones to the north, GBS-1e, GBS-1w and GBS-3, have extensive stands of mature laurel and sand live oaks. GBS-3 has been extensively fragmented by a network of sand roads and trails that are the result of a large informal camping area. The impacts to the remnant groundcover species are greatest in the areas closest to the main spring use area. The scattered remnant longleaf pines and groundcover patches offer some degree of hope for sandhill restoration in these areas.

A significant area of the sandhill was cleared as part of a major powerline corridor that bisects the western end of the park. This area is dominated by pasture grasses and weedy vegetation.

Pocket gophers (*Geomys pinetis*) and many active gopher tortoise burrows are still found onsite, along with eastern diamondback rattlesnakes. Therefore, it is likely that many other sandhill animal species have been able to persist.

The park's sandhills will need frequent prescribed fires to prevent and reverse the invasion of off-site hardwood species. Although growing season fires are preferred to stimulate groundcover response, dormant season fires may be used to reduce hardwood densities and to increase fire frequency. Removal or chemical control of off-site hardwoods may be necessary for restoration. The southern zones will require planting with longleaf pines after the initial prescribed fires and hardwood control.

Sinkhole and Sinkhole Lake
Due to the karst geology of the region, numerous sinkholes and depressions are scattered throughout the park. Some sinks remain dry the entire year, while others may contain water permanently or seasonally. The sinkholes within the park are relatively undisturbed and in good condition. However, at least one sinkhole in the park has evidence of being used as a trash dump. The sinkhole lakes include sinkholes in uplands areas that retain water and which may or may not have a direct connection with the Floridan aquifer, as well as sinkhole lakes at lower elevations in the floodplain which likely have direct Floridan aquifer connections.

Management of sinkholes and sinkhole lakes must emphasize protection. The edges of sinkholes need to be protected from impacts that could accelerate erosion. This is even more critical with sinkhole lakes, since increased levels of erosion can cause a decline in water quality. Direct access to these features, particularly the sinkhole lakes, should be limited to research purposes and resource management activities. Monitoring of these communities for impacts from invasive plant and animal species is needed.

Upland Hardwood Forest
Within the park, historical aerial photographs show a relatively thin band of hardwoods of varying width located upslope of the floodplain along the Santa Fe River. This transitional upland hardwood forest between the floodplain and sandhill communities has expanded upslope as a band of successional hardwood forest due to fire suppression in the past century. The boundary between the upland hardwood forest and sandhills is naturally dynamic and determined by local fire regimes and other disturbances such as windstorms. A portion of the upland hardwood forest was cleared as part of the powerline corridor. The upland hardwood forest within the park is in good to excellent condition with few impacts noted.

Impacts from service roads and trails will require monitoring. Abandonment and restoration of unnecessary roads will also be pursued.

Alluvial Forest
At Gilchrist Blue Springs, the alluvial forest occurs as a narrow strip along the Santa Fe River created by sand deposition, and as slightly elevated terraces associated with lower floodplain swamps within the floodplain.

These alluvial forest terraces occur at an intermediate level above the floodplain swamp and below the bottomland forest. These three floodplain community types are defined by the flooding regime based on topographic elevation but may be difficult to distinguish at times. These community types have been mapped using a digital elevation model derived from LIDAR data obtained from the SRWMD. This highresolution topographic dataset allows these areas to be mapped much more accurately than previously possible. The alluvial forest in the park is in excellent condition. However, in the northwest portion of the park it has been impacted by the powerline corridor.

Maintenance of a natural hydrological regime is critical to the long-term health of this community. Alluvial forest requires little active management other than protection from erosion impacts, control of feral hogs and control of invasive plant species.

Basin Swamp

The basin swamp at Gilchrist Blue Springs State Park is embedded within the western uplands. Intermittent overland flow from the Santa Fe River into this basin swamp during flood periods may play a hydrological role in this wetland. Basin swamps typically receive some inflow and can produce outflow, but they are not as heavily influenced by riverine systems as are floodplain swamps. Overall, the basin swamp is in good to excellent condition, with only a minimal sign of hog rooting disturbance.

Prescribed fires need to burn into the edges of basin swamps to maintain the natural ecotone between them and surrounding uplands. The park's basin swamp needs protection from the impacts of erosion and feral hog rooting.

Bottomland Forest

The bottomland forest at Gilchrist Blue Springs State Park occurs as a broad, low-lying terrace that lies on the slopes below the upland hardwood forest and as rises and terraces within the floodplain. Bottomland forest is usually found at slightly higher elevations than alluvial forest, and inundation does not occur on an annual basis. In general, however, Santa Fe River flooding does heavily influence the bottomland forest of the park. Recent hurricanes and flooding did tip up a significant number of larger trees in the bottomland forest, but this is a natural successional process in these forests. A portion of the bottomland forest was also cleared as part of the powerline corridor. Overall, the bottomland is in good to excellent condition.

Prescribed fires will be allowed to burn into the edges of bottomland forests to help maintain the natural ecotone between them and adjacent uplands. Some areas within these wetlands may require protection from erosion impacts along old roads or trails. DRP should determine whether any roads/trails cause significant enough hydrological harm to warrant their restoration to natural contour. Monitoring for signs of invasive plant species and feral hogs will continue.

Floodplain Swamp

Floodplain swamps at Gilchrist Blue Springs State Park occur adjacent to the Santa Fe River and in association with the various spring-run streams and floodplain channels in the park. Bald cypress and swamp tupelo are the dominant tree species, both of which are adapted to long-term flooding. In many cases, floodplain swamp and alluvial forest are difficult to distinguish from each other and form a complex mosaic based on local topography. A portion of the floodplain swamp was also cleared as part of the powerline corridor. The floodplain swamps at Gilchrist Blue Springs State Park are in excellent condition.

Maintenance of a natural hydrological regime is critical to the long-term health of this community. Floodplain swamps require little active management other than protection from erosion impacts, control of feral hogs and control of invasive plant species.

Blackwater Stream

The Santa Fe River is a blackwater stream that forms the north boundary of the park. Additional information about the river is included in the *Hydrology* section above. While the condition of the river, despite declining water quality and quantity, is still generally good, erosion is occurring along portions of the riverbank. Some of the erosion is attributable to natural flooding and some is a result of increased visitor use. Within the lower Santa Fe River region, the influence of groundwater flow is especially important.

Management of a complex aquatic system such as the Santa Fe River is a difficult task. Many impacts to this system have their origins either upstream or far from groundwater sources, and management considerations must necessarily extend beyond the park boundary, such as tracking and commenting on agency permits that regulate land-use changes within the springshed and research partnerships with the goal of defining springshed boundaries through dye trace research. Protection of the Lower Santa Fe River basin springsheds should be a priority for DRP. The DRP staff will continue to work with state agencies responsible for monitoring water quality and quantity on the river and will continue to support the basic and applied research that is ongoing within this watershed.

Spring-run Stream

Gilchrist Blue Spring is fed by the Floridan aquifer primarily through a single, large aquatic cave opening at the main headspring. This second-magnitude spring vent discharges to a short narrow spring-run stream that joins the Santa Fe River about 1,200 feet to the north. Two additional smaller spring vents are tributary to the main spring-run, including Naked and Little Blue springs. Naked Spring is the largest of the two and contributes nearly one-third of the overall discharge (Scott et al. 2004). Numerous smaller spring-run streams and seepages occur within the park, along the edges of the river within the adjacent floodplain and contribute to the flow of the Santa Fe River. Please see additional springs information above under the *Hydrology* section.

Across Florida, water scientists are studying numerous water quality and quantity issues that can threaten the health of spring-run stream ecosystems. There are many issues being studied, including eutrophication, nuisance macroalgae, ecosystem brownouts from river flooding, wildlife herbivory, recreational pressures, SAV declines and reductions in groundwater discharge, among others.

When the Santa Fe River is under extreme flood conditions, Gilchrist Blue Spring and its numerous smaller spring-run streams can reverse flow and the aquatic cave system can act as an estavelle, with tannic surface water pushing into the Floridan aquifer. Unnaturally elevated nutrient levels in the groundwater (eutrophication) have caused increased periphyton growth on SAV within most of Florida's spring-run streams. Because sunlight is an essential SAV growth requirement, thick layers of algae covering aquatic plants can cause severe die-offs in spring ecosystems.

These stream systems can also experience high turbidity levels associated with peak periods of recreational use. Gilchrist Blue Spring has long been attractive to outdoor recreation enthusiasts, and activities such as wading and walking on the spring bottom subject this aquatic system to highly intensive, and potentially destructive pressures. Extensive damage occurs to both the SAV (uprooting) and stream bottom, particularly in the area around the main spring vent.

Foot traffic in the spring run and the uprooting of aquatic vegetation tend to cause an increase in suspended sediments and silt in the water column and a corresponding decrease in sunlight penetration. Surface water column turbidity, coupled with increased periphyton growth, can have a harmful effect on SAV, and, by extension, the species that depend on them.

Additionally, Gilchrist Blue and Naked headsprings and the adjacent upslope terraces have undergone years of significant and repeated soil erosion with a high volume of stormwater runoff and sedimentation impacting the spring ecosystems and the adjacent Santa Fe River. The upslope terrace around both springs is considered in poor condition. In late summer 2022, a heavy rainfall event caused the partial collapse of the bulkhead at the south side of the Gilchrist Blue headspring and a washout of the access terrace on the eastern shoreline. A large plume of flocculent sediment washed into the swimming area. Park staff pumped the sediments out of the spring and repaired the bulkhead under an emergency authorization permit from the DEP Northeast District. Erosion control measures were installed upslope using sediment fencing and hay bales to prevent additional erosion.

It is important to note that SAV is an important dietary component for a variety of native wildlife such as Florida manatees (*Trichechus manatus*) and freshwater turtles, and therefore the amount of SAV biomass in this spring system can be highly dependent on the amount of foraging pressure (Johnston et al. 2018). Additionally, SAV biomass in this spring system can be influenced by significant flood or brownout events (see *Hydrology* section above).

In 2018, DRP documented the nearly complete collapse of several species of SAV in both Gilchrist Blue and Naked spring-runs. Two dominant SAV taxa that are strong indicators of a “healthy spring” as mentioned above under the *Hydrology* section appeared to have significantly declined in both springs at Gilchrist Blue Springs State Park. Spring-tape and eelgrass virtually disappeared in both systems twice during the period from 2017-22. Prior to this 2018 SAV collapse, the Gilchrist Blue ecosystem was one of only two remaining springs (rivaled only by the Ichetucknee) with healthy dense and diverse aquatic plant beds within the Lower Santa Fe River basin. By 2019, the spring-run was dominated by a dense monoculture of nuisance benthic macroalgae with very few large continuous beds of native SAV. The loss of SAV may have been precipitated by the extended flooding after Hurricane Irma, which browned out the spring-runs and the Santa Fe River. Increased herbivory in the spring runs due to loss of SAV in the river may have contributed to the decline. Continuous grazing by turtles accompanied by foot traffic in the spring-run may have prevented recovery of the SAV.

The first unit management plan for Gilchrist Blue Springs State Park, approved in the fall of 2019, established restrictions on wading and swimming outside the designated swimming area and closed Naked Spring. By the spring of 2020, significant recovery of native SAV beds were documented (Morris et al 2020). SAV coverage has fluctuated since that time, possibly due to brownout conditions and associated turtle herbivory, but recovery of SAV is no longer hampered by foot traffic in the spring runs. Based on these factors, plus recently declining flows in the Lower Santa Fe River, the Gilchrist Blue and Naked spring-run streams are considered in fair to good condition.

There are two highly invasive non-native SAV species that are found throughout the Santa Fe River, Gilchrist Blue Springs, and their spring-run streams, namely hydrilla (*Hydrilla verticillata*) and Indian swampweed (*Hygrophila polysperma*). Hydrilla is common in the main spring, but both are found all throughout the system. FWC has long had an herbicide program to control hydrilla in the Santa Fe River.

Since many factors affecting the spring-run stream originate outside the park within the Gilchrist Blue springshed, management considerations must necessarily extend beyond the park boundary. Within the 420 square mile region of the Gilchrist Blue springshed and especially within the DEP BMAP and PFA regions, DRP priorities should be focused on protection of groundwater sources, surface and groundwater quality and factors important to spring discharge, including maintenance of historic spring flows at the parks springs. DRP will also continue to work with appropriate state and federal agency stakeholders such as the DEP, the SRWMD, the Florida Forest Service (FFS), and the U.S. Fish and Wildlife Service in seeking ways to restore the ecological health of the park's spring ecosystems. DRP staff will continue to coordinate with the appropriate water experts and numerous research projects associated with the river and its springshed.

In order to protect the ecological health of spring ecosystems, DRP's priority management efforts within the park will include protection of surface water quality of park waterbodies, protection, restoration and monitoring the park's spring-run stream communities, and implementation of a responsible operational plan for recreational use of Gilchrist Blue Spring.

DRP staff will monitor and mitigate any stormwater runoff or other contamination threats that might occur within surface waterbodies of the park and especially associated with developed areas adjacent to springs or other sensitive karst features. DRP will upgrade the park septic systems to the highest level feasible and use advanced treatment technologies.

Considering the poor ecosystem health that has resulted from a near collapse of SAV at Gilchrist Blue and Naked springs, DRP will develop and implement a restoration plan aimed to protect these two springs from additional harm as described above in "Objective C" under the *Hydrology* section. Integral to this restoration plan is the protection and monitoring of existing native SAV at Gilchrist Blue Springs State Park and potentially implementing an experimental re-establishment program to enhance the growth of aquatic plant beds in the park.

To quantify significant ecosystem changes at Gilchrist Blue and Naked springs, monitoring will consist of two separate annual assessments, including a complete SAV characterization along a known transect, and spatial mapping of major aquatic plant beds and diversity, as well as a continuous visual assessment of SAV and water clarity.

DRP staff will coordinate with ACEPD/KES to continue supporting their ongoing SAV monitoring transects that were initiated in 2017. Submerged aquatic vegetation transect work is generally conducted in the spring. DRP will work collaboratively with these researchers during their monitoring efforts.

In conjunction with SAV transects described above, DRP biological staff will conduct an annual SAV mapping and monitoring assessment of Gilchrist Blue and Naked springs using visual, photographic and video elements to document the spatial extent of all major aquatic plant beds within these two spring ecosystems. The mapping surveys will occur approximately six months after the transect surveys.

Additionally, park staff will continuously document and track notable changes in aquatic plant beds at these two spring systems. Staff will note significant increases in sedimentation, loss of native SAV, increases of non-native SAV and sustained increases in surface water column turbidity. Similarly, staff will also continuously document and track brownouts and water clarity at select karst features in the park to identify significant changes that might be occurring in these natural communities, especially at Gilchrist and Naked springs. Details concerning Santa Fe River flooding and spring brownouts are found in the *Hydrology* section of this plan.

DRP will also continue cooperation with ongoing turtle researchers to further understand any potentially significant herbivory events within the system. Monitoring of the spring-run stream for impacts from invasive plant and animals is always necessary. DRP will develop a plan to remove hydrilla to keep the infestation at maintenance levels.

Efforts to educate visitors that recreate in Gilchrist Blue Spring should focus on best management practices to protect the spring bottom from erosion and reducing damage to aquatic plant beds. The impacts from visitor foot traffic that occurs on the spring bottom within both the headspring and spring-run stream are because of the naturally shallow conditions of Gilchrist and Naked springs. Sediments that are disrupted from the spring bottom in shallow areas result in increased surface water column turbidity and reduced sunlight to SAV downstream from the original point of disturbance. Turbidity is a direct water quality issue that can negatively influence natural growth rates of SAV in spring ecosystems.

Sedimentation from erosion that originates on the upslope terraces and shoreline around Gilchrist Blue and Naked springs can also influence the water quality of the spring ecosystem. DRP will use best management practices to prevent additional erosion on the slopes around the springs. A project to restore the natural shoreline contours and vegetation in and around Gilchrist and Naked spring, while establishing sustainable recreational access into the Gilchrist Blue headspring, was in the final design stages as of late 2022. This restoration will include stabilizing the natural upslope terraces and shoreline at both springs after removal of the failing bulkhead structure.

<u>Subterranean Cave – Aquatic</u>
Aquatic caves are associated with all springs within the park to some extent and lie beneath much of the park. At this time, there are only a few aquatic caves that have been mapped in the park, and most of these are associated with the adjacent Devil's Ear Spring system to the west. The conduit systems associated with the Gilchrist Blue Springs caves are likely to be very extensive and may have a significant connection to the Devil's Ear caves.

The Gilchrist Blue Springs aquatic cave system appears to be in good condition, from the paucity of cave research that is available. Much of the information available to DRP biologists about the condition of these caves is derived from communications with volunteer cave divers. The National Speleological Society Cave Diving Section is an active volunteer group at the park and is a consistent source of data, but as of 2022, a formal assessment of the overall health of the Gilchrist Blue cave system had not taken place. Extensive mapping of the adjacent Ginnie Springs cave system to the west of Gilchrist Blue Spring has occurred. The springshed boundary between Ginnie and Gilchrist Blue springs is currently unknown, but portions of the Ginnie cave conduits may overlap underground beneath the park.

DRP will continue to coordinate and cooperate with the cave diving community on research projects associated with the river, Gilchrist Blue Spring, and its springshed. Periodic monitoring of the aquatic caves by cave divers will allow park staff to track changes in the caves and assess impacts to the Gilchrist Blue headspring. Research dives in the cave system will provide DRP staff with detailed information about cave conditions.

It is very important that district and park staff begin to understand the upstream conduit connections for the Gilchrist Blue springshed, specifically the conduit system that is connected to the Devil's Ear cave system that divers are currently exploring. Dye trace work in the Gilchrist Blue springshed is lacking, and any research that expands our understanding of the connections between the Ginnie and Gilchrist Blue springsheds could fill a large gap in our knowledge of groundwater movement in this region, especially outside the park boundary.

To prevent silting in of the aquatic caves, staff will have to carefully monitor the erosion of slopes above the spring run and correct problems as they arise. A significant amount of planning will be necessary in order for the park to control visitor access more effectively and restore the shoreline area of this spring.

Abandoned Field/Abandoned Pasture

Portions of zones GBS-4, GBS-5, and GBS-6 were converted to improved pastures prior to 1937. These areas were subsequently planted with pines at least once, with the last pines being harvested in 2008-09. Bahiagrass (*Paspalum notatum*) still occurs onsite, and most of the groundcover is made up of weedy species. Like the adjacent sandhills in the same zones, there was no pine regeneration or planting after the last harvest. These former pasture/plantation areas will be treated with prescribed fire along with the adjacent sandhills and will be planted with longleaf pines. Control of off-site hardwoods may also be necessary. These areas may need selective herbiciding of the remnant pasture grasses and may require seeding with native groundcover species to aid restoration of the sandhill natural community.

Borrow Area

There are several borrow areas scattered across the park, primarily in zone GBS-1e. The largest is a shallow borrow area along the service road west of the shop. At least two smaller borrow areas are located immediately adjacent to the power line. These borrows were likely used as a source of fill onsite prior to state ownership. There are no current plans to fill in borrow areas, but the goal would be to restore these areas back to the appropriate historic natural community.

Developed

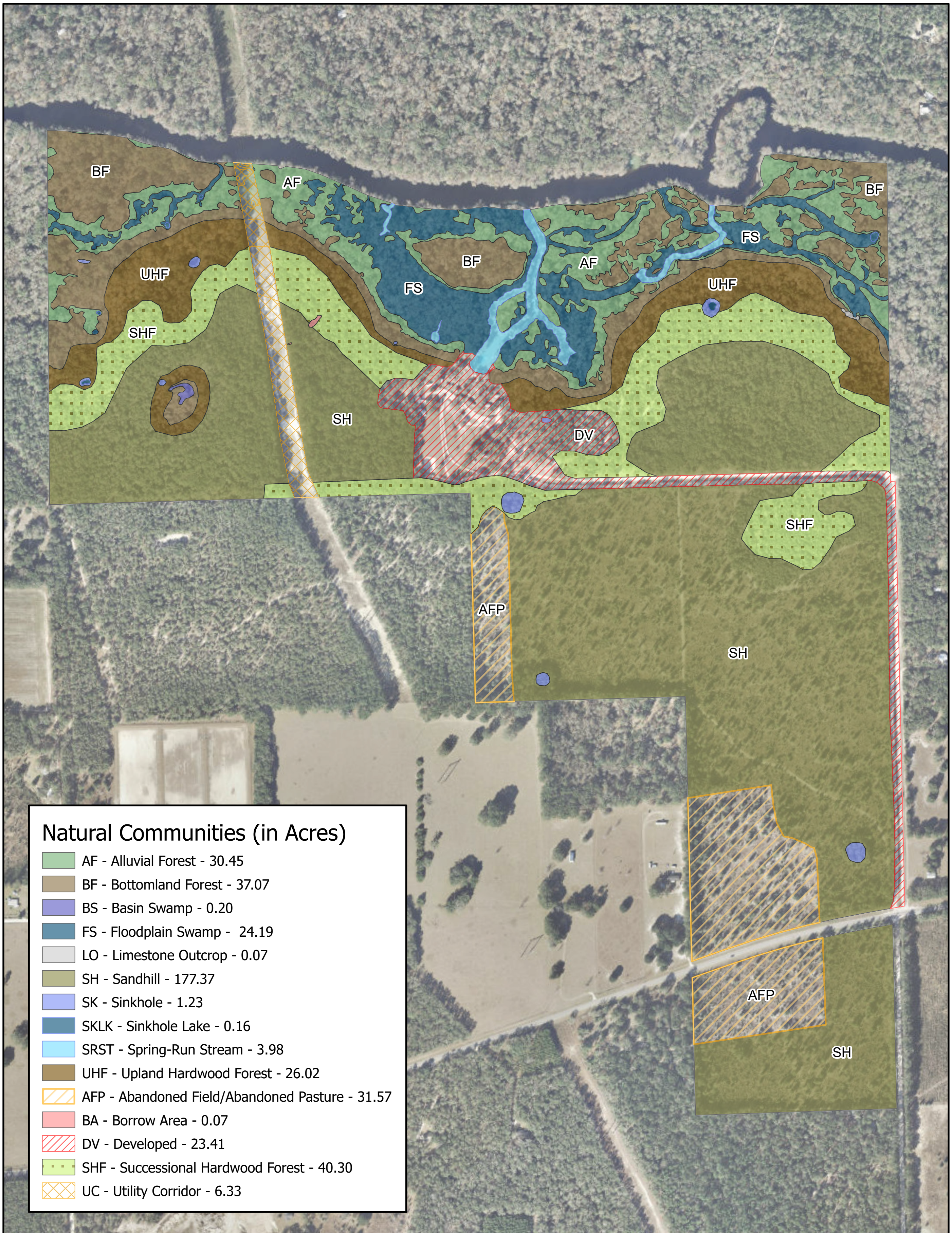
The developed area of the park is associated with the main spring. The day-use area is centered around the main spring. Development consists of a toll booth, parking area, picnic pavilions and bathrooms. To the east of the main spring are campsites and to the west are the shop and concession facilities.

Utility Corridor

A significant electric utility line corridor bisects the northwest portion of the park and is maintained by Duke Energy. The lines run roughly north-south across the park and pass over the Santa Fe River. Removal of the tree canopy occurred in the early 1960s, and these areas are kept open by routine maintenance. Should these utility corridors ever be abandoned, the desired future conditions would include sandhill, upland hardwood forest and floodplain natural communities. General management measures include control of priority invasive plant species and prescribed fire in the former sandhill. The park will coordinate with Duke Energy to try to minimize the impacts of the utility corridors on adjacent natural communities and on the aesthetics of the park.

Successional Hardwood Forest

The successional hardwood forests occur along the ecotone between the upland hardwood forest and sandhill community. Due to fire exclusion in the sandhills, laurel oaks and other off-site hardwoods moved into the sandhills from the adjacent upland hardwood forests. In addition, the sand live oaks in the sandhills expanded and created closed canopy areas due to lack of fires. Areas closest to the main spring were also heavily impacted by informal campsites that were established along with a network of trails and unimproved roads. Scattered adult longleaf pines still persist in these areas. Native groundcover species are present in some areas and will likely become more prevalent as the prescribed fire program proceeds. The desired future condition for the successional hardwood forest is sandhill.




RUTH B. KIRBY GILCHRIST BLUE STATE PARK
Natural Communities - Existing Conditions

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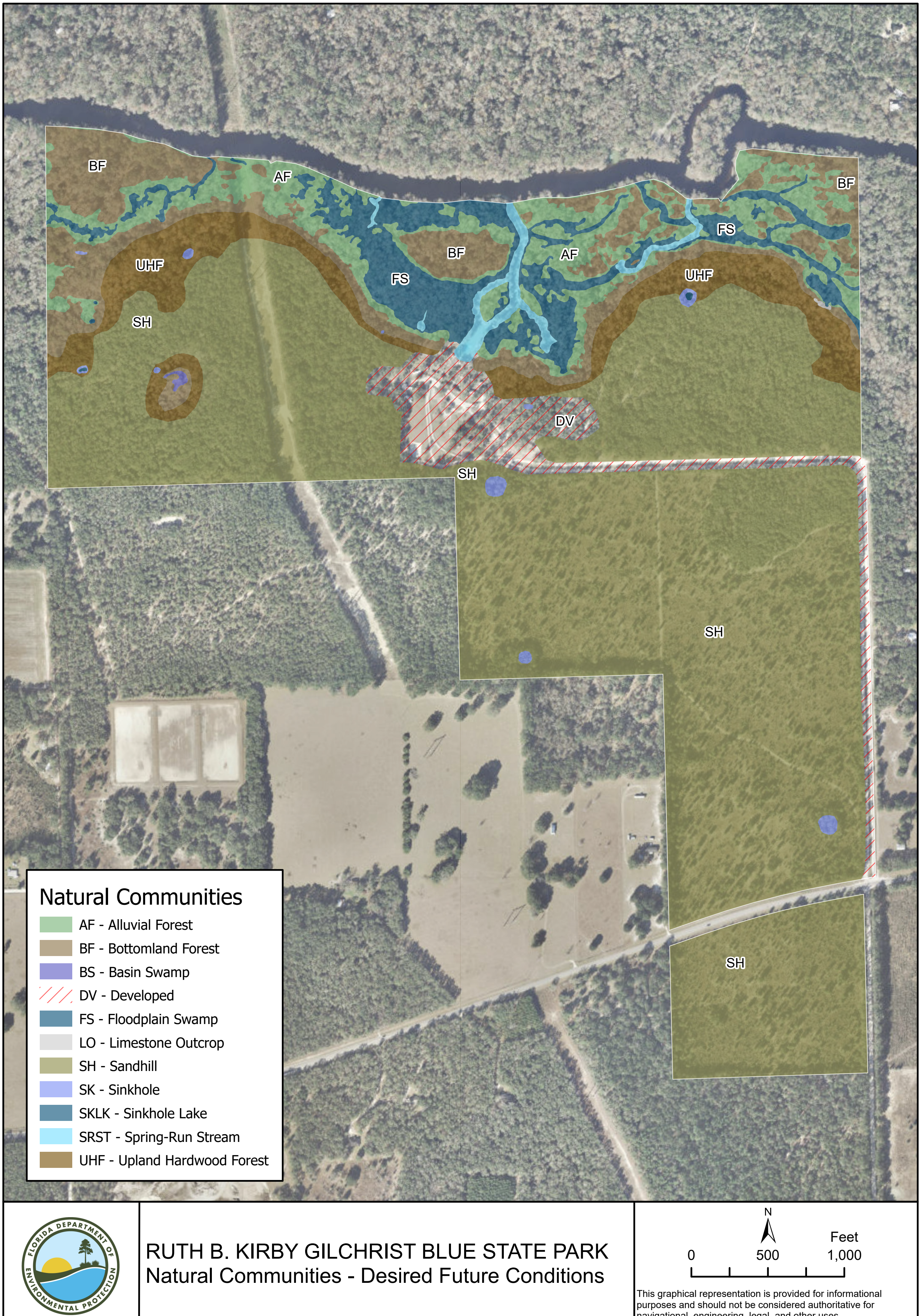
This graphical representation is provided for informational purposes and should not be considered authoritative for navigational, engineering, legal, and other uses.




RUTH B. KIRBY GILCHRIST BLUE STATE PARK
Natural Communities - Desired Future Conditions

Restoration efforts will require removal of the off-site hardwoods through chemical or mechanical treatment. It may also be necessary to do supplemental plantings with native groundcover species and longleaf pines.

***Objective A*:** Complete a comprehensive floral and faunal survey and create/update the park's baseline plant and animal list.

- Action 1 - Complete a comprehensive survey.
- Action 2 - Create a baseline plant and animal list.

Initial plant and animal surveys were conducted in late 2017 after acquisition of the park by the state of Florida. Additional surveys will be required to develop a more comprehensive species list. Surveys in other seasons of the year will allow detection of migratory animal species and will facilitate identification of plant species during growing and flowering seasons.

***Objective B*:** Within 10 years, have 250 acres of the park maintained within the optimum fire return interval.

- Action 1 - Develop/update annual prescribed fire plan.
- Action 2 - Manage fire-dependent communities by annually treating 85-235 acres with prescribed fire.
- Action 3 - Create 1.4 miles of perimeter firebreaks.

The Prescribed Fire Management Table contains a list of all fire-dependent natural communities found within the park, their associated acreage and optimal fire return interval, and the annual average target acreage to be burned.

| **Prescribed Fire Management** | | |
|---|---|---|
| **Natural Community** | **Acres** | **Optimal Fire Return Interval (Years)** |
| Sandhill | 177 | 1-3 |
| Abandoned Field/Abandoned Pasture | 32 | 1-3 |
| Successional Hardwood Forest | 40 | 2-3 |
| Utility Corridor | 6 | 1-3 |
| | | |
| Annual Target Acreage | 85-235 | |

Most of the park is either current or former sandhills. The sandhills to the south of the entrance road retain scattered native groundcover species despite having slash pines planted and harvested. Only a few longleaf pines remain in zones GBS-4, GBS-5 and GBS-6, but enough native grasses and herbaceous species persist to carry fire. Off-site hardwoods are scattered across these zones, but the pine harvesting in 2008-09 has left the site relatively open. Zones GBS-1e, GBS-1w and GBS-3 north of the entrance road retain scattered, adult longleaf pines with patches of native groundcover, including wiregrass. However, these zones are heavily invaded by off-site hardwoods, making prescribed fire more difficult.

Initial on-site prescribed fires should concentrate on the southern zones as completely as possible to reduce hardwoods and stimulate groundcover species in preparation for replanting with longleaf pines. Initial fires in the northern zones should concentrate on burning existing groundcover patches and introducing low-intensity fires in the vicinity of the adult longleaf to gradually reduce accumulated duff layers. The annual prescribed fire goal for the park is 85 to 235 acres per year.

Although much of the park boundary is protected by a perimeter road that can be used as a firebreak, approximately 1.4 miles of the park boundary will need a perimeter road/firebreak installed. Approximately 40 acres of former sandhill is classified as successional hardwood forest. Removal of off-site hardwoods may be necessary in this area, as well as some of the sandhills, to help promote better penetration of prescribed fires.

The sandhills at Gilchrist Blue Springs State Park still support a population of gopher tortoises and may also support burrow commensals. Frequent prescribed fire in the sandhills will be essential to sustain and increase the gopher tortoise population.

***Objective C*:** Conduct natural community/habitat improvement activities on 276 acres of sandhill natural community.

- Action 1 - Mechanically and/or chemically treat off-site hardwoods in the 32-acre abandoned field in zones GBS-4, GBS-5 and GBS-6. Hardwood removals may also be conducted in the sandhill portions of these zones.
- Action 2 - Plant longleaf pine in zones GBS-4, GBS-5 and GBS-6 on 148 acres of sandhill and abandoned pasture after hardwood removal and prescribed fire.
- Action 3 - Chemically treat 96 acres of selected hardwoods adjacent to existing longleaf pines in zones GBS-1w, GBS-1e and GBS-3.
- Action 4 - Determine the need for treatment of invasive pasture grasses and native groundcover seeding in addition to longleaf pine planting.
- Action 5 - Promote native groundcover improvement as needed.

The park has areas of sandhill that were recently logged but contain some native groundcover. These areas are lacking fire and longleaf pines. Adjacent to this and within the same management zones are smaller areas with off-site hardwoods and some invasive pasture grasses mixed with native ground cover. All these areas are lacking longleaf pines. Some areas may need treatment of invasive pasture grasses as well as off-site hardwoods.

Approximately 32 acres of off-site hardwoods in zones GBS-4, GBS-5 and GBS-6 need mechanical and/or chemical treatment. Because of the presence of invasive pasture grasses in parts of zones GBS-4, GBS-5 and GBS-6 (percentage cover ranges from 5% to 50%), these areas may need additional treatment of the invasive grasses and supplemental planting of native sandhill groundcover. Post-mechanical and chemical treatment and fire, all of these acres should be planted with longleaf pine at the rate of 400-500 trees per acre.

The sandhill and successional hardwood forest in zones GBS-1w, GBS-1e and GBS- 3 retain mature longleaf pines embedded in a matrix of excessively high-density mature sand live oaks and laurel oaks. This is due to the absence of fire over many years. To stimulate the native groundcover and improve the effects of prescribed fire, numerous hardwoods including sand live oaks and laurel oaks adjacent to remnant longleaf pines will be identified for removal.

After zones have undergone hardwood treatment and prescribed fire, zones will be evaluated for the presence of native groundcover and invasive grasses. Subsequent improvement needs will follow the post treatment and fire evaluations.

## IMPERILED SPECIES

Initial plant and animal surveys of the park have detected several imperiled species. Additional surveys will be needed to document additional imperiled species within the park. The only imperiled plant species detected so far is the rainlily (*Zephyranthes atamasca*), which occurs in the floodplain areas of the park and along the spring-run streams. Potential threats to this species include damage by feral hogs and recreational foot traffic.

Imperiled reptiles within the park include the gopher tortoise, American alligator and Suwannee alligator snapping turtle. Any future gopher tortoise surveys should utilize the Line Transect Distance Sampling technique recommended by FWC (Smith et al. 2009). The aquatic turtles at Gilchrist Blue Springs State Park have been monitored as part of a long-term population study by Dr. Gerald Johnston and researchers from Santa Fe College and other institutions (Johnston et al. 2016, Johnston et al. 2018). The Suwannee alligator snapping turtle is one focus of these ongoing studies. Staff will continue to facilitate research within the park to monitor trends in turtle populations.

Federally listed wood storks and West Indian manatees have also been observed within the park. Staff will monitor the spring runs for the presence of manatees and will ensure that recreational activities do not disturb manatees within the park. This is particularly important during colder weather when manatees may be seeking warm water refugia.

Table 4 contains a list of all known imperiled species within the park and identifies their status as defined by various authorities. It also identifies the types of management actions that are currently being taken by DRP staff or others and identifies the current level of monitoring effort. The codes used under the column headings for management actions and monitoring level are defined below the table. Explanations for federal and state status as well as FNAI global and state rank are provided in the Appendix.

**Imperiled Species Inventory**

| **Common and *Scientific Name*** | **Imperiled Species Status** | | | | **Management Actions** | **Monitoring Level** |
|---|---|---|---|---|---|---|
| | **FWC** | **USFWS** | **FDACS** | **FNAI** | | |
| **PLANTS** | | | | | | |
| Rainlily *Zephyranthes atamasca* | | | LT | | 4,10 | Tier 1 |
| **REPTILES** | | | | | | |

| Imperiled Species Inventory | | | | | | |
|---|---|---|---|---|---|---|
| **Common and *Scientific Name*** | **Imperiled Species Status** | | | | **Management Actions** | **Monitoring Level** |
| | **FWC** | **USFWS** | **FDACS** | **FNAI** | | |
| American alligator *Alligator mississippiensis* | FT (S/A) | SAT | | G5, S4 | 10 | Tier 1 |
| Gopher tortoise *Gopherus polyphemus* | ST | | | G3, S3 | 1,6,7,10,13 | Tier 2 |
| Suwannee alligator snapping turtle *Macrochelys suwanniensis* | ST | PT | | G2, S2 | 4,10 | Tier 2 |
| **BIRDS** | | | | | | |
| Swallow-tailed Kite *Elanoides forficatus* | | | | G5, S2 | | Tier 2 |
| Wood stork *Mycteria americana* | FT | LT | | G4, S2 | 4 | Tier 2 |
| **MAMMALS** | | | | | | |
| West Indian manatee *Trichechus manatus* | FT | LT | | G2G3T2, S2S3 | 4,10 | 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:*** Develop baseline imperiled species occurrence inventory lists for plants and animals.

- Action 1 - Develop baseline imperiled species occurrence inventory lists for plants and animals.

Initial surveys at the park have detected several imperiled species, but additional surveys are needed to establish an accurate list of imperiled species.

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

- Action 1 - Develop monitoring protocols for one selected imperiled animal species, the West Indian manatee.
- Action 2 - Implement monitoring protocols for four imperiled animal species, including those listed in Action 1 above and the Suwannee alligator snapping turtle, the gopher tortoise and imperiled bird species.

DRP staff will develop a monitoring/reporting system to track the use of the spring runs by West Indian manatees. This information will be shared with appropriate FWC, SRWMD and U.S. Fish and Wildlife Service (USFWS) staff as needed. Staff will also continue to work with the researchers from Santa Fe College and the North American Freshwater Turtle Research Group to facilitate the long-term monitoring of the turtle populations at Gilchrist Blue Springs State Park and other state parks along the Santa Fe River. In December 2017, Gilchrist Blue Springs State Park was included for the first time in the Ichetucknee/Santa Fe/O'Leno Christmas Bird Count. This annual count will be used to monitor all avian species in the park, including any imperiled species.

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

- Action 1 - Implement monitoring protocols for one imperiled plant species, the Rain Lily.

The rain lily, the only imperiled plant species detected so far within the park, is relatively common. As the imperiled plant list is expanded through additional survey work, additional monitoring may be necessary for specific species.

## INVASIVE SPECIES

Surveys for invasive plants have been conducted at the park. District biological staff conducted brief initial surveys in late 2017 over several visits and observed a few localized, non-native plant species. From these brief surveys, as well as other records from subsequent surveys, four Florida Invasive Species Council (FISC) Category I species were discovered, including mimosa (*Albizia julibrissin*), Chinese tallow (*Triadica sebifera*), hydrilla (*Hydrilla verticillata*) and Indian swampweed (*Hygrophila polysperma*).

Hydrilla and Indian swampweed are present in the park's springs and spring-run streams. Photos of the spring and spring-run from as late as March 2017 indicate that significant portions of the upper third of the stream were dominated by hydrilla. Impacts of Hurricane Irma in 2017 completely browned out the entire spring and may have caused a temporary die-off of hydrilla.

Two other non-native invasive plants not on an FISC list but found in the park include pitted beardstem (*Bothriochloa pertusa*) and centipede grass (*Eremochloa ophiuroides*). These two species are of concern because they may present an unexpected challenge for future groundcover restoration within the sandhill community. The non-native pasture grass Bahiagrass is also present. It is of less concern during restoration, but it should be treated in areas outside of the day-use area of the park.

### Plant and Animal Disease and Nuisance Insects

If symptoms of disease in native plant or animal populations are observed and appear to be spreading in any park, DRP will consult with FFS or FWC, as appropriate, to determine an appropriate and timely management response.

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. It was first detected in Gilchrist County in 2012. The beetle (and laurel wilt) has now spread throughout most of Florida and into many neighboring states.

It is not currently known if laurel wilt is present in the park, although in neighboring parks most adult red bay trees have been top-killed by this beetle-transmitted disease. Fortunately, red bay trees can re-grow from their root systems. It may be that members of the Lauraceae family will continue to survive in shrub form as the remnant tree root systems continue to grow. At this point, much remains unknown about the long-term impacts of this disease on red bays and other Lauraceae. Since visitors hauling firewood can transport the ambrosia beetle, park staff should restrict the movement of firewood into and out of the park and educate visitors about the issue.

Mosquito control occurs in some state parks. All DRP lands are designated as “environmentally sensitive and biologically highly productive” in accordance with Section 388.4111, Florida Statutes. If a local mosquito control district proposes treatment, DRP works with that district to adopt a mutually agreeable plan. DEP policy is for treatment plans to not include aerial adulticiding but typically allow larviciding. DRP policy also allows park managers to request typical truck spraying (adulticide fogging) in public use areas even in the absence of a treatment plan. DRP does not authorize new physical alterations of marshes through ditching or water control structures. Mosquito control plans temporarily may be set aside under declared threats to public or animal health, or during a Governor’s Emergency Proclamation.

There has been no arthropod management plan developed for Gilchrist Blue Springs State Park.

| Species Name<br>Scientific Name - Common Name | FLEPPC Category | Distribution | Zone ID |
|---|---|---|---|
| *Albizia julibrissin* - Mimosa | I | Single Plant or Clump | GBS-5 |
| *Eichhornia crassipes* - Water-hyacinth | I | Single Plant or Clump | GBS-2 |
| *Pistia stratiotes* - Water-lettuce | I | Single Plant or Clump | GBS-2 |
| *Sapium sebiferum* - Chinese tallow tree | I | Scattered Plants or Clumps | GBS-3 |

***Objective A*:** Annually treat all 0.005 infested acres of invasive plant species in the park which are currently distributed over 57 gross acres.

- Action 1 - Annually develop/update invasive plant management work plan.
- Action 2 - Implement annual work plan by treating all upland acres in the park and continuing maintenance and follow-up treatments as needed.
- Action 3 - Develop a specific plan to monitor, track and eradicate non-native SAV (especially hydrilla and Indian swampweed) from the park's spring systems.

Based on surveys, it appears that the number of infested acres is very low, with the possible exception of the spring-run area. While it is known that hydrilla and Indian swampweed are present in the spring run, their abundance varies dramatically in response to brownouts during floods and due to herbivory pressures. These species are mapped annually along with the native SAV beds in the main spring-run and in Naked Spring.

To protect the park from further spread of centipede grass and pitted beardstem, the park should develop a mowing and fire line protocol that includes recognition of these species, control of known populations, and an equipment decontamination protocol that avoids spreading the species via mowers and during fire line construction and maintenance.

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

- Action 1 - Control feral hogs on an as-needed basis.

Feral hogs (*Sus scrofa*) are present in the park but not in large numbers. DRP staff will continue to monitor for evidence of feral hog damage and implement control measures as needed.

## CULTURAL RESOURCES

### Prehistoric and Historic Archaeological Sites

The park has seven known archaeological sites. Two sites, GI20 and GI21, were originally recorded in 1966 and artifacts are stored in the Simpson Collection at the Florida Museum of Natural History. The remaining five sites were identified during a cultural resource survey in 2021 (LG2 Environmental Solutions, Inc., 2021).

Originally, 8GI20 was plotted as a General Vicinity (GV) site, meaning its exact location was unknown and was recorded from a vague, verbal description. James Dunbar updated the Florida Master Site File (FMSF) for 8GI20 in 1993 indicating the site had an underwater Paleoindian period component in the Santa Fe River. The site is not specifically mentioned in the underwater survey of the Santa Fe River (Smith et al 1997). The river bottom up and down stream of Rum Island was inspected (Smith et al 1997: 51-53) but artifacts were sparse. This was apparently the basis for the 1997 FMSF update. The 2021 survey provided little additional information.

8GI21 is described as concentrated in and around the springhead, in the spring run and along both sides of the spring run down to the Santa Fe River. The spatial extents of 8GI20 and 8GI21 have been established with archaeological testing in 2021. Artifacts from these sites are included in the Simpson collection housed at the Florida Museum of Natural History. The Bureau of Natural and Cultural Resources (BNCR) has archived digital images of these artifacts.

The park had a complete archaeological survey in 2021. The primary threats to the sites are human foot traffic and potential disturbance during the development of park facilities.

### Historic Structures and Collections

The park does not contain any historic structures. The park does not currently maintain a collection of archival material, historic objects, natural history objects or archaeological objects. An archaeological collection reported to be from 8GI20 and 8GI21 is maintained at the Florida Museum of Natural History in Gainesville. A preliminary review of this collection by BNCR staff indicates the sites are associated with the Middle Archaic Period (7000-4000 B.P.) and Deptford Period (500 B.C.-200 A.D). A Paleoindian (circa 12,000-9500 B.P.) projectile point was recorded in the FMSF record for 8GI20, which indicates that site may date to that time as well.

| Cultural Sites Listed in the Florida Master Site File | | | | | |
|---|---|---|---|---|---|
| **Site Name and FMSF #** | **Cultural/Temporal Period** | **Resource Type** | **Significance** | **Condition** | **Treatment** |
| GI20<br>Between Blue and Lily Springs | Prehistoric | Archaeological Site | NE | F | P |
| GI21<br>Blue Spring | Alachua, Archaic, Deptford, Orandge, Prehistoric & 20th Century | Archaeological Site | NE | F | P |
| GI00285<br>NN | Alachua A.D., 1250-A.D. 1600 | Archaeological Site | NS | NE | P |

| Cultural Sites Listed in the Florida Master Site File | | | | | |
|---|---|---|---|---|---|
| **Site Name and FMSF #** | **Cultural/Temporal Period** | **Resource Type** | **Significance** | **Condition** | **Treatment** |
| GI00286<br>NN | Archaic, Prehistoric | Archaeological Site | NS | NE | P |
| GI00287<br>NN | Alachua | Archaeological Site | II | NE | P |
| GI00288<br>NN | Prehistoric | Archaeological Site | NS | NE | P |
| GI00289<br>NN | Prehistoric | Archaeological Site | NS | NE | P |

***Objective A*****:** Assess and evaluate the physical condition of all cultural sites in the park.

- Action 1 - Complete DRP condition assessment of sites.

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

- Action 1 - Ensure all known archaeological sites have been recorded with the FMSF. Any new sites discovered will be recorded with the FMSF.
- Action 2 - Consult with the Division of Historical Resources (DHR) Compliance Review in advance of any ground disturbance.
- Action 3 - Develop a protocol to address archaeological artifacts found in the park and report any finds according to DRP procedures.
- Action 4 - Develop and adopt a Scope of Collections Statement that indicates the park will not maintain a collection.
- Action 5 - Conduct oral history interviews with the park's previous owners.

Gilchrist Blue Springs State Park is a new park that has recently entered public ownership. Its recent archaeological survey expanded the number of archaeological sites at the park. Consultation with DHR Compliance Review must be conducted well in advance if ground disturbance is anticipated. More research is needed on the pre-Columbian history of the park and its relation to the cultures along the Santa Fe River.

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

- Action 1 - Develop a protection and treatment plan for site GI21.

At this time, it is unknown what, if any, management measures are needed. This will be determined as part of a condition assessment.

# LAND USE COMPONENT

## VISITATION

Before becoming a state park, Ruth B. Kirby Gilchrist Blue Springs State Park was under private ownership for many years and was a very popular area among locals for its second-magnitude spring and warm waters. In 2017, the property was donated to the state to continue protection of the park's natural resources including the spring, spring run and aquatic vegetation. In addition to utilizing the spring, popular recreational activities include hiking, camping and snorkeling.

**Trends**

The park's busy season is typically in the summer due to the popularity of the spring. Visitation usually decreases in the colder winter months.

## EXISTING FACILITIES AND INFRASTRUCTURE

Most of the existing recreational activities were established when the park was under private ownership. Paddling, picnicking, camping, hiking, swimming and snorkeling are all appropriate resource-based recreation activities common to Florida State Parks and compatible to the resources of Gilchrist Blue Springs State Park. Park staff will focus on improving the quality of these recreational experiences through redevelopment of current park amenities and popular use areas, as well as the careful monitoring and mitigation of recreational impacts.

| *Park Entrance* | |
|---|---|
| Toll Booth | 1 |
| *Main Day Use Area* | |
| Picnic Pavilions | 5 |
| Bathhouse | 1 |
| Storage Building | 1 |
| Concession Building | 1 |
| *Camping Area* | |
| RV sites | 16 |
| Tent Sites | 8 |
| Campground Host Sites | 2 |
| *Park Trail Network* | |
| Hiking Trails (4 mi) | |
| *Support Area* | |
| Shop Building | 1 |
| Residence | 2 |
| Storage Building | 5 |

## CONCEPTUAL LAND USE PLAN

### Detailed Conceptual Land Use Plan Objectives

Five use areas at Ruth B. Kirby Gilchrist 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.

**Park Entrance**
***Objective: Relocate Park entrance***
*Action Items:*
- *Develop new paved entrance road and ranger station.*

The park's current entrance is located next to a private residential development. On days with heavy traffic, the location and condition of the road can create dusty and noisy conditions. Traffic will also back up along County Road 340 and impact adjacent property owners. A new park entrance, ranger station and park drive will be developed off County Road 340. The current park entrance road (Northwest 80th Street) will be dedicated for use as a service road and may serve as a firebreak along the eastern boundary of the park to enhance fire management and restoration of the park's remnant sandhill. The new park entrance, ranger station and park drive will be developed in concert with sandhill restoration objectives and utilize existing disturbed areas. This will be particularly important during the development of the proposed park drive and the existing footprint of the current entrance road should be utilized to the greatest extent possible. A new temporary ranger station will be sited near the current flagpole and gate and will be incorporated into the redesign of the main day-use area.

**Main Day Use Area**
***Objective: Bring unit up to Florida State Park standards***
*Actions:*
- Redesign main day-use area.
- Relocate paddling launch.
- Create and implement parkwide interpretive plan.

Gilchrist Blue Springs was a private recreation site for many years. Many of the current facilities, while adequate, may need to be removed, renovated, or replaced. Changes to the park will be initiated to ensure long-term conservation of the park's natural resources and complete the transition from private facility to state park. All current facilities and recreational amenities are being evaluated for their compatibility with the park's resources, and their overall safety and accessibility. DRP has determined that a complete redesign of the current day-use area would provide greater protection of the main spring and spring run. Day-use facilities such as picnic shelters will move uphill and off the slopes of the main spring bowl. An immediate priority is the landscape restoration and slope stabilization needed to reduce soil sedimentation and erosion into Gilchrist Blue Spring. This restoration work will largely be designed for aesthetics but will be based on the site's natural ecology and utilize native plant material. Water bars and other slope stabilization techniques will be utilized. A goal of this restoration effort will be the removal of the wooden retaining wall around the main spring and the eventual restoration of the natural shoreline. Designated access routes to the main spring, bathhouse and paddling launch will be incorporated into the redesign to improve pedestrian circulation, universal accessibility, and minimize further erosion. Protective fencing and springs overlooks will be installed at Naked, Johnson and Little

Blue springs. The redesign will clearly define a paddling launch area and a convenient location for boat storage. The current canoe launching area is small and becomes crowded with paddlers and swimmers on busy days. The redesign will determine the best location for this new facility and will include the installation of a floating canoe and kayak launch to provide greater shoreline protection and accessibility. Gilchrist Blue Springs once had a wonderful boardwalk that provided excellent views of the spring run. Unfortunately, the boardwalk was destroyed by flooding associated with Hurricane Irma. A new boardwalk will be included as part of the proposed redesign. The new boardwalk will be carefully developed within the floodplain near the spring run and provide overlooks of the floodplain and spring-run stream. The terminus of the boardwalk will provide visitors an opportunity to experience the dramatic confluence of the main spring run and Santa Fe River and the excellent views of the Santa Fe River corridor. Another focus of the redesign will be to rearrange the existing parking area and the large open space at the top of the slope adjacent to the main headspring. This will include creating a new stabilized parking area, new picnic area and improved landscaping and stormwater retention. The placement of all new facilities will be carefully considered to avoid any additional impacts to the park outside of the existing disturbed area. The redesign will include the construction of a new concession, picnic pavilions and a bathhouse. The existing modular support buildings will be removed to open more area for picnicking and sunbathing and new support buildings constructed in an area just to the west of the current parking area.

**Camping Area**

***<u>Objective: Create new campground</u>***

*<u>Actions:</u>*

- Develop a 30-campsite loop.
- Add 10 tent only sites.
- Construct one new dump station and one bathhouse.

As a private attraction, the park had a large area dedicated to camping. The area available for campsites was reduced. However, at least 18 existing campsites were powered and still serve as the park's current campground along with an additional seven non-powered sites used primarily by tent campers. This temporary campground will remain until a new family campground is developed in the same vicinity. The future campground will consist of a traditional 30-site campground loop and an additional 10 tent-only sites. Tent-only sites will be walk-up sites served by centrally located parking and will have centrally located potable water and power that serves more than one site. The future campground will be served by a single dedicated campground bathhouse and a dump station.

**Park Trail Network**

***<u>Objective: Improve parkwide trails</u>***

*<u>Actions:</u>*

- Improve existing hiking trails.
- Develop and add new interpretive elements along trails.

An interpretive hiking trail has been preliminarily established at the edge of the floodplain just to the east of the existing day-use area. This trail will be further developed and include interpretation related to the interesting karst features and plant communities that can be identified in this portion of the park. Additional trails are planned for longer hikes and will allow visitors to experience the park's ecological diversity. These trails will be developed over time. All trails developed in the park will be designated for hiking only.

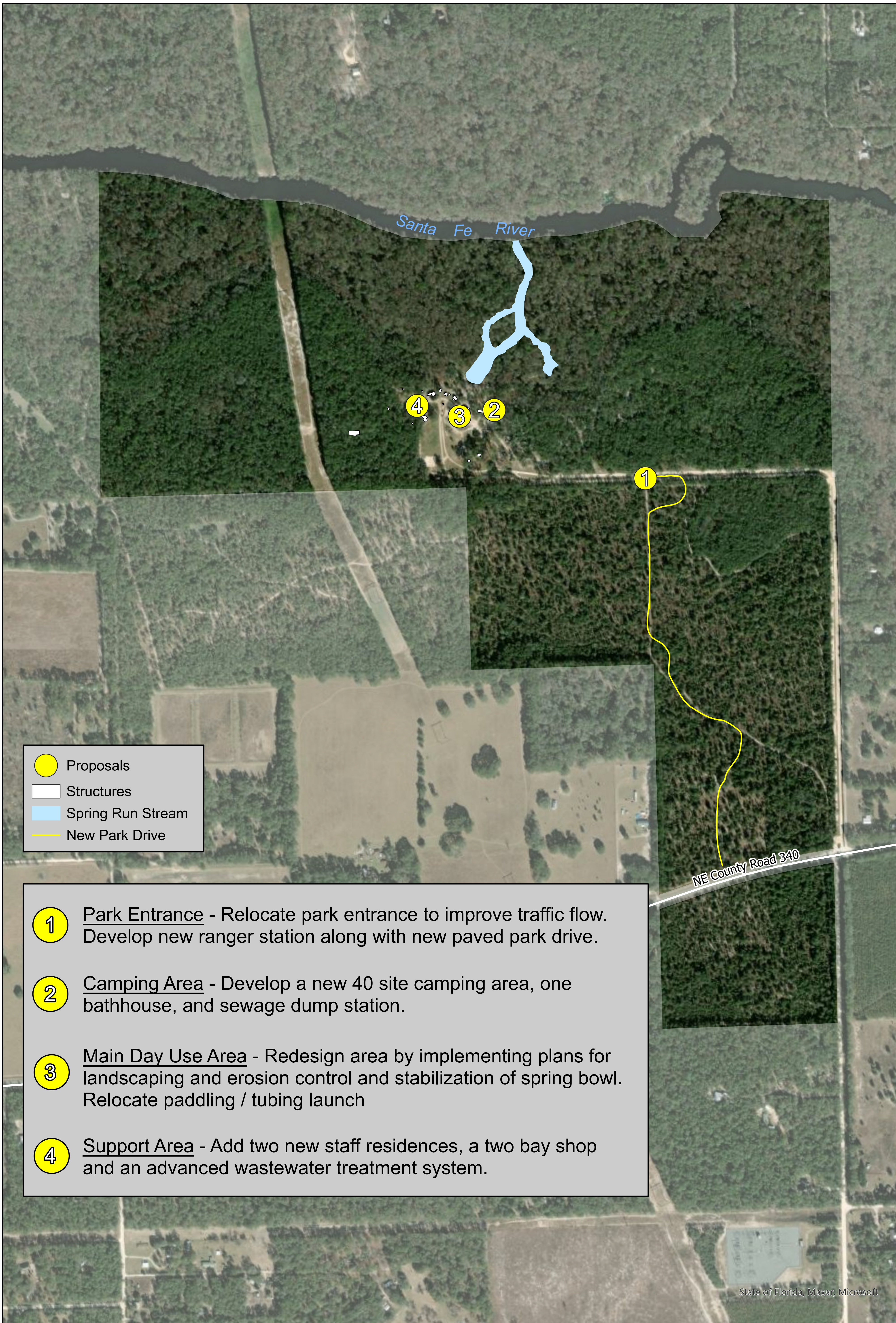
**Support Area**

***Objective: Relocate support area***

*Actions:*

- Add two new site-built residences.
- Add a two-bay shop.
- Add one equipment shelter.

Gilchrist Blue Springs State Park is a well-visited park that needs new support facilities. ark staff currently reside in mobile trailers. Site-built residences are needed. One new residence is currently funded and will soon be under construction, and a total of two staff residences, a two-bay shop and equipment shelter are planned. The existing support buildings and residences will be removed after construction. New support facilities will be placed in a wooded area to the west of the existing facilities as part of the redesign of the day-use area. All current septic facilities will be removed and replaced with Advanced Treatment Units as all park facilities are improved, constructed or replaced.




**Ruth B. Kirby Gilchrist Blue Springs State Park**

Conceptual Land Use Plan

## VISITOR USE MANAGEMENT

One use area at Ruth B. Kirby Gilchrist Blue Spring State Park is identified as having a specialized need for visitor management.

Since assuming management of the park, DRP has analyzed the current levels of visitation, the patterns of recreational use and the variety of recreational activities available. Resource impacts from recreational use at the park also were observed and documented. DRP has determined that most of the recreational activities at the park are sustainable. However, certain recreational activities will be discontinued or limited to certain areas. Changes to some recreational patterns have already occurred, including reducing the size of the camping areas that existed when the park was under private ownership and discontinuing swimming in Little Blue and Johnson springs. Achieving a balance between resource protection and public access is a particularly difficult task when considering long-term recreational use of Gilchrist Blue Spring and spring run. Regional demand for groundwater and nitrate pollution is affecting the quality of the park's namesake spring ecosystem. The effects of these impacts, such as an increase in the presence of harmful algal growth, can be amplified by recreational use. To conserve the spring and spring-run for the perpetual enjoyment of park visitors, two site-specific spring recreation zones are identified for Gilchrist Blue Spring and spring-run (See Spring Recreation Zones Map). Swimming, snorkeling and wading will be limited to the designated swimming area located within Gilchrist Blue Spring Zone A (headspring). Paddling will be the only activity permitted within zone B (spring run). Specific resource indicators, resource thresholds and management strategies designed to reduce or mitigate recreational impacts were identified for each zone and for all proposed recreational activities.

Resource Indicators and Thresholds

This plan includes site-specific indicators and thresholds selected to monitor resource conditions and the visitor experience. By monitoring conditions over time and clearly documenting when conditions become problematic, park staff can implement programs to prevent unacceptable resource conditions.

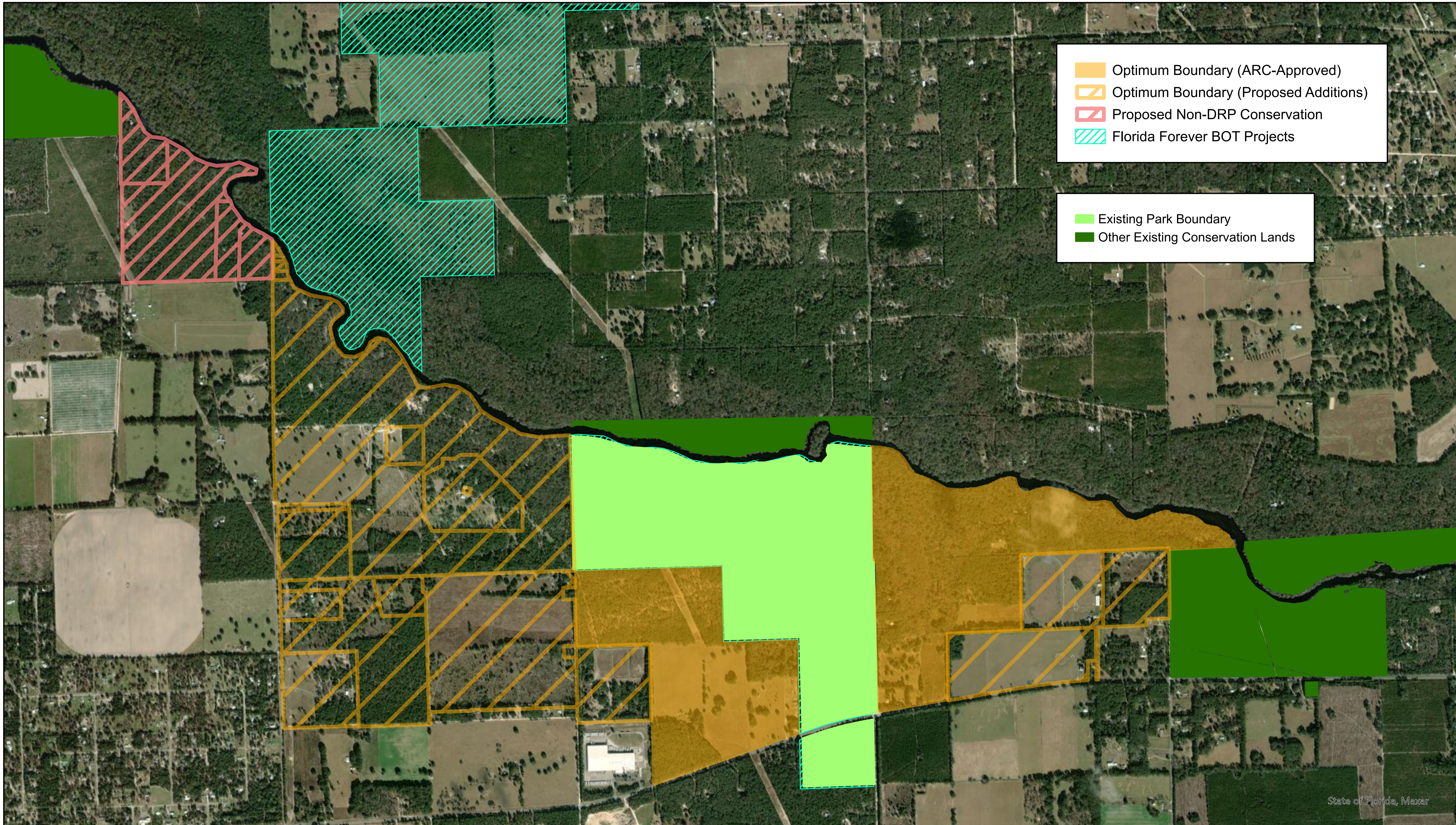
Many potential resource indicators were identified and evaluated, but those described in this section were considered the most significant given the vulnerability of the resource or visitor experience. The primary resource indicators (not in priority order) for Gilchrist Blue Springs State Park are associated with the following issues

- Sedimentation within the spring pool and spring-run stream and erosion of the slopes of the spring bowl.
- Trenching caused by human foot traffic within the spring pool and spring-run stream. Displacement, trampling and destruction of submerged aquatic vegetation caused by human foot traffic within the spring pool and spring-run stream.
- Decreased water clarity within the spring pool and spring-run stream because of recreational activity.
- Wildlife harassment in recreation areas.
- Vegetation and soil impacts within campsites and vegetated buffers.
- Erosion and impact to vegetation along trails.
- Excessive trash or pet waste accumulating along trails or in undeveloped areas.
- Damage to sensitive park resources.

## OPTIMUM BOUNDARY

Parcels that lie to the east of the park have been included to enhance protection of the Santa Fe River floodplain and two additional named springs, and to provide a greenway connection between Gilchrist Blue Springs State Park and Poe Springs County Park in Alachua County. The proposed non-DRP conservation lands to the east of the park would also further the greenway connection between Gilchrist Blue Springs State Park and Poe Springs County Park.

Additional parcels along the park's eastern boundary that are under single ownership have also been included. Digital elevation models indicated that the largest of these parcels contains an extensive area of floodplain and potential karst features. These parcels, as well as an additional property identified to the park's southwest, would buffer the park from potential future development and provide enhanced floodplain and springshed protection.




# Ruth B. Kirby Gilchrist Blue Springs State Park

Optimum Boundary