

Rainbow Springs State Park

Advisory Group Draft Unit Management Plan

**STATE OF FLORIDA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Division of Recreation and Parks
July 2021**





RAINBOW SPRINGS STATE PARK

Draft Unit Management Plan

Executive Summary

Purpose and Significance of the Park

Park History

Rainbow Springs State Park was initially acquired on October 20, 1990 with funds from the Conservation and Recreational Lands (CARL) program. The park is currently 1,694.41 acres.

Park Significance

Rainbow Springs State Park is significant as a unit of the state park system due to the Rainbow Springs, Florida's fourth largest first magnitude spring group consisting of at least 87 spring vents. Uplands in the park provide habitat for a variety of imperiled wildlife and plant species including gopher tortoises, indigo snakes, Florida mice, southern fox squirrels, Florida pine snakes, and gopher frogs. The park contains an abundance of archaeological sites, representing periods of Florida's history from Paleo-Indian through the discovery and mining of phosphate rock to the development of tourism during the early to mid-twentieth century.





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Park Interpretive Themes

Central Park Theme

A former roadside attraction, Rainbow Springs State Park's blooming azaleas and cascading waterfalls give way to the natural beauty of a first magnitude spring.

Primary Interpretive Themes

Habitats — The sandhills and diverse ecosystems surrounding the spring recharge the aquifer and river, which in turn nurtures a variety of terrestrial and aquatic wildlife.

Historic Use — The relics of the historic roadside attraction at Rainbow Springs remind us of how human actions in the past continue to affect our natural areas.

Recreational Opportunities — Responsible recreation on the Rainbow River is a safeguard for the water clarity and delicate vegetation of this ecological treasure.

Water Quality — The health of the Rainbow River relies on collaborative regional management efforts that prioritize nitrogen reduction and water conservation.





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Park Quick Facts

Natural Community Composition

- ♦ **Agency:** Department of Environmental Protection - Division of Recreation and Parks
- ♦ **Acreage :** 1,586.49
- ♦ **Location:** Marion County
- ♦ **Lease Management Agreement Number(s):** 3900
- ♦ **Use:** Single
- ♦ **Responsibility:** Public Outdoor Recreation and Conservation
- ♦ **Sublease:** None
- ♦ **Encumbrances:** See Appendix 1 for details
- ♦ **Public Involvement:** See Appendix 2 for details
- ♦ **Optimum Boundary:** Approximately 1,274 acres (See Optimum Boundary Page)

Natural Communities	Acreage	Percentage
Basin Swamp	35.13	2.21%
Depression Marsh	5.09	<1%
Altered Landcovers	704.86	44.36%
Floodplain Swamp	4.99	<1%
Hydric Hammock	141.63	8.91%
Mesic Flatwoods	145.45	9.15%
Scrubby Flatwoods	7.15	<1%
Sandhill	531.02	33.4%
Spring-Run Stream	13.64	<1%
Total Acreage	1,586.49	100%



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Park Accomplishments: 2002 — 2021

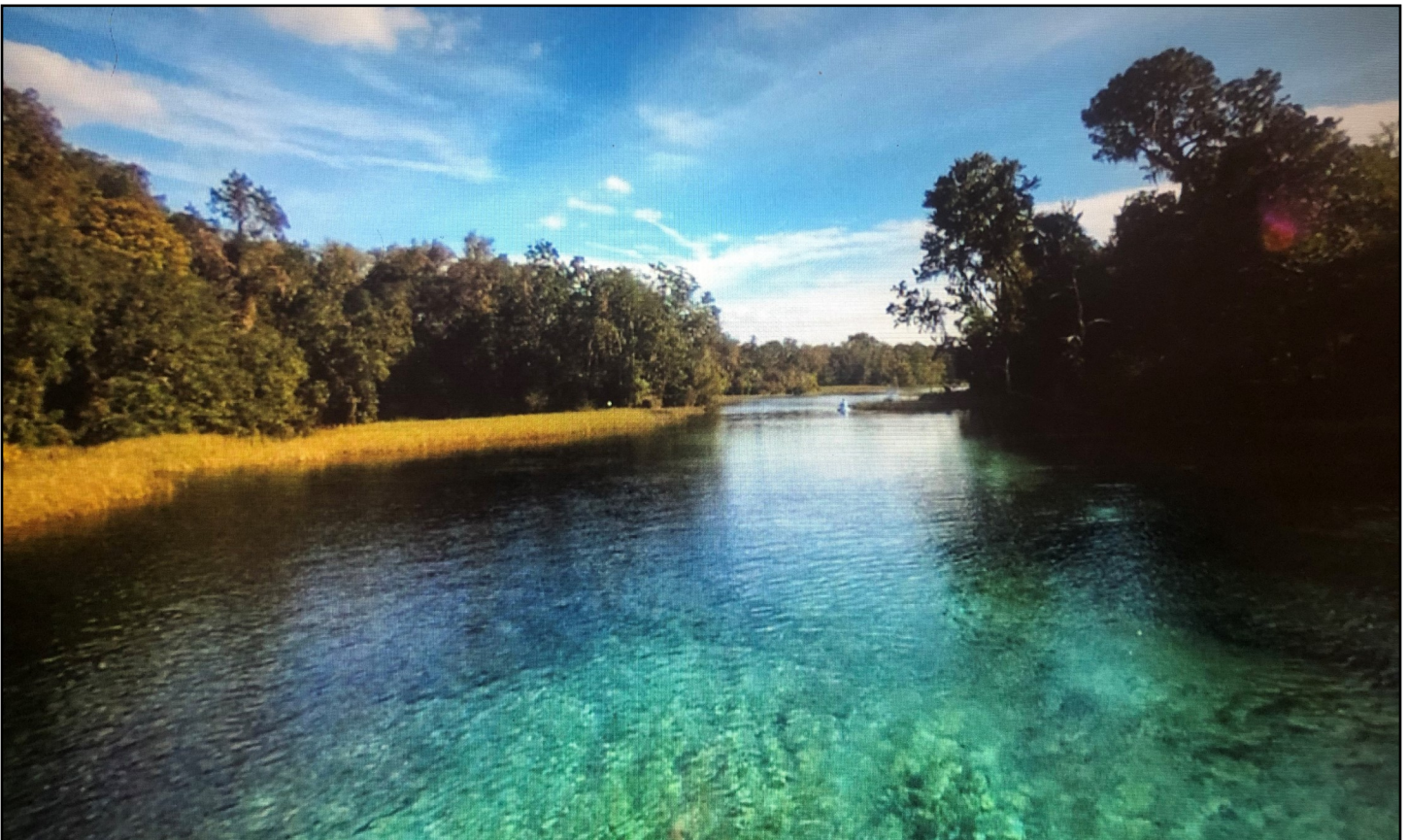
Ten-Year Planning Period Objectives

Previous Accomplishments

Since the 2002 Unit Management Plan for Rainbow Springs the park as made significant accomplishments in terms of resource management and continued protection of the park. The park has added approximately 504 acres to the park and has recorded over 285,000 volunteer hours. Since 2011, the park has treated 1,466 acres with prescribed fire and treated 428 acres of exotic species in the park.

Future Objectives

Moving forward in the next 10 years, the park plans to continue resource management efforts by restoring altered landcover types into their desired future conditions. Restoration activities will be done through the continued use of prescribed fire applications, exotic removal, and other management activities. To improve visitor use, the park will be making improvements to 6 use areas and creating 1 new use area.





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Management Goals & Objectives

Hydrological & Natural Communities

Objective: Assess hydrological restoration needs, monitor soil erosion, and restore natural hydrological condition and function to Spring-Run Stream natural community.

To restore the natural hydrological conditions, steps include developing a restoration plan for experimental plantings of submerged aquatic vegetation (SAV), developing a monitoring plan to track the health of the submerged aquatic vegetation in the spring run, and monitoring and evaluating soil erosion in the spring bowl.

Objective: Restore and improve approximately 407 acres of sandhill and flatwoods natural communities, and apply fire to approximately 950 acres.

To restore and improve the natural communities, steps include developing a restoration plan for 244 acres of sand pine plantation, 10 acres of offsite hardwoods, 75 acres of the Rainbow Ranch property, and burning between 291-858 acres of fire dependent natural communities annually.





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Executive Summary

Management Goals & Objectives

Imperiled & Exotic Species

Imperiled Species Management

Goal: Maintain, improve, and restore imperiled species populations and habitats.

Objective: Monitor and document 10 imperiled plant and animal species.

Rainbow Springs State Park has documented populations of a number of imperiled animal species that would benefit from additional monitoring. The giant orchid, southeastern fox squirrel, Florida mouse, southeastern kestrel, indigo snake, striped newt, gopher frog, gopher tortoise, Suwannee cooter, and Bachman's sparrow will be monitored or documented.

Exotic Species Management

Goal: Remove exotic and invasive species and conduct needed maintenance.

Objective: Annually treat 200 acres of exotic plant species in the park.

Various exotics including hydrilla, coral ardesia, and cogongrass are found within the park. Plans to remove these non natives include continuous treatment and survey. Removal will be done from park staff and contractors.





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Executive Summary

Management Goals & Objectives

Recreational Use & Infrastructure

Recreation and Facilities Management

Goal: Develop and maintain use areas and support infrastructure

Objective: Improve 6 use areas and Create 1 new use area.

To improve and expand visitor use at the park, plans include the improvements below:

Park Entrance

- Add Ranger Station

Parking Lot

- Additional Signage
- Redesign Parking Area
- Remove Excess Asphalt
- Restore Native Groundcover

Campground

- Connection to Central Waste
- Redefine Entrance

Tube Concession/Exit Area

- Potential Employee Trailer Site
- Redefine Entrance

Group Camping Area

- Develop Group Camping Area

Headspring Day Use Area

- Add Paddlecraft Dropoff
- Swimming Area Safety Improvements
- Landscaping Improvements

Ornamental Gardens

- Native Species & Cultural Interpretation





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Management Goals & Objectives

Optimum Boundary

The optimum boundary map for Rainbow Springs State Park shows much more than the typical optimum boundary map. This map shows the normal identified optimum boundary parcels that the park is interested in acquiring and managing along with many other lands that are not for park acquisition but rather alternative managing agencies. The purpose of adding these additional properties is to show the importance of regional conservation efforts to help protect the Rainbow Springshed. Additional lands that are listed include Florida Forever projects, conservation lands, and a large area of lands that are within the primary protection zone of the Rainbow springshed and are a primary focus area for the conservation of the lands to further protect the integrity of the springs recharge areas.

Identified Optimum Boundary Parcels

The optimum boundary for the park consists of 40 parcels that total approximately 1,274 acres. The parcels are divided between numerous parcels both large and small. The Northwest Parcels would help protect the headsprings recharge area and could provide a suitable site for future park activities. The Northeast Parcels contain sandhill communities that would improve the buffer and the habitat protection potential of the park. They would also connect the current northern and southern parcels of the park, expand recreational opportunities for trails, and would protect a spring and spring-run that flows directly into the Rainbow River. The Central Parcels would bring remaining out parcels of undeveloped shoreline into state ownership and ensure the protection of the sensitive shoreline habitats. The South Parcels would provide further protection of the Rainbow springshed, protect additional habitat for imperiled species, and would facilitate additional fire and exotic management practices.

Crucial Lands for Springs Protection

The goal of the primary focus area is to protect most of the undeveloped or minimally developed private land remaining along the Rainbow River. The southern parcels would bring a remaining large portion of undeveloped shoreline along the eastern side of the river into state ownership and provide a connection to the southern end of the Rainbow Springs State Park. Public acquisition of these lands will prevent further development and conflicting land uses that could further degrade the ecological value of this area. In addition, the potential restoration of altered habitats would help restore and maintain

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INTRODUCTION

Rainbow Springs State Park is located in Marion County (see Vicinity Map). Access to the park is from U.S. Highway 41 and Southwest 180th Avenue Road (see Reference Map). The Vicinity Map also reflects significant land and water resources existing near the park.

Rainbow Springs State Park was initially acquired on October 24, 1990 with funds from the Conservation and Recreation Lands Program (CARL). Currently, the park comprises 1,694.41 acres. The Board of Trustees of the Internal Improvement Trust Fund (Trustees) hold fee simple title to the park and on March 19, 1991, the Trustees leased (Lease Number 3900) the property to the DRP under a 50 year lease. The current lease will expire on March 19, 2041.

Rainbow Springs State Park is designated single-use to provide public outdoor recreation and other park-related uses. There are no legislative or executive directives that constrain the use of this property (see Addendum 1).

Purpose of the Park

The purpose of Rainbow Springs State Park is to conserve and protect the natural value of the Rainbow Springs and the Rainbow River, for the benefit of the people of Florida. The park was acquired to protect the spring and river system by restricting development around the springhead and river and to use this exceptionally scenic area for active and passive public recreation.

Park Significance

- Rainbow Springs State Park is significant as a unit of the state park system due to Rainbow Springs, Florida's fourth largest first magnitude spring group consisting of at least 87 spring vents.
- Uplands in the park provide habitat for a variety of imperiled wildlife and plant species including gopher tortoises, indigo snakes, Florida mice, southeastern fox squirrels, Florida pine snakes, and gopher frogs.
- The park contains an abundance of archaeological sites, representing periods of Florida's history from Paleo-Indian through the discovery and mining of phosphate rock to the development of tourism during the early to mid-twentieth century.
- The old Rainbow Springs Resort and Attraction at the headsprings is a cultural resource that represents a unique type of Florida tourist attraction that began to decline with the arrival of large-scale theme parks.

Rainbow Springs State Park is classified as a state park in the DRP's unit classification system. In the management of a state park, a 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 on the park's natural, cultural, and aesthetic attributes.

Park Interpretation

Interpretation is a mission-based communication process that forges emotional and intellectual connections between the interests of the audience and meanings inherent in the resource. Interpretive themes are the key concepts for communicating the meanings inherent in a Florida State Park. A central park theme is a short, dynamic interpretive statement that reflects the significance of a park by highlighting distinctive features and essential visitor experiences. In addition to a central park theme, each park has primary interpretive themes. These themes serve as a starting point for park staff to plan interpretive content by outlining the main stories of the park's natural and cultural resources. Further interpretive planning can branch off from these themes but should ultimately help reinforce the main interpretive messages of the park.

Central Park Theme

A former roadside attraction, Rainbow Springs State Park's blooming azaleas and cascading waterfalls give way to the natural beauty of a first magnitude spring.

Primary Interpretive Themes

Habitats

The sandhills and diverse ecosystems surrounding the spring recharge the aquifer and river, which in turn nurtures a variety of terrestrial and aquatic wildlife.

Historic use

The relics of the historic roadside attraction at Rainbow Springs remind us of how human actions in the past continue to affect our natural areas.

Recreational opportunities

Responsible recreation on the Rainbow River is a safeguard for the water clarity and delicate vegetation of this ecological treasure.

Water quality

The health of the Rainbow River relies on collaborative regional management efforts that prioritize nitrogen reduction and water conservation.

Interpretive Application

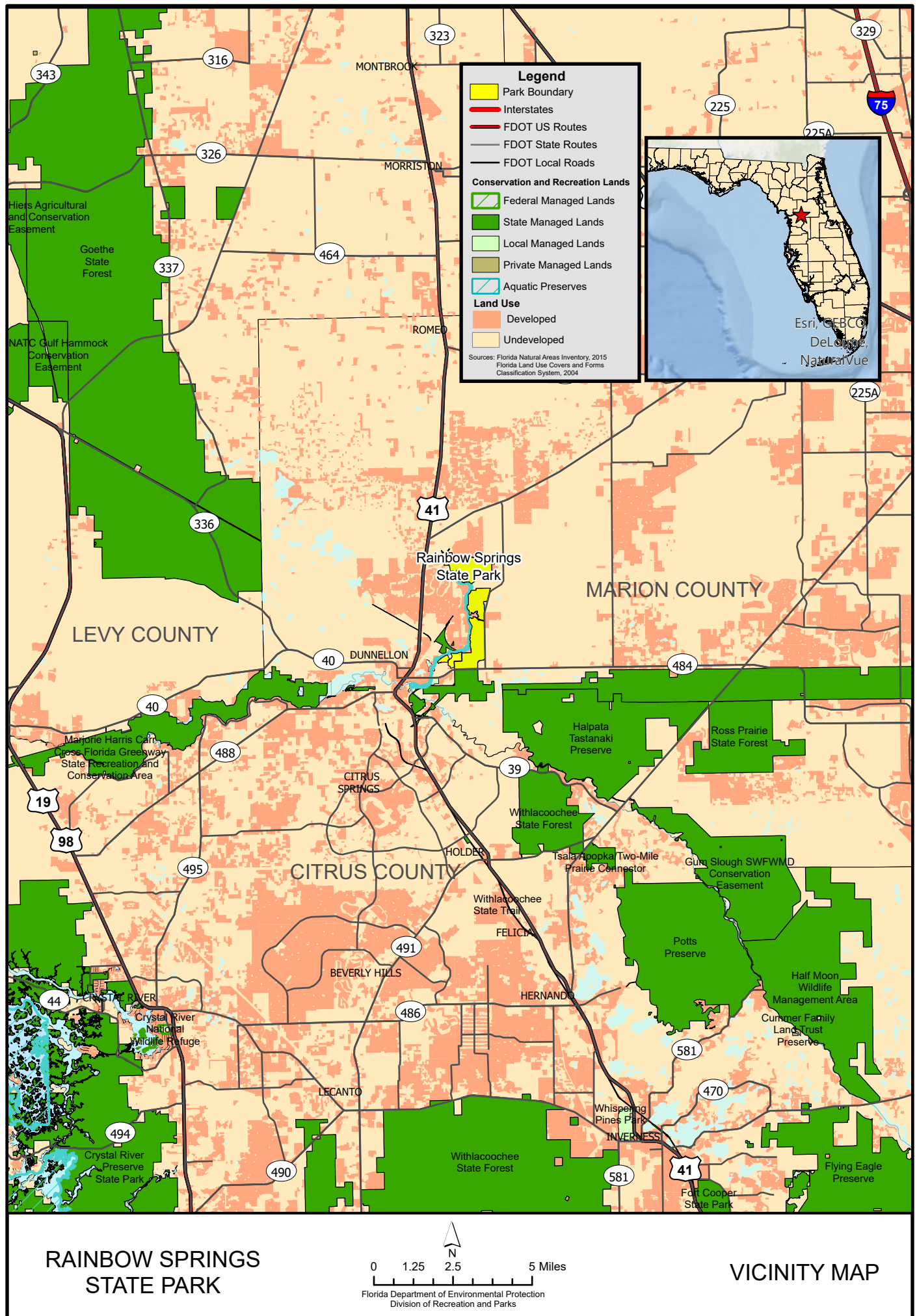
Interpretation is a DRP priority for the inherent value of visitor engagement and as a tool for promoting stewardship and conservation. Interpretation also plays an important role in achieving many other park management objectives.

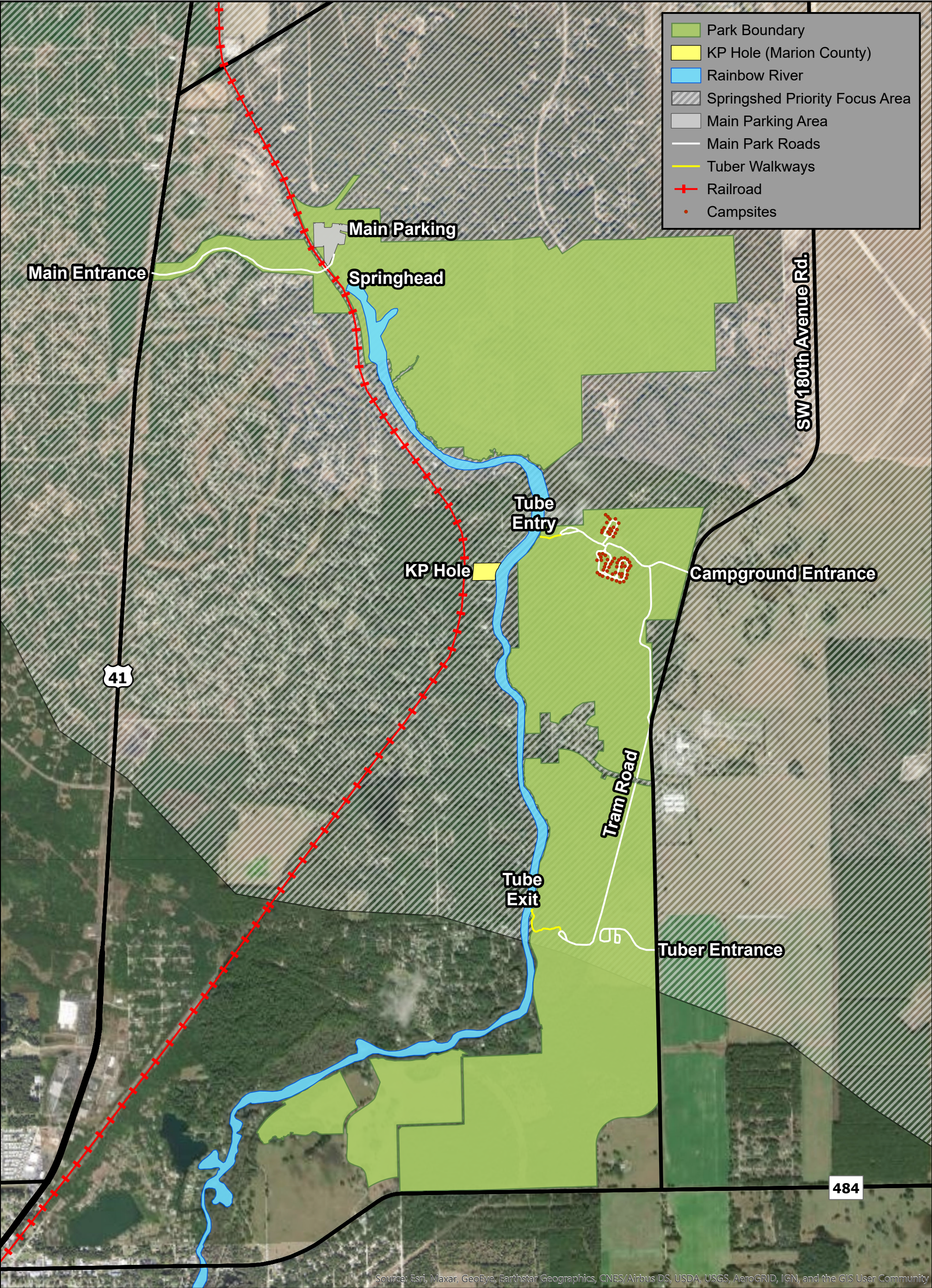
Non-Personal Interpretation

Interpretive elements which do not require a person to deliver a message (signs, exhibits, brochures, kiosks, etc.).

Personal Interpretation

One person or persons providing interpretation to another person or persons. It can be planned or impromptu.





Purpose and Scope of the Plan

This plan serves as the basic statement of policy and direction for the management of Rainbow Springs State Park as a unit of Florida's state park system. It identifies the goals, objectives, actions and criteria or standards that guide each aspect of park administration and sets forth the specific measures that will be implemented to meet management objectives and provide balanced public utilization. The plan is intended to meet the requirements of Sections 253.034 and 259.032, Florida Statutes, Chapter 18-2, Florida Administrative Code, and is intended to be consistent with the State Lands Management Plan. With approval, this management plan will replace the 2002 approved plan.

The plan consists of three interrelated components: the Resource Management Component, the Land Use Component and the Implementation Component. The Resource Management Component provides a detailed inventory and assessment of the natural and cultural resources of the park. Resource management needs and issues are identified, and measurable management objectives are established for each of the park's management goals and resource types. This component provides guidance on the application of such measures as prescribed burning, exotic species removal, imperiled species management, cultural resource management and restoration of natural conditions.

The Land Use Component is the recreational resource allocation plan for the park. Based on considerations such as access, population, adjacent land uses, the natural and cultural resources of the park, current public uses and existing development. Measurable objectives are set to achieve the desired allocation of the physical space of the park. These objectives identify use areas and propose the types of facilities and programs as well as the volume of public use to be provided.

The Implementation Component consolidates the measurable objectives and actions for each of the park's management goals. An implementation schedule and cost estimates are included for each objective and action. Included in this table are (1) measures that will be used to evaluate the DRP's implementation progress, (2) timeframes for completing actions and objectives and (3) estimated costs to complete each action and objective.

All development and resource alteration proposed in this plan is subject to the granting of appropriate permits, easements, licenses, and other required legal instruments. Approval of the management plan does not constitute an exemption from complying with the appropriate local, state or federal agencies. In the development of this plan, the potential of the park to accommodate secondary management purposes was analyzed. These secondary purposes were considered within the context of the DRP's statutory responsibilities and the resource needs and values of the park. This analysis considered the park natural and cultural resources, management needs, aesthetic values, visitation and visitor experiences. For this park, it was determined that no secondary purposes could be accommodated in a manner that would not interfere with the primary purpose of resource-based outdoor recreation and conservation. Uses such as water resource development projects, water supply projects, stormwater management projects, linear facilities and sustainable agriculture and forestry (other than those forest management activities specifically identified in this plan) are not consistent with this plan.

The potential for generating revenue to enhance management was also analyzed. Visitor fees and charges are the principal source of revenue generated by the park. It was determined that multiple-use management activities would not be appropriate as a means of generating revenues for land management. Instead, techniques such as entrance fees, concessions and similar measures will be employed on a case-by-case basis as a means of supplementing park management funding].

DRP may provide the services and facilities outlined in this plan either with its own funds and staff or through an outsourcing contract. Private contractors may provide assistance with natural resource management and restoration activities or a Visitor Service Provider (VSP) may provide services to park visitors in order to enhance the visitor experience. For example, a VSP could be authorized to sell merchandise and food and to rent recreational equipment for use in the park. A VSP may also be authorized to provide specialized services, such as interpretive tours, or overnight accommodations when the required capital investment exceeds that which DRP can elect to incur. Decisions regarding outsourcing, contracting with the private sector, the use of VSPs, etc. are made on a case-by-case basis in accordance with the policies set forth in DRP's Operations Manual (OM).

Management Authority and Responsibility

In accordance with Chapter 258, Florida Statutes and Chapter 62D-2, Florida Administrative Code, the Division of Recreation and Parks (DRP) is charged with the responsibility of developing and operating Florida's recreation and parks system. These are administered in accordance with the following policy:

It shall be the policy of the Division of Recreation and Parks to promote the state park system for the use, enjoyment, and benefit of the people of Florida and visitors; to acquire typical portions of the original domain of the state which will be accessible to all of the people, and of such character as to emblemize the state's natural values; conserve these natural values for all time; administer the development, use and maintenance of these lands and render such public service in so doing, in such a manner as to enable the people of Florida and visitors to enjoy these values without depleting them; to contribute materially to the development of a strong mental, moral, and physical fiber in the people; to provide for perpetual preservation of historic sites and memorials of statewide significance and interpretation of their history to the people; to contribute to the tourist appeal of Florida.

The Board of Trustees of the Internal Improvement Trust Fund (Trustees) has granted management authority of certain sovereign submerged lands to the DRP under Management Agreement MA 68-086 (as amended January 19, 1988). The management area includes a 400-foot zone from the edge of mean high water where a park boundary borders sovereign submerged lands fronting beaches, bays, estuarine areas, rivers or streams. Where emergent wetland vegetation exists, the zone extends waterward 400 feet beyond the vegetation. The agreement is intended to provide additional protection to resources of the park and nearshore areas and to provide authority to manage activities that could adversely affect public recreational uses.

The Division has management authority over a 400-foot zone from the edge of mean high water along the Rainbow River where it passes through or alongside the park. Where emergent wetland vegetation exists, the zone extends waterward 400 feet beyond the vegetation. Visitor impacts at the tuber entrance and take-out is within this 400-foot zone and will be managed by the Division in cooperation with the Aquatic Preserve. All wildlife within this zone, with the exception of fish, is protected from harvest, as stated in the Imperiled Species section, above.

Many operating procedures, used system-wide, are outlined in the DRP's Operations Manual (OM).

Park Management Goals

The following park goals express DRP's long-term intent in managing the state park:

- Provide administrative support for all park functions.
- Protect water quality and quantity in the park, restore hydrology to the extent feasible and maintain the restored condition.
- Restore and maintain the natural communities/habitats of the park.
- Maintain, improve or restore imperiled species populations and habitats in the park.
- Remove exotic and invasive plants and animals from the park and conduct needed maintenance-control.
- Protect, preserve and maintain the cultural resources of the park.
- Provide public access and recreational opportunities in the park.
- Develop and maintain the capital facilities and infrastructure necessary to meet the goals and objectives of this management plan.

Management Coordination

The park is managed in accordance with all applicable laws and administrative rules. Agencies having a major or direct role in the management of the park are discussed in this plan. The Florida Department of Agriculture and Consumer Services (FDACS), Florida Forest Service (FFS), assists DRP staff in the development of wildfire emergency plans and provides the authorization required for prescribed burning. The Florida Fish and Wildlife Conservation Commission (FWC) assists staff in the enforcement of state laws pertaining to wildlife, freshwater fish and other aquatic life existing within the park. In addition, the FWC aids DRP with wildlife management programs, including imperiled species management. The Florida Department of State (FDOS), Division of Historical Resources (DHR) assists staff to ensure protection of archaeological and historical sites. The Florida Department of Environmental Protection (DEP), Office of Resiliency and Coastal Protection (RCP) aids staff in aquatic preserves management programs.

Public Participation

DRP provided an opportunity for public input by conducting a public workshop and an Advisory Group meeting to present the draft management plan to the public. These meetings were held on [\[INSERT Dates\]](#), respectively. Meeting notices were published in the Florida Administrative Register, [\[INSERT publication date, VOL/ISSUE\]](#), included on the Department Internet Calendar, posted in clear view at the park, and promoted locally. The purpose of the Advisory Group meeting is to provide the Advisory Group members an opportunity to discuss the draft management plan (see Addendum 2).

Other Designations

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

All waters within the park have been designated as Outstanding Florida Waters, pursuant to Chapter 62-302, Florida Administrative Code. Surface waters in this park are also classified as Class III waters by the Department. This park is within or adjacent to the Rainbow River Aquatic Preserve as designated under the Florida Aquatic Preserve Act of 1975 (Section 258.35, Florida Statutes).

RESOURCE MANAGEMENT COMPONENT

Introduction

The DRP has implemented resource management programs for the perpetual preservation of representative examples of the state's significant natural and cultural resources. This component of the plan describes the natural and cultural resources of the park and identifies the methods that will be used to manage them. Management measures expressed in this plan are consistent with the DRP's overall mission in natural systems management.

The DRP's resource management philosophy is guided by the principles of natural systems management. Primary emphasis is placed on restoring and maintaining the natural processes that shaped the structure, function, and species composition of Florida's diverse natural communities as they occurred in the original domain. Single species management for imperiled species can be accommodated on a case-by-case basis and should be compatible with the maintenance and restoration of natural processes.

The DRP's management goal for cultural resources is to preserve sites and objects that represent Florida's cultural periods, significant historic events, or persons contributing to the history of Florida. This goal often entails active measures to stabilize, reconstruct, restore, or rehabilitate cultural resources. Appropriate public use of cultural resources will be considered according to the park's unit classification and the sensitivity of the resources.

Park units are often components of larger ecosystems, and their proper management can be affected by conditions that occur beyond park boundaries. Ecosystem management is implemented through an evaluation program that assesses resource conditions, refines management activities, and reviews local and regional development permit applications for park impacts.

The entire park is divided into management zones that delineate areas on the ground that are used to coordinate management activities (see Management Zones Map). The shape and size of each zone may be based on natural community type, burn zone, and the location of existing roads and fire breaks. Table 1 reflects the management zones with the acres of each zone.

Management Goals, Objectives, and Actions

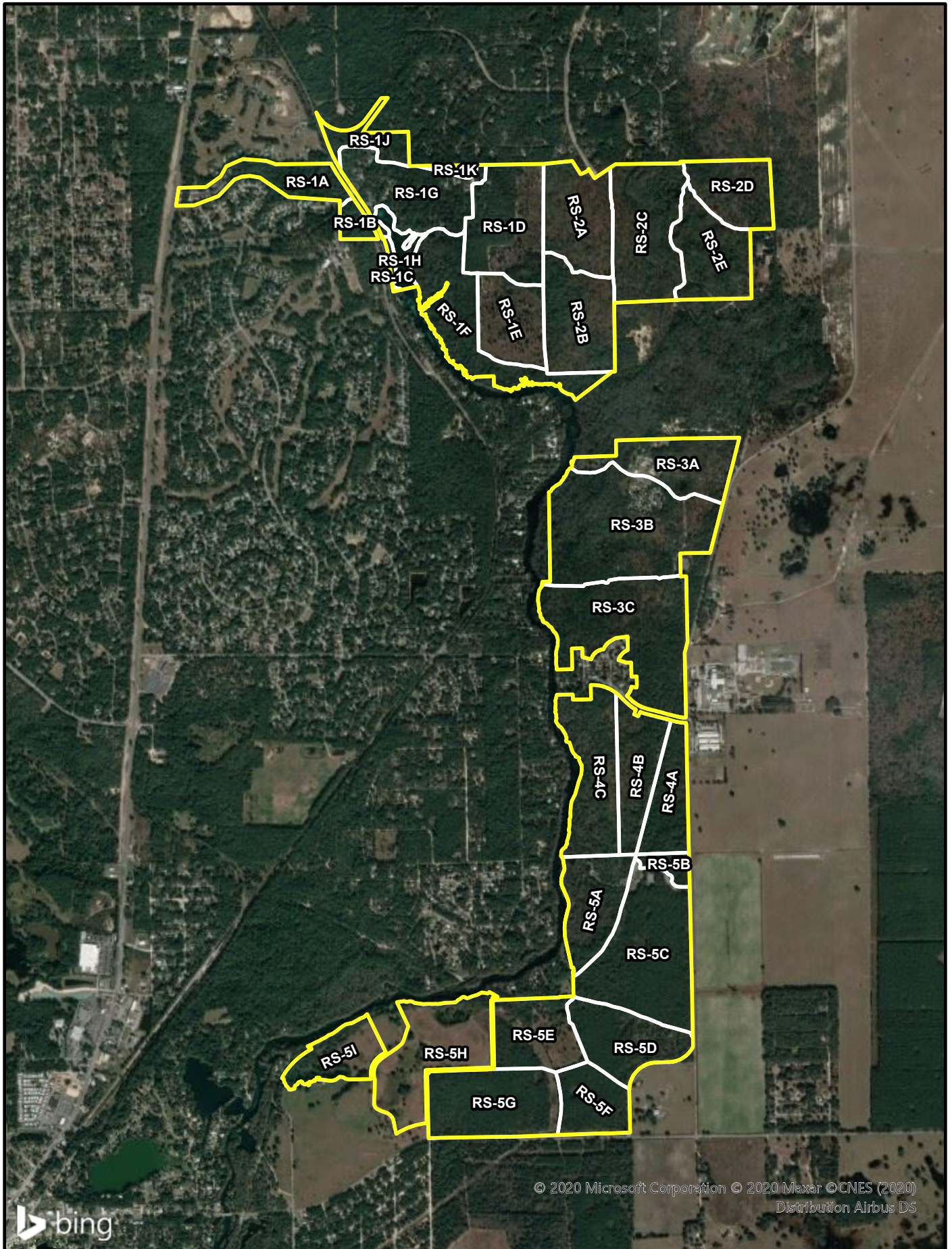
Measurable objectives, and actions have been identified for each of the DRP's management goals for Rainbow Springs State Park. The goals, objectives, and actions identified in this management plan will serve as the basis for developing annual work plans for the park. The ten-year management plan is based on conditions that exist at the time the plan is developed. The annual work plans provide the flexibility needed to adapt to future conditions as they change during the ten-year management planning cycle. As the park's annual work plans are implemented through the ten-year cycle, it may become necessary to adjust the management plan's priority schedules and cost estimates to reflect these changing conditions.

Table 1. Rainbow Springs State Park Management Zones			
Management Zone	Acreage	Managed with Prescribed Fire	Contains Cultural Resources
RS 1A	33.33	Y	Y
RS 1B	8.99	Y	N
RS 1C	2.55	Y	N
RS 1D	70.91	Y	Y
RS 1E	46.75	Y	Y
RS 1F	71.58	Y	Y
RS 1G	66.2	Y	Y
RS 1H	12.56	N	Y
RS 1J	19.17	Y	N
RS 1K	3.47	Y	N
RS 2A	58.14	Y	N
RS 2B	63	Y	Y
RS 2C	79.25	Y	N
RS 2D	41.86	Y	N
RS 2E	53.91	Y	N
RS 3A	53.39	Y	Y
RS 3B	133.64	Y	Y
RS 3C	113.25	Y	Y
RS 4A	38.13	Y	N
RS 4B	44.92	Y	Y
RS 4C	68.4	Y	Y
RS 5A	49.98	Y	N
RS 5B	9.5	Y	N
RS 5C	107.32	Y	N
RS 5D	53.01	Y	N
RS 5E	49.46	Y	N
RS 5F	37.07	Y	N
RS 5G	75.3	Y	N
RS 5H	78.39	Y	Y
RS 5I	34.14	Y	N

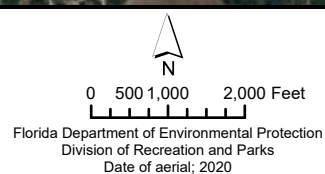
Topography

Rainbow Springs State Park lies within a region of the state known as the Central or Mid-peninsular Physiographic Zone, specifically within the Western Valley between the Brooksville Ridge and the Cotton Plant Ridge. This geomorphic zone is characterized by karst terrain, developed from solution of the underlying limestone.

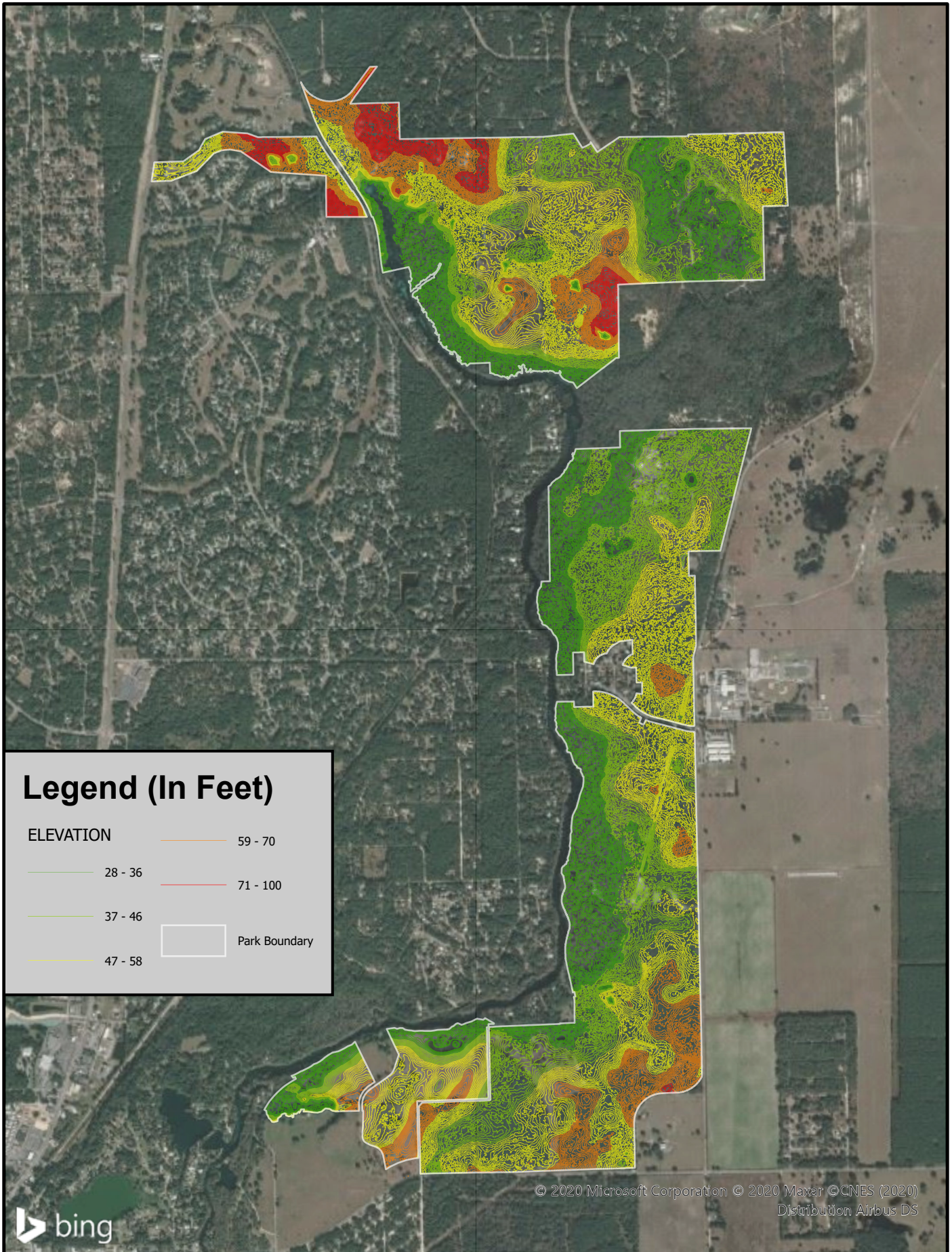
The area exhibits discontinuous highlands, forming nearly parallel ridges or terraces that are separated by broad valleys. The Withlacoochee River is the primary drainage basin in this region. This water body is one of only two major rivers in Florida that flow from south to north. Uniquely, it also abruptly turns westward through a large topographic valley called Dunnellon Gap as it joins the Rainbow River (Faulkner 1973). The Withlacoochee drainage subsequently passes through Lake Rousseau and empties into the Gulf of Mexico near Yankeetown.



RAINBOW SPRINGS
STATE PARK



MANAGEMENT ZONES
MAP



Legend (In Feet)

ELEVATION

28 - 36

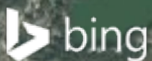
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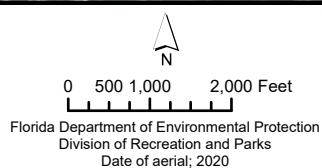
71 - 100

Park Boundary



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RAINBOW SPRINGS
STATE PARK



TOPOGRAPHIC MAP

Within the park, relatively flattened uplands gradually slope downward to a narrow zone of hydric soils along the eastern side of the Rainbow River. A broad corridor of interconnected forested wetlands in the northeast portion of the park drains gradually southward into the privately owned Indian Creek bottomlands. Park elevations range from about 100 feet above mean sea level (msl) in the uplands west of the headsprings to less than 30 feet in the river floodplain, with the headsprings situated between 30 to 40 feet above msl (see Topographic Map).

Significant topographic alterations occur in the park. Extensive alterations remain from the historic mining of hard rock phosphate, including several deep pits and large spoil piles. The development of the headsprings area as a tourist attraction in the mid-1900s also changed the topography considerably. Facilities at the attraction that had the greatest topographic impact include sidewalks, parking lots, artificial waterfalls, an artificial stream, and waterfront docks and buildings. Other alterations include a former railroad line and associated bed and old fire plow scars through the flatwoods. Several of the scars impact wetlands.

Geology

Regionally, deposits of varied origin underlie the area. In descending order, these deposits include the Hawthorn Group, Ocala Limestone, Avon Park Formation, Lake City and Oldsmar Formations. Described from youngest to oldest respectively, these deposits represent the Holocene, Pleistocene, Pliocene, Miocene, and Eocene Series. The Ocala Limestone is the oldest formation exposed in the vicinity.

Where they occur, Holocene and Pleistocene deposits consist of beds of soil, sand, and clay on marine and estuarine terraces, and of alluvial, lake, and windblown deposits. These undifferentiated deposits range to 100 feet in thickness and are generally not a reliable source of potable water.

Pliocene and Miocene deposits also range to 100 feet in thickness. These deposits consist primarily of grayish-green, waxy clays and some interbedded sand and limestone, phosphatic clay, marl, calcareous sandstone, and limestone residuum. The unit may contain a confining layer and is generally not used as a water source.

The Ocala Limestone, which dates to the Upper Eocene, contains limestone that is described as white to tan, fossiliferous, massive, soft to hard, and porous. The unit is 100 to 500 feet thick. The Avon Park Formation is a limestone and dolomite deposit from the Middle Eocene. The limestone is light to dark brown and highly fossiliferous, and its porosity is variable in the lower part. The dolomite is gray to dark brown and very fine to microcrystalline. It contains porous fossil molds, thin beds of carbonaceous material, and peat fragments. The unit is 200 to 800 feet thick. Both the Ocala Limestone and the Avon Park Formation yield large quantities of water.

Underlying the Avon Park Formation is the Lake City Formation, which averages about 600 feet in thickness. This formation consists of a brown, porous, highly fossiliferous limestone and dolomite. Beneath the Lake City Formation is the Oldsmar Formation, a unit composed of white to light brown chalky limestone interbedded with brown dolomite and intergranular evaporites. The presence of thick layers of carbonate rocks containing intergranular evaporites between the Lake City and Oldsmar Formations prevents the movement of water between the two units. This layer is considered the base of the Floridan aquifer; highly mineralized water lies below.

Soils

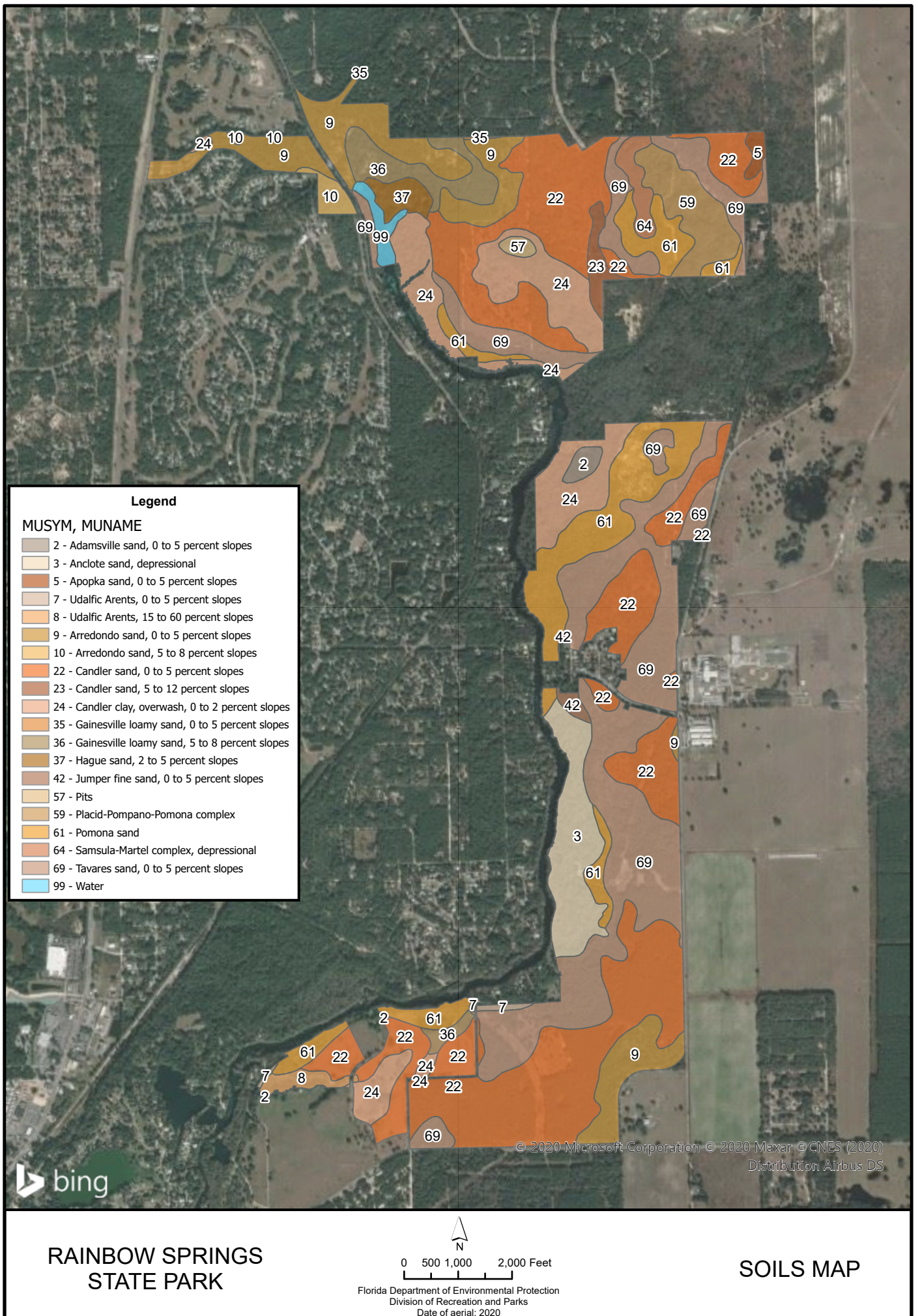
Nineteen soil types (see Soils Map) have been identified within Rainbow Springs State Park (Thomas et al 1979). Soils range from the well-drained sands of xeric uplands to the frequently inundated soils of basin swamps and hydric hammocks. Complete descriptions of these soils are contained in Addendum 3.

The importance of soil characteristics in determining native vegetative cover is well illustrated at Rainbow Springs State Park, where the soils have undergone drastic disturbances. The Candler Clay, Overwash soil (CwA) consists of mine tailings and spoil from phosphate mining in the area. These tailings were dumped in a continuous layer over a large area southeast of an old tailings pond. The original soil in the area was probably Candler Sand, which would have naturally supported sandhill vegetation. However, few sandhill species remain in the area overlain by Overwash soil. At present, the vegetative cover there consists of mesophytic oaks, exotic pasture grasses and other invader species able to benefit from the rich phosphate and clays in the tailings. Restoration of the site to the natural sandhill community will be difficult at best. All park management activities will follow the guidance of best management practices to prevent further soil erosion and conserve soil and water resources on site.

Stormwater runoff from roads within the portion of the former campground that abuts the Rainbow River has been a long-standing problem that may need additional attention. The main issue prior to removal of that section of old campground and relocation of its campsites to a new campground farther away from the river was that sediments were being transported down slope directly into the spring run with virtually no treatment or attenuation. In addition, the main access road into the campground area was directing runoff into a band of hydric hammock that paralleled the river. By constructing several vegetated terraces within the footprint of the old campground, the park was successful in redirecting most of that runoff into adjacent non-wetland areas to achieve a more natural infiltration. To treat runoff from the new campground, which is located in uplands further from the river, the park is using retention basins that are strategically designed to catch the excess runoff generated by strong storm events.

Historically, there have also been some erosion and stormwater issues along the shoreline of the headsprings. Stormwater runoff has tended to flow down slope from the parking and other impervious surfaces into the main headspring, causing sedimentation and water quality issues. Runoff continues to be problematic on some of the steep slopes above the north and east areas of the headsprings. Partial mitigation of direct runoff has been achieved through the installation of shoreline access structures and catchment basins. Removal of excess parking and associated impervious surfaces will improve water infiltration and further reduce runoff. Measures to reduce erosion on the slopes could include the planting of vegetation barriers as well as the construction of additional strategically placed terraces, which could be seeded with annual grasses until stabilization was achieved and then planted with native vegetation. Efforts to control non-native vegetation on garden slopes above the headsprings should incorporate anti-erosion measures such as erosion control mats.

Lingering erosion issues may be contributing to decreases in water quality and increases in sedimentation in the adjacent spring run. In that respect, it is important to understand that DRP and the Office of Resilience and Coastal Protection maintain a strong working relationship that enables the pooling of resources to find solutions to these issues.



Minerals

The Dunnellon phosphate boom of the 1890s ushered in an era of phosphate ore mining within the Rainbow River watershed (Dinkins 1969). Hard rock phosphate deposits like those mined around Dunnellon occur in Florida from southern Columbia and Suwannee Counties to eastern Hernando County (Blakey 1973). Prior to the 1940s, hard rock phosphate was mined by hand or steam shovel (Southwest Florida Water Management District (SWFWMD) 2004). Only those deposits with an overburden that had a maximum depth of 15 ft could be mined by hand (Blakey 1973). Only the hard rock and larger grain-sized phosphate nodules were removed. Since the technology to remove the smaller-sized particles was not yet available, ore processing consisted simply of screening and washing. Leftover materials, primarily sands, clays, and phosphate, were deposited as waste next to the mine pit.

Phosphate mining radically changed the topography in several areas of what is now Rainbow Springs State Park. Mining activities occurred in the uplands, in lowlands along the river, and even within the Rainbow River itself. Relicts of these activities persist in the park in the form of excavated pits and mounds of overburden, spoil, tailings and debris. One of the pits is a large, deep water-filled basin within the hydric hammock along the east bank of the Rainbow River near the park's tuber take-out facility (zone 5A). Superficially, the circular basin resembles a large spring feature that may have once discharged into the Rainbow. A more likely explanation, however, is that the basin was mined in the past and subsequent erosion has softened the edges of the basin.

One highly significant historic mining operation along the Rainbow River, named the Blue Cove Mine, was located about five miles downstream from the main headspring (Henigar and Ray 1987; Ellis et al. 2007). Tugboats once transported ore up and down the river from the Blue Cove, and extensive dredging helped to maintain the depth of the river for uninterrupted passage (Ellis et al. 2007).

Hydrology

The park's most prominent hydrologic feature is the spring-fed Rainbow River, also known as Blue Run, which flows southward for nearly six miles before emptying into the Withlacoochee River. The entire Rainbow River is noted for its exceptional ecological significance and stunning scenic beauty and is listed as an aquatic preserve. Except for the Indian Creek and Sateke Village properties, the State of Florida owns and the DRP manages most of the uplands and shoreline along the eastern side of the river from the headsprings downstream for about 4 miles. The park has management authority for the entire headsprings area. The park closely cooperates with the Office of Resilience and Coastal Protection (ORCP) staff of the Rainbow Springs Aquatic Preserve in co-managing the upper 4 miles of river and in addressing many of the issues that arise along the entire river system (DNR 1991).

The surface watershed of the Rainbow River covers about 75 square miles. It is a hydrologic unit of the Withlacoochee River Basin (Florida Department of Environmental Protection (FDEP) 2006; Trommer et al. 2009). However, the Primary Spring Protection Area for the Rainbow Springshed extends far beyond the surface watershed area to encompass about 350 square miles (Jones et al. 1996; Farrell and Upchurch 2005). The subsurface groundwater basin for Rainbow Springs is even larger and it varies in size seasonally, covering up to 650 square miles in the dry season and nearly 800 square miles in the wet season in western Marion, southern Alachua and eastern Levy Counties.

It is important to understand that the groundwater basins for the eastern Rainbow Springshed and the western Silver Springs Springshed (the largest peninsular spring system in Florida) may overlap substantially, depending on the season. However, the actual extent of groundwater connectivity and the precise location of the divide between the two springsheds remain poorly defined (Pete Butt pers. comm.; Farrell and Upchurch 2005; Florea and Vaucher 2007). Even though most of the groundwater flow from each of these two spring groups originates from near the top of the aquifer, apparently the Silver Springs source is much deeper than Rainbow's (Faulkner 1973; Sacks 1996).

The Rainbow River system has experienced numerous anthropogenic changes over the past 100 years (SWFWMD 2004) and has been designated an impaired water body with regard to nitrate-nitrogen levels (Holland, K., and R. Hicks 2013). Three landscape alterations in particular have had significant impacts on water quality and quantity in the river and its adjacent riparian areas. Industrial phosphate mining took place adjacent to the Rainbow River, the Inglis Dam was constructed near the mouth of the Withlacoochee River, and fertilizer use by the agricultural community and by residential developments became commonplace throughout the Rainbow River Springshed. Despite these changes, the Rainbow system remained an ecologically viable, regionally significant aquatic resource. In 1972, the U.S. Department of the Interior declared the Rainbow River a National Natural Landmark. The State of Florida subsequently designated the river an Aquatic Preserve and an Outstanding Florida Water. In addition, the SWFWMD has classified this river as its second priority water body within their Surface Water Improvement and Management (SWIM) program (Water and Air Research 1991).

One of the most significant landscape changes to impact Rainbow's surface water basin is Lake Rousseau, a manmade reservoir located downstream from the confluence of the Rainbow and Withlacoochee Rivers. When the Inglis Dam was built in 1909 to generate hydroelectric power, it impounded the waters of the Withlacoochee River and created the lake (German 1978). Authorities had planned to use the river impoundment as the western access to the Cross Florida Barge Canal (Faulkner 1973).

The Inglis Dam has artificially manipulated water levels in the Withlacoochee and Rainbow Rivers for over 100 years. It is unknown to what extent the Lake Rousseau impoundment may have altered floodplain wetlands along the Rainbow River by disrupting the natural back flooding cycles of the Withlacoochee River (Poff and Zimmerman 2010). Complicating matters further is the fact that the lower section of the Rainbow was dredged in the late 19th and early 20th Centuries. This makes it even more challenging to distinguish between factors that may be influencing the natural back flooding of the river (Ellis et al. 2007).

Floodplain communities along rivers are highly dependent on the ephemeral nature of back flooding from downstream water bodies (Pringle 1997). If the back flooding is disrupted, marked changes in the species composition of the communities may result (Light et al. 2002). Since the periodicity and extent of the Rainbow River flood regime have been modified because of the damming of the Withlacoochee River, the floodplain swamp and hydric hammock natural communities along the Rainbow may have already experienced significant changes. An excessive consumption of groundwater reserves in the region could further accelerate change within these wetland communities (Sepulveda 2002). To date, the only available estimates of water level changes on the Rainbow River are derived from a simulation model performed for a drawdown of Lake Rousseau (Downing et al. 1989). The study concluded that the dam has undesirable ecological consequences and that a program of periodic drawdowns of the lake would benefit the

entire system. Additionally, one last important confounding effect of the Inglis Dam is that it precludes imperiled wildlife such as Florida manatee's (*Trichechus manatus latirostris*) from using any critical warm-water habitats (i.e. Rainbow Springs) in the Withlacoochee River (Valade et al. 2020).

Rainbow Springs Group

Rainbow Springs, once known as Blue Springs, is a first magnitude spring group consisting of at least 87 known spring vents of various discharge strengths (including documented sand boils) that are distributed throughout the first five miles of the spring run (Post, Buckley, Shuh & Jernigan (PBS&J), 2007). The first 0.3 miles of the river are completely within park and the aquatic preserve boundaries. Greater than 70% of the spring vents occur within the river's first 0.5 miles but vents occur as far as 4.8 miles downstream. Surface runoff within the watershed contributes less than one percent of the total discharge of the Rainbow River, thereby making groundwater the number one contributor to this system (German 1978; Water and Air Research, Inc. 1991).

The Rainbow Springs Group is Florida's fourth largest spring system by total river discharge (Spechler & Schiffer 1995). The group contains nine named vents (Rosenau et al. 1977; Jones et al. 1996; Champion & Starks 2001; Scott et al. 2004; PBS & J 2005). These vents, all significant 1st to 3rd magnitude springs, include Rainbow Springs #1, #2, and #3 (1st), Rainbow Spring #4 (1st), Rainbow Springs #6 and #7 (1st), Waterfall Spring (2nd), Bubbling Spring (2nd), Bridge Seeps North and South (3rd), Rainbow Seep #1 (3rd), East Seep #1 (3rd), and Indian Springs #1, #2, #3, and #4 (3rd).

One attribute that characterizes this important springs group is the sheer density of spring vents throughout the system that contribute to the river's overall discharge. Many of the named springs are dense clusters of vents which makes an accurate determination of the discharge for each individual spring vent problematic. For example, the Rainbow Springs #1-#3 vents consist of three closely spaced, irregularly shaped, linear limestone fractures 30-50 feet in length and nearly 15 feet below the water surface. The combined discharge of these three vents qualifies them, at a minimum, for classification as a first magnitude spring. Researchers at Rainbow have typically grouped vents that are in close proximity to each other when discussing trends associated with overall discharge.

Approximately one mile south of the headsprings is Indian Creek, which is located on privately owned land. This spring-run stream is fed by Indian Springs, now known as Gissy Springs. Even though the property is not managed by the park, the spring run and its riparian wetlands are significant features that are important contributors to the Rainbow River system. The Indian Creek Spring system consists of a series of four vents that coalesce into a single, 70-foot diameter circular spring pool located about 2,000 feet upstream from the confluence of the Indian Creek floodplain and the Rainbow River (Henigar and Ray 1987). Depending on groundwater levels, the spring system may discharge a sufficient volume of water to provide flow through Indian Creek to the Rainbow River. However, in low water years, the system mostly exists as an isolated karst window embedded within the central portion of a large elongated forested wetland that originates within the state park to the north. Judging from the topography of the Indian Creek channel, at one time the flow of the spring run may have been much greater (Rosenau et al. 1977). An additional contributor to Indian Creek is up gradient surface water that emanates from two depressional wetland systems, one of which extends north into the park as a chain of basin swamps in the mesic flatwoods.

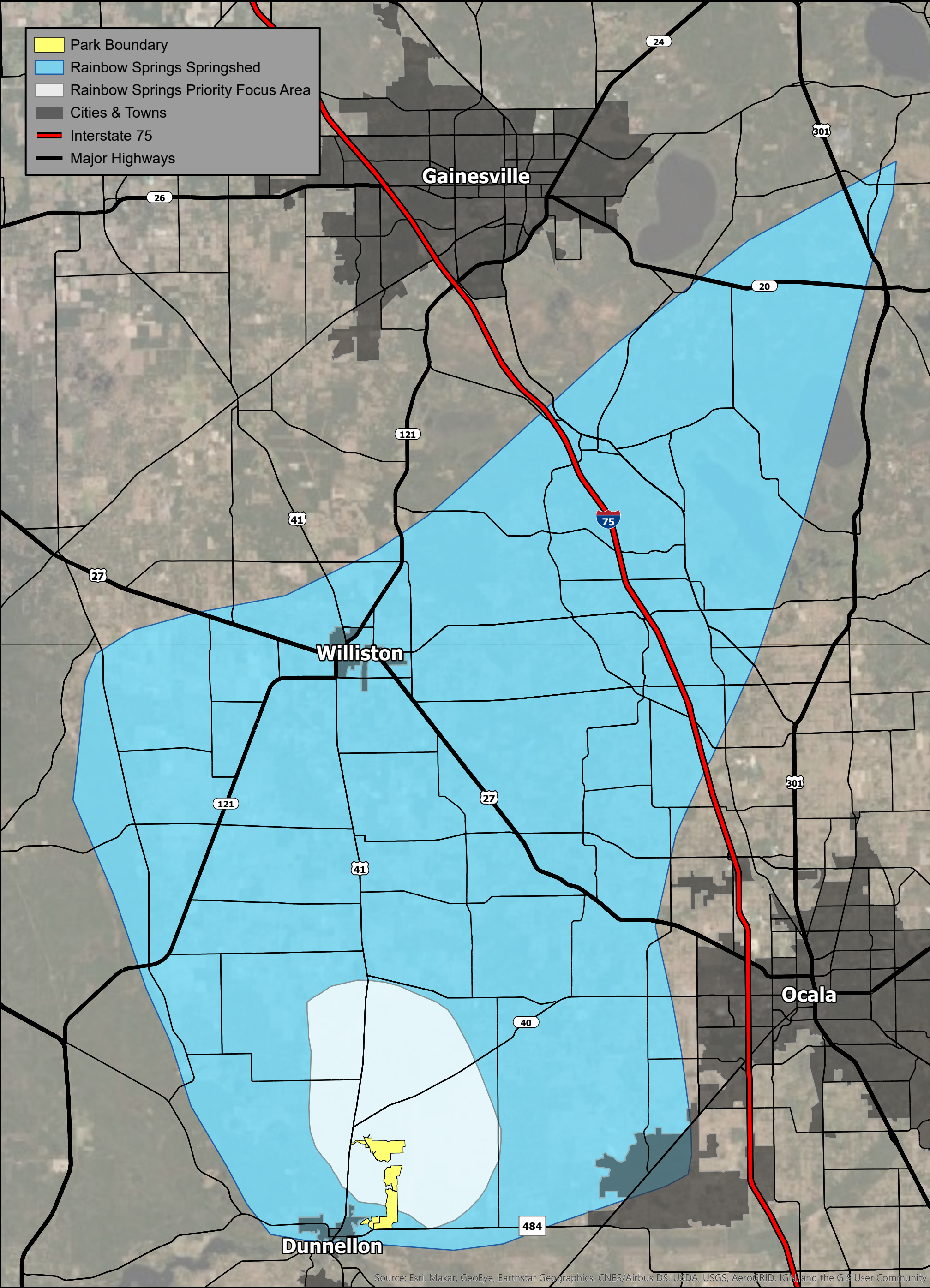
Water quantity

The Rainbow River is one of 33 first magnitude spring systems in the state. Daily discharge data are available from 1964 to present, but sporadic flow measurements go back as far as 1899 (i.e. Period of Record = POR). From 1965 to 2010, the average total discharge of the Rainbow River, as measured by the United States Geological Survey (USGS) at State Road 484 near Dunnellon, was 687 cubic feet per second (cfs) (USGS 2011a). However, if one includes all available data for the entire period of record, the average total discharge is 714 cfs (Wetland Solutions Incorporated (WSI) 2010). The minimum instantaneous flow ever recorded for the entire river was 460 cfs on June 7, 2000, while the maximum was 1023 cfs on October 12, 1964 (USGS, 2011b).

The three primary sources of the river are the two main headspring vents, Rainbow Springs Group #1, #2, and #3 (118 cfs) and Rainbow Spring #4 (128 cfs), as well as the largest known discharge point on the entire river, Rainbow Springs Group #6 and #7 (163 cfs) (Jones et al. 1996). Analyses of individual spring flows indicate discharge from the headspring area contributes up to 52 percent of the overall river flow. A recent spring ecosystem-level study summarized all available flow data from the Rainbow River and addressed its health and impairment status as well (WSI 2010). This 2009 snapshot of Rainbow River health depicted the overall river discharge as having a near failing grade (WSI 2009). Over the period of record, the Rainbow River discharge has apparently declined significantly with a loss of nearly 18% of its historic flow (Atkins North America, Incorporated and Debra Childs Woithe, Incorporated (ANAI / DCWI) 2012; Cohen et al. 2007; WSI 2010; Harrington et al. 2010). Reconciling this significant decrease with the upcoming Minimum Flows and Levels (MFLs) process, described below, will be an important resource issue for the Division in the years to come.

The situation at Rainbow is strikingly similar to that observed at several other spring systems in Florida, where water managers can now correlate specific regional drawdowns with shrinking springsheds and declining spring flows (Mirti 2001; Grubbs and Crandall 2007; Grubbs 2011). Climate driven events, such as drought cycles or seasonal rainfall inputs, may partially explain natural variation in spring discharge (Kelly 2004). However, in Florida it has been well documented that over depletion of our freshwater reserves by permitted consumptive uses (e.g. groundwater mining) can result in significant aquifer declines and subsequent natural system failures (Bacchus 2006). For example, in the mid-1970s within a five-county area of west central Florida, declines in the aquifer occurred throughout the groundwater basin (SWFWMD 2006). The ecological health of the region's water resources is extremely tenuous. As many as seven known springs within this region no longer flow (Champion and Starks 2001). Given the projected water supply needs for the area, the USGS predicts that spring flows throughout the state, including those in the Rainbow River, will continue to decline (Sepulveda 2002).

The SWFWMD is the agency that issues water use permits in the Rainbow River region. Currently Florida's water management districts use an approximation of groundwater extraction yields (Fernald and Purdum 1998) and ground water models to then determine sustainable yields for water supply (Schneider et al. 2008). Recent research by water experts suggests the need to track actual freshwater consumptive extraction from the Floridan aquifer to better understand the groundwater budget (Bacchus et al. 2011; Copeland et al. 2011; Gao et al. 2007; Kincaid 2011; Marella and Berndt 2005; Marella 2004)



Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Rainbow Springs State Park

0 4 8 16 Miles

Rainbow Springs
Springshed Map

Florida Department of Environmental Protection
Division of Recreation and Parks
Date of Aerial: 2020

The SWFWMD is responsible for prioritizing and establishing MFLs for water bodies within its boundaries. The final MFL document was developed in 2017 for the Rainbow River (Holzwart et al., 2017). If MFLs are to succeed in providing water bodies with adequate protection against significant harm, it will be important for stakeholders to work closely with the SWFWMD and other stakeholders during implementation of the Rainbow MFL and other Withlacoochee Basin MFLs, including the Silver Springs MFL, to ensure that Rainbow system receives the highest level of spring flow protection possible.

Recent documentation of flow reductions within other Florida springs (e.g. Ichetucknee River) and the trends toward shrinking springsheds in north Florida, make it especially important for DRP to cooperate with other agencies and the public on efforts to maintain high water quantity standards and continued strong protections against aquifer declines within the Withlacoochee Basin (Grubbs and Crandall 2007; Grubbs, 2011).

Water quality

Research evidence now exists to support the premise that in Florida springs a decreasing flow rate strongly correlates with increasing nutrient levels (Cohen et al. 2007). Water scientists are slowly identifying the visible indicators that illustrate an unhealthy spring ecosystem, including decreased spring flows, water clarity, submerged aquatic vegetation (SAV), biological diversity, ecological productivity, and aesthetic beauty as well as increased nuisance algae (periphyton) and non-native vegetation proliferation (Farrell and Upchurch 2005; Anastasiou 2006; WSI 2010). All of these indicators are unwanted but recognized consequences of an impaired spring ecosystem as defined by Florida's surface water quality (Chapter 62-302 FAC) impaired rule standards (Chapter 62-303.430 FAC) (Harrington et al. 2010).

Since the Rainbow River has undergone an extremely severe level of anthropogenic disturbance over the past 100 years, one might find it encouraging that several ecological health indicators (e.g., water clarity) in particular sections of this spring system rate above average when compared to other 1st magnitude springs (WSI 2009, WSI 2010). It is not clear if these indicators accurately depict the Rainbow River as a healthy system or if it has yet to succumb to anthropogenic stressors (WSI 2010).

Groundwater contamination from high nutrient loading has significantly influenced the ecological health of the Rainbow ecosystem (SWFWMD 2004). Several studies suggest that the primary water quality issue within the Rainbow River is unhealthy levels of nitrate-nitrogen within this spring system (Water and Air Research 1991; Jones et al. 1996; SWFWMD 2004; WSI 2010). Nitrate concentrations (NO₃ as N) in the Rainbow Springs main pool have measured from 0.16 mg/L (May 1974) to nearly 2.0 mg/L fairly consistently within the most recent past (WSI 2010; SWFWMD 2008). The earliest nitrate concentration (NO₃ as N) measurement in 1950s by Howard T Odum was 0.040 mg/L. Naturally occurring background nitrate levels should be less than 0.01 mg/L (Cohen et al., 2007).

Quarterly water quality monitoring in 18 important springs in Florida, including Rainbow Springs, took place from 2000-2007 (FDEP 2007; FDEP 2008). Reports from this work, referred to as Ecosummary, contain quarterly ecosystem health assessments of the Rainbow headspring pool. During the seven-year Ecosummary monitoring period, nitrate-nitrite levels averaged 1.50 mg/L (ranging from 1.0 to 2.5 mg/L). Of the 18 springs monitored, Rainbow ranked among the top ten poorest in water quality, based on the nitrate-nitrite parameter.

In 1989, the SWFWMD initiated baseline research studies on the Rainbow River in an effort to address the emerging issues of water quality and nuisance non-native aquatic vegetation proliferation (Water and Air Research 1991). With the culmination of this work, SWFWMD developed long-term goals and strategies to restore, protect and manage this important spring system (SWFWMD 2004). All of Florida's water management districts implement a similar surface water improvement and management (SWIM) plan under a legislative mandate created in 1987.

Within the Rainbow River, there has been very little research to understand the level of significance of the proliferation of nuisance periphyton (Stevenson et al. 2007). The 2011 and 2015 Rainbow River Vegetation Evaluation contains data on cover and distribution of periphyton and SAV along the river (ANAI / DCWI, 2012; Water and Air Research Inc. 2016). These are the first studies to include periphyton distribution maps on the river. Mapping and long-term change analysis of SAV and periphyton distribution will provide important information to understand factors affecting the health of the river and the aquatic vegetation.

In 1996 the FDEP initiated a formal, statewide monitoring program for surface waters and groundwater. This included those waters within the Rainbow Springshed (Maddox et al. 1992; FDEP 2005). These efforts were expanded in 2000. This Integrated Water Resource Monitoring Program (IWRMP) of Florida's water resources takes a comprehensive watershed approach based on natural hydrologic units. The 52 hydrologic basins in Florida are on a five-year rotating schedule that allows water resource issues to be addressed at different geographic scales (Livingston 2003). In addition, the IWRMP assigns a water body identification number (WBID) to each water body (FDEP 2006). This watershed approach provides a framework for implementing Total Maximum Daily Load (TMDL) requirements to restore and protect water bodies that are declared impaired (Clark and DeBusk 2008). A TMDL was finalized for the Rainbow River (Holland, K., and R. Hicks. 2013). A nitrate target goal was set at 0.35 mg/L.

In 2015, FDEP developed a Basin Management Action Plan (BMAP) for the entire Rainbow Springs in order to target specific reductions towards the TMDL (FDEP 2015). In 2016, FDEP implemented stronger legislative protections to the Rainbow Springs Group by mandating it as one of 30 Outstanding Florida Springs (Florida Springs and Aquifer Protection Act (Part VIII of Chapter 373, F.S.)). This legislation required additional protections specifically designed to assist efforts with the BMAP process including water quality restoration. Integral to this BMAP process is the designation of important springshed protection zones called Priority Focus Areas (PFA). The PFA is essentially equivalent to the primary protection area of a springshed (Upchurch and Champion 2004). The intent of PFA's are to institute the highest protection level to these 30 important freshwater spring ecosystems within their most vulnerable springshed areas (Scott et al. 2014; Upchurch and Champion 2004).

Much of the important hydrological information collected, stored, and managed by various agencies can now be accessed through a variety of web-based databases (FDEP, 2010a; FDEP, 2010b; Silvanima et al., 2008; USGS, 2011b). Additionally, there is an extensive well monitoring database all throughout the Rainbow Springshed (FDEP, 2010a; FDEP, 2010b). Numerous entities such as FDEP, water management districts, environmental consulting firms, and university researchers are all involved in the wells monitoring throughout the springshed. Well monitoring occurs for groundwater quality and background levels, waste management facilities, drinking water, contamination sites, and private, residential and public areas. There are over 124 different wells

scattered across the Rainbow surface watershed that are undergoing various levels of sampling. No Very Intense Study Area (VISA) wells occur in the Rainbow Springshed. VISA monitoring does occur within the adjacent Silver Springs watershed. In 1994, research at groundwater wells indicated nitrate concentrations within the Rainbow Springshed as high as 5.2 mg/L (Jones et al., 1996. Appendix II).

In the past eight years, two very important deep-water wells were installed by SWFWMD adjacent to the park. These two wells are part of a groundwater monitoring system to track groundwater quality changes associated with a significant new single-family home development located immediately northeast of the park within the Primary Protection Zone of the Rainbow Springshed.

During a statewide ecosystem-level study on twelve of Florida's 1st magnitude springs, a recent water quality assessment for Rainbow summarized and analyzed the entire period of record (82 years) (WSI, 2010). This research was modeled after a similar landmark springs ecosystem study completed in the 1950s (Odum, 1957a).

During the past century, agriculture and inorganic fertilizers use have been the primary nutrient load contributors into the regional groundwater system that supplies the Rainbow River (Water and Air Research, 1991). Similarly, nutrient contamination has occurred all throughout the majority of Florida's freshwater reserves (i.e. Floridan aquifer) (Cohen et al., 2007). The visual effects that we now observe within most of Florida's spring ecosystems are the explosive growth of nuisance macro-algae and non-native plants such as hydrilla (Brown, 2010).

In 1991, SWFWMD embarked upon an effort to assess long-term trends and changes in the Rainbow's aquatic vegetative structure (Water and Air Research, 1991; Jones et al., 1996; PBS & J, 2000; PBS & J, 2007; ANAI / DCWI, 2012, Water and Air Research, 2016). This research has continued every five years since then. It has assisted managers with adaptive strategies for protection and helped them understand significant shifts in the overall health of the river. While changes in algae occurrence in the river system have been observed anecdotally for some time only the most recent two studies have documented algae cover and distribution as well as SAV (ANAI / DCWI, 2012; Water and Air Research, 2016). In 2011 and 2015 algae cover increased the further one progressed downstream from the headspring. In 2015, algae cover for the whole river was 37.5% (Water and Air Research, 2016). The greatest cover losses for SAV occurred from 2005-2011 compared to previous years. Research has also confirmed that distribution of the invasive exotic plant hydrilla has increased along the river (Cichra and Holland, 2012 and ANAI / DCWI, 2012).

Based on historic water quality data for the Rainbow Springs Group, it is estimated that an alarming 70-fold increase in nitrate concentrations may have occurred over the past 80 years (Jones et al. 1996; Farrell and Upchurch 2005). Nutrient pollution is a serious anthropogenic stressor that has a direct connection to land use activities, particularly those located within a spring's immediate recharge area (i.e. springshed). All throughout the springshed, stormwater runoff and rainfall have principally acted to move surface contaminants down through the soil. This allows them to mix with the subsurface freshwater reserves (i.e. Floridan aquifer). Groundwater residence times to the Rainbow headspring have been estimated to be no more than a few decades depending on proximity to the main pool (Jones et al. 1996; Farrell and Upchurch 2005). Both fertilizers and waste pollutants from agriculture and domestic uses are the two largest known contributors to water quality decline within the Rainbow Springshed (Jones et al.

1996; Kuphal 2005; Farrell and Upchurch 2007). Since the Floridan aquifer within the Rainbow Springshed is generally unconfined, these two non-point sources rapidly move into the groundwater and continue to artificially elevate nutrient levels.

Research has demonstrated that a complex relationship exists between increased groundwater nutrient levels and increased presence and abundance of nuisance periphyton within many of Florida's springs (Stevenson et al. 2007; Heffernan et al. 2010). Native SAV communities within Florida's springs have undergone unexplained declines in species diversity and abundance while the abundance of non-native nuisance vegetation such as hydrilla has increased (Brown 2010; Knight 2010; and ANAI / DCWI, 2012). Hydrilla has been one of the four most common SAV species observed in the Rainbow over the past 20 years. Its increased presence within the river's mid-section is of concern (PBS & J 2007). There is now a widespread recognition that nuisance periphyton increases and extreme SAV community changes are occurring in nearly all of Florida's springs. These changes are symptoms of declining spring health (Cohen 2007; Harrington et al. 2010). Two assessments of periphyton abundance have been completed on the Rainbow River (Stevenson et al. 2007; and ANAI / DCWI, 2012). During the 2007 study, *Lyngbya* was identified as the most abundant form of nuisance algae within the headspring region. The 2011 research mapped the cover of epiphytic and benthic algae.

Recreational use also has the ability to impact both water quality and SAV as sediments are disturbed and suspended and plants are uprooted or soil conditions become less favorable for native vegetation with sediment re-deposition. Because parts of the Rainbow River have a history of phosphate mining and associated soil changes some areas may be more vulnerable to disturbance and displacement of native SAV by invasive exotic aquatic plants like hydrilla. Deposition of phosphorus containing sediments in the river from historic mining appears to have produced conditions favoring exotic aquatic plants over the native aquatic vegetation (Ellis et al. 2007). Upland areas in the park where phosphatic sediments were deposited have invasive plant species displacing native vegetation. Future research may need to determine if some areas of SAV are more vulnerable due to the combined impacts of recreation and phosphatic sediments from mining.

A recent study contracted by DRP examined the impacts of recreation on water quality and plants (Cichra and Holland, 2012). As might be expected motorboats had the greatest impact on both. The authors of this work stated that tubing had little impact on the aquatic plants, however they do mention the Ichetucknee River and the successful limitation of environmental damage on that river through the application of a carrying capacity. Early research on the Ichetucknee documented the detrimental impacts of intense recreational tubing on the spring run aquatic plant beds which lead to the establishment of a carrying capacity for the river (Dutoit, 1979). Nonetheless, the Rainbow and Ichetucknee rivers differ in ways that may make the Rainbow more resilient to damage (Cichra and Holland, 2012). The Rainbow is deeper, wider, has a greater volume of flow and greater light availability all of which may benefit the native aquatic vegetation and allow it to recover more quickly. However, trends noted by other research indicate that SAV changes are occurring on the Rainbow River (ANAI / DCWI, 2012). The extent of the relationship between recreational use and the health of the river (i.e. SAV impacts) needs further investigation within the Rainbow River.

If trends of decreasing flow, increasing nutrient levels, declining water quality, increasing algae levels and increasing recreation continue, the SAV may be more heavily impacted

by recreational use. Some researchers hypothesize that as water chemistry continues to change, nitrates in particular, the effects of recreational use may correspondingly shift (Cichra and Holland, 2012; Knight, 2015). Given that the trend around the state is declining spring ecological health, more frequent monitoring of the SAV in the headspring and spring run is needed and a recreational impact study should be conducted again within 10 years.

In Marion County, nearly 75% of the overall residential population uses on-site (i.e. septic tanks) wastewater disposal systems (Kuphal 2005). Residential septic systems within the Rainbow surface watershed have been shown to influence the nitrogen levels in the river (Henigar and Ray, 1987). As this predominantly rural county continues to grow, many water scientists have voiced strong concerns about increased nitrogen loading from both septic tanks and other forms of stormwater runoff within the Rainbow Springshed (Cohen 2007; Farrell and Upchurch 2005; Farrell and Upchurch 2007). For this reason, SWFWMD has identified, prioritized and funded over 13 major water quality studies over the past 9 years. This includes stormwater retrofits that are being implemented throughout the Rainbow Springshed (SWFWMD 2008).

Potential threats to the park's water resources from significant land use development within the Rainbow Springshed will increase as new residential home sites modify rural areas into more urban landscapes. Areas specifically within any of the Primary Protection Areas (i.e. PFA) of the Rainbow Springshed should be considered a high priority for inclusion into a conservation land status. As land use shifts, it will be necessary to continue review of environmental and water use permits to agencies such as the SWFWMD.

DRP staff consistently assess all stormwater runoff from impervious surfaces throughout the park. A chronic problem area has been identified within the main headspring. Stormwater runoff in this steep, sloping area has the potential to influence water quality within the headspring. Currently, runoff is captured by a variety of structures, ranging from trench-and-culvert to capture-and-pump systems. Many of these systems are holdovers from the previous property owner. While some of these systems are operational, they may not provide the necessary water quality treatment before discharge. Furthermore, the location and functionality of some of the systems may still be questionable. This will be addressed as information becomes available and should be considered during any redesign of the parking area north of the headspring. If necessary, a master stormwater plan for the park and all of its facilities will be developed. This will incorporate existing structures where feasible.

When the state acquired Rainbow Springs, a wastewater treatment facility was located in the park. It accepted wastewater from the Rainbow Springs Estates subdivision and from facilities within the park. That treatment plant provided only secondary treatment. Effluent was sprayed onto an open upland site known to be a high recharge area for the aquifer. Fortunately, both the subdivision and the park subsequently connected with a larger, more efficient municipal facility. A spray field adjacent to the park's main campground on the east side of the river is still functioning as a wastewater facility for the park. DRP is working to connect all park facilities to municipal sewer and will abandon this facility when that becomes possible.

Hydrological Management

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

The natural hydrology of most state parks has been impaired prior to acquisition to one degree or another. Florida's native habitats are precisely adapted to natural drainage patterns and seasonal water level fluctuations, and variations in these factors frequently determine the types of natural communities that occur on a particular site. Even minor changes to natural hydrology can result in the loss of plant and animal species from a landscape. Restoring state park lands to original natural conditions often depends on returning natural hydrological processes and conditions to the park. This is done primarily by filling or plugging ditches, removing obstructions to surface water "sheet flow," installing culverts or low-water crossings on roads, and installing water control structures to manage water levels.

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

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| Action 1 | Continue to cooperate with other agencies and independent researchers regarding hydrological research and monitoring programs. |
| Action 2 | Continue monitoring of surface and ground water quality at Rainbow Springs and the tracking of water quality changes within this natural spring system. |
| Action 3 | Continue to monitor all Onsite sewage treatment and disposal systems (OSTDS's) in the park for any detrimental impacts to the water quality and if feasible connect to the municipal water treatment system. |
| Action 4 | Continue to monitor land use or zoning changes around the park's resources. |
| Action 5 | Continue to cooperate with the SWFWMD to ensure MFLs for Rainbow Spring are monitored for compliance in order to maintain historic river flows. |

The Rainbow River system is the primary hydrologic feature of the park. The following are hydrological assessment actions recommended for the park. The Division of Recreation and Parks will continue its tradition of closely cooperating with state and federal agencies and independent researchers engaged in hydrological research and monitoring programs within the park and the adjacent Rainbow River, and it will encourage and facilitate additional research in those areas. Agencies such as SWFWMD, USGS, and FDEP will be asked to keep the Division apprised of any declines in surface water quality or any suspected contamination of groundwater in the region. Additional cooperative efforts may include facilitating the review and approval of research permits and providing researchers with assistance in the field, including orientation to park resources. Recommendations derived from these monitoring and research activities will be essential to the decision-making process during management planning.

The Division should encourage Rainbow Springshed delineation, especially within its undefined eastern boundary. The Division should support all springshed research, including dye trace work that will help to understand groundwater sources of this important spring group. Previous dye trace studies in other managed springsheds have

provided park management with invaluable information about the various sources of the springs and the timing of surface to groundwater interactions that potentially affect important surface water bodies.

Staff will continue to monitor land use or zoning changes within the landscape bordering the parks resources. Additionally, staff will continue to review comprehensive plan amendments and land development regulations that may govern proposed land use changes on properties adjacent to the park.

Any major ground disturbances in that area, or any runoff into the main headspring of the park, could seriously degrade the quality of its resources. Whenever possible, staff will provide comments to other agencies regarding proposed changes in land use or zoning. In addition, staff will closely monitor all mining operations within the springshed for significant changes that may adversely affect the parks natural resources. Staff should also work with the appropriate entities to determine the flow of stormwater within the footprint of the former attraction at the park. Because this area was constructed years before acquisition by the state there may be unknown drainage systems that contribute stormwater to the spring run.

Division staff will continue to work closely with the SWFWMD to ensure that MFLs developed for the Rainbow Springs Group are implemented and that its historic spring flows are protected. Additionally, the Division continue to cooperate with all work related to SWIM planning efforts for the priority waterbodies within the Springs coast region, including Rainbow Springs.

Objective B: Monitor and evaluate the natural hydrological conditions and functions within the headspring and improve approximately 0.1 discontinuous acres of spring-run stream natural community.

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| Action 1 | District and park staff will design and implement a monitoring plan to track changes in the submerged aquatic vegetation health of the spring run. |
| Action 2 | Develop a plan for experimental plantings of key species of submerged aquatic vegetation in the spring and spring run stream in areas that have experienced loss. Implement the plan if need is indicated. |

Division staff will work closely with the Aquatic Preserve staff and SWFWMD to assess any hydrological impacts and address any water quality or quantity issues that have caused degradation of the Rainbow spring-run community. They will also continue its cooperation with the Aquatic Preserve staff to control hydrilla proliferation in this system.

In addition, staff will continue to respond to all water quality impacts known to stem from the location or design of park facilities, and mitigate those impacts using the best available options for remediation. When feasible the park should connect the campground sewage treatment system to a municipal sewer system.

To protect the Rainbow Spring run habitat and SAV the Division should track impacts to the spring run plant beds more frequently. The results of the Rainbow River Vegetation Evaluation ongoing research from the SWFWMD (ANAI / DCWI, 2012) indicated continued degradation of the SAV in the Rainbow spring run. From 1996 – 2011 the cover of invasive exotic plants and the amount of bare area have increased. Recreation

levels and nitrate and nutrient concentrations have also increased.

To proactively protect this natural resource the Division should continue to strengthen partnerships with stakeholders to conduct reoccurring assessments of the visitor use impacts on the natural resources of the river system, similar to Cichra and Holland (2012) and the SWFWMD's submerged aquatic vegetation analyses (Water and Air Research, 1991; Jones et al., 1996; PBS & J, 2000; PBS & J, 2007; ANAI / DCWI, 2012). This should reoccur on a five-year interval. In addition, the Division needs annual data that will permit greater adaptive management to prevent negative changes to this system. Changes to SAV in spring-run systems can occur quickly. District and park staff will collaborate with the Aquatic Preserve to design and implement a monitoring plan to track changes in the SAV health of the spring run.

If data indicate that the natural resources of the park's headspring and spring run are becoming significantly degraded recreational carrying capacities may need to be implemented in the future to protect them from further damage.

Aquatic plant beds adjacent to and downstream of the designated swimming areas, the headsprings canoe launch, the tube launch and landing facility will be monitored for negative impacts and, if necessary, may require restoration plantings and continuous removal of hydrilla if re-infestation occurs. Park and District staff will collaborate with the Aquatic Preserve staff and the FWC's Wildlife and Invasive Plant Management bureau to control hydrilla in these areas. Within the next ten years, staff will examine the feasibility of conducting experimental SAV plantings of key species at sites where significant damage might be occurring.

Objective C: Monitor and evaluate impacts associated with soil erosion at Rainbow Springs State Park.

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| Action 1 | Perform dye trace or appropriate studies around the headspring to determine the stormwater flows within the developed uplands, particularly the former attraction. |
| Action 2 | Develop and implement a plan to control erosion within the headspring and "Bowl" day use area. |
| Action 3 | Remove excess headspring parking areas, associated impervious surfaces and revegetate to improve water infiltration. |

Several areas within the park continue to experience significant erosion and sedimentation despite past corrective measures enacted by district and park staff. In that respect, the Division will investigate best management options to continue to monitor public access at visitor access points such as the main headspring, canoe launch area, and the overall tubing facility put-in and take-out locations. The following are hydrological restoration actions recommended for the park.

Areas of the park subject to significant erosion will be monitored, specifically within the headspring area. The area around the headspring which is referred to as "The Bowl", is heavily used particularly during the summer months and is subject to erosion as grass cover diminishes. The canoe/kayak concession area is subject to heavy foot traffic and erosion also. Unauthorized foot traffic along the riverbanks can also greatly exacerbate soil disturbance.

Park management will pursue corrective measures to prevent soil erosion or other

impacts to water resources in these areas. The district and park staff will monitor stormwater runoff from the walkways and other impervious surfaces on slopes above the headsprings to determine the function and extent of the existing underground drainage system. Many of these walkways channel runoff from slopes above the springs into a passive underground drainage system. If any portion of this system is discovered to allow leakage into the headsprings, the Division will develop corrective plans.

Impervious surfaces in excess parking areas will be removed to improve infiltration and the area will be revegetated. Additional vegetative terracing or plantings may also be designed and constructed to slow stormwater and minimize erosion during heavy rain events. Stormwater will be diverted as much as possible away from the headspring and into surrounding woodlands to encourage natural infiltration. If necessary, modifications will be made to the walkways or drainage system to meet current water quality standards.

Staff will evaluate other past alterations of the natural hydrological systems of the park and will initiate restoration measures when they are deemed necessary. Restoration may include back filling of old fire plow scars that may be causing significant hydrological changes in wetland communities. Staff will also evaluate service roads that cut through wetlands and roads that traverse mesic flatwoods to determine possible effects on natural hydrological patterns and water quality. Management measures to preserve natural hydrology and water quality or to correct problem areas may include the installation of low water crossings or culverts in appropriate locations.

Natural Communities

This section of the management plan describes and assesses each of the natural communities found in the state park. It also describes of the desired future condition (DFC) of each natural community and identifies the actions that will be required to bring the community to its desired future condition. Specific management objectives and actions for natural community management, exotic species management, imperiled species management and restoration are discussed in the Resource Management Program section of this component.

The system of classifying natural communities employed in this plan was developed by the Florida Natural Areas Inventory (FNAI, 2010). The premise of this system is that physical factors such as climate, geology, soil, hydrology and fire frequency generally determine the species composition of an area, and that areas that are similar with respect to those factors will tend to have natural communities with similar species compositions. Obvious differences in species composition can occur, however, despite similar physical conditions. In other instances, physical factors are substantially different, yet the species compositions are quite similar. Some physical influences, such as fire frequency, may vary from FNAI's descriptions for certain natural communities in this plan.

When a natural community within a park reaches the desired future condition, it is considered to be in a "maintenance condition." Required actions for sustaining a community's maintenance condition may include, maintaining optimal fire return intervals for fire dependent communities, ongoing control of non-native plant and animal species, maintaining natural hydrological functions (including historic water flows and water quality), preserving a community's biodiversity and vegetative structure, protecting viable populations of plant and animal species (including those that are

imperiled or endemic), and preserving intact ecotones linking natural communities across the landscape.

The park contains 10 distinct natural communities as well as altered landcover types and developed areas (see Natural Communities Map). A list of known plants and animals occurring in the park is contained in Addendum 5.

Upland Hardwood Forest

Desired future condition: Mature, closed canopy hardwood forest typically occurring on slopes and rolling hills with generally mesic conditions. Overstory tree species may consist of southern magnolia (*Magnolia grandiflora*), sweetgum (*Liquidambar styraciflua*), live oak (*Quercus virginiana*), laurel oak (*Quercus laurifolia*) and swamp chestnut oak (*Quercus michauxii*). Understory species will include trees and shrubs such as American holly (*Ilex opaca*), flowering dogwood (*Cornus florida*), eastern redbud (*Cercis canadensis*), red bay (*Persea borbonia*), horse sugar (*Symplocos tinctoria*), and beautyberry (*Callicarpa americana*). Ground cover will be comprised of shade tolerant herbaceous species, sedges and vines.

Description and assessment: Much of the upland hardwood forest area has been impacted either by development of phosphate mining. The canopy currently consists primarily of live oak, southern magnolia, laurel oak and sweetgum with the understory species mentioned above.

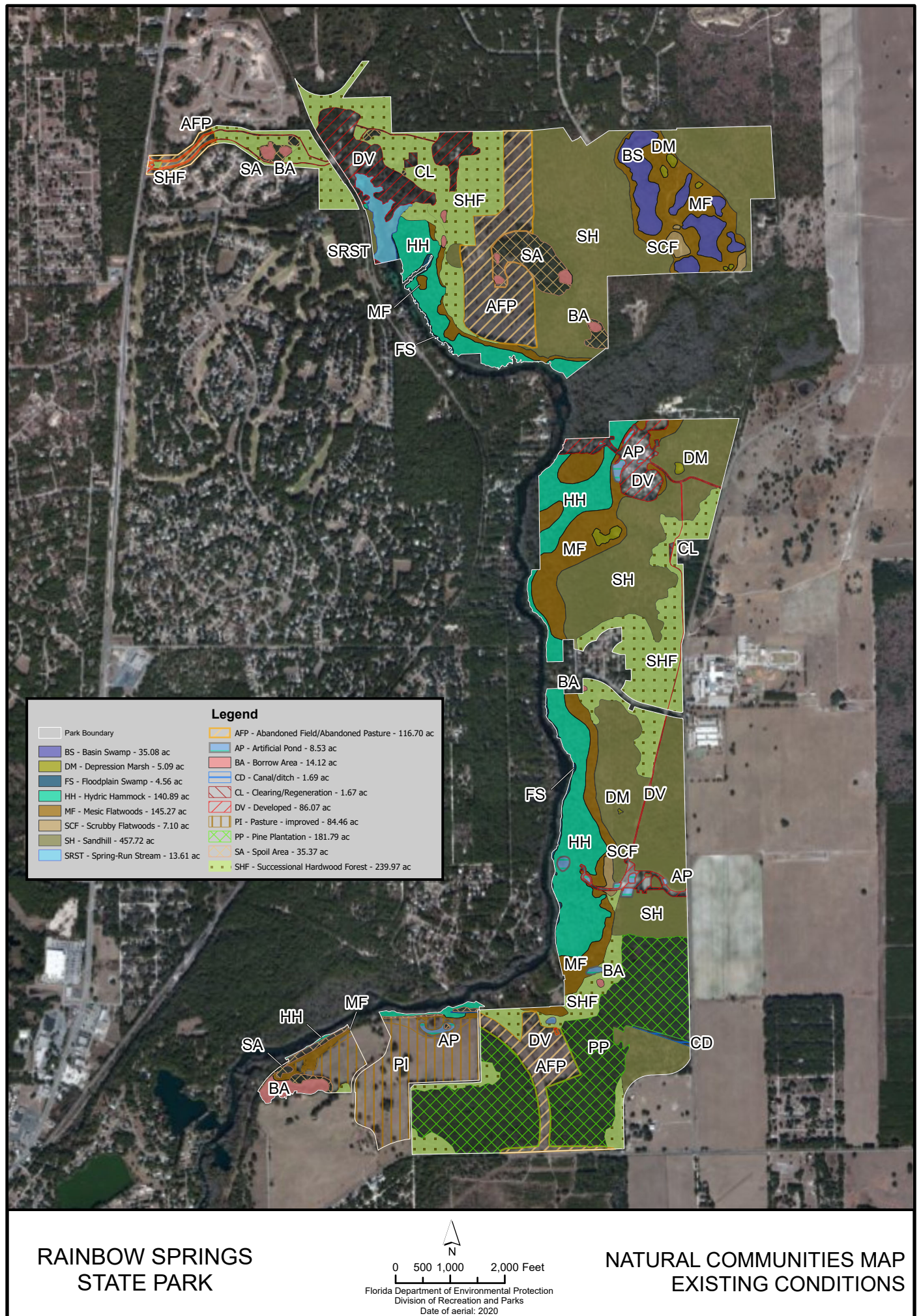
General management measures: Management of this natural community in the park consists primarily of controlling invasive exotic plant species.

Mesic Flatwoods

Desired future condition: Dominant pines will usually be longleaf pine (*Pinus palustris*). Native herbaceous groundcover should be over at least 50 percent of the area and primarily less than 3 feet in height. Saw palmetto (*Serenoa repens*) will comprise no more than 50 percent of total shrub species cover and are less than 3 feet in height. Shrub species include saw palmetto, gallberry (*Ilex glabra*), fetterbush (*Lyonia lucida*), runner oak (*Quercus elliotii*), dwarf live oak (*Quercus minima*), shiny blueberry (*Vaccinium myrsinites*), and dwarf huckleberry (*Gaylussacia dumosa*). Shrubs are generally knee-high or less, and there are few if any large trunks of saw palmetto along the ground. The Optimal Fire Return Interval for this community is 1-3 years.

Description and assessment: The best example of mesic flatwoods occurs in the northeastern portion of the property in association with the basin swamps and depression marshes that drain towards the Indian Creek Bottoms. The mesic flatwoods are located along an elevation gradient between the downslope depression marshes and basin swamps and the upslope scrubby flatwoods and sandhills. A narrow band of mesic flatwoods also occurs as a transition zone on slopes parallel to the river between the sandhill and hydric hammock communities. This transition zone is broadest in the area of the campground. Isolated patches of mesic flatwoods also occur within the hydric hammock.

The longleaf and slash pine overstory of the mesic flatwoods was logged in the past, leaving an artificially low density of mature pines. The herbaceous component of the community seems to be relatively intact with a healthy population of wiregrass (*Aristida beyrichiana*) on site. Several old fire plow scars and abandoned roads dissect the mesic



flatwoods, but they do not appear to have altered the hydrology greatly. The community appears to be in good condition despite past disturbances.

General management measures: Additional prescribed fires and replanting with longleaf pines should suffice to restore much of this community. Some areas south of the campground may require some removal of offsite hardwoods to open up the canopy and allow prescribed fires to penetrate.

Sandhill

Desired future condition: Dominant pines will usually be longleaf pine (*Pinus palustris*). Herbaceous cover is 80 percent or greater, typically of wiregrass (*Aristida beyrichiana*), and is primarily less than 3 feet in height. In addition to groundcover and pines characteristics, there will be scattered individual trees, clumps, or ridges of onsite oak species (usually turkey oaks (*Quercus laevis*), sand post oak (*Quercus margaretta*), and blue-jack oak (*Quercus incana*)). In old growth conditions, sand post oaks are commonly 150-200 years old, and some turkey oaks are over 100 years old. The Optimal Fire Return Interval for this community is 1-3 years.

Description and assessment: The sandhill natural community occurs throughout the xeric uplands of the park. Most of the sandhills are in good shape, but they have suffered from past fire exclusion. Before state acquisition, the last fires in the northern sandhills occurred in the late 1970s. It is likely that much, if not all, of the area was clear-cut at some point. The herbaceous plant diversity has probably decreased through the years because of fire exclusion and low intensity cattle grazing. Despite these impacts, most of the sandhills remain in relatively good condition due to natural regeneration of longleaf pines and the presence of a relatively intact herbaceous layer.

The sandhills in the best condition are located on both sides of the mesic flatwoods in the northeastern part of the park, to the east of the large pasture. Another area in good condition lies to the east and south of the campground. These intact sandhill communities support a variety of wildlife species including several rare and threatened species such as indigo snakes (*Drymarchon couperi*), gopher tortoises (*Gopherus polyphemus*), Florida mice (*Peromyscus floridanus*), southeastern fox squirrels (*Sciurus niger niger*), Florida pine snakes (*Pituophis melanoleucus mugitus*), and gopher frogs (*Lithobates capito*). Unfortunately, few natural sandhill areas remain outside the park to support these populations.

Several sandhill areas just west of the northern pastures have endured a relatively long period of fire exclusion; these areas have been extensively invaded by laurel oaks and other non-fire-adapted species and are only in fair condition. The small area of sandhill northeast of the parking lots is in poor condition. A small remnant area of sandhill in poor condition also occurs on the west bank of the Rainbow River south of the old Village Café building.

Remnants of the sandhill community also exist along the entrance drive. Much of this area has suffered from phosphate mining or has succeeded to successional hardwood forest, making restoration more problematic. Initial sandhill restoration efforts along the entrance drive have included hardwood removal and the reintroduction of fire.

Parts of the northern sandhill community were mined for phosphate within and to the east of the large pasture area. Several deep pits remain, surrounded by extensive spoil

areas of the Candler Clay Overwash soil type. These areas lack wiregrass and other species characteristic of sandhills and are dominated by mesophytic oaks and weedy invader species. The areas covered by phosphate tailings will be more difficult to reclaim as sandhill because of the massive soil disturbance and the high density of offsite vegetation. These areas are classified as spoil areas.

At the southern end of the park, most of the Griffiths Addition of the park was formerly sandhill. Unfortunately, past land use practices have negatively affected much of the community, and it is now considered to be in poor condition. Native longleaf pine was logged in the late 1970s and offsite sand pines were planted over most of the sandhills in the early 1980s. The resulting plantation was harvested in the mid-1990s. Pinecones that remained after logging facilitated sand pine regeneration over much of the area, and the sandhills are again dominated by off-site sand pines. The exotic cogongrass (*Imperata cylindrica*), which likely expanded onto the property from adjacent road shoulders, has invaded the sandhills. Logging of the sand pine plantation increased the extent of the cogongrass infestation. However, the sandhills still retain patches of wiregrass and other native groundcover species in areas not shaded by dense stands of sand pines or infested by cogongrass. These patches contain scattered gopher tortoise burrows. The eastern indigo snake has been found there also.

General management measures: Restoration of disturbed sandhills within the park and acquisition of adjacent sandhill habitats remain a priority at Rainbow Springs. Sandhill sites that retain native groundcover will receive a higher priority for restoration than degraded sites now devoid of characteristic species. Additional lightning season fires will no doubt continue to improve the sandhills that in are in fair to good condition. Some sandhills will need additional offsite hardwood removal to improve conditions for prescribed burning and recovery of native groundcover. The areas converted to pastures will require more extensive restoration actions, including the removal of pasture grasses, planting of longleaf pines, and restoration of groundcover species.

The Griffiths Addition requires a phased removal of the sand pine plantation. Continued treatment of the remaining cogongrass patches will be an important part of the restoration of this area. As sand pines are removed, longleaf pines will be planted in their place and prescribed fires will be reintroduced. Care will be taken to protect the remaining patches of native groundcover and resident gopher tortoises and their burrows. Plugging or direct seeding of native groundcovers may be required in some areas depending on what species respond to the sand pine removal and burning.

Scrubby Flatwoods

Desired future condition: Dominant tree species of the interior will usually be longleaf pine (*Pinus palustris*). Mature sand pines (*Pinus clausa*) will typically not be present. There will be a diverse shrubby understory often with patches of bare white sand. A scrub-type oak "canopy" will vary in height from 3 – 8 feet and there will be a variety of oak age classes/heights across the landscape. Dominant shrubs include sand live oak (*Quercus geminata*), myrtle oak (*Quercus myrtifolia*), Chapman's oak (*Quercus chapmanii*), saw palmetto (*Serenoa repens*), rusty staggerbush (*Lyonia ferruginea*), and tarflower (*Bejaria racemosa*). Cover by herbaceous species is often well below 40 percent. The Optimal Fire Return Interval for this community is regionally variable. Areas may be burned as frequently as every 3-8 years when burn prescriptions are designed to achieve a mosaic of burned and unburned areas.

Description and assessment: The scrubby flatwoods at Rainbow Springs are located in the northeastern part of the property and within the Griffiths Addition, slightly upslope of the mesic flatwoods. Although limited in size, these areas contribute to the diversity of the park. As in the mesic flatwoods, it is apparent that the scrubby flatwoods have endured logging activities and fire exclusion in the past. Fire plow scars are also evident. In general, the scrubby flatwoods are in fair to good condition.

General management measures: The application of prescribed fire at proper intervals should suffice to restore the scrubby flatwoods. In the southern end of the park, some hardwood removal may also be necessary.

Sinkhole

Desired future condition: Sinkholes are characterized by cylindrical or conical depressions with limestone or sand walls. Sinkholes do not contain standing water for long periods as do Sinkhole Lakes. Depending upon the age of the sinkhole, the vegetation of sandy sinkholes may represent a well-developed forest including southern magnolia (*Magnolia grandiflora*), sweetgum (*Liquidambar styraciflua*), wax myrtle (*Myrica cerifera*), grape vines (*Vitis* spp.), Virginia creeper (*Parthenocissus quinquefolia*), water oak (*Quercus nigra*) and pignut hickory (*Carya glabra*). Sinkholes with vertical limestone walls may be covered by a variety of mosses, liverworts, ferns and small herbs. Sinkholes will generally have a very moist microclimate due to seepage and being buffered by the lower elevation and a tree canopy. Desired future conditions include limiting unnatural erosion and protecting the microclimate from disturbance.

Description and assessment: Small sinkholes occur within the northern end of the park. The sinkholes are widely scattered and appear to be in good condition.

The park is riddled with phosphate pits that superficially resemble sinkholes. Many of these pits are relatively old and contain mature trees. They may easily be mistaken for true sinkholes. Close inspection, however, reveals earthen ramps leading into the pits and spoil piles around their rims. Many of these pits receive runoff from the surrounding uplands.

General management measures: Sinkholes will be protected from erosion due to foot traffic and stormwater runoff.

Basin Swamp

Desired future condition: Basin swamps are forested basin wetlands that are highly variable in size, shape and species composition and will have an extended hydroperiod typically 200-300 days. While mixed species canopies are common, the dominant trees will be pond cypress (*Taxodium ascendens*) and swamp tupelo (*Nyssa sylvatica biflora*). Other canopy species can include slash pine (*Pinus elliottii*), red maple (*Acer rubrum*), dahoon holly (*Ilex cassine*), sweetbay (*Magnolia virginiana*), loblolly bay (*Gordonia lasianthus*), and sweetgum (*Liquidambar styraciflua*). Depending upon fire history and hydroperiod, the understory shrub component can be throughout or concentrated around the perimeter. Shrub species can include a variety of species including Virginia willow (*Itea virginica*), swamp dogwood (*Cornus foemina*), wax myrtle (*Myrica cerifera*), and titi (*Cyrilla racemiflora*). The herbaceous component is also variable and may include a wide variety of species such as maidencane (*Panicum hemitomon*), ferns, arrowheads (*Sagittaria* spp.), lizard's tail (*Saururus cernuus*), false nettle (*Boehmeria cylindrica*), and

sphagnum moss (*Sphagnum* spp.). Soils will be typically acidic, nutrient poor peats often overlying a clay lens or other impervious layer.

Description and assessment: A number of basin swamps are located in the northeastern part of the park, surrounded by mesic flatwoods. Pond cypress is the dominant tree. Superficially, the basin swamps of the park resemble domes, another natural community. However, their irregular, elongate shapes distinguish them from the more circular domes. It is likely that, during periods of exceptionally high rainfall, these swamps are hydrologically connected, by surface water flow, with the Indian Creek bottomlands to the south.

Historically, these areas were probably logged, either selectively or by clear-cut. However, the second growth cypress is well established and most of these swamps are in good condition. A boundary road or firebreak along the south fence line bisects one basin swamp. A second road with fire plow scars skirts the northern edge of the same basin swamp, but the disturbance is not as substantial. Soil disturbance from feral hog rooting has also impacted the basin swamps. The basin swamp in zone RS-2C has a recently discovered population of the Category I invasive exotic plant, giant Salvinia (*Salvinia molesta*).

The basin swamps are reported to host a variety of amphibians and are critical breeding habitat for many of those species. The gopher frog (*Lithobates capito*), a species of special concern, has been recorded in at least one of the basin swamps.

General management measures: Maintenance of a natural hydroperiod is essential for the preservation of these basin swamps and the species that depend upon them. Prescribed fires should be allowed to burn into the edges of the basin swamps during wet periods to reestablish a more natural ecotone between the mesic flatwoods and the basin swamps. Continue to control giant Salvinia in cooperation with FWC.

Depression Marsh

Desired future condition: Emergent herbaceous and low shrub species will be dominant over most of the area with open vistas. Trees are few and if present, will occur primarily in the deeper portions of the community. There is little accumulation of dead grassy fuels due to frequent burning; one can often see the soil surface through the vegetation when the community is not inundated. Dominant vegetation in depression marsh include maidencane (*Panicum hemitomon*), panic grasses (*Panicum* spp.), cutgrass (*Leersia* sp.), pickerelweed (*Pontederia cordata*), arrowheads (*Sagittaria* sp.), buttonbush (*Cephalanthus occidentalis*), St. John's wort (*Hypericum fasciculatum*), and coastalplain willow (*Salix caroliniana*). The Optimal Fire Return Interval for this community is 2-10 years depending on fire frequency of adjacent communities.

Description and assessment: Several depression marshes of various sizes are located in the eastern and southern areas of the park. The grass-dominated marshes often contain open water, especially when rain has fallen recently. Hardwood encroachment into the marshes is not severe and should be easily controlled when the surrounding mesic flatwoods and sandhills are burned. The depression marshes are in good condition, although most show some adverse impacts from feral hogs.

General management measures: Control of feral hogs and restoration of a natural fire regime are the primary management measures for the depression marshes. In some

cases, removal of hardwoods or invading loblolly pines may be necessary to improve the condition of certain depression marshes in the park.

Floodplain Swamp

Desired future condition: Floodplain swamps are a frequently or permanently flooded community in low-lying areas along streams and rivers. Soils will consist of a mixture of sand, organics and alluvial materials. Closed canopy will typically be dominated by bald cypress (*Taxodium distichum*) but commonly includes tupelo species (*Nyssa* spp.) as well as water hickory (*Carya aquatica*), red maple (*Acer rubrum*) and overcup oak (*Quercus lyrata*). Trees bases are typically buttressed. Understory and groundcover will be typically sparse.

Description and assessment: A thin band of floodplain swamp lies between the Rainbow River and the hydric hammock that parallels the river. An additional finger of floodplain swamp extends from the river into the hydric hammock for approximately 700 feet, appearing as a narrow depressional system. The floodplain swamps of the park lack the cypress overstory characteristic of this natural community. Past logging practices and alterations of the natural hydroperiod of the river may explain this apparent aberration. The floodplain swamp is considered to be in good condition.

General management measures: Protection of the floodplain swamps from exotic plants and feral hogs will be necessary.

Hydric Hammock

Desired future condition: Hydric hammock is a closed canopy, evergreen hardwood and/or palm forest with a variable understory dominated by palms, with sparse to moderate ground cover of grasses and ferns. Typical canopy species will include laurel oak (*Quercus laurifolia*), cabbage palm (*Sabal palmetto*), live oak (*Quercus virginiana*), sweetbay (*Magnolia virginiana*), swamp tupelo (*Nyssa sylvatica biflora*), American elm (*Ulmus americana*), red maple (*Acer rubrum*) and other hydrophytic tree species. Soils are poorly drained, with a normal hydroperiod seldom over 60 days per year. Hydric hammock should occasionally burn by allowing fires to naturally burn across ecotones from fires originating in adjacent upland natural communities.

Description and assessment: Hydric hammock occurs in the lowlands along the east bank of the Rainbow River. The hydric hammock community shares many characteristics and species with the bottomland forest and the floodplain swamp communities. One primary difference between these communities is the frequency and source of flooding. River flooding typically inundates bottomland and alluvial forests, while hydric hammocks receive hydrologic input from groundwater seepage and rainfall (Vince et al. 1989).

Historically, the lowland forests along the Rainbow River may have flooded at regular intervals. However, the construction of the dam across the Withlacoochee River, forming Lake Rousseau, may have stabilized any natural fluctuations in the levels of the Rainbow River. The primary hydrologic inputs appear to be groundwater seepage from the adjacent spring-run stream, rainfall, and runoff from the uplands.

Alteration of the natural hydroperiod of the river has had an undetermined impact on the natural communities along the river. Much of the hydric hammock remains in fair to good condition, although feral hogs have severely impacted many areas. Phosphate mining

within the hydric hammock has had severe localized impacts on the community. The presence of pits, spoil piles, and mine tailings has permanently altered portions of this community. These areas, where identified, are classified as spoil areas.

General management measures: Control of feral hogs and exotic plants are primary management measures for hydric hammocks. Care must also be taken to prevent stormwater runoff from developed areas or roads impacting adjacent hydric hammocks.

Spring-Run Stream

Desired future condition: Spring-run streams are perennial watercourses that derive most, if not all, of their water from limestone artesian openings from the underground aquifer. The waters will be typically cool, clear, and circumneutral to slightly alkaline with nitrate levels of 0.01 mg/L. These factors allow for optimal sunlight penetration and minimal environmental fluctuations that promote plant and algae growth. However, the characteristics of the water can change significantly downstream as surface water runoff becomes a greater factor. Areas of high flow will typically have sandy bottoms while organic materials concentrate around fallen trees and limbs and slow-moving pools. Typical vegetation will include tapegrass (*Vallisneria americana*), arrowheads (*Sagittaria* spp.), southern naiad (*Najas guadalupensis*), and pondweeds (*Potamogeton* spp.).

Description and assessment: Rainbow River is one of the largest spring-fed rivers in Florida. The headsprings are the fourth largest first magnitude spring group in the state (Rosenau et al. 1977). The park extends about one-third of a mile south along the west bank of the river and about 1.1 miles south along the east bank of the river to the Gissy property. Then there is a quarter mile gap in public ownership along the east bank to a point just north of the campground. From the campground, park property runs another 2 miles south along the eastern shoreline, with two private inholdings occupying about 0.4 miles of that shoreline. The sovereign lands below mean high water of the headsprings are included within the boundary of Rainbow Springs State Park. The remainder of the spring and river is also included in the Rainbow Springs Aquatic Preserve.

Two major side springs and their spring runs occur on the east side of the headsprings, Bubbling Springs to the south, and an unnamed sand boil spring to the north. Bubbling Springs has a rocky limestone pavement around the main vents, while the unnamed spring has a predominately sandy bottom. A large, deep basin occurs along the west bank just north of the property's south boundary. Although it superficially resembles a large side spring, no vent is visible in the floor of the basin. While some natural process may have scoured it out, it is possible the basin was dredged or mined in the past.

Several docking structures associated with the old Rainbow Springs attraction remained in the headspring area after state acquisition. Both occurred on the west bank and consisted of large fiberglass-coated steel pilings that were sunk into the substrate. A concrete bulkhead was located by the northernmost set of pilings. A covered wooden structure near the Village Café was associated with the pilings to the south. These structures have been adapted for support of a swimming access platform to the north and a canoe launch facility at the Village Café site to the south.

The aquatic plant beds in the headsprings of the Rainbow River have been adversely affected by factors such as decreased water clarity, increased nitrate levels, and high public use. Fortunately, despite steadily increasing recreational use of the headsprings over the past twenty years, the spring waters continue to exhibit a high degree of clarity (Anastasiou, 2006). Increasing nitrate levels in the river and in individual springs are

reasons for concern, however, and rapid development in the recharge areas of Rainbow Springs will likely cause these trends to continue. The water quality of the Rainbow spring run stream has been declared impaired.

October 1991 aerial photographs showed about 36 percent of the headspring was lacking vegetative cover. Since then boats, except canoes and kayaks, scuba divers and tubers have been excluded from the headspring. A defined swimming area also has been designated. These actions have improved the cover of the submerged aquatic vegetation in the headspring except within the designated swimming area. Within its boundaries a loss of sediments, resulting in exposure of the underlying bedrock in many areas and an almost complete loss of aquatic vegetation, has occurred.

Recreational use continues to have a detrimental impact on the aquatic plant beds and the spring run. In water depths of less than five feet, tubing, swimming and boating extensively damage the plant beds in the spring run and spring bottom. In shallower water increased numbers of tubers continue to damage submerged aquatic vegetation primarily when they drag their feet or exit tubing areas. Water clarity at the headspring is good but is degraded downstream due at least in part to disturbance of sediments.

Stormwater runoff from adjacent uplands can also affect water quality. Restoration of shoreline vegetation and construction of vegetated berms by Aquatic Preserve and Park staff have mitigated these impacts to some extent. Additional areas would benefit from the construction of small vegetated berms or other methods of stormwater mitigation. It needs to be determined if an existing underground drainage system also contributes stormwater to the system.

General management measures: Management of complex aquatic systems is a difficult task. Since many impacts to the spring-run stream originate outside the park boundary in the groundwater sources, management must necessarily extend outside the park boundary. Protection of the Rainbow River Springshed is a priority. The park and district staff will continue to work with the Rainbow Springs Aquatic Preserve, Florida Springs Institute, SWFWMD and the numerous researchers that are conducting hydrological projects associated with the river and the springshed. Continued monitoring of vegetation transects by SWFWMD will be encouraged to track changes in aquatic plant coverage and diversity.

Water quality impacts to the Rainbow are primarily due to elevated nutrients, which originate mainly outside the park, and turbidity which is related to recreational use and possibly some runoff. A potential contribution to the nutrients in the river is the wastewater treatment system and sprayfield associated with the campground. A long-term goal is to remove this system and connect to city sewer when it becomes available. As an interim measure any septic tanks should be advanced aerobic treatment if they are not connected to the package plant. Foot traffic by tubers and other recreational users uproot vegetation and disturb the stream bed. Proactive protection of the submerged aquatic vegetation from turbidity, physical disturbance and nutrient impacts is a high priority.

Aquatic Cave

Desired future condition: Caves are characterized as cavities below the ground surface in karst areas, a cave system may contain portions classified as terrestrial caves and portions classified as aquatic caves. The latter vary from shallow pools highly susceptible to disturbance, to more stable, totally submerged systems. Desired future conditions

include protecting against alterations that may increase pollution in aquatic systems.

Description and assessment: Although none of the spring vents within Rainbow Springs State Park are large enough to allow human access and exploration, there are undoubtedly large underground conduits feeding the springs. These conduits within the Floridan aquifer are considered aquatic caves and are of unknown extent within the park. Since they are undisturbed, their condition is assumed excellent.

General management measures: Protection of the springshed of Rainbow Springs from excessive groundwater withdrawals and contamination are important management measures for the aquatic caves as well as the spring-run stream. However, most of the springshed for Rainbow Springs lies outside the park boundary. As with the spring-run stream, park staff will continue to work with other agencies and researchers on issues that extend beyond the park boundary. The Rainbow Springshed Priority Focus Area (refer to Map?) indicates land that has high aquifer recharge necessary for springs protection that should be placed in conservation status and can aid agencies' collaboration to achieve that aim. Current research projects include dye trace mapping to determine the extent of the springshed reach. Erosion of the slopes above the headspring must also be monitored and corrected to prevent siltation of the aquatic caves.

Altered Landcover Types

Abandoned Field/Abandoned Pasture

Most of the highly disturbed areas in the northern end of the park were originally sandhills, including all of the pastures (management zones RS-1D and RS-1E) and the entrance drive (management zone RS-1A). These areas are in very poor condition, but they are restorable with the possible exception of RS-1A. The pasture areas in 1D and 1E that are surrounded by good sandhills will be require removal of the exotic pasture grasses. Several areas within the pastures have been planted with longleaf pines. Some of the Griffitts Addition sandhills were converted to improved pasture in 1972-73. The main pasture area, in management zone RS-5E, is located near the old horse stable, which is adjacent to the former Canal Authority property where pasture grasses also dominate. The desired future condition of these pastures is mostly sandhill with possibly some mesic flatwoods.

Borrow Area

At least nine significant borrow areas exist at the park. Most or all of these are the result of former phosphate mining prior to the establishment of the park. Many of the pits are associated with spoil piles excavated during mining. Invasive exotic plants have colonized these sites. Japanese climbing fern (*Lygodium japonicum*) is found in the pits.

Canal/Ditch

At least two substantial ditches occur on the park in association with abandoned railroad right-of-ways. A deep ditch is located in zone 5H within a band of mesic flatwoods near the edge of the Rainbow River on the Griffitts Addition. Another deep ditch that was presumably associated with a rail line or tram road is found along the eastern end of the boundary between zones 5C and 5D on the Griffitts Addition. In zones 6A and 6C the rail

bed is raised above the topography of the flood plain. Hydrological restoration needs for these areas will need to be determined and the appropriate natural community desired future condition of the ditches would be determined at that time.

Clearing

Areas within the park were cleared in the past for various reasons. At the northern end of the gardens, a sewage package plant was in operation until after state acquisition. When municipal sewage became available to the park and surrounding private development, the package plant was dismantled and removed. Another clearing is located south of the campground along the tram road adjacent to a private parcel.

Developed

Rainbow Springs State Park contains a large developed area associated with the former tourist attraction. This area has numerous buildings and other structures, including abandoned animal cages and waterfalls. In addition to the buildings associated with the tourist attraction at the headsprings, there are parking lots, staff residences, a shop complex, and a greenhouse. Most of the developed area was probably once sandhill or upland hardwood forest.

Another remnant of the old Rainbow Springs tourist attraction is the large ornamental garden on the slopes above the headsprings. Some native species remain on site, primarily tree species. Most of the ornamental plants used in the gardens are either native to Florida or are non-invasive exotic species. A large number of Asian azaleas (*Rhododendron* sp.) are present. Some exotic ornamentals that aggressively invade natural areas, such as Japanese honeysuckle (*Lonicera japonica*), white flowered tradescantia (*Tradescantia fluminense*) and coral ardisia (*Ardisia crenata*) are also present. Another exotic, the air potato (*Dioscorea* spp.) spread throughout much of the gardens and surrounding areas during the two decades of neglect prior to state acquisition. The most insidious threat, skunk vine (*Paederia foetida*) is established in the gardens and surrounding areas and poses the greatest threat to adjacent natural areas.

The park also includes a campground that was originally developed in the early 1970s. The campground was expanded and re-developed by the Division in 2008. In 2006 a tuber exit facility was constructed at the north end of the Griffiths Addition. The development mainly impacted the sand pine plantation, although a number of gopher tortoises did have to be relocated onsite. A tram road was constructed at the same time to link the campground with the tuber exit facility. Although the tram road was located on an existing service road, the surrounding sandhill was peripherally impacted by the road construction and stormwater retention ponds. The Griffiths Addition also includes an old horse stable that was constructed in 1972-73 according to aerial photography.

Many exotic control efforts in the park also have occurred in developed areas within and adjacent to the gardens and parking lots. These areas have had the highest concentrations of exotics and their control may help prevent large-scale invasions of the adjacent hydric hammock and sandhill. Priority invasive plant species (FLEPPC Category I and II species) will be removed from all developed areas. Other management measures in developed areas include proper stormwater management and development guidelines that are compatible with prescribed fire management in adjacent natural areas.

Impoundment/Artificial Pond

At least one depression marsh appears to have been modified into a permanent pond. This pond lies just north of the old horse stable on the Griffiths Addition and appears to have been modified around early 1972 based on aerial photography. At least two phosphate pits contain permanent water bodies and are also classified as artificial ponds. Several stormwater retention ponds were installed during construction of the tuber exit facility, tram road and campground redevelopment.

Pasture - Improved

Areas of former sandhill and mesic flatwoods in the Rainbow River Ranch parcel are improved pasture. The predominant pasture grass is Bermudagrass (*Cynodon dactylon*). Cogongrass (*Imperata cylindrica*) and sweet tangle head (*Heteropogon melanocarpus*) are invading the edges from infested road shoulders. Control of exotic pasture grasses like Bermuda grass (*Cynodon dactylon*) is ongoing at the Rainbow River Ranch in preparation for native groundcover restoration in conjunction with the submerged aquatic Florida Water Management District.

Pine Plantation

Most of the Griffiths Addition at the southern end of the park, adjacent to and south of the tuber entrance, was formerly sandhill. Unfortunately, past land use practices have negatively affected much of the community, and it is now considered to be in poor condition. After logging of the native pines in the late 1970s, offsite sand pines were planted over most of the sandhills in the early 1980s. The resulting plantation was harvested in the mid-1990s. Pinecones that remained after logging facilitated sand pine regeneration over much of the area, and the sandhills are again dominated by off-site sand pines. The exotic cogongrass (*Imperata cylindrica*), which likely expanded onto the property from adjacent road shoulders, has invaded the sandhills. Removal of the sand pine plantation increased the extent of the cogongrass infestation. However, the sandhills still retain patches of wiregrass and other native groundcover species in areas not shaded by dense stands of sand pines or infested by cogongrass. These patches contain scattered gopher tortoise burrows.

Since acquisition by the state, the park has obtained grant funding through the FWC to treat the cogongrass infestations. Cogongrass, skunkvine and centipede grass (*Eremochloa ophiuroides*) are the primary target species to control to assist with restoration activities there. Restoration of the sandhills requires removal of the sand pines and continued control of the cogongrass, while minimizing damage to the remaining wiregrass, turkey oaks, sand post oak, blue-jack oak and longleaf pines and protecting the gopher tortoises.

Road

Paved roads are associated with the developed areas in the northern part of the park, the campground area, the tuber exit, and the tram road that connects the tuber exit to the campground. All efforts will be made to control priority invasive plant species (FLEPPC Category I and II species) along road shoulders.

Spoil Area

The majority of the spoil areas within the park are the result of past phosphate mining activities. The massive soil disturbances associated with the mine pits, spoil piles, and mine tailings probably preclude restoration to a natural condition. Most of the mining took place in sandhills that have been irrevocably altered by the dumping of highly fertile mine tailings over naturally sterile sands. Some of these areas are now dominated by a thick growth of mesic-adapted oaks and other secondary succession plant species. Two large pits remain in the northern pasture. These have historically been used as a dumping site for organic debris such as logs, limbs, and leaf litter. Few species native to the sandhills remain on the phosphate-mined lands. The Rainbow River Ranch parcel has several large spoil piles and pits. A significant aspect of the phosphate sites is their impact on soil chemistry and thus on the vegetation currently growing in these areas. Because of the higher nutrient content of the soil and its disturbed nature, more hardwoods and invasive exotic plants are present in these areas. In some cases this affects the fire return interval.

The mine tailings are identified as the Candler Clay Overwash soil type. Sites having Overwash soils could potentially be developed as use areas since they are already degraded. However, it is very likely that the mine tailings contain uranium deposits that may release radon. No permanent enclosed structures are advisable for areas that have a high radon contamination.

The hydric hammock areas that were mined have a more natural species composition, but portions are still considered ruderal because of topographic alterations. Only the spoil piles and pits are labeled as spoil areas in these communities.

Successional Hardwood Forest

In most cases successional hardwood forests occur on areas that were historically sandhills. Those successional hardwood forests that have encroached upon the edges of natural sandhills may be restored with hardwood reduction and replanting with longleaf pines and groundcover species if necessary. Those areas that have succeeded from abandoned pastures or phosphate mined areas may be very difficult to restore to a natural sandhill community due to a complete loss of groundcover species or alteration of soil profiles.

Successional hardwood forest occurs at the north end of the park between the developed areas and the sandhills. Some of this area may have historically been associated with the town of Juliette. Successional hardwood forest also occurs along the park entrance drive in areas impacted by phosphate mining and pasture conversion. A plant nursery area was developed during the 1970s as part of the tourist attraction to provide landscaping plants for the attraction. It is located in the northwest corner of management zone RS-1D. It remained an active nursery area until the late 1980s when it was abandoned and began to succeed to a hardwood forest. Restoration of the sandhills in RS-1D would require hardwood removal, groundcover replacement and planting of longleaf pines.

Some former sandhill that is now successional hardwood forest occurs in the southern portion of the park in zone RS-3B, RS-3C, RS-4A, RS-4B, RS-4C, 5C and 5F among other areas. These areas need reduction or removal of off-site hardwood species and increased fire frequency.

Natural Communities Management

Goal: Restore and maintain the natural communities/habitats of the park.

As discussed above, the DRP practices natural systems management. In most cases, this entails returning fire to its natural role in fire-dependent natural communities. Other methods to implement this goal include large-scale restoration projects as well as smaller scale natural communities' improvements. Following are the natural community management objectives and actions recommended for the state park.

Prescribed Fire Management

Prescribed fire is used to mimic natural lightning-set fires, which are one of the primary natural forces that shaped Florida's ecosystem. Prescribed burning increases the abundance and health of many wildlife species. A large number of Florida's imperiled species of plants and animals are dependent on periodic fire for their continued existence. Fire-dependent natural communities gradually accumulate flammable vegetation; therefore, prescribed fire reduces wildfire hazards by reducing these wild land fuels.

All prescribed burns in the Florida state park system are conducted with authorization from the FDACS, Florida Forest Service (FFS). Wildfire suppression activities in the park are coordinated with the DOF.

Objective A: Within 10 years, have 950 acres of the park maintained within the optimum fire return interval.

- Action 1 Develop/update annual burn plan
- Action 2 Manage fire dependent communities by burning between 285-840 acres annually.

Table 2 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 for acres to be burned.

Table 2. Prescribed Fire Management		
Natural Community	Acres	Optimal Fire Return Interval (Years)
Sandhill	458	1-3
Pine Plantation	182	15-25
Mesic Flatwoods	145	1-3
Successional Hardwood Forest	241	2-10
Abandoned Pasture	117	2-4
Pasture – Improved	90	2-4
Scrubby Flatwoods	7	3-8
Depression Marsh	5	2-10
Annual Target Acreage*	285 - 840	
*Annual Target Acreage Range is based on the fire return interval assigned to each burn zone. Each burn zone may include multiple natural communities.		

Prescribed fire is planned for each burn zone on the appropriate interval. The park's burn plan is updated annually because fire management is a dynamic process. To provide adaptive responses to changing conditions, fire management requires careful planning based on annual and very specific burn objectives. Each annual burn plan is developed to support and implement the broader objectives and actions outlined in this ten-year management plan.

Rainbow Springs State Park contains a significant amount of burn habitat. Natural communities within the park that are naturally maintained by fire include sandhills, mesic flatwoods, scrubby flatwoods, basin swamps, and depression marshes. Altered landcover types that may also be managed with fire include pine plantation, successional hardwood forest, and abandoned pasture. The majority of the burn habitat consists of sandhills and mesic flatwoods of varying quality. A large area of sandhills on the Griffiths Addition was converted to sand pine plantation in the past and is currently unavailable for burning due to the incendiary nature of sand pine plantations. Once the sand pines are removed through a timber harvest, those areas will be placed in rotation with the other sandhill management zones. Some sandhill and mesic flatwood areas have become dominated by offsite hardwoods, primarily laurel oaks, due to long term fire suppression. These areas are currently classified as successional hardwood forest. Some of these areas may not be available for burning without substantial hardwood reduction. Abandoned pastures will also be managed with fire to suspend encroachment of offsite hardwoods and manage herbaceous vegetation.

Careful planning and execution of prescribed fires is essential due to the proximity of U.S. Highway 41, State Road 40, adjacent schools, and numerous residential communities. The highways and most of the residences are located to the north and west of the park boundaries, while two schools and a two-lane county road (SW 180th Avenue Road) are located east of the park.

Firebreaks around zones consist of pre-existing breaks such as service roads and park boundary lines, as well as natural firebreaks such as mesic woods or watercourses. Wherever appropriate, ecotones between natural communities will be maintained by fire. Prescribed fires should be allowed to burn through ecotones to the extent that natural fires would have. The basin swamps can be used as natural firebreaks during wet years but may burn if the soils are not saturated. The construction of artificial firebreaks between natural communities is discouraged.

Where significant archaeological sites occur, soil disturbance in the preparation of firebreaks should be minimized. Neither the periphery of the large pasture (Zone 1E) nor the road that runs along the south boundary of Zone 2B should be disked. In most other areas, disking will not be required if proper equipment and staff are available to rake lines or if wet lines are used.

Fire was excluded from most of the burn habitat of the park for at least a decade before state acquisition. In many cases, fire had been absent much longer. With the exception of the Griffiths Addition and the Rainbow River Ranch, all of the fire-type management zones in the park have been burned multiple times. Some overgrown areas still require additional burns to reduce fuel levels and open the canopy. Even sandhills in relatively good condition that have been excluded from fire for too long require fuel reduction burns in the non-lightning season to protect longleaf pines that are surrounded by heavy fuel buildups and thick layers of duff. The ultimate goal, however, will be to burn

predominately during the lightning season to simulate natural fires. In practice, however, seasons and intervals are flexible and should vary over time to mimic natural random events and to take advantage of all opportunities to burn.

Management zones in the Griffiths Addition (5C, 5D, 5E, 5F, and 5G) are dominated by a sand pine plantation that was harvested in the mid-1990s and allowed to regenerate another sand pine stand. Prescribed fires are not normally possible in sand pine stands due to the extreme volatility of the live fuels. Restoration of these stands to sandhill began with control of cogongrass infestations. As the sand pines are harvested, these management zones will be included in the annual burn plan for the park. Sand pines have been harvested in RS-5B and a portion of RS-5C.

Prescribed fire may also be useful in controlling the spread of invasive species. Rainbow Springs State Park has numerous scattered infestations of skunk vine, a FLEPPC Category I invasive exotic plant. Fire is a valuable tool for controlling skunkvine. Some areas of successional hardwood forest may be given a higher priority for prescribed burns if they contain skunkvine that can be controlled with fire.

Many wildlife species within the park are adapted to and dependent on fire for maintenance of their natural habitats. Prescribed fires are a critical tool for the management of gopher tortoises, indigo snakes, Florida mice, southeastern fox squirrels, Bachman's sparrows, southeastern kestrels, Florida pine snakes, striped newts, gopher frogs, and other imperiled species or species of greatest conservation need.

In order to track fire management activities, the DRP maintains a statewide burn database. The database allows staff to track various aspects of each park's fire management program including individual burn zone histories and fire return intervals, staff training/experience, backlog, if burn objectives have been met, etc. The database is also used for annual burn planning which allows the DRP to document fire management goals and objectives on an annual basis. Each quarter the database is updated and reports are produced that track progress towards meeting annual burn objectives.

Natural Communities Restoration

In some cases, the reintroduction and maintenance of natural processes is not enough to reach the natural community desired future conditions in the park, and active restoration programs are required. Restoration of altered natural communities to healthy, fully functioning natural landscapes often requires substantial efforts that may include mechanical treatment of vegetation or soils and reintroduction or augmentation of native plants and animals. For the purposes of this management plan, restoration is defined as the process of assisting the recovery and natural functioning of degraded natural communities to desired future condition, including the re-establishment of biodiversity, ecological processes, vegetation structure and physical characters.

Examples that would qualify as natural communities' restoration, requiring annual restoration plans, include large mitigation projects, large-scale hardwood removal and timbering activities, roller-chopping and other large-scale vegetative modifications. The key concept is that restoration projects go beyond management activities routinely done as standard operating procedures such as routine mowing, the reintroduction of fire as a natural process, spot treatments of exotic plants, small-scale vegetation management

Objective B: Conduct habitat/natural community restoration activities on 322 acres of sandhill community

- Action 1 Develop a site specific restoration plan.
- Action 2 Implement restoration plan.

The southern end of Rainbow Springs has approximately 244 acres of sandhill that was converted to sand pine plantation in the 1980s and additional acres that were converted into pasture. The area has gopher tortoises and indigo snakes. Scattered remnant native groundcover including wiregrass and giant orchid is still present particularly in sunny gaps in the plantation. Some native sandhill oaks, turkey oak, blue jack oak and sand post oak are also present throughout the site. There are remnant longleaf pines and sand post oak. The area has received ongoing treatment of cogongrass since 2005. Cogongrass treatment will need to continue as an integral part of the restoration process. Scattered areas of centipede grass also occur throughout. It can outcompete native groundcover. It must be treated to prevent spread by equipment. Sand pine will need to be harvested from the site. Prior to logging, the older sand post oaks and any turkey oak, blue jack oak, southern red oak, mockernut hickory, dogwood and Crataegus species should be identified and marked as leave trees. Because this area has gopher tortoises, logging during the winter is preferable. It may be necessary to mechanically or chemically treat off site hardwoods. Fire will be a critical part of the restoration process and will be needed to kill the young sand pine recruitment that occurs after the harvest. It also will be a very important tool to control off-site hardwood sprouting.

Post sand pine harvest and prescribed fire, it will be necessary to evaluate the site for groundcover enhancement or restoration. Other sandhill zones in Rainbow Springs may serve as a seed source for groundcover restoration. Planting of wiregrass plugs or direct seeding of some areas may also be necessary. Longleaf pine will be planted throughout the area.

This is a long-term project and restoration will not be complete during the life of this plan. Cogongrass maintenance treatment is extremely important during the project and cogongrass and centipede grass should be monitored and treated annually. Natal grass has recently been discovered in the tuber entrance area. This will need aggressive monthly treatment. Treatment of off-site hardwood re-sprouts and monitoring of groundcover species including wiregrass is very important. Monitoring the survival of planting longleaf pines will be important so that it can be determined if any replanting is needed.

Maintenance activities will include prescribed fire, follow-up treatment of cogongrass, centipede grass, natalgrass and other invasive exotic species, and retreatment of invading offsite hardwoods and their sprouts.

This is the highest priority restoration project the park has at this time.

Objective C: Conduct habitat/natural community restoration activities on 75 acres of sandhill and flatwoods natural communities on the Rainbow River Ranch parcel.

- Action 1 SWFWMD develops a site-specific restoration plan.
- Action 2 SWFWMD implements the restoration plan initial steps consisting of:
 - 1) Multiple applications of a chemical treatment and possible

- mechanical treatment of exotic pasture grasses and invasive species for up to 2 years
 - 2) Post removal of exotic pasture grasses the SRWMD will site prepare and direct seed native groundcover species appropriate to the sandhill at Rainbow River
 - 3) The SWFWMD will follow native groundcover seeding by monitoring establishment success of native groundcover and treating any remaining exotic pasture grasses and other invasive exotic species.
- Action 3 After year 3, the FPS will continue monitoring and control of exotic pasture and other species and using fire to management the site.
- Action 4 Plant longleaf pine seedlings.

The Rainbow River Ranch parcel was acquired by the SWFWMD in 2017. It contains approximately 88 acres of improved pasture and 0.44 miles of river front. The SWFWMD has developed a restoration plan for the former sandhill which involves chemical and mechanical removal of exotic pasture grass followed by seeding of native groundcover species. Once the native groundcover is established and the exotic pasture is under control the site will be managed by fire and planted with longleaf pine trees.

Natural Communities Improvement

Improvements are similar to restoration but on a smaller, less intense scale. This typically includes small-scale vegetative management activities or minor habitat manipulation. Following are the natural community/habitat improvement actions recommended at the park.

Objective D: Conduct natural community/habitat improvement activities on at least 10 acres of sandhill community and successional hardwood forest.

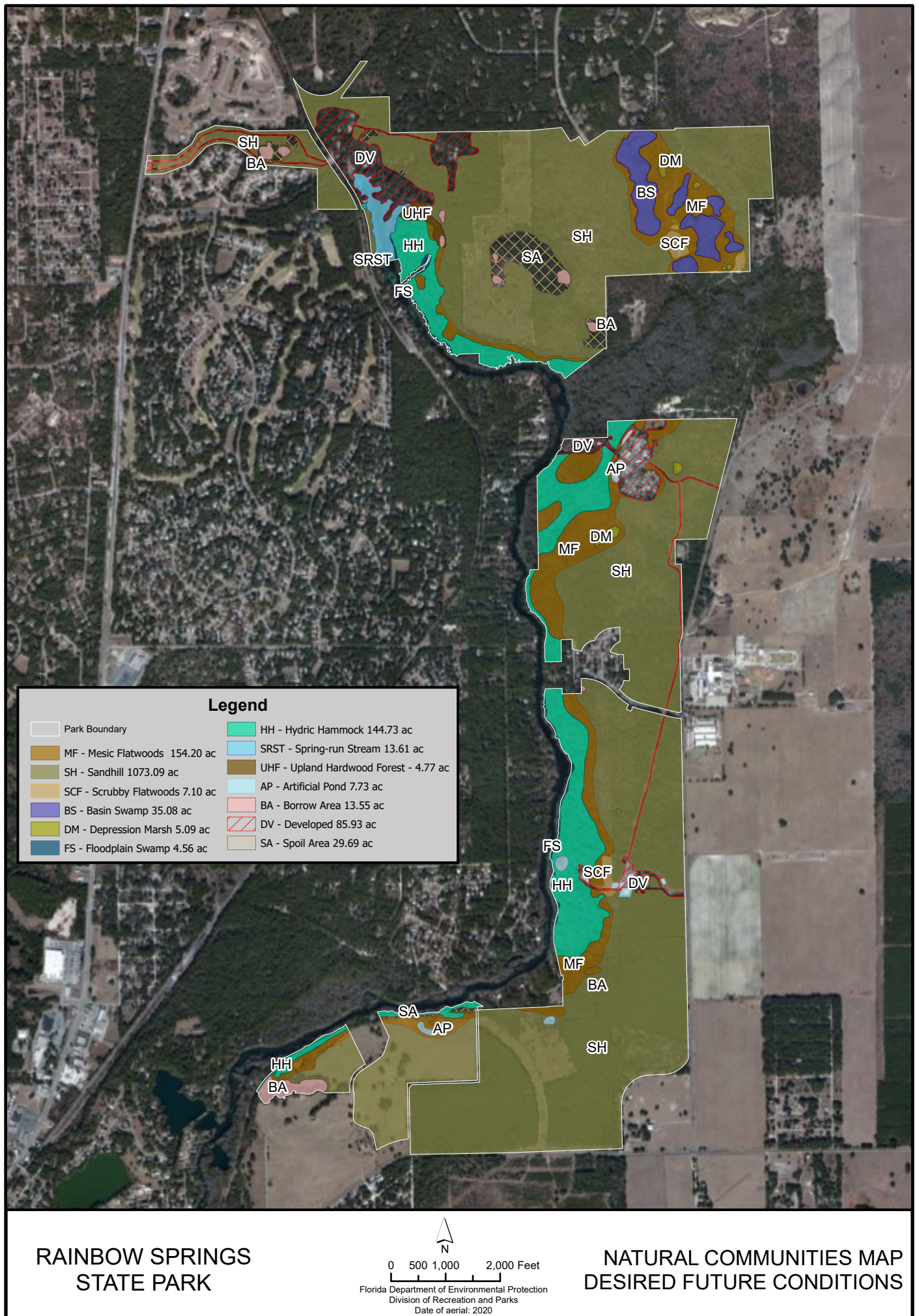
- Action 1 Develop and implement a plan to treat off-site hardwoods.

Scattered areas of sandhill are overgrown with off-site hardwoods and are becoming successional hardwood forest due to lack of fire. Invading hardwoods, such as laurel oak and sweetgum, will need mechanical and/or chemical treatment. Fire will be an important part of the process to control hardwood resprouting, stimulate remnant groundcover species and control invasive exotic plants like skunkvine. Limited planting of longleaf pines may also be included in this improvement project. Maintenance activities would include prescribed fire, retreatment of off-site hardwood sprouts and supplemental planting of longleaf and/or groundcover species if needed.

Imperiled Species

Imperiled species are those that are (1) tracked by FNAI as critically imperiled (G1, S1) or imperiled (G2, S2); or (2) listed by USFWS, FWC, or FDACS as endangered, threatened or of special concern.

The number of imperiled plant species within the park is probably underestimated. More extensive surveys for rare and endangered plants must be conducted before a list that truly reflects the natural diversity of the park will be available. The imperiled species list for vertebrates, however, is much more complete, because of



a comprehensive survey that was conducted by the Nongame Wildlife Program of the FWC near the time of state acquisition.

Many of the imperiled vertebrate species are associated with the sandhill natural community. Years of fire suppression and conversion to other uses by humans have altered most of this habitat statewide, resulting in the endangerment of a number of species that depend upon sandhills. At Rainbow Springs, there still appears to be a relatively healthy population of gopher tortoises, although some poaching probably occurred on the property before state acquisition. Other imperiled or rare species that occur as gopher tortoise commensals, such as eastern indigo snakes (*Drymarchon couperi*), gopher frogs, and Florida mice (*Podomys floridanus*) have also been recorded on the property. Southeastern fox squirrels (*Sciurus niger niger*) are often sighted in or near the sandhills, but the population is probably very small given the limited amount of habitat. Other imperiled sandhill species identified within the park include the Southeastern kestrel (*Falco sparverius paulus*), striped newts (*Notophthalmus perstriatus*) and Florida pine snake (*Pituophis melanoleucus mugitus*). Bachman's sparrow (*Aimophila aestivalis*) is a species of conservation need that is also found within the sandhills at Rainbow Springs. Habitat destruction jeopardizes the continued existence of these species in Florida. Large tracts of natural sandhills are necessary to maintain viable populations. In the future, if the park becomes isolated by development, the small number of sandhill acres currently found within the park will not support most of these species indefinitely. Relatively few undeveloped sandhills remain in western Marion County, with Rainbow Springs State Park representing one of the only major publicly owned sandhill tracts.

Several depression marshes and basin swamps have been surveyed in recent years for striped newts in cooperation with an FWC initiative to document additional breeding ponds. Unfortunately, no striped newts have been recently documented in the park. Park and District staff will continue to work with FWC to try and determine the status of striped newts in the park.

In 2011, transects were set up in the Rainbow Springs sandhills to monitor Bachman's sparrows as well as other bird species listed as Species of Greatest Conservation Need (FWC 2005). Birds monitored include the redheaded woodpecker (*Melanerpes erythrocephalus*), common ground dove (*Columbina passerina*), northern bobwhite (*Colinus virginianus*), and swallow-tailed kite (*Elanoides forficatus*).

Other imperiled bird species recorded within the park include several species of herons, egrets, and raptors. These populations are probably not seriously threatened at present, although continued habitat loss and human-related disturbance may ultimately change that situation. Monitoring of avian species is supplemented with data from the Audubon Society Christmas Bird Count.

Several gopher tortoise surveys have been conducted in the past, usually in response to a development proposal. The only tortoises relocated due to development occurred in 2006 prior to construction of the tuber exit on the Griffiths Addition. The tortoises were relocated onsite a short distance from their impacted burrows. In the spring of 2018 FWC conducted a formal gopher tortoise census using the Line Transect Distance Sampling methodology (Smith et al 2009). The model estimated the population within the sampled areas of the park to be 479 tortoises with an average density of about 2 tortoises per hectare. The population is considered viable since there are greater than 250 acres of available habitat and more than 250 tortoises. The habitat suitability was

rated a 2 due to an overabundance of oaks in some areas (FWC 2018).

Gopher tortoises still exist within the sand pine plantations that were not censused during the FWC LTDS census. These areas are scheduled for restoration to sandhill. Impacts from logging activities will be minimized by careful placement of loading zones and skidder trails. Burrows near high impacts areas will be staked and marked to avoid inadvertent damage to burrows. Staff will continue to refer to the FWC Gopher Tortoise Management Plan (FWC 2012) to guide management of this imperiled species.

Another rare turtle species is the Suwannee cooter (*Pseudemys suwanniensis*). Dr. Peter Meylan of Eckerd College has been conducting a mark-recapture study of the aquatic turtle community at Rainbow River since 1990 (Meylan et al 1992; Huestis and Meylan 2004). Comparisons to data collected in the early 1940s by Marchand (1942) have shown that there has been a marked decrease in the numbers, particularly of the larger size classes, of the Suwannee cooter, peninsula cooter (*Pseudemys peninsularis*), and Florida red-bellied cooter (*Pseudemys nelsoni*) in the Rainbow Run. Meylan et al (1992) and Giovanetto (1992) attribute this to potential impacts from harvesting for human consumption. Long-term data from Meylan's work have shown that there is a distinct decrease in survivorship of larger individuals in the Rainbow River (Mattheus and Meylan 2010) which is likely attributable to harvesting or some other anthropogenic impact. Past actions by the FWC make it illegal to harvest cooters (*Pseudemys* spp.) from the wild in Florida. It is hoped that this will decrease additional impacts to the aquatic turtle community at Rainbow River.

Construction of the Inglis Dam may have led to the disruption of wildlife movement routes such as those used by certain anadromous fishes in their annual migration from the Gulf of Mexico to the Rainbow River. According to current monitoring, some of the migratory fish once common in the river, such as the hogchoker (*Trinectes maculatus*) and the striped mullet (*Mugil cephalus*), have not been observed in the Rainbow system for over 20 years. Another example of the dam's potentially negative effect on wildlife migration is that there is only one historic record of a Florida manatee using the Rainbow system as a warm water refuge during the winter (Powell and Rathbun 1984; Beeler and O'Shea 1988). There undoubtedly could be other factors contributing to the absence of manatees in the Rainbow River (Laist and Reynolds 2005), however, state and federal fish and wildlife agencies have recently made it a high priority to restore all available winter refugia for this federally endangered species in Florida, including those at Homosassa Springs, Crystal River, and Fanning Springs.

The harvest of all wildlife, with the exception of fish, is prohibited along the length of the Rainbow River where the river passes through, or along the boundary of, Rainbow Springs State Park. The area under jurisdiction of the park includes a 400-foot zone from the edge of mean high water along sovereign submerged lands of the Rainbow River. Where emergent wetland vegetation exists, the zone extends water-ward 400 feet beyond the vegetation.

Eastern indigo snakes have been documented within the park on numerous occasions. They are typically associated with gopher tortoise burrows. Given the limited amount of habitat within the park, it is likely that the resident indigo snakes range outside the park boundary. This puts them at risk of being harmed or killed by uninformed residents of the surrounding developments, and at risk of being killed by vehicles on adjacent roadways. Improvement and restoration of sandhill habitats within the park might reduce these threats or might provide support for a larger population of indigo snakes.

There are similar concerns over the Florida pine snake (*Pituophis melanoleucus mugitus*) population, which also frequents sandhills and tortoise burrows, as well as pocket gopher tunnels. The park should consider developing an interpretive program about indigo snakes and pine snakes to help ensure their protection.

Most of the imperiled plant species found within the park do not appear to have any imminent threats. Careful management of the natural communities of the park and prudent park development planning should suffice to protect and preserve their populations. However, feral hogs have the potential for causing severe impact to certain plant species, particularly those that occur within wetland edges or ecotones. Feral hogs damaged many of the wetland ecotones in the park in the past. These areas may have harbored populations of imperiled plant species. If feral hogs become an issue again in the future, the park will activate the feral hog removal program.

Several imperiled plant species, however, occur under slightly unusual circumstances in the park. Giant Orchid (*Pteroglossaspis ecristata*) is found on the Griffiths tract in areas invaded by cogongrass. Because of the grass like appearance of its leaves staff and contractors treating cogongrass will need to take special care not to spray the orchid. The star anise (*Illicium parviflorum*), a threatened species endemic to central Florida, is found planted as an ornamental throughout the developed area of the park. While it is questionable whether any naturally occurring star anise grows along the banks of the Rainbow River, the proper habitat for it does exist there. Planted specimens of Ashe's magnolia (*Magnolia ashei*), an endangered species endemic to the Florida panhandle, are found along the entrance drive.

Table 3 contains a list of all known imperiled species within the park and identifies their status as defined by various entities. 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 following the table. Explanations for federal and state status as well as FNAI global and state rank are provided in Addendum 6.

Table 3. Imperiled Species Inventory						
Common and Scientific Name	Imperiled Species Status				Management Actions	Monitoring Level
	FWC	USFWS	FDACS	FNAI		
PLANTS						
Golden polypody <i>Acrostichum aureum</i>			LT	G5,S3		Tier 1
Star anise <i>Illicium parviflorum</i> *			LE	G2,S2		Tier 1
Ashe's magnolia <i>Magnolia ashei</i> *			LE	G2,S3		Tier 1
Yellow butterwort <i>Pinguicula lutea</i>			LT		1,4, 10	Tier 1
Southern tubercled orchid <i>Platanthera flava</i>			LT			Tier 1

Table 3. Imperiled Species Inventory						
Common and Scientific Name	Imperiled Species Status				Management Actions	Monitoring Level
	FWC	USFWS	FDACS	FNAI		
Giant orchid <i>Pteroglossaspis ecristata</i>			LT	G2G3, S2	1,2	Tier 1
INVERTEBRATES						
Florida cebrionid beetle <i>Selonodon floridensis</i>				G2G4, S2S4		
Large-jawed cebrionid beetle <i>Selonodon mandibularis</i>				G2G34 S2S4		
AMPHIBIANS						
Striped newt <i>Notophthalmus perstriatus</i>				G2G3, S2	1,6	Tier 2
REPTILES						
American alligator <i>Alligator mississippiensis</i>	FT (S/A)	T(S/A)		G5,S4		Tier 1
Eastern indigo snake <i>Drymarchon couperi</i>	FT	LT		G3, S3	1,6	Tier 1
Gopher tortoise <i>Gopherus polyphemus</i>	ST			G3,S3	1,6, 13	Tier 3
Florida pine snake <i>Pituophis melanoleucus mugitus</i>	ST			G4,S3	1,6, 13	Tier 1
BIRDS						
Little Blue Heron <i>Egretta caerulea</i>	ST			G5,S4	4	Tier 2
Tricolored Heron <i>Egretta tricolor</i>	ST			G5,S4	4	Tier 2
Swallow-tailed Kite <i>Elanoides forficatus</i>				G5,S2		Tier 2
Southeastern American Kestrel <i>Falco sparverius paulus</i>	ST			G5T4, S3	1,5, 6	Tier 2
Wood Stork <i>Mycteria americana</i>	FT	LT		G4,S2	4	Tier 2

Management Actions:

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

Monitoring Level:

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

Imperiled Species Management

Goal: Maintain, improve or restore imperiled species populations and habitats in the park.

The DRP strives to maintain and restore viable populations of imperiled plant and animal species primarily by implementing effective management of natural systems. Single species management is appropriate in state parks when the maintenance, recovery or restoration of a species or population is complicated due to constraints associated with long-term restoration efforts, unnaturally high mortality or insufficient habitat. Single species management should be compatible with the maintenance and restoration of natural processes and should not imperil native species or compromise park values.

In the preparation of this management plan, DRP staff consulted with staff of the FWC's Imperiled Species Management or that agency's Regional Biologist and other appropriate federal, state and local agencies for assistance in developing imperiled animal species management objectives and actions. Likewise, for imperiled plant species, DRP staff consulted with FDACS. Data collected by the USFWS, FWC, FDACS and FNAI as part of their ongoing research and monitoring programs will be reviewed by park staff periodically to inform management of decisions that may have an impact on imperiled species at the park. Management of imperiled species will be guided by Florida's Imperiled Species Management Plan (FWC 2016) and appropriate Species Action Plans.

Ongoing inventory and monitoring of imperiled species in the state park system is necessary to meet the DRP's mission. Long-term monitoring is also essential to ensure the effectiveness of resource management programs. Monitoring efforts must be prioritized so that the data collected provides information that can be used to improve or confirm the effectiveness of management actions on conservation priorities. Monitoring intensity must at least be at a level that provides the minimum data needed to make informed decisions to meet conservation goals. Not all imperiled species require intensive monitoring efforts on a regular interval. Priority must be given to those species that can provide valuable data to guide adaptive management practices. Those species selected for specific management action and those that will provide management guidance through regular monitoring are addressed in the objectives below.

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

Although parts of Rainbow Springs State Park have been surveyed for imperiled vertebrate species in the past, additional surveys for plants and invertebrates are needed. Staff will document species occurrences whenever possible and will work with outside researchers and institutions to document additional species occurrences.

Objective B: Monitor and document 9 selected imperiled animal species in the park.

- Action 1 Implement monitoring protocols for the 9 animal species mentioned below.

Southeastern fox squirrel, Florida mouse, SE Kestrel, Indigo snake, striped newt, gopher frog, gopher tortoise, Suwannee cooter, and Bachman's sparrow will be monitored or documented.

Rainbow Springs State Park has documented populations of a number of imperiled animal species that would benefit from additional monitoring. Staff will continue to report incidental sightings of southeastern fox squirrels and indigo snakes and will record dates and locations. Dip net surveys for striped newts and gopher frogs will be continued in cooperation with the District biological staff and FWC biologists. Re-confirming the presence of these species at breeding ponds in the park is a priority.

Specific surveys for gopher tortoise burrows and Florida mice have been conducted in the past. These surveys will be expanded within the Griffiths Addition as part of the sandhill restoration project to estimate baseline tortoise populations within the restoration zone and to document the presence of Florida mice on the addition. A LTDS survey for gopher tortoises was conducted in the spring of 2018 by FWC staff.

Nest boxes were installed in the past within the park for southeastern kestrels. These boxes will continue to be monitored for activity. In 2011 a series of transects were established to monitor Bachman's sparrow populations during the spring breeding season. Surveys of singing males will provide an index for monitoring the number of breeding pairs within the park.

The park and district staff will continue to support and assist with the ongoing population studies of Suwannee cooters and other aquatic turtle species in the Rainbow River. This long-term study by Dr. Peter Meylan and his associates from Eckerd College provides valuable data on the Suwannee cooter population and will continue to provide guidance for management and protection of turtle populations within the park.

Objective C: Monitor and document 1 selected imperiled plant species in the park.

- Action 1 Develop a monitoring protocol for Giant orchid.
Action 2 Implement the monitoring protocol for the imperiled plant species listed in Action 1 above.

The giant orchid occurs in fire-adapted uplands within the park. A population has been documented on the Griffiths Addition. This population will be monitored during and after the sandhill restoration on the Griffiths Addition. A monitoring protocol for this species will be developed.

Exotic Species and Nuisance Species

Exotic species are plants or animals not native to Florida. Invasive exotic species are able to out-compete, displace or destroy native species and their habitats, often because they have been released from the natural controls of their native range, such as

diseases, predatory insects, etc. If left unchecked, invasive exotic plants and animals alter the character, productivity and conservation values of the natural areas they invade.

Rainbow Springs State Park is faced with the management of a diversity of Category I and Category II invasive plant species as classified by the Florida Exotic Pest Plant Council lists (FLEPPC 2019). Many of these exotics are concentrated near the headsprings within and adjacent to the footprint of the gardens of the former attraction, within the remnant phosphate pits or at the southern end of the park where logging occurred prior to state acquisition.

Skunkvine (*Paederia foetida*), which was probably introduced by birds, is becoming widespread throughout the park particularly in the gardens and disturbed areas. Japanese climbing fern (*Lygodium japonicum*) as well as skunkvine is also found in the phosphate pits and the clay settling pond associated with the former phosphate mining. Air potato (*Dioscorea bulbifera*) is present in the garden and some of the phosphate pits although its prevalence has been dramatically reduced by the introduction of the biocontrol beetle *Lilioceris cheni*. The Griffiths addition at the southern end of the park has about 200 acres of sandhill which is infested with cogongrass (*Imperata cylindrica*). Natal grass (*Melinis repens*) was recently found along the tuber entrance drive and threatens the sandhill restoration projects there. Hydrilla (*Hydrilla verticillata*) is found in the headspring and the river.

The gardens of the former attraction provided an initial source for many of the invasive exotic plants at the north end of the park. Air potato (*Dioscorea bulbifera*), ardisia (*Ardisia crenata*), camphor (*Cinnamomum camphora*), privet species (*Ligustrum lucidum*, *Ligustrum sinensis*), tuberous sword fern (*Nephrolepis cordifolia*) and silver thorn (*Elaeagnus pungens*) are all species that have expanded beyond the boundaries of the former attraction's garden. The Friends of Rainbow Springs Citizen Support Organization has previously supported the renovation of the former garden. This includes the removal of many invasive exotics and supplementing the plantings with native species.

The park is regularly surveyed for invasive exotic plants. Surveys and treatments are tracked in the statewide database. Additional surveys are conducted as treatment continues to proactively find new exotic infestations before they increase in size.

In 2019 giant Salvinia (*Salvinia molesta*) was found in a basin marsh in RS-2C. FWC has been instrumental in treating this aggressive species.

The recently acquired Rainbow River Ranch and the Mann parcel need an initial survey and a treatment plan. The SWFWMD, the acquisition and initial restoration partner for the Ranch property, is treating cogongrass and exotic pasture grasses in preparation for groundcover restoration. Additional treatment of woody species is needed in the historic cemetery and river corridor.

Invasive exotic plant management consists of in-house treatment by park staff, AmeriCorps members, the District exotic plant rover and District biologists as well as contractor assistance provided by the Friends of Rainbow Springs, FWC, the former BIPM and District projects as funding allows. The SWFWMD will provide initial exotic control in the pasture areas of the Rainbow River Ranch to initiate the restoration process. Within the river, the Rainbow Springs Aquatic Preserve provides critical assistance in the control of hydrilla. Park staff conducts exotic removal days in the garden area. District staff

provides support with exotic removal throughout the park and particularly in the natural areas. This includes project development and contractor management.

Since 2011 the park has treated 428 infested acres of invasive exotic plants. This effort required physically traversing 3,742 acres. The treatment has been a combined effort of park and District staff and contractors funded by the CSO, FWC and the former Bureau of Invasive Plant Management. Because the park manages swimming, tubing, camping and the garden attraction, staff is limited in their ability to fully treat the exotics found in the park. For this reason, it will be very important to consistently apply for exotic removal funding from FWC on an annual basis and partner with the CSO to remove exotics and with the Aquatic Preserve to remove hydrilla.

Table 4 contains a list of the Florida Exotic Pest Plant Council (FLEPPC) Category I and II invasive, exotic plant species found within the park (FLEPPC, 2019). The table also identifies relative distribution for each species and the management zones in which they are known to occur. An explanation of the codes is provided following the table. For an inventory of all exotic species found within the park, see Addendum 5.

Table 4. Inventory of FLEPPC Category I and II Exotic Plant Species			
Common and Scientific Name	FLEPPC Category	Distribution	Management Zone (s)
PLANTS			
Air-potato <i>Dioscorea bulbifera</i>	I	2	RS-1E, RS-1G, RS-3B
		3	RS-1D
Camphor-tree <i>Cinnamomum camphora</i>	I	1	RS-1E, RS-3B
		2	RS-1G, RS-4A
Chinese privet <i>Ligustrum sinense</i>	I	2	RS-1G
Chinese tallow tree <i>Triadica sebiferum</i>	I		RS-1E, RS-3B
		2	RS-3C, RS-4A
Cogon grass <i>Imperata cylindrica</i>	I	2	RS-1G, RS-2E, RS-3B, RS-3C, RS-5B, RS-5C, RS-5D, RS-5E, RS-5F, RS-5G
		3	RS-3A
Coral ardisia <i>Ardisia crenata</i>	I	2	RS-1A, RS-1B, RS-1G, RS-1J
Giant Salvinia <i>Salvinia molesta</i>	I	3	RS-2C
Glossy privet <i>Ligustrum lucidum</i>	I	2	RS-1G
Hydrilla <i>Hydrilla verticillata</i>	I	2	RS-1H
Japanese climbing fern <i>Lygodium japonicum</i>	I	2	RS-1A, RS-1E, , RS-5H
		3	RS-2B

Table 4. Inventory of FLEPPC Category I and II Exotic Plant Species			
Common and Scientific Name	FLEPPC Category	Distribution	Management Zone (s)
Mimosa <i>Albizia julibrissin</i>	I	1	RS-1A, RS-1D,
		2	RS-1G, RS-5F
Natal grass <i>Melinis repens</i>	I	2	RS-5B, RS-5C
Skunkvine <i>Paederia foetida</i>	I	2	RS-1A, RS-1B, RS-1C, RS-1D, RS-1E, RS-1F, RS-1G, RS-2B, RS-5E, RS-5G, RS-5H
		3	RS-1D, RS-1G
Small-leaf spiderwort <i>Tradescantia fluminensis</i>	I	3	RS-1G
Tuberous sword fern <i>Nephrolepis cordifolia</i>	I	3	RS-1G
Wild taro <i>Colocasia esculenta</i>	I	2	RS-1G
Chinese wisteria <i>Wisteria sinensis</i>	II	3	RS-1G
Elephant ear <i>Xanthosoma sagittifolium</i>	II	2	RS-1G
		3	RS-1E
Flamegold tree <i>Koelreuteria elegans</i>	II	2	RS-5E
Silverthorn <i>Elaeagnus pungens</i>	II	2	RS-1G
Caesar's weed <i>Urena lobata</i>	I	1	RS-3B
		3	RS-2B
Wedelia <i>Sphagneticola trilobata</i>	II	2	RS-1G

Distribution Categories:

- 0 No current infestation: All known sites have been treated and no plants are currently evident.
- 1 Single plant or clump: One individual plant or one small clump of a single species.
- 2 Scattered plants or clumps: Multiple individual plants or small clumps of a single species scattered within the gross area infested.
- 3 Scattered dense patches: Dense patches of a single species scattered within the gross area infested.
- 4 Dominant cover: Multiple plants or clumps of a single species that occupy a majority of the gross area infested.
- 5 Dense monoculture: Generally, a dense stand of a single dominant species that not only occupies more than a majority of the gross area infested, but also covers/excludes other plants.
- 6 Linearly scattered: Plants or clumps of a single species generally scattered along a linear feature, such as a road, trail, property line, ditch, ridge, slough, etc. within the gross area infested.

Exotic animal species include non-native wildlife species, free ranging domesticated pets or livestock, and feral animals. Because of the negative impacts to natural systems attributed to exotic animals, the DRP actively removes exotic animals from state parks, with priority being given to those species causing the greatest ecological damage.

In some cases, native wildlife may also pose management problems or nuisances within state parks. A nuisance animal is an individual native animal whose presence or activities create special management problems. Examples of animal species from which nuisance

cases may arise include raccoons, venomous snakes and alligators that are in public areas. Nuisance animals are dealt with on a case-by-case basis in accordance with the DRP's Nuisance and Exotic Animal Removal Standard.

Fortunately, Rainbow Springs has few exotic animals. Terrestrial species are feral hogs (*Sus scrofa*), nine-banded armadillo (*Dasypus novemcinctus*), occasional feral cats or dogs. Feral hog sign is most often seen in the southern end of the park known as the Griffiths addition.

Feral hogs, cats, and dogs are removed as needed. Armadillos may cause extensive ground disturbance and are a threat to ground nesting birds and small reptiles and amphibians. Armadillos are sometimes removed by park staff.

Coyotes are common in north central Florida and are well established in the park. There are currently no control measures in place for coyotes. With the extirpation of the native red wolf in the southeast, the coyote may be filling a portion of that species' niche.

The aquatic exotic fish, Armored Sailfin Catfish (*Pterygoplichthys disjunctivus*), is found in the Rainbow River.

The exotic fire ant (*Solenopsis saevissima*) also occurs within the park. This noxious species may compete with native ant species and is undesirable in visitor use areas. In recent years a phorid fly, a biological control for the fire ant, has been released in Florida by the USDA-APHIS (Collins and Scheffrahn, 2008). If fire ants become a problem, the park should first contact the Division of Plant Industry and USDA-APHIS in Gainesville, FL to see about establishing a biocontrol release at the park. Because most of the public recreation areas are adjacent to the head spring and Rainbow River biological control should be the first resort to control fire ants. Fire ants can also be controlled using fire ant bait approved by the Division of Recreation and Parks. Bait should be applied directly to the mounds, rather than broadcast, to avoid impacting non-target ant species. Fire ant bait should only be used if the biological control agent has not significantly reduced the incidence of fire ants.

In 2002, the red bay ambrosia beetle (*Xyloborus glabratus*) was first detected in the United States in southeast Georgia. The beetle carries the fungal pathogen (*Raffaelea lauricola*) which it transmits to red bay trees (*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, Florida. To date the disease is found in every county in Florida. Currently the disease has killed most of the adult red bays in the park and the beetle (and laurel wilt) has now spread throughout most of Florida and into many of the neighboring states. The disease top kills adult red bays which then continue to resprout from their roots. It may be that members of the Lauraceae family will continue to survive in shrub form as the remnant tree root systems continue to resprout. At this point, much remains unknown about the long-term impacts of this disease on red bays and other Lauraceae. The park should continue to restrict the movement of firewood in the park and educate visitors about the issue.

Exotic Species Management

Goal: Remove exotic and invasive plants and animals from the park and conduct needed maintenance control.

The DRP actively removes invasive exotic species from state parks, with priority being given to those causing the ecological damage. Removal techniques may include mechanical treatment, herbicides or biological control agents.

Objective A: Annually treat 200 acres of exotic plant species in the park.

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| Action 1 | Annually develop/update exotic plant management work plan. |
| Action 2 | Implement annual work plan by treating 200 gross acres in the park annually, and continue maintenance and follow-up treatments |
| Action 3 | Continue annual treatment of cogongrass in all zones but particularly the zones south of the tuber entrance. |
| Action 4 | Develop and implement a control tactic for natal grass at the tuber entrance area to prevent invasion into the adjacent restoration areas |
| Action 5 | Survey and treat the Rainbow River Ranch and Mann acquisitions. |

The primary focus of the exotic control efforts should be to keep the natural areas as free of exotics as possible. The park should continue to implement its annual treatment plan for the natural upland areas and garden. The plan should clearly differentiate and address the treatment needs of the upland natural acres of the park and the garden. Annual treatment goals should be set for each area. In addition, the park should refine the plan to address the need to retreat areas with sufficient frequency to keep the most aggressive exotics from reproducing. Natal grass in particular needs a plan to treat it at least every 30 days. Two recent acquisitions to the park, the Rainbow River Ranch and the Mann parcel need to be surveyed for exotics and have an annual treatment plan.

Zones that have cogongrass under pine plantations that are undergoing restoration need ongoing annual treatment to prevent rapid regrowth of cogongrass. This is critical to the success of the restoration.

The park currently does not have the resources to achieve this level of treatment in-house. However certain actions can help make this goal more attainable. More frequent prescribed fire should be used to enhance exotic plant treatment whenever possible. This might mean burning a zone prior to or the year following treatment. This is particularly important with regard to skunkvine which is moving from the disturbed areas into the natural areas. Burning areas such as the main park drive, around the shop and the clay settling pond will help control skunkvine which is reproducing aggressively there. Project funding sources such as the FWC weed management project should be applied for on an annual basis. Continued collaboration with the Friends of Rainbow Springs to control exotics in the garden and the SWFWMD to control exotics on the Rainbow River Ranch will be very important.

The park should also continue to collaborate with the Aquatic Preserve in the removal of hydrilla from the headspring and other areas.

Research on the biological control of skunkvine, ardisia, cogongrass and Japanese climbing fern would benefit this park and many other natural areas.

Objective B: Develop and implement measures to prevent the accidental introduction or further spread of invasive exotic plants in the park.

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| Action 1 | Prepare and implement written guidelines to prevent the introduction and spread of invasive exotic plants. Provide staff with |
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the tools to implement the guidelines.

Rainbow Springs has a garden that remains from the former attraction. To prevent the accidental introduction of potentially invasive species, it is very important to carefully select species that will be planted. If new plants are introduced to the garden area, native plants should be the first choice. Any new plant introductions should be reviewed by the District biological staff prior to planting. This will help prevent introductions of species that have the potential to become invasive. Any FLEPPC Category I or II species occurring in the gardens should be removed.

To prevent new invasive exotic plant populations from expanding, the park should survey for and map new invasive exotics in every zone within the park at least twice within the next 10 years. It is important to know what exotic species are present within the park, where they are located and how severe their infestations are. It is also very important to know what zones or communities are currently free of exotics so that the park can keep those areas exotics free. This is particularly true for high quality or ecologically important habitats. By regularly surveying these exotics free zones, staff can discover new infestations at an early stage and eliminate them before they increase significantly in size. Areas that serve as sources of particularly aggressive species, or of species that can dramatically change ecosystem function, may need to be scouted more frequently. Finding new populations of invasive exotic plants before they become established will help prevent larger infestations from developing. The focus should be on EPPC Category I and II species, while at the same time keeping a watch out for new species that exhibit aggressive tendencies.

Exotic plants often invade an area accidentally through preventable methods of entry. An example of this is the recently observed natal grass at the tuber entrance that is being spread by mowing. To limit accidental introduction and movement of exotic species, park staff will need to develop and practice preventative measures, including a protocol for equipment inspection and decontamination. Activities such as mowing, landscaping debris disposal, logging, fire line preparation and road building can introduce or redistribute exotics through contaminated equipment. Fill dirt, lime rock, potted horticultural plants and mulch are all potentially contaminated by exotics even if they are not readily visible at the time of entry into the park. Some new infestations of exotics may be preventable by ensuring that contractors clean their equipment before entering the park. The further spread of exotics already established in the park may be avoided by making sure that staff and contractors do not move equipment, landscaping debris or soil from a contaminated area to an exotic free area within the park. Any equipment that is moved from a contaminated area to an exotic free area should be cleaned prior to moving it.

Objective C: Implement control measures on 3 nuisance and exotic animal species in the park.

Action 1 Remove and document nuisance animals as they occur in the park.

Feral cats and dogs will be removed from the park as they are encountered. The park does have feral hogs periodically. Areas where damage occurs will continue to be monitored. A feral hog control program will be implemented on an as needed basis.

Special Natural Features

The Rainbow Springs Group are first magnitude, in fact the fourth largest in the state in terms of total river discharge (Rosenau et al. 1977; Spechler and Schiffer, 1995). However, when only vents that are hydrologically linked are considered, the discharge is second only to that of Silver Springs (Wilson and Skiles, 1989).

The springs are remarkably beautiful and are the focal point of the park. The headspring waters are generally clear, affording extraordinary visibility. In recognition of the outstanding qualities of the springs, the U.S. Department of the Interior has designated the site as a National Natural Landmark.

Cultural Resources

This section addresses the cultural resources present in the park that may include archaeological sites, historic buildings and structures, cultural landscapes and collections. The Florida Department of State (FDOS) maintains the master inventory of such resources through the Florida Master Site File (FMSF). State law requires that all state agencies locate, inventory and evaluate cultural resources that appear to be eligible for listing in the National Register of Historic Places. Addendum 7 contains the FDOS, Division of Historical Resources (DHR) management procedures for archaeological and historical sites and properties on state-owned or controlled properties; the criteria used for evaluating eligibility for listing in the National Register of Historic Places, and the Secretary of Interior's definitions for the various preservation treatments (restoration, rehabilitation, stabilization and preservation). For the purposes of this plan, significant archaeological site, significant structure and significant landscape means those cultural resources listed or eligible for listing in the National Register of Historic Places. The terms archaeological site, historic structure or historic landscape refer to all resources that will become 50 years old during the term of this plan.

Condition Assessment

Evaluating the condition of cultural resources is accomplished using a three-part evaluation scale, expressed as good, fair and poor. These terms describe the present condition, rather than comparing what exists to the ideal condition. Good describes a condition of structural stability and physical wholeness, where no obvious deterioration other than normal occurs. Fair describes a condition in which there is a discernible decline in condition between inspections, and the wholeness or physical integrity is and continues to be threatened by factors other than normal wear. A fair assessment is usually a cause for concern. Poor describes an unstable condition where there is palpable, accelerating decline, and physical integrity is being compromised quickly. A resource in poor condition suffers obvious declines in physical integrity from year to year. A poor condition suggests immediate action is needed to reestablish physical stability.

Level of Significance

Applying the criteria for listing in the National Register of Historic Places involves the use of contexts as well as an evaluation of integrity of the site. A cultural resource's significance derives from its historical, architectural, ethnographic or archaeological context. Evaluation of cultural resources will result in a designation of NRL (National Register or National Landmark Listed or located in an NR district), NR (National Register eligible), NE (not evaluated) or NS (not significant) as indicated in the table at the end of

this section.

There are no criteria for use in determining the significance of collections or archival material. Usually, significance of a collection is based on what or whom it may represent. For instance, a collection of furniture from a single family and a particular era in connection with a significant historic site would be considered highly significant. In the same way, a high-quality collection of artifacts from a significant archaeological site would be of important significance. A large herbarium collected from a specific park over many decades could be valuable to resource management efforts. Archival records are most significant as a research source. Any records depicting critical events in the park's history, including construction and resource management efforts, would all be significant.

Pre-Historic and Historic Archaeological Sites

Desired Future Condition: All significant archaeological sites within the park that represent Florida's cultural periods or significant historic events or persons are preserved in good condition in perpetuity, protected from physical threats and interpreted to the public.

Description: The 20 known archaeological sites and two historic cemeteries in the park are recorded with the FMSF.

Rainbow Springs State Park contains evidence of over ten thousand years of human history, from prehistory through the discovery of phosphate rock and the development of tourism during the mid-twentieth century. Archaeologically, several cultures meet where Rainbow Springs is located (Vojnovski, 1999). Because the park contains archaeological evidence for many periods of the aboriginal cultural sequence from Paleo-Indian times through European contact, it has the potential to yield significant information concerning changing settlement patterns in north central Florida.

During the Archaic period from 7000 B.C. to 1000 B.C., settlement and subsistence patterns changed from the nomadic lifestyle of the Paleo-Indians to a lifestyle marked by seasonal settlements of large populations. Social groups would come together at certain times of the year to share food resources, and then break into smaller family groups as the seasons changed and the need to share food was not so urgent (Milanich and Fairbanks 1987).

Several archaeological surveys and studies have been undertaken at Rainbow Springs State Park over the past 35 years. These include Carty (2004); Quinn et al. (2004); Chance (1980, 1988); Vojnovski et al. (1999); Memory, (1999); Memory and Newman (2000) and Newman (1991).

At least two large pre-historic sites occur within the park. Research indicates at least one site shows evidence of being used during the Paleo-Indian, Archaic, and Weeden Island culture Formative Periods (Chance, 1988; Weisman, 1991). The area was much drier during the Paleo-Indian period than at present. The spring was probably a significant gathering place for animals and the Paleo-Indian hunters (Chance, 1988).

The first European economic and political center of western Marion County was a settlement sequentially called Canton, Blue Springs and finally Juliette. This settlement, situated around the headwaters of the Rainbow River, was homesteaded as early as

1839. By 1883, about 75 people lived in this farming community. Juliette's railroad station, sawmill, hotel, several stores, and post office were located at Rainbow Springs (Vojnovski et al. 1999). The exact locations of the community structures are unknown.

The park contains two historical cemeteries. One of the cemeteries (MR2057) may be associated with the community of Juliette. The other is known as the Blue Run Cemetery (MR2752). Cemetery (MR2057) may have been associated with the community of Juliette. The cemetery (MR2057) contains three tombstones and a wooden stake. It is not known if other unmarked graves are present. The Blue Run Cemetery (MR2752) encompasses the period from 1888 to 1960.

The economy of the area changed when phosphate was discovered. The phosphate industry in Florida began with the discovery of phosphate in 1879 in Hawthorne, Florida. Hard rock phosphate was discovered near Dunnellon in 1889 by Albertus Vogt (Blakely, 1973). This initiated an economic boom in the area. The first company to mine hard rock phosphate was the Marion Phosphate Company around Dunnellon.

Phosphate mining required the removal of the overburden of sand and clay. The overburden then would be impounded in a vacant area. Initially phosphate was mined by hand with picks, shovels and horse-drawn scrapers. Later steam shovels and hydraulics were used if possible. The maximum overburden depth that could be removed by hand was 15 ft. Use of the pick and shovel method continued until about 1904. In some areas around Dunnellon the water table was too high for the pick and shovel method. In that case steam dredges on wooden hulls were used to mine below the surface of the water (Blakely, 1973).

Phosphate was transported from the Dunnellon area by rail to several ports including Fernandina, Florida. From there it was shipped to Europe. Mining continued in the area until 1966 when the last mine, the section 12 mine near Dunnellon, closed in the very spot where the mining had first begun in 1889 (Blakely, 1973).

Rainbow Springs State Park has at least nine sites where mining took place. Phosphate mine pits, spoil piles and clay settling areas are found in several areas in the park.

Eight of the archaeological sites at the park are prehistoric in nature: Rainbow Springs 2 (MR00207), Rainbow Springs 3 (MR00208), Rainbow Springs State Park (MR02397), Jungle Café (MR02667), Tipi (MR02701), Rainbow Ridge (MR03268), Campground East (MR03269) and AmeriCorps Site (MR03343).

The Sandhill Cistern (MR03657) is historic in nature and may also have been associated with the community of Juliette. The depth and actual age of this brick lined cistern is unknown at this time. It is located on the edge of some of the phosphate mining disturbance and may have been associated with some of the early mining activities.

The following sites are all relics of the phosphate mining industry that occurred within the park: Rainbow Springs Phosphate Pit 1 (MR03648), Rainbow Springs Phosphate Pit 2 (MR03649), Rainbow Springs Phosphate Pit 3 (MR03650), Rainbow Springs Phosphate Pit 4 (MR03651), Rainbow Springs Phosphate Pit 5 (MR03652), Rainbow Springs Phosphate Pit 6 (MR03653), Rainbow Springs Phosphate Spoil Pile (MR03654), Phosphate Clay Settling Pond (MR03655) and Phosphate Pit and Mining Spoil (MR03656). Most or all of these areas were mined prior to 1940 because they appear in 1940 aerial photos. At least one of the pits on the park entrance drive (MR03648) appears to have a

ramp entering the pit. This may indicate that it was mined with picks, shovels and horses prior to 1905 but further research would be needed to confirm the date of mining. Several areas contain mine spoil: Rainbow Springs Phosphate Spoil Pile (MR03654), Phosphate Clay Settling Pond (MR03655) and the Phosphate Pit and Mining Spoil (MR03656) sites. After 1927 the mining technology changed to allow more recovery of phosphate from the washer debris. It might be possible to determine the age of these sites based on the nature of the spoil. No research has been conducted on the phosphate sites and no artifacts have been recovered.

A predictive model for the park was completed in 2012 (Collins et al., 2012).

Condition Assessment: Of the 18 archaeological sites, 17 are in good condition and one is in fair condition.

One site, Campground East (MR03269), is in fair condition. It has been disturbed in the past by development. Regular foot traffic has the potential to cause low level continued disturbance.

The Tipi (MR02701) site has been severely looted in the past. Although this site has been restored and is in good condition, it is close to houses and could be looted again.

Rainbow Ridge (MR03268) is a high density site that is close to houses. This could be an attractive site to looters.

The Cemetery (MR2057) is becoming overgrown by off-site hardwoods particularly laurel oaks. Since these are not long lived, strong trees, the headstones could be damaged by falling branches. The Blue Run Cemetery (MR2752) needs vegetation maintenance, particularly the control of invasive exotic plants and removal of any tree limbs threatening the structures of the cemetery.

The Sandhill Cistern (MR03657) is in good condition. However, in the past, air potato was disposed of by dumping it into the cistern. This could serve as a source of air potato infestation in that area of the park and it should be checked for exotics. Because this site is flush with the soil surface it should be marked in some manner to indicate its presence.

Sites with looting potential should be observed regularly.

Level of Significance: One archaeological site in the park, the Rainbow Ridge (MR03268) site, has been determined eligible for the National Register by the State Historic Preservation Officer (SHPO), who agreed with the surveyor that the site's intact deposits of Paleoindian and Late Archaic artifacts had the potential to yield significant information about Florida's aboriginal peoples and the greater Southeast (National Register Criterion D). One other site within the park was considered potentially eligible for the National Register by its surveyor, but the site was not formally evaluated by the SHPO. The Tipi (MR02701) site was believed to be potentially National Register eligible by the surveyor although the site had been extensively looted in the past. More testing was recommended as a high concentration of artifacts was still observed at the site as well as topographic features which seem to indicate a much larger site.

Four of the recorded archaeological sites in the park have been determined ineligible for the National Register. Campground East (MR03269) was determined ineligible by the

SHPO who agreed with the surveyor that the lack of density and tools at the site indicated that it held no further research potential. The Abandoned Railroad Grade (MR03270), the Dunnellon Short Railroad Grade (MR03271), and a portion of the Atlantic Coast Line/CSX Railroad (MR03402) which lies within the park were all determined ineligible by the SHPO who concurred with the surveyors' opinions that the leveling of a portion of the railroad grades and alteration or removal of the tracks had affected the integrity of the sites and limited their research potential.

The remaining recorded archaeological sites in the park have not been evaluated for National Register eligibility. However, two of these sites were noted for potential local significance. Rainbow Springs 3 (MR00208) was believed to be locally significant as one of the only aboriginal sites near the Rainbow Springs area when the site file was updated in 1988; however the recorder did not venture an opinion as to its potential National Register eligibility nor was the site formally evaluated by the SHPO. The Cemetery (MR02057), which is believed to be associated with the former town of Juliette, was not evaluated for National Register eligibility due to insufficient information regarding the cemetery and its relationship to the former town site and the limited testing of the site when surveyed.

General Management Measures: All archaeological sites in the park are protected. The park needs to develop an annual monitoring program which ensures that all sites are visited regularly. Photo documentation of the more vulnerable sites is recommended. It will be especially important to institute more frequent monitoring of sites that are subject to looting. Staff will document any new looting that occurs at previously looted sites or at currently intact sites. The park will request that law enforcement provide assistance in protecting these sites if necessary.

Historic Structures

Desired Future Condition: All significant historic structures and landscapes that represent Florida's cultural periods or significant historic events or persons are preserved in good condition in perpetuity, protected from physical threats and interpreted to the public.

Description: Rainbow Springs has 24 historic structures and five resource groups. All of the historic structures and two of the resource groups are associated with the tourist attraction. The remaining resource groups are railroad lines. All known historic structures are registered with the FMSF.

In 1886 the Dunnellon Short (the Silver Springs, Ocala, and Gulf Railroad) reached the community of Juliette located at the Rainbow River headspring. In 1887 construction of the rail line continued on the west bank of the river toward Homosassa (Riley, 2005). This section is still active today.

Hard rock phosphate was discovered near Dunnellon in 1889 and the phosphate economic boom began. The first phosphate shipment to Europe was in 1902 and continued in the area until after World War 1 when the industry collapsed (Riley, 2005).

The community of Juliette no longer exists. While its exact location is unknown it was described by Albertus Vogt, the discoverer of hard rock phosphate in the area. He stated "Immediately at the head of the springs are beautiful residences, lit by gas, with dancing pavilions, pleasure boats, and post-office stores. Stone terraces encompass the springs"

(Vogt in Dinkins, 1969:50-1). The community continued until at least 1926; the last date it had a postmaster. The Rainbow Springs tourist attraction was not developed until the 1930's.

Commercial development of the spring was begun by the Blue Springs Company in the 1930's (Dinkins, 1969). Later F.R. Greene and F.E. Hemphill joined forces. They renamed the spring Rainbow Springs and by the mid 1930's the gift shop and many other structures were built. One of the falls was constructed by 1937 in time for the grand opening that summer (Riley, 2005). Reptile, tropical bird and animal cages were built in 1939. The attraction operated under several owners through the years until it finally closed to the public in 1974. It was purchased by the State of Florida in 1990.

Three linear resources in the park predate the development of the Rainbow Springs tourist attraction. These are the rail lines: Dunnellon Short Railroad Grade (MR03271), Abandoned Railroad Grade (MR03270) and the Atlantic Coastline/CSX Railroad (MR03402). Today the latter is still an active rail line, the Dunnellon Short is abandoned and portions of MR03270 are used by the park as a tuber tram road.

Structures from the original Rainbow Springs attraction include two of the waterfalls: Rainbow Falls (MR3636) and Seminole Falls (MR3635). Soil to construct Seminole Falls was dredge soil from a nearby phosphate pit. Various animal cages are original to the first attraction: the Otter Pool (MR3634), the Alligator Pool (MR3633), the Tropical Bird Cage (MR3639), and the Animal Cages (MR3638). They are constructed of concrete and stone. Several buildings still in use today were built as vacation cottages in 1947 for the attraction: Building A (MR3622), Building B (MR3623), and Building C (MR3624). These are stone structures that currently house the Aquatic Preserve Office, the park's administration and a conference room.

During the later development phase of the attraction additional structures were built. The entrance fountain (MR3640), the Gift Shop (MR3628), the Restroom at Springs (MR3629) and Building D (MR3625) were built in 1968. These are still used for their original function except Building D which formerly housed the offices of the attraction and the fountain which now functions as an entrance planter. In 1968 Submarine Boats (MR3641) were used in the park so that visitors could view the beauty of the spring and the river from below the water surface. These boats are present at the park today but are not functional. Their deteriorated state and distance from the water makes them not eligible for the National Register of Historic Places.

Between 1970 and 1972 other structures were built as part of the attraction. These include: Aviary Falls (MR3637), Forest Flight (MR3642), Building E (MR3626), Greenhouse (MR3627), Canoe Shed (MR3630), Veterinarian's Office (MR3631), Residence Pump house (MR3632), Campground Recreation Building (MR3644), River Bathhouse (MR3645), Campground Shop Pole Barn (MR3646) and the Campground Water Tank Shed (MR3647). The most interesting of these structures is the Forest Flight which was a monorail ride. Visitors traveled through the attraction in leaf shaped gondolas. They even passed right through a very large aviary which no longer exists. Most of these structures continue to serve their original use. The exceptions are the Veterinarian's Building which was demolished because of its condition and the Forest Flight of which only the foundations remain.

The Division of Historical Resources has determined that Rainbow Springs State Park is eligible as a district for listing on the National Register of Historic Places at the local level

under Criterion A for Settlement/Exploration and Entertainment/Recreation and Criterion C for Architecture. The period of significance is from 1884 to 1898 and circa 1930s to 1971. The archaeological sites are still undergoing review, but there is an opportunity to add them while the nomination is being prepared or added via amendment at a later date. The nomination should focus now on the cemetery (MR2057) as remnants of the town of Juliette, and the historic roadside attraction. All of the resort structures together could be submitted in the future to the FMSF as an historic district. A suggested name is Rainbow Springs Resort and Attraction.

Condition Assessment: In general, the park's historic structures are in good condition. The exceptions to this are the Tropical Bird Cage (MR3639), Campground Shop Pole Barn (MR3646), and Campground Water Tank Shed (MR3647) which are in fair condition and the Submarine Boats (MR3641) and the Forest Flight (MR3642) which are in poor condition. The Forest Flight is considered to be in poor condition because all that remains of the monorail are the footers. The condition of the Forest Flight will not be improved but rather preserved as it is. The Submarine Boats are in poor condition due to age and exposure to weather. The Veterinarian Office was in poor condition and was demolished. The condition of the Submarine Boats will continue to deteriorate as long as they are exposed to the weather. A decision needs to be made about their future management. The Veterinarian Office deteriorated past the point of rehabilitation for park use. This structure was removed.

Level of Significance: SHPO has evaluated the attraction area and several buildings, structures, sites, and objects are considered to be potentially eligible for the National Register under Criteria A (Event) and C (Design/Construction) in relationship to the former Rainbow Springs Resort and Attraction (MR03643) and the town of Juliette. These historic structures are representative elements of a once popular, pre-Disney resort and attraction, and contain excellent examples of rustic designed buildings and landscape elements as well as tourist-specific elements such as animal enclosures and submarine boats. Contributing historic structures to a potential NR district include Building A (MR03622), Building B (MR03623), Building D (MR03625), Building E (MR03626), the Gift Shop (MR03628), the Alligator Pool (MR03633), the Otter Pool (MR03634), Seminole Falls (MR03635), Rainbow Falls (MR03636), Aviary Falls (MR03637), Animal Cages (MR03638), the Tropical Bird Cage (MR03639), the Entrance Fountain (MR03640), Cemetery (MR02057), Canoe Shed (MR03630), Residence Pump house (MR03632), Restroom at Springs (MR03629), the brick walkways, and the stone walls in the attraction area.

Other historic structures recorded within the boundary of the potential district are considered as ineligible for the National Register and therefore non-contributing to a potential district due to either insensitive alterations or additions or an overall lack of material integrity. They include Building C (MR03624), the Greenhouse (MR03627), the Veterinarian's Office (MR03631), the Quarter-Horse Barn (MR04275), the Quarter-Horse Rodeo Grounds (MR04274), Submarine Boats (MR03641), and the remaining foundation pads for Forest Flight (MR03642).

The Campground Recreation Building (MR03644), River Bathhouse (MR03645), Campground Shop Pole Barn (MR03646) and Campground Water Tank Shed (MR03647) are located on the property of a former private campground and are not associated with the former Rainbow Springs attraction. All of these buildings were constructed in the early 1970's and will become 50 years of age during the scope of this UMP. All of these buildings are of standard campground and shop design, and are unlikely to be

considered as eligible for the National Register. The surveyor's opinion is that these structures are potentially ineligible for the register due to their lack of either notable architectural features or similarity of design which could result in a potential district.

General Management Measures: The Park needs a formalized historic structure management plan that includes preventative, routine and corrective maintenance.

Some of the historic structures which are in good condition have issues developing that need attention before they affect the overall building condition.

Building A (MR3622) and Building B (MR3623) have recently had their roofs replaced. Building C (MR3624), Building D (MR3625) and Building E (MR3626) will all need new roofs. All the buildings except Building E have T111 siding which needs to be replaced. Building B has settlement cracks in the walls and floor which need repair.

The Gift Shop (MR3628) was damaged in a fire and has been renovated. The non-historic portion of the building was removed, the roof was repaired and the poles supporting the veranda were replaced. The building also has T111 siding which needs replacement. Alligator Pool (MR3633) is structurally sound but continuously holds water. The drain system needs repair.

Rainbow Falls (MR3636) has a masonry trough at the top of the falls which needs repair. A tree fall during Hurricane Irma broke the corner of the masonry trough. If this deteriorates further it could impact the functioning of the falls.

The Animal Cages (MR3638) need some rockwork repair.

The Cemetery (MR02057) was originally located in sandhill. The site is overgrown with vegetation, including smilax vines encircling the gravestones, and is being invaded by fire intolerant oaks. To date, boundaries of the cemetery have not been determined and additional unmarked burials are possible within the cemetery. Furthermore, a pile of brick rubble has been noted near the cemetery that may be related to the cemetery. To bring it into good condition off site hardwoods should be removed and the boundaries should be determined.

The Veterinarian Office (MR3631) has been demolished due to safety concerns. This structure is part of the later development of the attraction. It sat idle for 20 years before the state purchased the park. During that time it deteriorated structurally. It was not suitable for rehabilitation for reuse and was not considered a significant historic structure.

The park needs a plan to manage the Submarine Boats (MR3641). Exposure to the elements threatens all of them. The park does not have a structure to house all of the boats. It is not known if they are all the same age. They should be evaluated to decide which, if any, to restore, interpret or document and deaccession.

Collections

Desired Future Condition: All historic, natural history and archaeological objects within the park that represent Florida's cultural periods, significant historic events or persons, or natural history specimens are preserved in good condition in perpetuity, protected

from physical threats and interpreted to the public.

Description: Rainbow Springs State Park has very few items in its collection and all of its collection is informal. The most important items are 5 boats that were part of the former attraction. These are described as submarine boats because the viewing portholes are below the surface of the water. The boats are a steel construction with concrete decks to help them submerge to a proper underwater viewing level. They may be unique in Florida due to their partially submersible nature.

Other than the boats the park has a few items that relate to the former attraction. A diorama from the 1964 World's Fair depicts the head spring when it was owned by the attraction. This is on loan to the park. There are several plastic decals that were sold by the attraction's gift shop; a pre-1959 souvenir coin depicting the paddle wheeler, the Rainbow Queen; a lifesaving mermaid ring and maps from the attraction era; photographs; glass bottles from the headsprings and several pieces of china marked Rainbow Springs.

There are a few natural history items including fossil bones that were recovered from the river as well as a stuffed bobcat, alligator skulls, turtle shells, a deer hide and antlers and other bones and skulls.

At one time the park had a dugout canoe as part of its collection. This was transferred to Collier-Seminole State Park.

The 5 submarine boats are each at least 40 ft by 15 ft and the diorama is 3 ft by 3ft. The rest of the collection probably occupies no more than 5 cubic feet.

The park's collection focuses on the interpretation of the former attraction and the natural resources of the headspring and the Rainbow River.

Condition Assessment: The boats are in poor condition. They are stored outside at the shop area. One is covered with a tarp. This boat has been partially restored. The remaining 4 are not protected from the weather. Rainwater accumulation is a serious problem because the boats are not under cover and they hold water. The park does keep vegetation trimmed away from the boats. A better method of storage is needed for the boats.

The diorama is in good condition. It is stored at the environmental education building in climate-controlled conditions. All of the other collection items are in good condition. They are stored in the manager's office or the visitors' center. All buildings are climate controlled, receive pest control and are locked when not attended. Relative humidity is not monitored, and temperatures are set manually. The visitor center has an alarm system.

Level of Significance: All of the collection items originated in the park and therefore are significant to the interpretation of the park's history and natural resources. The boats and mermaid lifesaving ring were used in the park during the era of the original tourist attraction and represent that historic period. The decals and coin were souvenirs from the original attraction and the diorama represented the attraction at the 1964 World's Fair.

The fossils were found in the Rainbow River and represent the park's natural history.

All of the objects are valuable for their research, interpretive, and educational potential

in relation to the cultural and natural history of the park.

General Management Measures: The Park needs to develop a Scope of Collections Statement to guide the deaccession and acquisition of collection items. All items in the collection should be inventoried. No collections management assessment has been done for the park. The boats should be evaluated to determine how many, if any, the park should retain in its collection. The remaining boats should be documented and deaccessioned. An important part of the park's history is the phosphate mining industry and its impacts that still remain on the land. There are no items from this era in the collection. The park should decide in the Scope of Collections Statement if such things as photos and other items from this era would be a potential part of the collection.

Table 5 contains the name, reference number, culture or period, and brief description of all the cultural sites within the park that are listed in the Florida Master Site File. The table also summarizes each site's level of significance, existing condition and recommended management treatment.

Table 5. Cultural Sites Listed in the Florida Master Site File					
Site Name & FMSF #	Culture/Period	Description	Significance	Condition	Treatment
Rainbow Springs 2 MR00207	Pre-Colombian	Archaeological Site	NE	G	P
Rainbow Springs 3 MR00208	St. Johns, Weeden Is.	Archaeological Site	NE	G	P
Cemetery MR02057	Early 19 th Century	Historical Cemetery	NR	F	P
Rainbow River Ranch Mine MR2228	Late 19 th & Early 20 th Century	Archaeological Site	NE	G	P
Rainbow Springs State Park MR02397	Pre-historic, Historic	Archaeological Site	NE	G	P
Jungle Café MR02667	Pre-historic, 20 th Century	Archaeological Site	NE	G	P
Tipi MR02701	Pre-historic through the present	Archaeological Site	NE	G	P
Blue Run Cemetery MR2752	1888 - 1960	Historical Cemetery	NE	F	P
Rainbow Ridge MR03268	Archaic, Historic	Archaeological Site	NE	G	P
Campground East MR03269	Pre-historic	Archaeological Site	NS	F	P
Abandoned Railroad Grade MR03270	19 th and 20 th Century	Linear Resource Group	NE	G	RH

Table 5. Cultural Sites Listed in the Florida Master Site File

Site Name & FMSF #	Culture/Period	Description	Significance	Condition	Treatment
Dunnellon Short Railroad Grade MR03271	Late 19 th Century	Linear Resource Group	NE	G	P
AmeriCorps Site MR03343	Pre-historic, Unknown	Archaeological Site	NE	G	P
Atlantic Coastline/ CSX Railroad MR03402	Early 20 th Century	Linear Resource Group	NE	G	NA
Building A MR3622	Mid-20 th Century - 1947	Historic Structure	NR	G	RH
Building B MR3623	Mid-20 th Century - 1947	Historic Structure	NR	G	RH
Building C MR3624	Mid-20 th Century - 1947	Historic Structure	NS	G	RH
Building D MR3625	Mid-20 th Century - 1968	Historic Structure	NR	G	RH
Building E MR3626	20 th Century - 1970	Historic Structure	NR	G	RH
Greenhouse MR3627	20 th Century - 1972	Historic Structure	NS	G	RH
Gift Shop MR3628	20 th Century - 1968	Historic Structure	NR	G	RH
Restroom at Springs MR3629	20 th Century - 1968	Historic Structure	NR	G	RH
Canoe Shed MR3630	20 th Century - 1970	Historic Structure	NR	G	RH
Veterinarian's Office MR3631	20 th Century - 1971	Historic Structure/ Removed	NS	P	R
Residence Pumphouse MR3632	20 th Century - 1971	Historic Structure	NR	G	RH
Alligator Pool MR3633	Early 20 th Century - 1939	Historic Structure	NR	G	P
Otter Pool MR3634	Early 20 th Century - 1939	Historic Structure	NR	G	P
Seminole Falls MR3635	Early 20 th Century - 1937	Historic Structure	NR	G	P
Rainbow Falls MR3636	Early 20 th Century - 1937	Historic Structure	NR	G	P
Aviary Falls MR3637	20 th Century - 1970	Historic Structure	NR	G	P

Table 5. Cultural Sites Listed in the Florida Master Site File

Site Name & FMSF #	Culture/Period	Description	Significance	Condition	Treatment
Animal Cages MR3638	Early 20 th Century - 1939	Historic Structure	NR	G	P
Tropical Bird Cage MR3639	Early 20 th Century - 1939	Historic Structure	NR	F	P
Entrance Fountain MR3640	20 th Century - 1968	Historic Structure	NR	G	P
Submarine Boats MR3641	20 th Century - 1968	Historic Structure	NS	P	RS/ RH/R
Forest Flight MR3642	20 th Century	Resource Group	NS	P	P
Campground Recreation Building MR3644	20 th Century - 1972	Historic Structure	NS	G	RH
River Bathhouse MR3645	20 th Century - 1972	Historic Structure	NS	G	RH
Campground Shop Pole Barn MR3646	20 th Century - 1972	Historic Structure	NS	F	RH
Campground Water Tank Shed MR3647	20 th Century - 1972	Historic Structure	NS	F	RH
Rainbow Springs Phosphate Pit 1 MR03648	Late 19 th Century- Early 20 th Century	Archaeological Site	NE	G	ST
Rainbow Springs Phosphate Pit 2 MR03649	Late 19 th Century- Early 20 th Century	Archaeological Site	NE	G	ST
Rainbow Springs Phosphate Pit 3 MR03650	Late 19 th Century- Early 20 th Century	Archaeological Site	NE	G	ST
Rainbow Springs Phosphate Pit 4 MR03651	Late 19 th Century- Early 20 th Century	Archaeological Site	NE	G	ST
Rainbow Springs Phosphate Pit 5 MR03652	Late 19 th Century- Early 20 th Century	Archaeological Site	NE	G	ST
Rainbow Springs Phosphate Pit 6 MR03653	Late 19 th Century- Early 20 th Century	Archaeological Site	NE	G	ST
Rainbow Springs Phosphate Spoil Pile MR03654	Late 19 th Century- Early 20 th Century	Archaeological Site	NE	G	ST

Table 5. Cultural Sites Listed in the Florida Master Site File

Site Name & FMSF #	Culture/Period	Description	Significance	Condition	Treatment
Phosphate Clay Settling Pond MR03655	Late 19 th Century- Early 20 th Century	Archaeological Site	NE	G	ST
Phosphate Pit and Mining Spoil MR03656	Late 19 th Century- Early 20 th Century	Archaeological Site	NE	G	ST
Sandhill Cistern MR03657	Late 19 th Century- Early 20 th Century	Archaeological Site	NE	G	ST
Quarter-Horse Barn MR04275	1968	Historic Structure/ Archaeological Site	NS	G	P
Quarter-Horse Rodo Grounds MR04274	1968	Historic Structure/ Archaeological Site	NS	F	P

Significance:

NRL..... National Register listed
 NR..... National Register eligible
 NE..... not evaluated
 NS..... not significant

Condition

G..... Good
 F Fair
 P Poor
 NA..... Not accessible
 NE Not evaluated

Recommended Treatment:

RS Restoration
 RH Rehabilitation
 ST..... Stabilization
 P..... Preservation
 R Removal
 N/A..... Not applicable

Cultural Resource Management

Cultural resources are individually unique, and collectively, very challenging for the public land manager whose goal is to preserve and protect them in perpetuity. The DRP is implementing the following goals, objectives and actions, as funding becomes available, to preserve the cultural resources found in Rainbow Springs State Park.

Goal: Protect, preserve and maintain the cultural resources of the park.

The management of cultural resources is often complicated because these resources are irreplaceable and extremely vulnerable to disturbances. The advice of historical and archaeological experts is required in this effort. All activities related to land clearing, ground disturbing activities, major repairs or additions to historic structures listed or eligible for listing in the National Register of Historic Places must be submitted to DHR for review and comment prior to undertaking the proposed project. Recommendations may include concurrence with the project as submitted, monitoring of the project by a certified archaeological monitor, cultural resource assessment survey by a qualified professional archaeologist, modifications to the proposed project to avoid or mitigate potential adverse effect. In addition, any demolition or substantial alteration to any

historic structure or resource must be submitted to DHR for consultation and the DRP must demonstrate that there is no feasible alternative to removal and must provide a strategy for documentation or salvage of the resource. Florida law further requires that the DRP consider the reuse of historic buildings in the park in lieu of new construction and must undertake a cost comparison of new development versus rehabilitation of a building before electing to construct a new or replacement building. This comparison must be accomplished with the assistance of DHR.

Objective A: Assess and evaluate 35 of 50 recorded cultural resources in the park.

- Action 1 Complete 35 assessments/evaluations of cultural sites.
- Action 2 Complete 1 Historic Structures Report for the Gift Shop (MR03628).

The park needs to develop a protocol to assess its cultural resources on a regular basis. Most of the sites are in good condition. The exceptions are sites MR02057, MR2752, MR03269, MR03639, MR03646 and MR03647 which are considered to be in fair condition, and sites MR03641 and MR03642 which are ranked as poor. The site MR02701 was looted in the past. It needs to be assessed more frequently as a preventative measure even though it is in good condition. Although many of the historic structures are currently in good condition, they need regular assessment to retain that status.

The two historic cemeteries, MR2057 and MR2752, should have their boundaries delineated with ground penetrating radar or other method to ensure protection of all the gravesites.

Of the two sites in poor condition the Submarine Boats (MR03641) should be assessed to prevent further deterioration until a decision is made about restoration and de-accession.

Rainbow Springs has many historic structures currently in adaptive reuse by the park. At this time the only structure recommended to receive a Historic Structures Report (HSR) is the Gift Shop (MR03628). Additional structures may require an HSR but that has yet to be determined. During the next ten years, the park should try to remedy that situation by deciding which of the structures, if any, will need an HSR. For this process, the park could consider the Rainbow Springs Resort and Attraction structures as one group. If an HSR identifies any necessary rehabilitation or maintenance projects, the park staff will prioritize them.

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

- Action 1 Delineate the bounds of the historic Cemetery (MR02057) and Blue Run Cemetery (MR2752) using Ground Penetrating Radar or other appropriate method.
- Action 2 Ensure all known sites are recorded or updated in the Florida Master Site File.
- Action 3 Develop and utilize a Scope of Collections Statement.
- Action 4 Conduct a Phase 1 archaeological survey for 1 priority area identified by the predictive model.

- Action 5 Prepare and submit the nomination of Rainbow Springs to the National Register of Historic Places at the local level under Criterion A for Settlement/Exploration and Entertainment/Recreation and Criterion C for Architecture

As new historic or archaeological resources are identified the park will submit this information to the FMSF. All currently known sites have been submitted to the FMSF. The Veterinarian's Office MR3631 has been demolished and the FMSF form needs to be updated to reflect that.

The Park needs to develop a Scope of Collections Statement around specific themes. This statement will also help guide any deaccession and acquisition of collection items. The focus of the Scope of Collections statement will provide guidance on the type of historic and archaeological resources to document and interpret. At this time the park has very little documentation of the community of Juliette, the historic cemetery and the history of the phosphate mining that occurred within the park. Additional documentation of the Forest Flight monorail location would be of interest. More information is needed on the fossils found in the area and the pre- European native peoples who utilized the spring resource.

The boundaries of the historic cemeteries are currently unknown. This could be documented through the use of ground penetrating radar (GPR). This would assist the park protect the site as well.

A predictive model for locating archaeological sites within the park was completed in 2012. Rainbow Springs State Park has a rich history of human habitation including pre-European settlements, 19th pioneer century communities, 19th and 20th Century phosphate mining and an early 20th Century tourist attraction. The predictive model indicates areas of high, medium and low probability for the occurrence of archaeological sites. The model also provides guidance for future development and will aid in selecting the best locations for future Phase 1 archaeological surveys. The park should identify the areas that are highest priority for a Phase 1 survey based on the results of the predictive model report.

Objective C: Bring 11 of 50 recorded cultural resources into good condition.

- Action 1 Develop and implement a protocol to assess known cultural resources in the park.
- Action 2 Develop and implement a plan to bring the Gift Shop (MR3628) into good condition.
- Action 3 Develop and implement a plan to repair the Rainbow Falls (MR03636).
- Action 4 Develop and implement a plan to manage, restore or deaccession the submarine Boats (MR3641)

The park needs to develop a cyclical maintenance program for its cultural resources, particularly its historic structures and cemetery. Any problems identified should be described in a work plan. The maintenance plan should include actions and schedules that are preventative, routine and corrective in nature.

The park should develop a monitoring program for all of its cultural resources. Staff should formalize that program by writing and adopting a clear protocol. This should include a visual evaluation of buildings on a weekly basis as park rangers work in the

area of historic structures and other cultural resources.

Because the park has so many historic structures, it is necessary to prioritize their repair in order to bring them into good condition or maintain them in good condition. The ability of the park to improve these structures to a good condition will also depend on the availability of funding. The following is a prioritized list of cultural resources in the park that need repairs or removal: Building A (MR3622), Building B (MR3623), Building C (MR3624), Building D (MR3625), Building E (MR3626), Rainbow Falls (MR03636), Cemetery (MR02057), and the Submarine Boats (MR03641).

The Gift Shop (MR3628) has T111 siding which needs replacement.

Building C (MR3624), Building D (MR3625) and Building E (MR3626) will all need new roofs within a few years. All the buildings except Building E have T111 siding which needs to be replaced. Building B has settlement cracks in the floor which need repair.

Rainbow Falls (MR3636) has a masonry trough at the top of the falls which needs repair. If this deteriorates it could impact the functioning of the falls.

The Cemetery (MR02057) was originally located in sandhill. The site is overgrown with vegetation, including smilax vines encircling the gravestones, and is being invaded by fire intolerant oaks. To date, boundaries of the cemetery have not been determined and additional unmarked burials are possible within the cemetery. To bring it into good condition off site hardwoods should be removed and the boundaries should be determined and delineated for protective purposes.

A plan needs to be developed and implemented that addresses the restoration and/or deaccession and interpretation of the Submarine Boats (MR3641). Exposure to the elements currently threatens all of the boats and they may currently be beyond repair. Consult with DHR and restoration experts as to possible steps.

While the Sandhill Cistern (MR03657) appears to be in good condition it is a potential safety issue particularly during prescribed burns. Since the site is flush with the ground, DHR should be consulted to determine if it could be filled in for safety reasons.

Special Management Considerations

Timber Management Analysis

Chapters 253 and 259, Florida Statutes, require an assessment of the feasibility of managing timber in land management plans for parcels greater than 1,000 acres if the lead agency determines that timber management is not in conflict with the primary management objectives of the land. The feasibility of harvesting timber at this park during the period covered by this plan was considered in context of the DRP's statutory responsibilities and an analysis of the park's resource needs and values. The long-term management goal for forest communities in the state park system is to maintain or re-establish old-growth characteristics to the degree practicable, with the exception of those communities specifically managed as early successional.

Two timber assessments have been conducted for Rainbow Springs State Park. A timber assessment for the portion of the park known as the Griffiths Addition was prepared in May 2011 by a state lands forester. A second timber assessment that encompassed the

entire park was prepared by private consultants in December 2017.

The Griffiths Addition is located north of CR 484 and west of SW 180th Ave Rd near Dunnellon, FL. This area was acquired in 2004. One hundred and eighty-two acres of second-generation sand pine plantation occur on the property. These acres were formerly sandhill and will require timber management to restore it to sandhill. The previous owners clear-cut the original longleaf in the sandhill and planted sand pine. This plantation was harvested and the current sand pine regenerated from the original plantation. A small patch of original longleaf remains surrounded by the sand pine plantation. A few of the original hardwoods such as sand post oak remain. Cogongrass is present on site and was probably introduced during logging operations.

Historically this area was sandhill that graded into mesic flatwoods. While silvicultural activities have strongly impacted the tract, there are a few areas with some remnant native groundcover species. There is no evidence of recent fire. Gopher tortoises are common and indigo snakes are present.

The long-term goal for this site is to reestablish the original natural communities. The Division will achieve this in part by removing the sand pine and replanting the area with the longleaf pine that would have historically occupied the site. Throughout this process the park will continue to treat the cogongrass and other invasive exotics found on site. The sand pine will be managed with appropriate silvicultural techniques that include clearcutting and post-harvest prescribed fire. It may also be necessary to control offsite hardwood species through mechanical or chemical methods to implement prescribed fire successfully and to improve conditions for restoring the native groundcover species and the planting of longleaf pines.

No longleaf pines will be harvested and no other pine harvests except sand pine are planned over the life of this plan. Off-site hardwood harvests will be considered if they further restoration goals in pine natural communities and are deemed the best option to achieve those goals.

Arthropod Control Plan

All DRP lands are designated as “environmentally sensitive and biologically highly productive” in accordance with Ch. 388 and Ch. 388.4111 Florida Statutes. If a local mosquito control district proposes a treatment plan, the DRP works with the local mosquito control district to achieve consensus. By policy of DEP since 1987, aerial adulticiding is not allowed, but larviciding and ground adulticiding (truck spraying in public use areas) is typically allowed. The DRP does not authorize new physical alterations of marshes through ditching or water control structures. Mosquito control plans temporarily may be set aside under declared threats to public or animal health, or during a Governor’s Emergency Proclamation. Mosquito control plans are typically proposed by local mosquito control agencies when they desire to treat on public lands that are protected by Ch. 388.4111. A plan has not been proposed for Rainbow Springs.

Additional Considerations

In springs managed by the Florida Park Service, a fine balance must be achieved between protection of the natural resources and provision of outdoor recreation. Since the early 1990s, the Division has restricted motorized boat access within the park managed section of spring-run stream. The purpose of this restriction is to protect SAV

from propeller scarring and help restore these sensitive park resources from previous overuse. Two side springs on the eastern shoreline were also designated as restricted zones to allow them to recover from damage.

Swimmers, snorkelers, and waders often inadvertently uproot native aquatic vegetation and denude areas of the spring run. This allows the aggressive spread of hydrilla that seriously affects the ecological integrity and aesthetic quality of the river and its headspring. To mitigate these impacts while still providing for recreation, swimming access within the headspring is restricted to two designated areas (a deep primary area and shallow children's area).

In 2006, the Division constructed a new tubing recreational facility in two primary locations along the park-managed uplands of the Rainbow River. The upper put-in tuber facility is located adjacent to the campground facilities, and the lower take-out facility is located 1.5 miles downstream. A long boardwalk system was constructed across the floodplain wetlands at the tuber take-out facility. Because the put-in, intervening sensitive shallow areas along the river and the take-out facilities receive high use during the summer months a program to monitor ecological impacts to the SAV in these areas is needed.

Annual monitoring of these areas will supplement data collected by the SWFWMD every 5 years on impacts to the SAV. This will help the Division make decisions on how best to establish management methods for controlling adverse effects. These methods might include restriction of use in sensitive areas, mitigation of impacts through restoration and revision of the park's recreational carrying capacity to include measures of ecologically based carrying capacity.

DRP Resiliency Statement

Climate-related shocks and stressors present new challenges to the Florida Park Service mission of providing resource-based recreation while preserving, interpreting and restoring natural and cultural resources. Parks will adapt to climate threats with prescriptive strategies to minimize and manage the impacts of more severe storms and droughts, sea-level rise, invasive organisms, and other emerging environmental disturbances. Resilience strategies will be incorporated in all park plans and resource management decisions. Land Uses along the Rainbow River including watercraft launches and landings may need to be set back or altered to accommodate for the potential for rises in water levels. At this stage in the resiliency planning process, no specific developments, renovations, landscape alterations, or augmentations are proposed.

Resource Management Schedule

A priority schedule for conducting all management activities that is based on the purposes for which these lands were acquired, and to enhance the resource values, is in the Implementation Component of this management plan.

Land Management Review

Section 259.036, Florida Statutes, established land management review teams to determine whether conservation, preservation and recreation lands titled in the name of the Board of Trustees are being managed for the purposes for which they were acquired and in accordance with their approved land management plans. The DRP considered

recommendations of the land management review team and updated this plan accordingly.

Rainbow Springs State Park was subject to a land management review on October 11, 2019. The review team made the following determinations:

- 1.** The land is being managed for the purpose for which it was acquired.
- 2.** The actual management practices, including public access, complied with the management plan for this site.

LAND USE COMPONENT

Land use planning and park development decisions for the state park system are based on the dual responsibilities of the DRP. These responsibilities are to preserve representative examples of original natural Florida and its cultural resources, and to provide outdoor recreation opportunities for Florida's citizens and visitors. These dual responsibilities inform all recreational and infrastructure development considerations. Balancing equitable access to recreational facilities and preservation of Florida's resources is the main priority when developing recreation and land use proposals.

The general planning and land use planning process begins with an analysis of the natural and cultural resources of the unit, proceeds through the creation of a conceptual land use plan, and culminates in the actual design and construction of park facilities. Input to the plan is provided by experts in environmental sciences, cultural resources, park operation, and management. Additional input is received through public meetings and advisory groups with key stakeholders. With this approach, the DRP's objective is to provide high-quality facilities for resource-based recreation throughout the state with a high level of sensitivity to the natural and cultural resources at each park.

This component of the management plan includes an inventory and brief description of the existing recreational uses, facilities, and special conditions on use. Specific areas within the park that will be given special protection are also identified. The Land Use Component then summarizes the Conceptual Land Use Plan (CLUP) for the park and identifies large-scale repair and renovation projects, new building and infrastructure projects, and new recreational amenities that are recommended to be implemented over the next ten-year planning period. Any adjacent lands that should be pursued for acquisition are identified as a part of the park's Optimum Boundary.

Existing Use of Adjacent Lands

Rainbow Springs State Park is surrounded by single-family residential development, undeveloped residential and agricultural lands. Single-family residential development accounts for most of the land use to the park's north and west. Almost the entire west side from K.P. Hole Park south is privately owned and has experienced intensive residential development. Agricultural uses are predominant to the east and south. Dunnellon High School and Dunnellon Elementary School are located on the east side of SW 180th Avenue across from the entrance to the Sateke Village subdivision. The Cross Florida Greenway is located directly south of the park on the south side of CR 484. The City of Dunnellon occupies upland areas along the last 1.5-mile stretch of the river.

Planned Use of Adjacent Lands

The Future Land Use (FLU) designation for the majority of land to the north and west of the park is Low Density Residential (one dwelling unit per acre) and Medium Density Residential (four dwelling units per acre). The majority of the property to the east of the park is designated as Rural Land with a maximum density of one dwelling unit per ten acres (Marion County, Florida, Comprehensive Plan, 2035). Zoning for the majority of properties to the west of the park is Single

Family Residential with some areas of Residential Mixed Use for single and multi-family residential development. Both of these designations allow for a maximum density of four dwelling units per acre. The General Agriculture zoning designation applies to most properties on the east side. The maximum density for this category is one dwelling unit per ten acres (Marion County, Florida, Land Development Code, 2020).

The FLU for adjacent land within the City of Dunnellon is designated as Agriculture and Mixed Use. The maximum density for the Agriculture category is one dwelling unit per ten acres. The property at the southeastern corner of the park (the intersection of SW 180th Avenue and CR 484) is designated as Mixed-Use, which allows for a variety of neighborhood scale commercial uses (City of Dunnellon, Florida, Comprehensive Plan, 2007-2025).

The Florida Department of Transportation is currently planning to improve a four-mile segment of US Highway 41 from Dunnellon to a point just north of the intersection of State Road 40. The project entails the reconstruction of the highway from two to four lanes and includes grassed medians, paved shoulders, sidewalks, driveway reconstruction, and full and directional median openings. The project right of way were completed in 2018 and the project is currently funded for construction in 2024. These improvements are expected to increase the safety of visitors to the headsprings area as they enter and leave the park.

Planning for new residential development has been conducted for the tract of agricultural land adjoining the Griffith's addition southwestern boundary in the past. Much of that property, the Rainbow River Ranch, was acquired by the SWFWMD for conservation purposes. At this time, the development is not slated to proceed. Residential and associated commercial development west of Rainbow River Ranch and on land east of S.W. 180th Avenue should be anticipated in the future.

Assessment of Use

All legal boundaries, significant natural features, structures, facilities, roads and trails existing in the unit are delineated on the base map (see Base Map). Specific uses made of the unit are briefly described in the following sections.

Past Uses

Historic and prehistoric activities on the property date back approximately 10,000 years. Hunting, agriculture, silviculture and tourism are the past uses having the greatest impact on the natural communities through the alteration and removal of native species, introduction of exotic species, and the construction of structures, paving and water features. The area immediately surrounding the headsprings and spring-run stream, was developed for phosphate mining, as a vacation resort, and as a commercial attraction by a series of private owners before state acquisition.

Future Land Use and Zoning

The DRP works with local governments to establish designations that provide both consistency between comprehensive plans and zoning codes and permit typical state park uses and facilities necessary for the provision of resource-based recreation.

The Marion County FLU designation for a majority of the park is Natural Reservation (NR). The general range of potential uses includes open space, appropriate recreational activities, passive nature parks, and accessory structures. NR allows for the development of park related facilities as long as they are specified in the park management plan. The county zoning designations include Agriculture (A1) (one dwelling unit per ten acres) and Medium Density Residential (R4) (four dwelling units per acre). The portion of the property located within the City of Dunnellon has a FLU designation of Recreation allowing for passive and/or active recreational activities and associated facilities. The City zoning is General Agriculture (A-1). This category is intended to preserve agriculture as the primary use. The maximum density is one dwelling unit per ten acres. Typical park uses and facilities are permissible within the future land use and zoning categories. No conflicts to park development and management are anticipated.

Current Recreational Use and Visitor Programs

Rainbow Springs State Park offers visitors several resource-based recreation opportunities. The campground is one of the more popular in the state park system. Campground occupancy rates are relatively high in all months of the year with particularly high use in the winter and spring months. Swimming, snorkeling, canoeing, picnicking, interpretive programs, special events and sightseeing are the recreational activities occurring in the headspring area of Rainbow Springs State Park. Activities outside the park on the Rainbow River include swimming, snorkeling, scuba diving, canoeing, boating, tubing, fishing and sightseeing. Canoeing, kayaking and the use of other human-powered boats are allowed in the reach of the spring-run stream managed by the Division.

The southern parcel of the park lies on the east bank of the Rainbow River, approximately 1.25 miles downstream from the headsprings. This area is primarily sandhill community with wetland communities located along the river. The camping area and river access point for tubers is located near the northern boundary of the southern parcel. During the last planning period, management of the campground was transferred from Marion County to the DRP. The campground was redesigned and all campsites were removed from the hydric hammock area along the river and relocated uphill out of the flood zone.

Shoreline facilities located just downslope from the campground include water access, campground swimming area, and picnic area. The tuber take-out (ramp and boardwalk) is located approximately 1.5 miles downstream in the tuber day use and entrance area. Tubers enter and park at this location and are shuttled to the launch area on a concession-operated tram.

Many of the park's current facilities can be attributed to the park's history as a roadside tourist attraction. Recreation facilities that have been restored in the headsprings area that were initially constructed prior to state ownership include: the ornamental gardens, the visitor center/concession and restroom buildings, a concrete block building on the spring-run stream that now houses the park's canoe livery. All other facilities in the park have been developed under DRP management.

Rainbow Springs State Park recorded 249,959 visitors in FY 2019/2020. By DRP estimates, the FY 2019/2020 visitors contributed \$22.5 million in direct economic impact, the equivalent of adding 314 jobs to the local economy (FDEP 2020).

Other Uses

The park provides office space and a small area to operate an aquatic plant nursery for Rainbow Springs Aquatic Preserve staff.

Protected Zones

A protected zone is an area of high sensitivity or outstanding character from which most types of development are excluded as a protective measure. Generally, facilities requiring extensive land alteration or resulting in intensive resource use, such as parking lots, camping areas, shops or maintenance areas, are not permitted in protected zones. Facilities with minimal resource impacts, such as trails, interpretive signs and boardwalks are generally allowed. All decisions involving the use of protected zones are made on a case-by-case basis after careful site planning and analysis.

At Rainbow Springs State Park, all wetlands and floodplain as well as Sandhill communities, and known imperiled species habitat have been designated as protected zones. The park's current protected zone is delineated on the Conceptual Land Use Plan.

Existing Facilities

Recreation Facilities

Headsprings Day Use Area

Swimming area and deck
Canoe/kayak launch
Canoe concession building
Visitor center/concession building
Group pavilion
Picnic pavilions (3)
Ornamental gardens
Scenic Overlooks (2)
Restrooms (2)
Parking (400 spaces)
Hiking trails (approx. 3 mi.)

Family Camping Area

Reception hall/concession building
Standard campsites (53)
Tent campsites (7)
Bathhouses (3)
Restroom
Picnic pavilions (3)
Playground

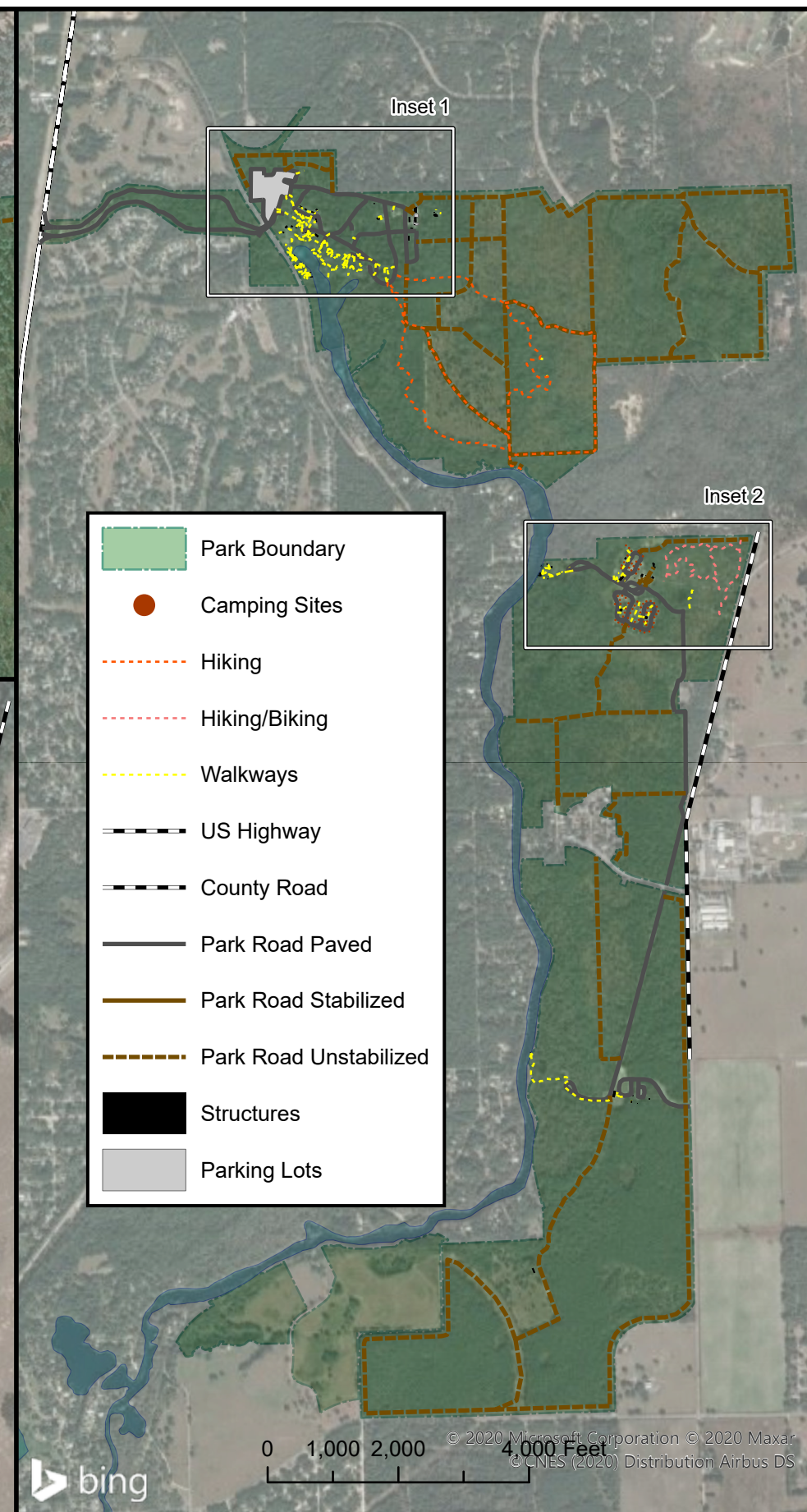
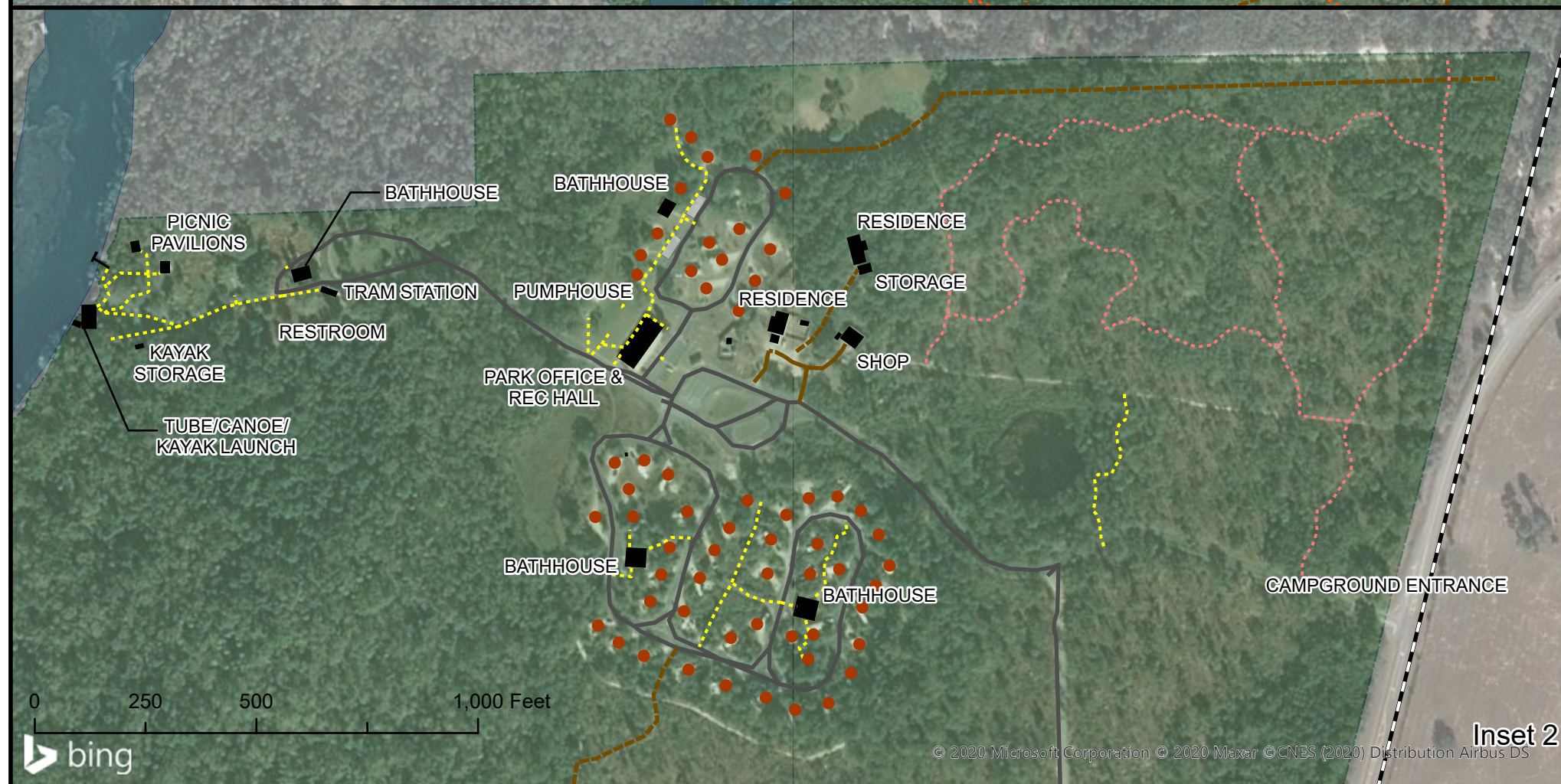
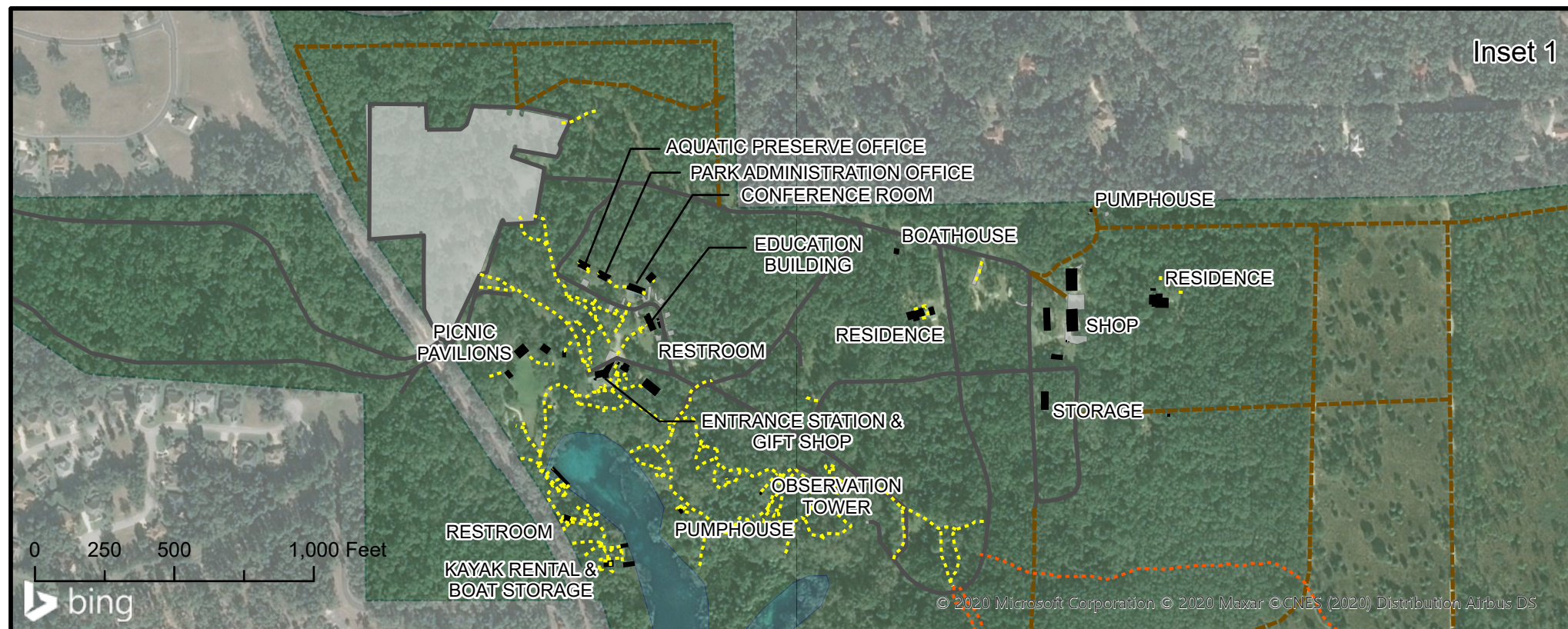
Swimming area
Tuber/canoe/kayak launch
Tram unloading shelter

Tube Concession/Exit Area

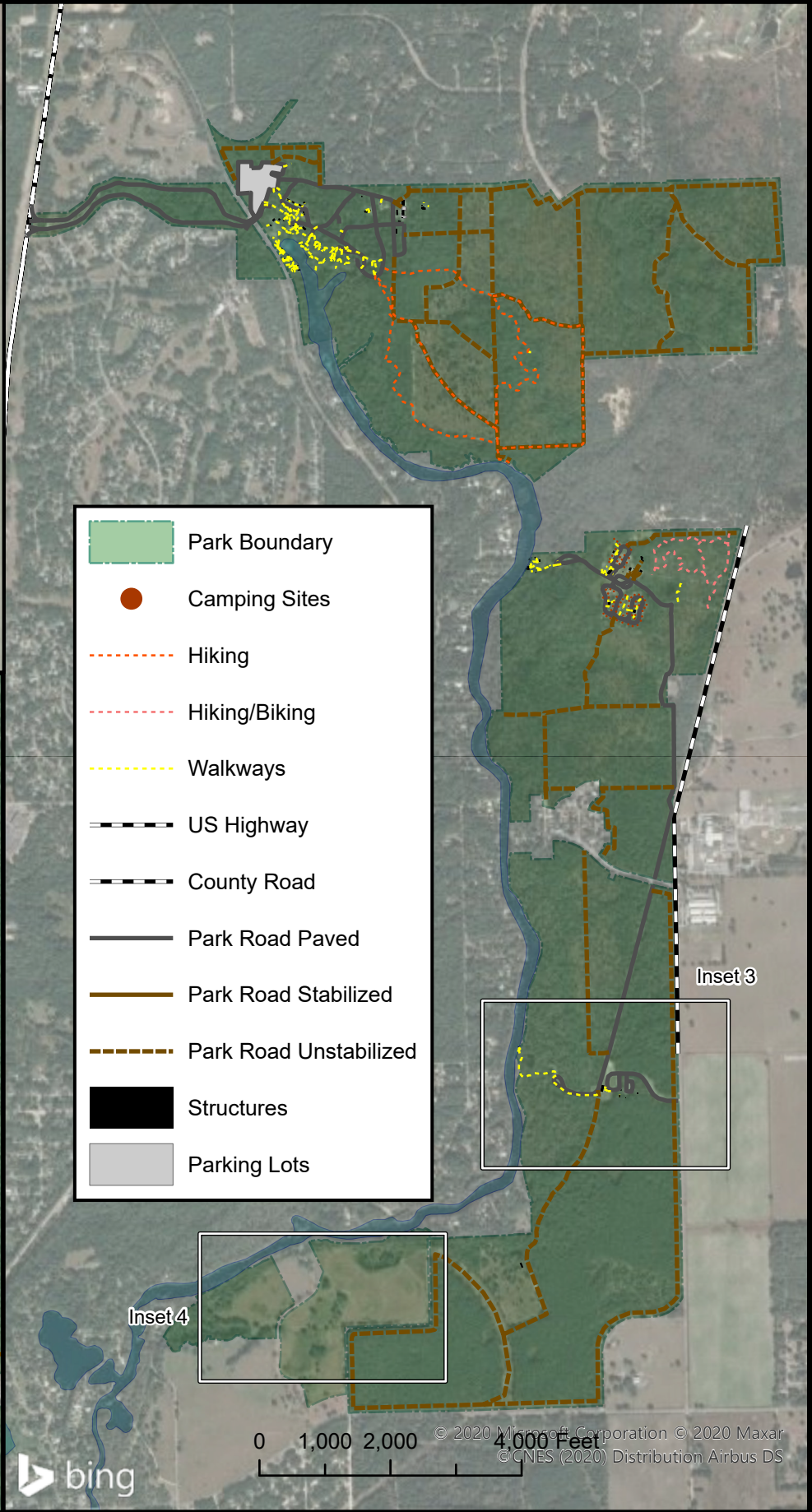
Picnic pavilions (2)
Concession building/bathhouse
Tuber takeout ramp
Tram loading shelter
Tram road (2 mi.)
Parking (106 spaces)

Support Facilities

Entrance station (tuber entrance)
Offices (5)
Staff residences (4)
Shop buildings (2)
Equipment shelter
Storage sheds (9)
Greenhouse
Pump houses (2)
Sewage lift stations (2)
Sewage spray field



- Park Boundary
- Camping Sites
- Hiking
- Hiking/Biking
- Walkways
- US Highway
- County Road
- Park Road Paved
- Park Road Stabilized
- Park Road Unstabilized
- Structures
- Parking Lots



Conceptual Land Use Plan

The following narrative represents the current conceptual land use proposal for this park. The conceptual land use plan is the long-term, optimal development plan for the park, based on current conditions and knowledge of the park's resources, landscape and social setting. The conceptual land use plan is modified or amended, as new information becomes available regarding the park's natural and cultural resources or trends in recreational uses, in order to adapt to changing conditions. Additionally, the acquisition of new parkland may provide opportunities for alternative or expanded land uses. The DRP develops a detailed development plan for the park and a site plan for specific facilities based on this conceptual land use plan, as funding becomes available.

During the development of the conceptual land use plan, the DRP assessed the potential impact of proposed uses or development on the park resources and applied that analysis to determine the future physical plan of the park as well as the scale and character of proposed development. Potential resource impacts are also identified and assessed as part of the site planning process once funding is available for facility development. At that stage, design elements and design constraints are investigated in greater detail. Municipal sewer connections, advanced wastewater treatment or best available technology systems are applied for on-site sewage disposal.

Creation of impervious surfaces is minimized to the greatest extent feasible in order to limit the need for stormwater management systems, and all facilities are designed and constructed using best management practices to limit and avoid resource impacts. Federal, state and local permit and regulatory requirements are addressed during facility development. This includes the design of all new park facilities consistent with the universal access requirements of the Americans with Disabilities Act (ADA). After new facilities are constructed, park staff monitors conditions to ensure that impacts remain within acceptable levels.

Public Access Management

Goal: Provide public access and recreational opportunities in the park.

The existing recreational activities and programs of this state park are appropriate to the natural and cultural resources contained in the park and should be continued. New and improved activities and programs are also recommended and discussed below.

Objective: Maintain the park's current recreational use.

Public access and recreational opportunities to be maintained include visitation of the ornamental gardens, swimming, snorkeling, canoeing, tubing, picnicking, interpretive programming, hiking, wildlife observation, and nature study.

Objective: Expand the park's recreational use.

A primitive group camping area is proposed to provide additional overnight accommodations at the park for groups wanting a more primitive camping experience while remaining close to the spring day use area.

Interpretive Application

Rainbow Springs State Park will develop and implement new Non-Personal elements and Personal Interpretive programs based in the park's Central Park Theme and Primary Interpretive Themes.

Visitor Use Management

The DRP manages visitor use to sustain the quality of park resources and the visitor experience, consistent with the purposes of the park. The dynamic nature of visitor use requires a deliberate and adaptive approach to managing resource impacts from recreational activity.

To manage visitor use, the DRP will rely on a variety of management tools and strategies, potentially including modes of access and limits on the number of people within certain areas of the park. Achieving balance between resource protection and public access is fundamental to the provision of resource-based recreation and interpretation. The premise of a visitor use management strategy is to protect the park's significant natural and cultural resources. A strategy may include site-specific indicators and thresholds selected to monitor resource conditions and visitor experience. By monitoring conditions over time and clearly documenting when conditions become problematic, the DRP can implement actions to prevent unacceptable resource conditions.

Levels of visitation, patterns of recreational use, and varieties of available recreational activities are routinely monitored parkwide. Indicators have shown that this park is operating sustainably for its resources and offers high quality experiences for its visitors.

Resource indicators to be considered during this planning period include:

- Receding springhead retaining wall under the swimming dock
- Loss of sediment in the swimming area
- Shoreline erosion along the spring run and at visitor access points
- Increase in non-native exotic plant species in the spring and spring run stream
- Decrease in native submerged aquatic vegetation

Quality of visitor experience indicators to be considered include:

- Overcrowding at the springhead swimming area

Thresholds are defined as the minimally acceptable conditions for each indicator and represent the point at which resource impacts will require a change in management strategy. Thresholds are assigned based on the desired resource conditions, the data on existing conditions, relevant research studies, management experience, and current visitor use patterns. It is important to note that identified thresholds still represent acceptable resource conditions and not degraded or impaired conditions. Management actions may also be taken prior to reaching the thresholds. Specific thresholds for resource conditions and experiential quality have not yet been established for the park. As monitoring

continues, collected data may be used to determine baseline and desired conditions, thereby establishing thresholds.

Monitoring Efforts

Document and monitor recession of shoreline under the swimming dock

- Develop a baseline to measure change over time
- Monitor every quarter and document results
- Continue interpretive efforts to discourage this activity

Partner with other agencies to develop a river bottom profile

- Engage the Aquatic Preserve and SWFWMD to develop a river bottom profile
- Scan the river bottom every two years to detect changes over time
- Monitor the swimming area sand plume for downstream impacts

Monitoring and assessment of SAV health in the spring run

- Continue to partner with SWFWMD on SAV assessments
- Conduct assessments every 5 years
- Consider re-planting efforts if deemed necessary

River shoreline survey monitoring

- Conduct annual shoreline surveys to monitor erosion and visitor impact
- Collect GPS points for problem areas and create GIS maps
- Determine adaptive management strategies for reoccurring issue areas

Visitor Use Management Limitations

The actions and efforts listed above will be taken and followed to ensure that the park does everything that it can for the health of the Rainbow River and the experience of the visitors that use this resource. In addition to the efforts that the park puts in place there are additional impacts that are occurring outside of the park boundary that need to be considered and evaluated. These impacts include declining spring flows and reduced water quality due to the impacts that are present within the Rainbow Rivers springshed. The park will need to continue to cooperate with other agencies, county and city leaders, private owners, and the public to monitor impacts, interpret these impacts, and come up with solutions to protect the springshed recharge areas and combat the impacts to the Rainbow River.

Capital Facilities and Infrastructure Management

Goal: Develop and maintain use areas and support infrastructure.

The vision for the park and issues identified with the facilities listed above are the basis for the land use objectives below. Thematic land use objectives include improving the visitor experience in the main use areas and improving facilities. Action items associated with the land use objectives are described below.

The existing facilities of this state park are appropriate to the natural and cultural resources contained in the park and should be maintained. New construction, as discussed further below, is recommended to improve the quality and safety of the

recreational opportunities, to improve the protection of park resources, and to streamline the efficiency of park operations.

Objective: Maintain all use area and support facilities in the park.

All capital facilities, trails and roads within the park will be kept in proper condition through the daily or regular work of park staff and/or contracted help.

Objective: Improve the visitor experience in 6 use areas.

Major repair projects for park facilities may be accomplished within the ten-year term of this management plan, if funding is made available. These include the modification of existing park facilities to bring them into compliance with the Americans with Disabilities Act (a top priority for all facilities maintained by DRP). The following discussion of other recommended improvements and repairs are organized by use area within the park.

Park Entrance

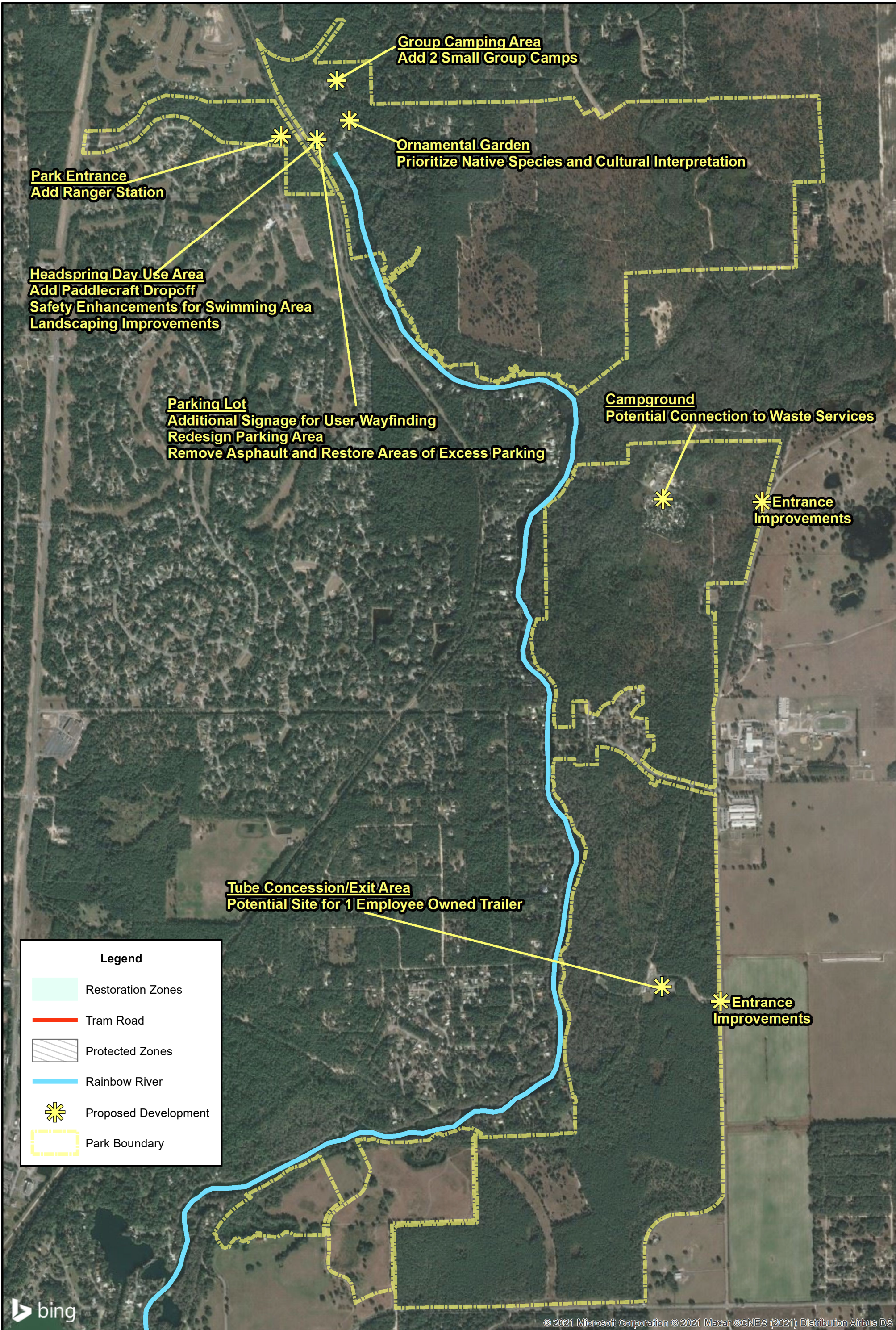
A ranger station is proposed to the west of the railroad tracks on the main park drive. This ranger station will provide the park with an additional means of fee collection and oversight and redesign of the parking area. This will also allow a better flow of visitors to the main springhead area without confusion conflicts between visitors and vehicles. The current conflict involves visitors walking from their vehicles to the pay station and the vehicles entering the parking area. Additionally, the parking area redesign listed below should help to address this issue.

Parking Area

The proposals for the main parking area are meant to provide a better experience for visitors. The proposals include opening the vista to the head spring by removing fencing and additional signage to enhance the wayfinding abilities of visitors to the springhead use area. Additional proposals include a redesign of the parking area to allow better flow of vehicles into the park and ensure safety for visitors going to and from their vehicles. Lastly the redesign will include the removal of the back 4 parking lots which is the equivalent of 200 parking spaces. Asphalt and other impervious material should be removed from these parking areas to allow for the restoration of these areas and increased water infiltration.

Headspring Day Use Area

A drop off location for personal paddle craft is proposed near the current emergency access gate. This approximately 500-foot walk will provide a more streamlined experience for visitors using their own craft. Additional proposals include relandscaping around the bowl of the springhead to open the vista to the head spring from the parking area and safety enhancements for the swimming area. The current safety concerns at the swimming area are that the average depth of the swimming area makes it extremely dangerous for visitors as most areas required constant treading of water to stay afloat. Additional concerns are that visitors are undermining the floating dock and removing limestone boulders



to use as standing platforms inside the swimming area. The park will consult with and get advice on the best alternatives to make this area safe for visitors.

Ornamental Gardens

The proposal for the gardens is to manage the gardens at a reduced size. The primary focus of the ornamental gardens is to prioritize native species within the garden and to interpret the cultural significance of the gardens.

Tube Concession/Exit Area

The proposal for this area is to add 1 site for employee housing. This site would provide the opportunity for an employee owned trailer to be placed on the site to add additional park presence in a more remote location of the park. Additionally, the entrance to this area will be evaluated and redefined or redesigned to reduce negative impacts on visitors attempting to enter this area and reduce safety hazards of traffic backing up onto 180th Avenue.

Campground

The proposal for the campground is to hook the campground up to central sewer. The county is currently extending the sewer connection and the parks connection to sewer would allow the removal of the waste processing facility and accompanying spray field. This removal would allow the park to be completely on sewer connections and would greatly reduce the impact on the health of the spring. Additionally, the entrance to the campground will be evaluated and redefined or redesigned to reduce negative impacts on the camper's experience while attempting to enter this area and reduce safety hazards of campers backing up onto 180th Avenue.

Objective: Develop 1 new use area.

Primitive Group Camp

A new primitive camp is proposed in the northern portion of the main park area. This area will be relatively close to the parking area and will only have walk in access for its users. The area will have 2 fire rings and the capacity to accommodate 30 people per fire ring. Additionally, the area will have potable water and a restroom with flushable toilets to accommodate users. This camp area is in a wooded area that still provides groups with walking access to the main springhead area.

Optimum Boundary

The optimum boundary map reflects lands considered desirable for direct management by the DRP as part of the state park. These parcels may include public or privately owned land that would improve the continuity of existing parklands, provide the most efficient boundary configuration, improve access to the park, provide additional natural and cultural resource protection or allow for future expansion of recreational activities. Parklands that are potentially surplus to the management needs of DRP are also identified. As additional needs are identified through park use, development, and research, and as land use changes

on adjacent property, modification of the park's optimum boundary may be necessary.

Identification of parcels on the optimum boundary map is intended solely for planning purposes. It is not to be used in connection with any regulatory purposes. Any party or governmental entity should not use a property's identification on the optimum boundary map to reduce or restrict the lawful rights of private landowners. Identification on the map does not empower or suggest that any government entity should impose additional or more restrictive environmental land use or zoning regulations. Identification should not be used as the basis for permit denial or the imposition of permit conditions.

The optimum boundary map for Rainbow Springs State Park shows much more than the typical optimum boundary map. This map shows the normal identified optimum boundary parcels that the park is interested in acquiring and managing along with many other lands that are not for park acquisition but rather alternative managing agencies. The purpose of adding these additional properties is to show the importance of regional conservation efforts to help protect the Rainbow Springshed. Additional lands that are listed include Florida Forever projects, conservation lands, and a large area of lands that are within the primary protection zone of the Rainbow springshed and are a primary focus area for the conservation of the lands to further protect the integrity of the springs recharge areas. Large undeveloped parcels with single owners are focused on in the map as they would provide a more efficient acquisition. These parcels lie within the priority focus area and are important lands to be conserved and managed to improve the quality and health of the springshed.

Florida Forever Projects

The Rainbow River Corridor Florida Forever project meets several Florida Forever goals, including those of increasing biodiversity protection by conserving 916 acres of rare species habitat, of preserving landscape linkages and conservation corridors by preserving 1,062 acres of ecological greenways, of protecting surface waters of the state by preserving 1,154 acres that provide surface-water protection, of preserving aquifer recharge areas, and by increasing natural-resource based recreation opportunities by filling several land gaps between sections of the Rainbow River State Park. There are 18 parcels in the park's optimum boundary that total approximately 713 acres that lie within this project.

The South Goethe Florida Forever project (SGFFP) includes two ownerships separated by highway CR 40. The Robinson tract (north of CR 40) is a single, one-owner tract of 5,722 acres contiguous with the southern boundary of Goethe State Forest. The Marino tract consists of 460 acres south of the Robinson tract. This addition provides a corridor from the Goethe State Forest to the Marjorie Harris Carr Cross Florida Greenway State Recreation and Conservation Area along the Withlacoochee River and forms a linkage to the Etoniah Cross Florida Greenway Florida Forever project. One of the primary concepts of this project is to protect the Withlacoochee River's watershed by connecting Goethe State Forest with the greenway. Another stated goal of the project is providing a significant buffer along the southern boundary of the forest while eventually enhancing the forest and its associated habitat through restoration.

The Bear Hammock Florida Forever project in southern Marion County would meet the state goals of enhanced coordination of land-acquisition efforts by making a conservation link that fills a gap among several other properties. One goal of state conservation is to preserve areas of at least 50,000 acres, and Bear Hammock provides a connector between Goethe State Forest and the Marjorie Harris Carr Cross Florida Greenway, creating a continuity of more than 200,000 acres. Bear Hammock meets state goals of preserving habitat areas, because the project has an estimated 4,232 acres of rare species habitat. About 24 percent of the area is considered Strategic Habitat Conservation Area. Bear Hammock is known to be habitat for such species as wood stork, bald eagle, diamondback rattlesnake, and gopher tortoise. Finally, the property has a high potential to fulfill the Florida Forever goals of providing recreation access

Identified Optimum Boundary Parcels

The optimum boundary for the park consists of 40 parcels that total approximately 1,274 acres. The parcels are divided between numerous parcels both large and small. For this description the parcels have been divided into four groups based on their location. The groups are Northwest Parcels, Northeast Parcels, Central Parcels, and South Parcels.

The Northwest Parcels consist of 11 parcels that total approximately 394 acres. The majority of the parcels (375 acres) lie within the Rainbow River Corridor Florida Forever Project. These parcels would help protect the headsprings recharge area and could provide a suitable site for future park activities.

The Northeast Parcels consist of 18 parcels that total approximately 674 acres. Of these parcels only 178 acres are within the Rainbow River Corridor Florida Forever Project. These parcels contain sandhill communities that would improve the buffer and the habitat protection potential of the park. They would also connect the current northern and southern parcels of the park, expand recreational opportunities for trails, and would protect a spring and spring-run that flows directly into the Rainbow River.

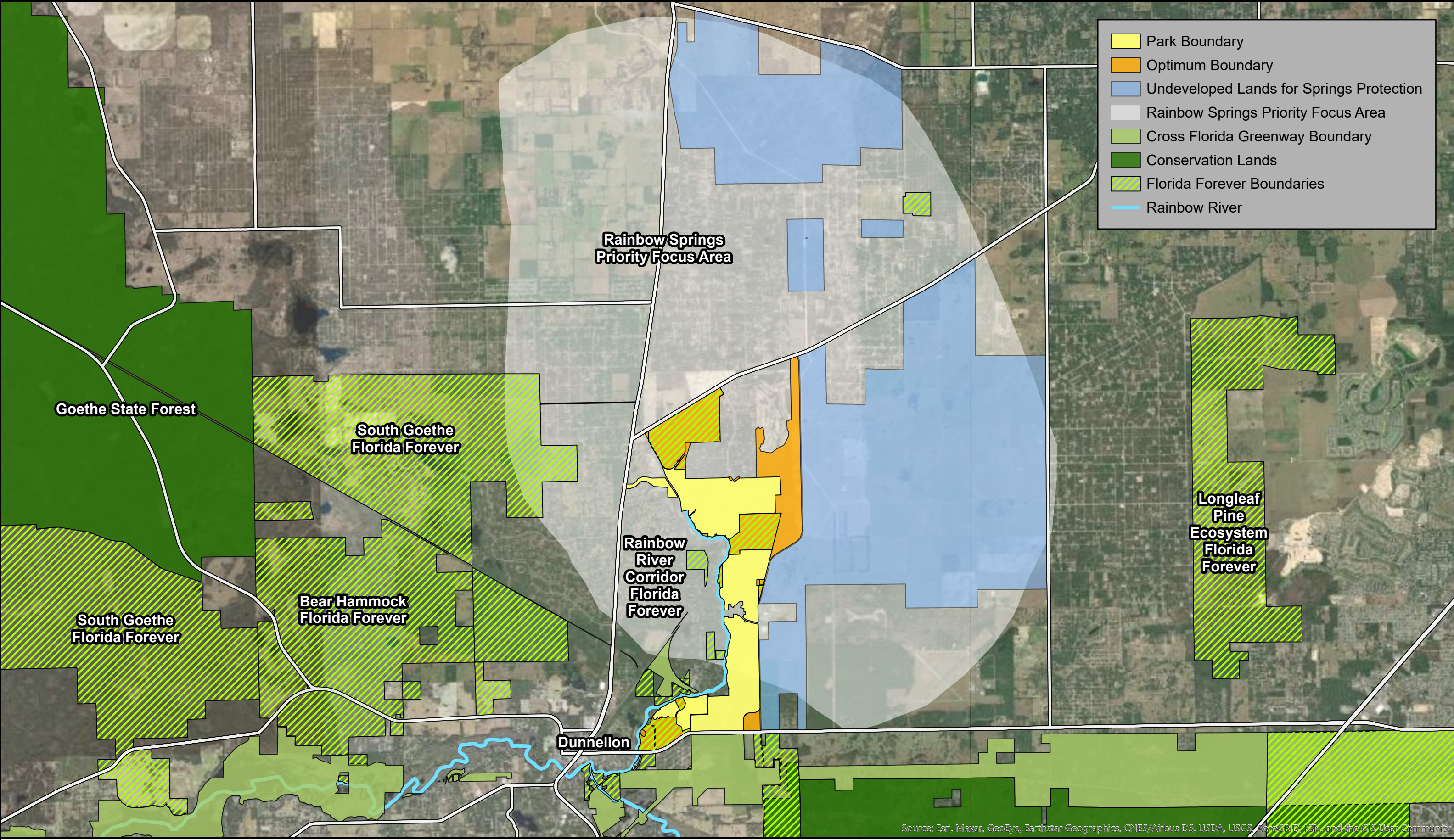
The Central Parcels consist of 4 parcels that total approximately 17 acres. The majority of this area (14 acres) lie within the Rainbow River Corridor Florida Forever Project. These parcels would bring remaining out parcels of undeveloped shoreline into state ownership and ensure the protection of the sensitive shoreline habitats.

The South Parcels consist of 7 parcels that total approximately 190 acres. All of these parcels are within the Rainbow River Corridor Florida Forever Project. These parcels would provide further protection of the Rainbow springshed, protect additional habitat for imperiled species, and would facilitate additional fire and exotic management practices.

Crucial Lands for Springs Protection

The goal of the primary focus area is to protect the undeveloped or minimally developed private land remaining along the Rainbow River as well as lands that are crucial to continuing the protection of the Rainbow Springshed. The southern parcels would bring a remaining large portion of undeveloped shoreline along the

eastern side of the river into conservation. Public acquisition of these lands will prevent further development and conflicting land uses that could further degrade the ecological value of this area. In addition, the potential restoration of altered habitats would help restore and maintain water quality and habitat along one of Florida's largest spring-run streams. Some large undeveloped parcels have also been identified for acquisition by other conservation entities as they contain sandhill community which enhances the recharge and health of the Rainbow Spring system.



IMPLEMENTATION COMPONENT

The resource management and land use components of this management plan provide a thorough inventory of the park's natural, cultural and recreational resources. They outline the park's management needs and problems and recommend both short and long-term objectives and actions to meet those needs. The implementation component addresses the administrative goal for the park and reports on the Division of Recreation and Parks (DRP) progress toward achieving resource management, operational and capital improvement goals and objectives since approval of the previous management plan for this park. This component also compiles the management goals, objectives and actions expressed in the separate parts of this management plan for easy review. Estimated costs for the ten-year period are provided for each action and objective, and the costs are summarized under categories of land management activities.

Management Progress

Since the approval of the last management plan for Rainbow Springs State Park in 2002, significant progress has been made towards meeting the DRP's management objectives for the park. These accomplishments fall within three of the five general categories that encompass the mission of the park and the DRP.

Acquisition

- The 365-acre Griffiths addition was purchased in 2004 with a Unit Management Plan Amendment completed in 2005.
- The 22-acre Greenways and Trails addition west of Griffiths was acquired as a transfer in 2005.
- The 5.45-acre Mann parcel was acquired in 2017.
- The 110.66-acre Rainbow Ranch addition was acquired in 2019 by the Southwest Water Management District.

Park Administration and Operations

- Since 2003 approximately 285,000 volunteer hours have been contributed to the park to assist with park maintenance, visitor services, administration, interpretation, protection and resource management activities.
- Toll booth gift shop renovations completed in 2014.
- Terraces at the headspring were resodded in 2014.
- Headsprings walkway stabilization project completed in 2015.
- Old vet building removed in 2015.
- Former rodeo arena was refurbished in 2017.
- Admin building was refurbished and restored in 2017.
- New headspring day use restroom constructed in 2017
- All campground pedestals upgraded or replaced in 2019
- Fencing project completed for tubing entrance in 2020.

Resource Management

Natural Resources

- In 2004 FDEP Springs Initiative funded \$10,000 for erosion control terraces around the main headspring.
- Since 2011 1,466 acres of the park has been treated with prescribed fire.
- In 2021 Southwest Florida Water Management District (SWFWMD) initiated their five-year submerged aquatic vegetation (SAV) assessment in the Rainbow Springs and River. Comparable studies were conducted in 1991, 1996, 2000, 2005, 2011, and 2016.
- In 2006 FDEP/SWFWMD completed a water quality and clarity analysis of the Rainbow River, additional similar analyses are on-going.
- A bathymetric and river sediment analysis of the Rainbow River was completed by SWFWMD in 2007.
- The first recreational use study of the Rainbow River was completed in 1995 by the University of Florida. In 2011 this same research group completed a second comparable study to its companion in 1995.
- Conducted imperiled species surveys including Bachman sparrows (2011-current), Sandhill invertebrates (2012-13).
- Continued support for long-term annual monitoring of freshwater turtles on the Rainbow Springs River System (1942-2021).
- Obtained and implemented grant projects from Florida Fish and Wildlife Conservation Commission (FWC) and Bureau of Invasive Plant Management funding that totaled more than \$275,000 to treat major infestations of Cogon grass as the initial step toward restoration at the Griffiths tract.
- Since 2011 the park has treated 428 infested acres of invasive exotic plants. This effort required physically traversing 3,742 acres.
- Friends of Rainbow Springs State Park partnered with the park and provided funding to help control invasive exotic plants in the ornamental garden area.
- Dye trace techniques were used to determine stormwater drain pathways and connections above the headspring during the implementation of Gift Shop/Park Office renovations in 2014.
- In 2014, a new permanent satellite telemetry and monitoring station at Rainbow Springs Headspring was installed by SWFWMD to track daily water quality and quantity changes.
- In 2018 FWC conducted a LTDS Gopher Tortoise Census within the park.
- In 2019, roller chopping was done to 6.2 acres of fire shadow to allow for better fire penetration and safer fire lines.
- In 2019, the park burned 718.34 acres which was 117% of the burn goal for the year.
- In 2020, FWC began treating *Salvinia molesta*.
- In 2020, began phase 1 of longleaf restoration and sand pine removal on 74 acres.
- In 2020, SJRWMD began restoration work on the Rainbow Ranch property.

Cultural Resources

- The park underwent a cultural resource Predictive Model Assessment in 2011. The outcome of the predictive model assessment will be used to further understand the placement of protected zones in the park.
- At least 35 unrecorded cultural sites were documented and recorded with the Florida Master Site File.

Park Facilities

- In 2004-05 FDEP Springs Initiative funded \$153,000 to renovate building into outdoor springs education facility to be used by school groups for water quality testing and other springs research activities.
- In 2005 FDEP Springs Initiative funded \$1,436 to install four waterless urinals in restrooms at headsprings to conserve water.
- Headspring sidewalk modification project in 2008.
- In 2006 constructed a new recreation facility at the south end of the park designed to create a stabilized Tuber exit. The facility includes a park entrance station, a boardwalk from the river to a south take out concession office, parking area, and a paved tram road between the tuber entrance (i.e. campground) and take-out
- In 2008, major renovations to the campground area on the east side of the river were completed.
- In 2009 five picnic pavilions were constructed.
- In 2014, a major renovation project was implemented redesigning the park entrance Gift Shop and park offices located above the headspring.
- In 2013 the Volunteer Village was relocated in order to hook up to a sewer line and the septic tank was abandoned.
- In 2020 installed fencing from Sateke Village to just south of the tuber entrance.

Management Plan Implementation

This management plan is written for a timeframe of ten years, as required by Section 253.034 Florida Statutes. The Ten-Year Implementation Schedule and Cost Estimates (Table 7) summarizes the management goals, objectives and actions that are recommended for implementation over this period, and beyond. Measures are identified for assessing progress toward completing each objective and action. A time frame for completing each objective and action is provided. Preliminary cost estimates for each action are provided and the estimated total costs to complete each objective are computed. Finally, all costs are consolidated under the following five standard land management categories: Resource Management, Administration and Support, Capital Improvements, Recreation Visitor Services and Law Enforcement.

Many of the actions identified in the plan can be implemented using existing staff and funding. However, a number of continuing activities and new activities with measurable quantity targets and projected completion dates are identified that cannot be completed during the life of this plan unless additional resources for these purposes are provided. The plan's recommended actions, time frames and cost estimates will guide the DRP's planning and budgeting activities over the period of this plan. It must be noted that these recommendations are based on the information that exists at the time the plan was prepared. A high degree of adaptability and flexibility must be built into this process to ensure that the DRP can adjust to changes in the availability of funds, improved understanding of the park's natural and cultural resources, and changes in statewide land management issues, priorities and policies.

Statewide priorities for all aspects of land management are evaluated each year as part of the process for developing the DRP's annual legislative budget requests. When preparing these annual requests, the DRP considers the needs and priorities of the entire state park system and the projected availability of funding from all sources during the upcoming fiscal year. In addition to annual legislative appropriations, the DRP pursues

supplemental sources of funds and staff resources wherever possible, including grants, volunteers and partnerships with other entities. The DRP's ability to accomplish the specific actions identified in the plan will be determined largely by the availability of funds and staff for these purposes, which may vary from year to year. Consequently, the target schedules and estimated costs identified in Table 7 may need to be adjusted during the ten-year management planning cycle.

Table 6
Rainbow Springs State Park Ten-Year Implementation Schedule and Cost Estimates

NOTE: THE DIVISION'S ABILITY TO COMPLETE THE OBJECTIVES OUTLINED BY THE MANAGEMENT PLAN IS CONTINGENT ON THE AVAILABILITY OF FUNDING AND OTHER RESOURCES FOR THESE PURPOSES.				
Goal I: Provide administrative support for all park functions.		Measure	Planning Period	Estimated Manpower and Expense Cost* (10-years)
Objective A	Continue day-to-day administrative support at current levels.	Administrative support ongoing	C	\$1,000,000
Objective B	Expand administrative support as new lands are acquired, new facilities are developed, or as other needs arise.	Administrative support expanded	UFN	\$153,000
Goal II: Protect water quality and quantity in the park, restore hydrology to the extent feasible, and maintain the restored condition.		Measure	Planning Period	Estimated Manpower and Expense Cost* (10-years)
Objective A	Conduct/obtain an assessment of the park's hydrological needs.	Assessment conducted	UFN	\$26,000
Action 1	Continue to cooperate with other agencies and independent researchers regarding hydrological research and monitoring programs	Program ongoing	C	\$4,000
Action 2	Continue to monitor surface and groundwater quality at Rainbow Springs and the tracking of water quality changes within this natural spring system	Program ongoing	C	\$2,500
Action 3	Continue to monitor all Onsite Sewage Treatment and Disposal Systems (OSTDS's) in the park for any detrimental impacts to the water quality and if feasible connect to the municipal water treatment system	Program ongoing	UFN	\$2,500
Action 4	Continue to monitor land use or zoning changes around the park's resources.	Program ongoing	C	\$15,000
Action 5	Continue to cooperate with the SWFWMD to ensure MFLs for Rainbow Spring are monitored for compliance in order to maintain historic river flows.	Program ongoing	C	\$2,000
Objective B	Monitor and Evaluate the natural hydrological conditions and functions within the headspring and improve approximately 0.1 discontinuous acres of Spring-run Stream natural community	# Acres restored	UFN	\$17,000
Action 1	District and park staff will design and implement a monitoring plan to track changes in the submerged aquatic vegetation health of the spring and spring run	Plan developed & implemented	C	\$10,000
Action 2	Develop a plan for experimental plantings of key species of submerged aquatic vegetation in the spring and spring run stream in areas that have experienced loss. Implement the plan if need is indicated	Plan developed	ST	\$7,000
Objective C	Monitor and evaluate impacts associated with soil erosion at Rainbow Springs State Park	Program ongoing	C	\$111,500
Action 1	Perform dye trace or appropriate studies around the headspring to determine the stormwater flows within the developed uplands, particularly in the former attraction.	Study complete	UFN	\$90,000
Action 2	Develop and implement a plan to control erosion within the headspring and "Bowl" day use area	# Problem areas stabilized	UFN	\$1,500
Action 3	Remove excess headspring parking areas, associated impervious surfaces and revegetate to improve water infiltration.	Asphalt removed, area revegetated	UFN	\$20,000

* 2021 Dollars
ST = actions within 2 years
LT = actions within 10 years
C = long term or short term actions that are continuous or cyclical
UFN = currently unfunded need

Table 6
Rainbow Springs State Park Ten-Year Implementation Schedule and Cost Estimates

NOTE: THE DIVISION'S ABILITY TO COMPLETE THE OBJECTIVES OUTLINED BY THE MANAGEMENT PLAN IS CONTINGENT ON THE AVAILABILITY OF FUNDING AND OTHER RESOURCES FOR THESE PURPOSES.				
Goal III: Restore and maintain the natural communities/habitats of the park.		Measure	Planning Period	Estimated Manpower and Expense Cost* (10-years)
Objective A	Within 10 years have 950 acres of the park maintained within optimal fire return interval.	# Acres within fire return interval target	LT	\$414,000
Action 1	Develop/Update annual burn plan.	Plan updated	C	\$4,000
Action 2	Manage fire dependent communities for ecosystem function, structure and processes by burning between 291 - 858 acres annually, as identified by the annual burn plan.	Average # acres burned annually	C	\$410,000
Objective B	Conduct habitat/natural community restoration activities on 322 acres of sandhill community.	# Acres restored or with restoration underway	UFN	\$195,000
Action 1	Develop a site specific restoration plan	Plan complete	ST	\$2,000
Action 2	Implement the restoration plan	Acres restored or underway	LT	\$193,000
Objective C	Conduct habitat/natural community restoration activities on 75 acres of sandhill and flatwoods natural communities on the Rainbow River Ranch parcels.			\$298,100
Action 1	SWFWMD develops a site specific restoration plan.			\$4,000
Action 2	SWFWMD implements the restoration plan initial steps consisting of: 1. Multiple applications of chemical treatment and possible mechanical treatment of exotic pasture grasses and invasive species for up to 2 years. 2. Post removal of exotic pasture grasses the SWFWMD will site prepare and direct seed native groundcover species appropriate to the sandhill. 3. the SWFWMD will follow native groundcover seeding by monitoring establishment success of native groundcover and treating any remaining exotic pasture grasses and other exotic species.			\$249,100
Action 3	After year 3 the FPS will continue monitoring ans control of exotic pasture grasses and other species and using fire management on the site.			\$30,000
Action 4	Plant Longleaf Pine seedlings.			\$15,000
Objective D	Conduct habitat/natural community improvement activities on 10 acres of sandhill community.	# Acres improved or with improvements underway	LT	\$3,000
Action 1	Develop and implement a plan to remove off-site hardwoods	Plan complete	ST	\$3,000
Goal IV: Maintain, improve or restore imperiled species populations and habitats in the park.		Measure	Planning Period	Estimated Manpower and Expense Cost* (10-years)
Objective A	Update baseline imperiled species occurrence inventory lists for plants and animals, as needed.	List updated	C	\$2,000
Objective B	Monitor and document 9 selected imperiled animal species in the park.	# Species monitored	C	\$12,000
Action 1	Implement monitoring protocols for the 9 selected imperiled animal species	# Protocols developed	ST	\$12,000
Objective C	Monitor and document 1 selected imperiled plant species in the park.	# Species monitored	C	\$1,000
Action 1	Develop a monitoring protocol for giant orchid.	# Protocols developed	ST	\$200
Action 2	Implement the monitoring protocol for the imperiled plant species listed in Action 1 above.	# Species monitored	C	\$800

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Goal V: Remove exotic and invasive plants and animals from the park and conduct needed maintenance-control.		Measure	Planning Period	Estimated Manpower and Expense Cost* (10-years)
Objective A	Annually treat 200 acres of exotic plant species in the park.	# Acres treated	C	\$564,400
Action 1	Annually develop/update exotic plant management work plan.	Plan updated	C	\$3,000
Action 2	Implement annual work plan by treating 200 gross acres in park, annually, and continuing maintenance and follow-up treatments, as needed.	Plan implemented	C	\$478,000
Action 3	Continue annual treatment of cogongrass in all zones but particularly the zones south of the tuber entrance.	# Acres treated	C	\$45,000
Action 4	Develop and implement a control tactic for natal grass at the tuber entrance area to prevent invasion into the adjacent restoration areas.	Tactic developed	C	\$3,000
Action 5	Survey and treat the Rainbow River Ranch and Mann acquisitions	Survey completed	C	\$35,400
Objective B	Develop and implement measures to prevent the accidental introduction or further spread of invasive exotic plants in the park	# Measures developed and implemented	C	\$2,000
Action 1	Develop and implement written guidelines to prevent the introduction and spread of invasive exotic plants. Provide staff with the tools to implement the guidelines.	# Measures developed	ST	\$2,000
Objective C	Implement control measures on 3 exotic and nuisance animal species in the park.	# Species for which control measures implemented	C	\$20,000
Action 1	Remove and document nuisance animals as they occur in the park.	# Removed	C	\$20,000
Goal VI: Protect, preserve and maintain the cultural resources of the park.		Measure	Planning Period	Estimated Manpower and Expense Cost* (10-years)
Objective A	Assess and evaluate 35 of 50 recorded cultural resources in the park.	Documentation complete	LT	\$20,000
Action 1	Complete 35 assessments/evaluations of archaeological sites.	Assessments complete	LT, ST	\$5,000
Action 2	Complete 1 Historic Structures Reports (HSR's) for the Gift Shop (MR03641)	Reports and priority lists completed	LT	\$15,000
Objective B	Compile reliable documentation for all recorded historic and archaeological sites.	Documentation complete	LT	\$211,000
Action 1	Delineate the bounds of the Historic Cemetery (MR02057) and Blue Run Cemetery (MR2752) using GPR or other appropriate method	Documentation complete	LT	\$5,000
Action 2	Ensure all known sites are recorded or updated in the Florida Master Site File.	# Sites recorded or updated	ST	\$1,000
Action 3	Develop and utilize a Scope of Collections Statement.	Document completed	ST	\$3,000
Action 4	Conduct a Phase 1 archaeological survey for 1 priority are identified by the predictive model	Survey completed	LT	\$184,000
Action 5	Prepare and submit the nomination of Rainbow Springs to the National Register of Historic Places at the local level under Criterion A for Settlement/Exploration and Entertainment/Recreation and Criterion C for Architecture.	Nomination Submitted	ST	\$15,000

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Table 6
Rainbow Springs State Park Ten-Year Implementation Schedule and Cost Estimates

NOTE: THE DIVISION'S ABILITY TO COMPLETE THE OBJECTIVES OUTLINED BY THE MANAGEMENT PLAN IS CONTINGENT ON THE AVAILABILITY OF FUNDING AND OTHER RESOURCES FOR THESE PURPOSES.				
Objective C	Bring 11 of 50recorded cultural resources into good condition.	# Sites in good condition	LT	\$102,000
Action 1	Develop and implement a protocol to assess known cultural resources in the park	# Sites monitored	C	\$2,000
Action 2	Develop and implement a plan to bring the Gift Shop (MR3628) into good condition	Project completed	C	\$75,000
Action 3	Develop and implement a plan to repair Rainbow Falls (MR3636)	Project completed	LT	\$10,000
Action 4	Develop and implement a plan to manage or deaccession the submarine boats (MR3641)	Projects completed	LT, ST	\$15,000

* 2021 Dollars
ST = actions within 2 years
LT = actions within 10 years
C = long term or short term actions that are continuous or cyclical
UFN = currently unfunded need

Table 6
Rainbow Springs State Park Ten-Year Implementation Schedule and Cost Estimates

NOTE: THE DIVISION'S ABILITY TO COMPLETE THE OBJECTIVES OUTLINED BY THE MANAGEMENT PLAN IS CONTINGENT ON THE AVAILABILITY OF FUNDING AND OTHER RESOURCES FOR THESE PURPOSES.				
Goal VII: Provide public access and recreational opportunities in the park.		Measure	Planning Period	Estimated Manpower and Expense Cost* (10-years)
Objective A	Maintain the park's current recreational use.			\$1,220,751
Objective B	Expand the park's recreational use.			\$96,000
Objective C	Develop and Implement new programs based on the park's Central Park Theme and its Primary Interpretive Themes.	# Interpretive/education programs	C	\$80,000
Goal VIII: Develop and maintain use areas and support facilities.		Measure	Planning Period	Estimated Manpower and Expense Cost* (10-years)
Objective A	Maintain all use areas and support facilities in the park.	Facilities maintained	C	\$1,997,000
Objective B	Continue to implement the park's transition plan to ensure facilities are accessible in accordance with the American with Disabilities Act of 1990.	Plan implemented	LT	\$350,000
Objective C	Improve Visitor Experience in 6 Use Areas	# Facilities/Miles of Trail/Miles of Road	UFN	\$2,060,000
Objective D	Develop 1 new Use Area.	# Facilities/Miles of Trail/Miles of Road	UFN	\$380,000
Objective E	Expand maintenance activities as existing facilities are improved and new facilities are developed.	Facilities maintained	C	\$60,000
Summary of Estimated Costs				
Management Categories				Total Estimated Manpower and Expense Cost* (10-years)
Resource Management				\$1,996,000
Administration and Support				\$1,153,000
Capital Improvements				\$4,847,000
Recreation Visitor Services				\$1,396,751
Law Enforcement Activities ¹				
		¹ Law enforcement activities in Florida State Parks are conducted by the FWC Division of Law Enforcement and by local law enforcement agencies.		

* 2021 Dollars
ST = actions within 2 years
LT = actions within 10 years
C = long term or short term actions that are continuous or cyclical
UFN = currently unfunded need

Addendum 1—Acquisition History

LAND ACQUISITION HISTORY REPORT					
Park Name	Rainbow Springs State Park				
Date Updated	7/14/2021				
County	Marion County				
Trustees Lease Number	Lease No. 3900				
Current Park Size	1694.41 acres 1476.90 acres (BOT) 217.51 (SWFWMD)				
Purpose of Acquisition	The Board of Trustees of the Internal Improvement Trust Fund of the State of Florida has acquired Rainbow Springs State Park to protect unique headsprings and river system by restricting expansion of housing constructuion around the springhead and the river and to use this exceptionally scenic area for active and passive public recreation.				
Acquisition History (includes only acquisitions with areas of 10 acres or more)					
Parcel Name or Parcel DM-ID	Date Acquired	Initial Seller	Initial Purchaser	Size in acres	Instrument Type
DMID4593	10/24/1990	Raibow Springs, Limited	Board of Trustees of the Internal Improvement Trust Fund of the State of Florida	598.47	Warranty Deed
DMID338941	7/2/2004	Individually as Trustee of the Griffiths Family Land Trust Agreement Number 1	The Board of Trustees of the Internal Improvement Trust Fund of State of Florida	365.64	Warranty Deed
DMID12036	8/10/1992	Terry S. Roberts and Kenneth E. Roberts; Edgar S. Roberts and his wife Mamie Roberts, Individually and as Trutees of the Edgar S. Roberts second Amended and Restated Living Trust Agreement dated October 9, 1987.	Board of Trustees of the Internal Improvement Trust Fund of the State of Florida	264.8532	Warranty Deed
DMID10085	9/7/1995	Sue E. Blauser, Mark A. Johnson, and John D. Hemphill, Jr.	The Board of Trustees of the Internal Improvement Trust Fund of State of Florida	85.657	Warranty Deed
DMID12034	8/10/1992	Terry S. Roberts and Kenneth E. Roberts	Board of Trustees of the Internal Improvement Trust Fund of the State of Florida	78.8468	Warranty Deed
DMID12035	8/10/1992	Strebor, Inc.	Board of Trustees of the Internal Improvement Trust Fund of the State of Florida	24.3648	Warranty Deed
	10/25/1990		SWFWMD	110.36	
	10/22/2019		SWFWMD	107.12	
Management Lease					
Parcel Name or Lease Number	Date Leased	Initial Lessor	Initial Lessee	Current Term	Expiration Date
Lease No. 3900	3/19/1991	The Board of Trustees of the Internal Improvement Trust Fund of the State of Florida	The State of Florida Department of Natural Resources, Division of Recreation and Parks	50 years	3/19/2041
Outstanding Issue	Type of Instrument	Brief Description of the Outstanding Issue		Term of the Outstanding Issue	
There are no known deed-related outstanding issues such as restrictions and reservations on use of Rainbow Springs State Park					

Addendum 2—Advisory Group Members and Report

**Rainbow Springs State Park
Advisory Group Members and Report**

List

**Rainbow Springs State Park
Advisory Group Members and Report**

Report

Addendum 3-----References Cited

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Addendum 4--Soil Descriptions

Rainbow Springs State Park Soil Descriptions

(2) Adamsville sand, 0 to 5 percent slopes - This is a nearly level to gently sloping, somewhat poorly drained soil that occurs as small and large areas in the flatwoods and along the lower slopes of the sandy uplands. The water table rises to within 10 to 20 inches of the surface for less than 2 weeks during wet periods, but remains at 20 to 40 inches for cumulative periods of 2 to 6 months during most years. It recedes to a depth of more than 40 inches during dry periods.

Included with this soil in mapping are a few areas of a similar soil that is fine sand, is extremely acid or has a slope of 5 to 8 percent. Also included are small areas of Candler, Pomana, Pompano, and Tavares soils. Included soils make up about 15 percent of any one mapped area.

(3) Anclote sand - This is a very poorly drained soil that occurs as small areas on low flats, in depressions, and along poorly defined drainageways in the flatwoods. It has the profile described as representative of the series. Slopes are 0 to 2 percent. The water table is within a depth of 10 inches for more than 6 months, and in depressions the surface is covered with about 4 to 20 inches of water for 6 months or more during most years. Areas along the Oklawaha River are subject to flooding.

Included with this soil in mapping are small areas of Holopaw, Okeechobee, Placid, Bluff, and Tomoka soils; small areas where the surface layer is 8 to 16 inches thick and is more than 20 percent organic matter; and a few small areas of a similar soil that has a sandy clay loam subsoil at a depth of 50 to 80 inches. Included soils make up about 20 percent of any one mapped area.

(5) Apopka sand, 0 to 5 percent slopes - This is a nearly level to gently sloping, well drained soil that generally occurs as small areas in the uplands. It has the profile described as representative of the series. The water table is at a depth of more than 72 inches.

In representative profile the surface layer is dark gray sand about 6 inches thick. The subsurface layer is about 49 inches of sand, many grains of which are uncoated. The upper 22 inches is light yellowish brown, and the lower 27 inches is yellow. The subsoil is about 26 inches thick. The upper 5 inches is yellowish red sandy clay loam having a few lenses of sandy loam, the next 9 inches is yellowish red sandy clay loam, mottled yellowish red and red light sandy clay loam. The underlying material to a depth of 88 inches is mottled strong brown, yellowish red, yellowish brown, and white, partly weathered sandy loam and sandy clay loam.

Included with this soil in mapping are small areas of similar soils, where the sandy surface and subsurface layer combined are less than 40 inches thick, the slope is 5 to 8 percent, or the surface layer is fine sand and small areas of Candler, Jumper, and Tavares soils. Also included, in the western part of the county, are a few areas where 35 to 60 inches of strongly acid to slightly acid fine sand overlies a slightly acid to neutral subsoil and calcareous limestone. Included soils make up about 15 percent of any one mapped area.

(7) Udalfic Arents, 0 to 5 percent slopes - This mapping unit is mixed material that has been smoothed and shaped. This material was piled adjacent

Rainbow Springs State Park Soil Descriptions

to surface mines during mining. It was later spread over the surface of adjacent soils and then shaped or leveled. It is commonly about 24 to 48 inches thick, but in places is more than 60 inches thick. In a few areas it is about 1 to 5 percent hard limestone fragments. The soils buried under this material have retained their original properties. In about 55 percent of the delineated areas, they can be identified. These areas are about 60 percent Fellowship, Hague, Kendrick, and Zuber soils and 40 percent Arredondo and Candler soils. The water table is below a depth of 72 inches.

Included in this unit in mapping are a few areas of fill material that is mostly sandy soil and small areas where only about 12 to 24 inches of mixed material overlies uniform soil material. Also included are a few small areas where organic and inorganic refuse have been placed in old mines. This refuse has been mixed with fill material and is also used as cover material. In a few spots the water table is within 20 to 72 inches of the surface. Included areas make up about 15 percent of this unit.

(8) Udalfic Arents, 15 to 60 percent slopes - This mapping unit is well-drained, mixed soil material and unconsolidated material that has been excavated from and piled adjacent to mine pits. The materials remain in the position in which they were deposited, and areas are generally small. The water table is at a depth of more than 72 inches.

Included in this unit in mapping are several small areas of Udalfic Arents, 0 to 5 percent slopes. In a few areas, the mixed soil material is dominantly pale brownish sandy material. Included soils make up less than 12 percent of any one mapped area.

Weeds, shrubs, and grasses have become established in some areas. In some of the older areas, a number of trees have reseeded naturally. Many areas are bare or have sparse vegetation.

(9) Arredondo sand, 0 to 5 percent slopes - This is a nearly level to gently sloping, well drained soil that occurs as both small and large areas in the upland. This soil occurs as broad rolling areas of the upland. It has the profile described as representative of the series. The water table is at a depth of more than 72 inches.

In a representative profile the surface layer is dark grayish brown sand about 7 inches thick. The subsurface layer is mixed yellowish brown and dark yellowish brown sand about 11 inches thick. The subsoil extends to a depth of 90 inches or more. In sequence downward, it is 28 inches of yellowish brown sand mottled with strong brown, 19 inches of strong brown sand having a few white mottles, 5 inches of strong brown loamy sand, and 20 inches of strong brown fine sandy loam.

Included with this soil in mapping are small areas of Candler, Kendrick, Hague, Gainesville, and Sparr soils; a few small areas where the surface layer is fine sand, loamy sand, and loamy fine sand; a few areas of a similar soil, where the slope is 5 to 8 percent; and, in the south-central part of the county, spots where 35 to 65 inches of strongly acid to medium acid fine sand overlies limestone. Also included are rock outcrop sinkholes, and a few small depressions where a very dark gray or black surface layer 8 to 24 inches thick

Rainbow Springs State Park Soil Descriptions

overlies ray sand. Included soils make up about 20 percent of any one mapped area.

(10) Arredondo sand, 5 to 8 percent slopes - This is a sloping, well drained soil that occurs as small areas on sharp-breaking slopes and on long slopes of the upland. In places a few rills have formed as a result of erosion. The water table is at a depth of more than 72 inches.

Included with this soil in mapping are small areas of Candler, Kendrick, and Hague soils; a few small depressions where a black surface layer 8 to 24 inches thick overlies yellowish brown to grayish brown sandy material; and a few areas, of a similar soil, where the slope is 0 to 5 or 8 to 12 percent. Also included are a few small areas where the surface layer is fine sand, loamy sand, and loamy fine sand. Rock outcrops and sinkholes occur in places. Included soils make up about 15 percent of any one mapped area.

(22) Candler sand, 0 to 5 percent slopes - This is a nearly level to gently sloping, excessively drained sandy soil that has thin lamellae of loamy sand within a depth of 60 to 80 inches. It occurs as small and large areas on sandy ridges in the uplands. It has the profile described as representative of the series. The water table is at a depth of more than 72 inches.

In a representative profile the surface layer is dark gray sand about 5 inches thick. It is underlain by 62 inches of yellow sand. The next 42 inches is very pale brown sand that is mottled with white and has thin lamellae of yellowish brown loamy sand. Below this is 6 inches of brownish yellow sandy loam.

Included with this soil in mapping are small areas of Arredondo, Apopka, Astatula, Adamsville, and Tavares soils. Also included are small areas of a similar soil having no thin lamellae of loamy sand and a few areas of a similar soil having slope of 5 to 12 percent. Included soils make up about 15 percent of any one mapped area.

(23) Candler sand, 5 to 12 percent slopes - This is a sloping to strongly sloping, excessively drained sandy soil that has thin lamellae of loamy sand within a depth of 60 to 80 inches. It occurs as small and large areas on sandy ridges in the uplands. The hazard of erosion is slight during periods of high rainfall. The water table is at a depth of more than 72 inches.

Included with this soil in mapping are small areas of Apopka, Arredondo, Tavares, Adamsville, and Pompano soils. Also included are spots, of a similar soil, where the slope is 0 to 5 percent and small areas of a similar soil having no thin lamellae of loamy sand. Included soils make up about 20 percent of any one mapped area.

(24) Candler clay, overwash, 0 to 2 percent slopes - This is a nearly level, well drained soil that generally occurs as small areas along the lower parts of slopes and in slight depressions in the uplands of the southwestern part of the survey area. It has a profile similar to the one described as Candler Sand, but the upper 10 to 20 inches is mixed clayey mine wash from the mining of phosphate. The water table is at a depth of more than 72 inches.

Available water capacity is high in the clayey material, very low in the sandy

Rainbow Springs State Park Soil Descriptions

material to a depth of about 78 inches, and low below. Permeability is slow in the clayey material, very rapid in the sandy material to a depth of about 78 inches, and rapid below. Natural fertility is medium in the clayey material and low in the sandy material. Organic-matter content is low.

Included with this soil in mapping are about 30 acres, of a similar soil, where the mine wash is 20 to 36 inches deep over the sandy soil, small areas where the mine wash is only 3 to 10 inches deep, and small areas where the water table is within a depth of 72 inches. Also included is about 10 acres where 20 to 30 inches of mine wash overlies a poorly drained sandy soil that has a loamy subsoil. Included soils make up about 20 percent of any one mapped area.

(35) Gainesville loamy sand, 0 to 5 percent slopes - This is a nearly level to gently sloping, well drained soil that occurs as small and large areas in the upland. This soil occurs in broad, undulating areas of the upland. It has the profile described as representative of the series. The water table is at a depth of more than 72 inches.

In a representative profile the surface layer is loamy sand about 10 inches thick. The upper 5 inches is very dark grayish brown, and the lower 5 inches is dark brown. The underlying material to a depth of more than 90 inches is loamy sand. The upper 13 inches is brown, and the lower 67 inches is strong brown.

Included with this soil in mapping are small areas, of a similar soil, where the texture is fine sand to a depth of more than 80 inches and a few spots, also of a similar soil, here the slope is 5 to 8 percent. Also included are small areas of Arredondo, Hague, Kendrick, and Zuber soils. Included soils make up less than 15 percent of any one mapped area.

(36) Gainesville loamy sand, 5 to 8 percent slopes - This is a sloping, well drained soil that generally occurs as small areas on sharp-breaking slopes in the upland. Surface runoff is slow, and the erosion hazard is slight. The water table is at a depth of more than 72 inches.

Included with this soil in mapping area few small areas of Arredondo, Hague, and Kendrick soils and areas of a well drained soil that is fine sand to a depth of 80 inches or more. Also included are a few spots of a similar soil, where the slope is 0 to 5 or 8 to 12 percent of any one mapped area.

(37) Hague sand, 2 to 5 percent slopes - This is a gently sloping, well drained soil that occurs generally as small areas in the upland. Its available water capacity is moderate (about 6.7 inches). Flooding or ponding does not occur. The water table is at a depth of more than 80 inches.

This soil has a profile representative of the series. The surface layer is mixed very dark grayish brown and dark grayish brown sand 0 to 8 inches thick. The subsurface layer is sand about 16 inches thick. The upper 9 inches is light yellowish brown, and the lower 7 inches reddish yellow. The subsoil extends to a depth of 74 inches. It is, in sequence downward, 3 inches of strong brown sandy loam, 13 inches of yellowish red sandy clay loam, 9 inches of yellowish

Rainbow Springs State Park Soil Descriptions

red sandy loam, and 25 inches of strong brown loamy sand. The underlying material to a depth of 82 inches is strong brown loamy sand.

Included with this soil in mapping are: small areas of Arredondo, Gainesville, Kendrick, and Zuber soils; a few areas of a similar soil, where the base saturation is less than 35 percent within a depth of 72 inches; and a few areas, also of a similar soil, where the surface layer is fine sand and loamy fine sand. Also included are a small acreage where the slope is 0 to 2 percent and a few areas where the subsoil is within a depth of 20 inches. Moderately eroded spots and sinkholes occur in some areas. Included soils make up about 15 percent of any one mapped area.

(42) Jumper fine sand, 0 to 5 percent slopes – This is a nearly level to gently sloping, somewhat poorly drained soil that occurs as small areas in the flatwoods and along gentle slopes of the sandy uplands. The water table fluctuates between approximately 30 and 60 inches for 2 to 4 months during most years. For brief periods of about 2 weeks to 2 months, it is within a depth of 30 inches.

Included with this soil in mapping are a few areas of a similar soil that has a loamy sand surface layer, small areas of a similar soil that has a sandy clay subsoil or is less than 5 percent plinthite within a depth of 60 inches, and small areas of a somewhat poorly drained soil that has a sandy surface layer less than 20 inches thick. Also included are small areas of Apopka, Sparr, and Lynne soils and a few small areas where the slope is 5 to 8 percent. Included soils make up about 15 percent of any one mapped area.

(57) Pits – These are primarily borrow pits (40 percent) and mine pits (35 percent). Minor components (25 percent) consist of aquents, which are altered or disturbed areas where the original soil material has been removed, repositioned or fill has been added.

(59) Placid-Pompano-Pomona complex - This mapping unit consists of poorly drained and very poorly drained soils. It is on broad flats adjacent to large ponds and swamps in the flatwoods and in shallow depressions of the sandy uplands. It is mostly on the broad flats in the northeastern part of the survey area and in the poorly drained and very poorly drained areas adjacent to the swamps. It is 37 percent Placid soils, 31 percent Pompano soils, and 26 percent Pomona soils. Pomona soils are slightly higher on the landscape than Placid and Pompano soils. Slopes are 0 to 2 percent.

The water table is within 10 inches of the surface for about 4 to 8 months during most years. Slight depressions, mostly in the southwestern part of the survey area, are covered with water for 3 to 6 months during most years.

Included in this unit in mapping are areas of Lynne soils and small areas of a poorly drained soil where a sandy surface layer is underlain by sandy loam and sandy clay loam at a depth of 40 to 60 inches. Also included are areas of a poorly drained sandy soil having a weakly cemented layer at a depth below 30 inches. Included soils make up 10 percent or less of this unit.

Rainbow Springs State Park Soil Descriptions

(61) Pomona sand - This is a poorly drained soil that occurs as small and large areas in the flatwoods and as small areas adjacent to wet depressions on sandy ridges. Slopes are 0 to 2 percent. During most years the water table is within 10 inches of the surface for 1 month to 3 months and fluctuates between 10 and 40 inches for 6 months or more. During dry periods it recedes to a depth of more than 40 inches.

Included with this soil in mapping are small areas of a similar soil, where the surface layer is fine sand or a weakly cemented layer is at a depth of 30 to 40 inches. Also included are small areas of Electra, Lynne, Pompano, and Placid soils. Included soils make up about 20 percent of any one mapped area.

(64) Samsula-Martel complex, depressional - This complex has a nearly level to gentle slope (0 to 2 percent) and a concave down- and across-slope shape. It is a very poorly drained soil that formed in herbaceous organic material over sandy, loamy, and clayey marine deposits. The water table is at the surface (0 inches), and available water capacity is high (to about 10.8 inches). Ponding is frequent.

This complex is comprised of Samsula and similar soils (38 percent), Martel variant and similar soils (32 percent), and minor components (30 percent). The latter are Placid, depressional (15 percent) and Pompano, depressional (15 percent) soils.

In a typical profile, muck extends to a depth of 31 inches, with sand occurring from 11 to 49 inches below the surface. The lower layers are comprised of sandy clay (42 to 73 inches) mixed in with sandy clay loam (49 to 60 inches).

(69) Tavares sand, 0 to 5 percent slopes - This is a nearly level to gently sloping, moderately well drained sandy soil that occurs as small and large areas in the broad sandy flatwoods and along the lower slopes of the deep sandy uplands. The water table fluctuates between 40 to 60 inches for cumulative periods of 6 months or more during most years. During wet periods it may rise to within 30 to 40 inches of the surface for periods of less than 60 days. It recedes to a depth of more than 60 inches during droughty periods.

Included with this soil in mapping are a few small areas of a similar soil, where the slope is 5 to 8 percent. Also included are small areas of Adamsville, Candler, Apopka, and Pompano soils. Included soils make up about 15 percent of any one mapped area.

Addendum 5—Plant and Animal List

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
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LICHENS

Isidiate eyelash lichen	<i>Bulbothrix isidiza</i>	
Carolina shield lichen	<i>Canoparmelia caroliniana</i>	
Powdery-headed shield lichen...	<i>Canoparmelia cryptochlorophaea</i>	
Pale-fruited funnel cladonia.....	<i>Cladonia beaumontii</i>	
Powder-puff lichen.....	<i>Cladonia evansii</i>	
Turban cladonia	<i>Cladonia peziziformis</i>	
Cup cladonia.....	<i>Cladonia ramulosa</i>	
Ravenel's cup cladonia	<i>Cladonia ravenelii</i>	
Powdery peg lichen.....	<i>Cladonia subradiata</i>	
Dixie reindeer lichen	<i>Cladonia subtenuis</i>	
Salted shell lichen	<i>Coccocarpia palmicola</i>	
Christmas lichen	<i>Cryptothecia rubrocincta</i>	
Green Christmas lichen	<i>Cryptothecia striata</i>	
Wrinkled loop lichen	<i>Hypotrachyna livida</i>	
Ruffled blue jellyskin.....	<i>Leptogium cyanescens</i>	
Salted blue jellyskin.....	<i>Leptogium isidiosellum</i>	
Hairless-spined shield lichen	<i>Parmelinopsis minarum</i>	
Pustuled shield lichen.....	<i>Parmelinopsis spumosa</i>	
Salted ruffle lichen	<i>Parmotrema crinitum</i>	
K+ y-r unwhiskered.....	<i>Parmotrema cristiferum</i> complex	
K-P+red.....	<i>Parmotrema gardneri</i>	
P+ orange powdered	<i>Parmotrema hypoleucinum</i>	

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
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UV-perforated ruffle.....	<i>Parmotrema perforatum</i> complex	
Long-whiskered lichen.....	<i>Parmotrema rampoddense</i>	
Palm ruffle lichen	<i>Parmotrema tinctorum</i>	
Southern strap ramalina	<i>Ramalina stenospora</i>	
Powder-tipped beard lichen.....	<i>Usnea dimorpha</i>	
Red beard lichen	<i>Usnea rubicunda</i>	
Bushy beard lichen	<i>Usnea strigosa</i>	

PTERIDOPHYTES

Golden leather fern.....	<i>Acrostichum aureum</i>	HH
Ebony spleenwort.....	<i>Asplenium platyneuron</i>	
Japanese climbing fern.....	<i>Lygodium japonicum</i> *	
Tuberous sword fern	<i>Nephrolepis cordifolia</i> *	
Cinnamon fern	<i>Osmunda cinnamomea</i>	
Royal fern	<i>Osmunda regalis</i> L. var. <i>spectabilis</i>	
Resurrection fern	<i>Pleopeltis polypodioides</i> var. <i>michauxiana</i>	
Tailed bracken	<i>Pteridium aquilinum</i> var. <i>pseudocaudatum</i>	
Chinese ladder brake	<i>Pteris vittata</i> *	
Water spangles	<i>Salvinia minima</i> *	
Giant salvinia.....	<i>Salvinia molesta</i> *	
Netted chain fern	<i>Woodwardia areolata</i>	
Virginia chain fern	<i>Woodwardia virginica</i>	

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
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GYMNOSPERMS

Red cedar	<i>Juniperus virginiana</i>	
Sand pine	<i>Pinus clausa</i>	
Slash pine	<i>Pinus elliottii</i>	
Longleaf pine.....	<i>Pinus palustris</i>	
Loblolly pine	<i>Pinus taeda</i>	
Pond-cypress.....	<i>Taxodium ascendens</i>	
Bald-cypress.....	<i>Taxodium distichum</i>	
Florida arrowroot; Coontie	<i>Zamia pumila</i>	

ANGIOSPERMS

MONOCOTS

Splitbeard bluestem.....	<i>Andropogon ternarius</i>	
Broomsedge bluestem.....	<i>Andropogon virginicus</i>	
.....	<i>Anthaenantia</i> sp.	
Greendragon	<i>Arisaema dracontium</i>	
Jack-in-the-pulpit.....	<i>Arisaema triphyllum</i>	
Wiregrass	<i>Aristida stricta</i> var. <i>beyrichiana</i>	
.....	<i>Aristida</i> sp.	
Hammock sedge	<i>Carex fissa</i>	
Gholson's sedge	<i>Carex gholsonii</i>	
Godfrey's sedge	<i>Carex godfreyii</i>	

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
Florida hammock sedge.....	<i>Carex vexans</i>	
European fan palm	<i>Chamaerops humilis</i> *	
Jamaica swamp sawgrass	<i>Cladium jamaicense</i>	
Wild taro.....	<i>Colocasia esculenta</i> *	
Common dayflower.....	<i>Commelina diffusa</i> var. <i>diffusa</i> *	
Pampasgrass	<i>Cortaderia selloana</i> *	
Water-trumpet.....	<i>Cryptocoryne walkeri</i>	
Bermudagrass	<i>Cynodon dactylon</i> *	
Papyrus flatsedge.....	<i>Cyperus papyrus</i> *	
Air-potato	<i>Dioscorea bulbifera</i> *	
Spikerush	<i>Eleocharis</i> sp. *	
Green-fly orchid	<i>Epidendrum conopseum</i>	
Elliott's lovegrass	<i>Eragrostis elliottii</i>	
Purple lovegrass.....	<i>Eragrostis spectabilis</i>	
Centipedegrass	<i>Eremochloa ophiuroides</i> *	
Tenangle pipewort.....	<i>Eriocaulon decangulare</i>	
.....	<i>Gymnopogon</i> sp.	
Toothpetal false reinorchid.....	<i>Habenaria floribunda</i>	
Longhorn false rein orchid	<i>Habenaria quinqueseta</i>	
Sweet tanglehead.....	<i>Heteropogon melanocarpus</i> *	
Waterthyme; hydrilla	<i>Hydrilla verticillata</i>	
Fringed yellow stargrass.....	<i>Hypoxis juncea</i>	
Cogongrass	<i>Imperata cylindrica</i> *	
Carolina redroot.....	<i>Lachnanthes caroliana</i>	
Whitehead bogbutton.....	<i>Lachnocaulon anceps</i>	

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
Common duckweed	<i>Lemna minor</i>	
Big blue lilyturf	<i>Liriope muscari</i> *	
Burmann's basketgrass	<i>Oplismenus burmannii</i> *^	
Basketgrass	<i>Oplismenus hirtellus</i>	
Giant Orchid	<i>Orthochilus ecristatus</i>	SH
Panicgrass.....	<i>Panicum</i> sp.	
Maidencane	<i>Panicum hemitomon</i>	
Egyptian paspalidium	<i>Paspalidium geminatum</i>	
Bahiagrass	<i>Paspalum notatum</i> *	
Common reed.....	<i>Phragmites australis</i>	
Water-lettuce	<i>Pistia stratiotes</i> *	
Southern tubercled orchid.....	<i>Platanthera flava</i>	HH
Pickerelweed	<i>Pontederia cordata</i>	
Curly pondweed	<i>Potamogeton crispus</i> *	
Illinois pondweed	<i>Potamogeton illinoensis</i>	
Fascicled beaksedge	<i>Rhynchospora fascicularis</i>	
Cabbage palm	<i>Sabal palmetto</i>	
Grassy arrowhead	<i>Sagittaria graminea</i>	
Bulltongue arrowhead	<i>Sagittaria lancifolia</i>	
Broadleaf arrowhead.....	<i>Sagittaria latifolia</i>	
Awl-leaf arrowhead.....	<i>Sagittaria subulata</i>	
Saw palmetto	<i>Serenoa repens</i>	
.....	<i>Setaria</i> sp.	
Earleaf greenbrier	<i>Smilax auriculata</i>	
Saw greenbrier	<i>Smilax bona-nox</i>	

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
Cat greenbrier	<i>Smilax glauca</i>	
Laurel greenbrier.....	<i>Smilax laurifolia</i>	
Lopsided indiagrass.....	<i>Sorghastrum secundum</i>	
Smutgrass	<i>Sporobolus indicus</i> *	
Pineywoods dropseed.....	<i>Sporobolus junceus</i>	
Yellow hatpins	<i>Syngonanthus flavidulus</i>	
Bartram's airplant	<i>Tillandsia bartramii</i>	
Ballmoss.....	<i>Tillandsia recurvata</i>	
Spanish moss	<i>Tillandsia usneoides</i>	
Small-leaf spiderwort.....	<i>Tradescantia fluminensis</i> *	
Cattail	<i>Typha</i> sp.	
Tapegrass	<i>Vallisneria americana</i>	
Arrowleaf elephant's ear.....	<i>Xanthosoma sagittifolium</i> *	
Spanish bayonet	<i>Yucca aloifolia</i>	
Adam's needle	<i>Yucca filamentosa</i>	
Soldier's orchid	<i>Zeuxine strateumatica</i> *	
Annual wild rice; Indian rice.....	<i>Zizania aquatica</i>	

DICOTS

Red maple	<i>Acer rubrum</i>
False foxglove.....	<i>Agalinis</i> sp.
Purple false foxglove.....	<i>Agalinis purpurea</i>
Hammock snakeroot.....	<i>Ageratina jucunda</i>

* Non-native species ^ Garden species

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
Silktree; Mimosa	<i>Albizia julibrissin</i> *	
Alligatorweed.....	<i>Alternanthera philoxeroides</i> *	
Common ragweed	<i>Ambrosia artemisiifolia</i>	
Peppervine	<i>Ampelopsis arborea</i>	
Fringed bluestar	<i>Amsonia ciliata</i>	
Devil's walkingstick.....	<i>Aralia spinosa</i>	
Scratchthroat; Coral ardisia	<i>Ardisia crenata</i> *	
Elegant Dutchman's-pipe	<i>Aristolochia elegans</i> *^	
Virginia snakeroot	<i>Aristolochia serpentaria</i>	
Florida Indian plantain	<i>Arnoglossum floridanum</i>	
Milkweed	<i>Asclepias</i> sp.	
Savannah milkweed.....	<i>Asclepias pedicellata</i>	
Butterflyweed	<i>Asclepias tuberosa</i>	
Slimleaf pawpaw	<i>Asimina angustifolia</i>	
Woolly pawpaw	<i>Asimina incana</i>	
Bigflower pawpaw	<i>Asimina obovata</i>	
Dwarf pawpaw	<i>Asimina pygmea</i>	
Netted pawpaw	<i>Asimina reticulata</i>	
Smooth yellow false foxglove ...	<i>Aureolaria flava</i>	
Fernleaf yellow false foxglove...	<i>Aureolaria pectinata</i>	
Groundsel tree; Sea-myrtle.....	<i>Baccharis halimifolia</i>	
Coastalplain honeycombhead ...	<i>Balduina angustifolia</i>	
Wax begonia	<i>Begonia cucullata</i> *	
Tarflower	<i>Bejaria racemosa</i>	
Florida greeneyes.....	<i>Berlandiera subacaulis</i>	

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
Beggarticks	<i>Bidens alba</i>	
Crossvine.....	<i>Bignonia capreolata</i>	
False nettle; Bog hemp	<i>Boehmeria cylindrica</i>	
Paper mulberry	<i>Broussonetia papyrifera</i> *	
American beautyberry.....	<i>Callicarpa americana</i>	
Trumpet creeper	<i>Campsis radicans</i>	
Coastalplain chaffhead	<i>Carphephorus corymbosus</i>	
Vanillaleaf	<i>Carphephorus odoratissimus</i>	
American hornbeam	<i>Carpinus caroliniana</i>	
Pignut hickory.....	<i>Carya glabra</i>	
Mockernut Hickory.....	<i>Carya tomentosa</i>	
Littleleaf buckbrush	<i>Ceanothus microphyllus</i>	
Sugarberry; Hackberry.....	<i>Celtis laevigata</i>	
Spadeleaf.....	<i>Centella asiatica</i>	
Spurred butterfly pea.....	<i>Centrosema virginianum</i>	
Common buttonbush	<i>Cephalanthus occidentalis</i>	
Florida rosemary	<i>Ceratiola ericoides</i>	
Coontail.....	<i>Ceratophyllum demersum</i>	
Eastern redbud	<i>Cercis canadensis</i>	
Partridge pea.....	<i>Chamaecrista fasciculata</i>	
Mexican tea.....	<i>Chenopodium ambrosioides</i> *	
Camphortree	<i>Cinnamomum camphora</i> *	
Purple thistle	<i>Cirsium horridulum</i>	
Sorrelvine	<i>Cissus trifoliata</i>	
.....	<i>Clerodendrum</i> sp. *^	

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
Tread-softly.....	<i>Cnidoscolus stimulosus</i>	
Roughleaf dogwood	<i>Cornus asperifolia</i>	
Flowering dogwood.....	<i>Cornus florida</i>	
Swamp dogwood	<i>Cornus foemina</i>	
Yellowleaf hawthorne	<i>Crataegus flava</i>	
Rabbitbells	<i>Crotalaria rotundifolia</i>	
Showy rattlebox.....	<i>Crotalaria spectabilis</i> *	
Silver croton.....	<i>Croton argyranthemus</i>	
Titi.....	<i>Cyrilla racemiflora</i>	
Summer farewell.....	<i>Dalea pinnata</i>	
Cowitch vine.....	<i>Decumaria barbara</i>	
Zarabacoa comun.....	<i>Desmodium incanum</i>	
Dixie ticktrefoil	<i>Desmodium tortuosum</i> *	
Common persimmon.....	<i>Diospyros virginiana</i>	
Pink sundew	<i>Drosera capillaris</i>	
Silverthorn	<i>Elaeagnus pungens</i> *	
.....	<i>Elephantopus</i> sp.	
Prairie fleabane.....	<i>Erigeron strigosus</i>	
Dogtongue wild buckwheat	<i>Eriogonum tomentosum</i>	
Coralbean; Cherokee bean.....	<i>Erythrina herbacea</i>	
Fragrant eryngo	<i>Eryngium aromaticum</i>	
American strawberrybush	<i>Euonymus americanus</i>	
White thoroughwort.....	<i>Eupatorium album</i>	
Dogfennel	<i>Eupatorium capillifolium</i>	
Yankeeweed	<i>Eupatorium compositifolium</i>	

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
Mohr's thoroughwort.....	<i>Eupatorium mohrii</i>	
Silver dwarf morning-glory	<i>Evolvulus sericeus</i>	
Pineapple guava.....	<i>Feijoa sellowiana</i> *	
Creeping fig.....	<i>Ficus pumila</i> *^	
Eastern swampprivet	<i>Forestiera acuminata</i>	
Southern beeblossom	<i>Gaura angustifolia</i>	
Dwarf huckleberry	<i>Gaylussacia dumosa</i>	
Blue huckleberry	<i>Gaylussacia frondosa</i> var. <i>tomentosa</i>	
Yellow jessamine.....	<i>Gelsemium sempervirens</i>	
Transvaal daisy.....	<i>Gerbera jamesonii</i> *	
Rough hedgehyssop.....	<i>Gratiola hispida</i>	
Firebush	<i>Hamelia patens</i> ^	
Pinebarren frostweed	<i>Helianthemum corymbosum</i>	
Narrowleaf sunflower	<i>Helianthus angustifolius</i>	
Stiff sunflower	<i>Helianthus radula</i>	
Camphorweed	<i>Heterotheca subaxillaris</i>	
Oakleaf hydrangea	<i>Hydrangea quercifolia</i> ^	
Manyflower marshpennywort....	<i>Hydrocotyle umbellata</i>	
St. Andrew's-cross	<i>Hypericum hypericoides</i>	
Myrtleleaf St. John's-wort	<i>Hypericum myrtifolium</i>	
Fourpetal St. John's-wort.....	<i>Hypericum tetrapetalum</i>	
VA marsh St. John's-wort	<i>Hypericum virginicum</i>	
Dahoon	<i>Ilex cassine</i>	
Chinese holly	<i>Ilex cornuta</i> *	
Inkberry; Gallberry.....	<i>Ilex glabra</i>	

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
American holly	<i>Ilex opaca</i>	
Yaupon	<i>Ilex vomitoria</i>	
Yellow anisetree; star anise	<i>Illicium parviflorum</i>	DEV
Carolina indigo	<i>Indigofera caroliniana</i>	
Hairy indigo	<i>Indigofera hirsuta</i> *	
Tievine	<i>Ipomoea cordatotriloba</i>	
Virginia willow	<i>Itea virginica</i>	
Flamegold	<i>Koelreuteria elegans</i> subsp. <i>formosana</i> *	
Sandspur	<i>Krameria lanceolata</i>	
Crapemyrtle	<i>Lagerstroemia indica</i> *^	
Lantana; Shrubverbena	<i>Lantana camara</i> *	
Virginia pepperweed	<i>Lepidium virginicum</i>	
Hairy lespedeza	<i>Lespedeza hirta</i>	
Gayfeather	<i>Liatris</i> sp.	
Fewflower gayfeather	<i>Liatris pauciflora</i> var. <i>pauciflora</i>	
Gopher apple	<i>Licania michauxii</i>	
Japanese privet	<i>Ligustrum japonicum</i> *	
Glossy privet	<i>Ligustrum lucidum</i> *	
Sweetgum	<i>Liquidambar styraciflua</i>	
Cardinalflower	<i>Lobelia cardinalis</i>	
Japanese honeysuckle	<i>Lonicera japonica</i> *	
Coral honeysuckle	<i>Lonicera sempervirens</i>	
Creeping primrosewillow	<i>Ludwigia repens</i>	
Skyblue lupine	<i>Lupinus diffusus</i>	
Rose-rush	<i>Lygodesmia aphylla</i>	

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
Rusty staggerbush.....	<i>Lyonia ferruginea</i>	
Fetterbush	<i>Lyonia lucida</i>	
Southern magnolia	<i>Magnolia grandiflora</i>	
Ashe's magnolia.....	<i>Magnolia macrophylla</i> var. <i>ashei</i> ^	DEV
Sweetbay.....	<i>Magnolia virginiana</i>	
Ornamental apple.....	<i>Malus x purpurea</i> *	
Florida spiny pod.....	<i>Matelea floridana</i>	
Chinaberrytree.....	<i>Melia azedarach</i> *	
White sweetclover	<i>Melilotus albus</i> *	
Natal grass.....	<i>Melinis repens</i> *	
Florida sensitive briar.....	<i>Mimosa quadrivalvis</i> var. <i>floridana</i>	
Partridgeberry	<i>Mitchella repens</i>	
Balsampear	<i>Momordica charantia</i> *	
Spotted beebalm.....	<i>Monarda punctata</i>	
Red mulberry.....	<i>Morus rubra</i>	
Simpson's stopper	<i>Myrcianthes fragrans</i> ^	DV
Southern bayberry	<i>Myrica cerifera</i>	
Twoleaf watermilfoil.....	<i>Myriophyllum heterophyllum</i>	
Nandina.....	<i>Nandina domestica</i> *	
European watercress	<i>Nasturtium officinale</i> *	
Blackgum.....	<i>Nyssa sylvatica</i>	
Common eveningprimrose	<i>Oenothera biennis</i>	
Cutleaf eveningprimrose.....	<i>Oenothera laciniata</i>	
Pricklypear	<i>Opuntia humifusa</i>	
Piedmont leatherroot	<i>Orbexilum lupinellus</i>	

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
Eastern hophornbeam	<i>Ostrya virginiana</i>	
Pink woodsorrel	<i>Oxalis corymbosa</i>	
Skunkvine	<i>Paederia foetida</i> *	
.....	<i>Palafoxia</i> sp.	
Jerusalem thorn	<i>Parkinsonia aculeata</i> *	
Virginia creeper	<i>Parthenocissus quinquefolia</i>	
Purple passionflower	<i>Passiflora incarnata</i>	
Buckroot.....	<i>Pedimelum canescens</i>	
Manyflower beardtongue	<i>Penstemon multiflorus</i>	
Red bay	<i>Persea borbonia</i>	
Florida false sunflower	<i>Phoebanthus grandiflorus</i>	
Oak mistletoe	<i>Phoradendron leucarpum</i>	
Red chokeberry.....	<i>Photinia pyrifolia</i>	
American pokeweed.....	<i>Phytolacca americana</i>	
Yellow butterwort	<i>Pinguicula lutea</i>	MF
Japanese cheesewood	<i>Pittosporum tobira</i> *	
Narrowleaf silkgrass	<i>Pityopsis graminifolia</i>	
Rosy camphorweed	<i>Pluchea baccharis</i>	
Yew plum pine	<i>Podocarpus macrophyllus</i> *	
Paintedleaf	<i>Poinsettia cyathophora</i>	
Orange milkwort	<i>Polygala lutea</i>	
Tall jointweed	<i>Polygonella gracilis</i>	
Chickasaw plum	<i>Prunus angustifolia</i>	
Carolina laurelcherry.....	<i>Prunus caroliniana</i>	
Black cherry	<i>Prunus serotina</i>	

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
Blackroot	<i>Pterocaulon pycnostachym</i>	
Firethorn.....	<i>Pyracantha coccinea</i> *	
Chapman's oak	<i>Quercus chapmanii</i>	
Spanish oak; S. red oak	<i>Quercus falcata</i>	
Sand live oak.....	<i>Quercus geminata</i>	
Bluejack oak.....	<i>Quercus incana</i>	
Turkey oak.....	<i>Quercus laevis</i>	
Laurel oak; Diamond oak.....	<i>Quercus laurifolia</i>	
Sand post oak	<i>Quercus margaretta</i>	
Myrtle oak.....	<i>Quercus myrtifolia</i>	
Water oak	<i>Quercus nigra</i>	
Shumard's oak.....	<i>Quercus shumardii</i>	
Live oak.....	<i>Quercus virginiana</i>	
Pale meadowbeauty.....	<i>Rhexia mariana</i>	
Florida flame azalea.....	<i>Rhododendron austrinum</i> ^	
Sweet pinxter azalea	<i>Rhododendron canescens</i>	
Formosa azalea.....	<i>Rhododendron simsii</i> *	
Winged sumac	<i>Rhus copallinum</i>	
Michaux's snoutbean.....	<i>Rhynchosia michauxii</i>	
Tropical Mexican clover	<i>Richardia brasiliensis</i> *	
Castorbean	<i>Ricinus communis</i> *	
Sand blackberry	<i>Rubus cuneifolius</i>	
Carolina wild petunia	<i>Ruellia caroliniensis</i>	
Heartwing dock.....	<i>Rumex hastatulus</i>	
Shortleaf rosegentian.....	<i>Sabatia brevifolia</i>	

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
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Azure blue sage	<i>Salvia azurea</i>	
Lyreleaf sage	<i>Salvia lyrata</i>	
American elder; Elderberry	<i>Sambucus nigra</i> subsp. <i>canadensis</i>	
Sassafras	<i>Sassafras albidum</i>	
Lizard's tail.....	<i>Saururus cernuus</i>	
.....	<i>Scutellaria</i> sp.	
Septicweed	<i>Senna occidentalis</i> *	
Cuban jute	<i>Sida rhombifolia</i>	
Kidneyleaf rosinweed	<i>Silphium compositum</i>	
Common coleus	<i>Solenostemon scutellarioides</i> *	
Goldenrod	<i>Solidago</i> sp.	
Creeping oxeye.....	<i>Sphagneticola trilobata</i> *	
Florida hedgenettle.....	<i>Stachys floridana</i>	
Queensdelight.....	<i>Stillingia sylvatica</i>	
Coastalplain dawnflower	<i>Stylisma patens</i>	
Eastern silver aster.....	<i>Symphyotrichum concolor</i>	
Scurf hoarypea	<i>Tephrosia chrysophylla</i>	
Carolina basswood	<i>Tilia americana</i> var. <i>caroliniana</i>	
Rosewood	<i>Tipuana tipu</i>	
Atlantic poison oak	<i>Toxicodendron pubescens</i>	
Eastern poison ivy	<i>Toxicodendron radicans</i>	
Wavyleaf noseburn	<i>Tragia urens</i>	
Forked bluecurls.....	<i>Trichostema dichotomum</i>	
Clasping Venus' looking-glass...	<i>Triodanis perfoliata</i>	
Florida elm	<i>Ulmus americana</i> var. <i>floridana</i>	

Rainbow Springs State Park Plants

Common Name	Scientific Name	Primary Habitat Codes (for designated species)
Caesarweed	<i>Urena lobata</i> *	
Humped bladderwort	<i>Utricularia gibba</i>	
Sparkleberry	<i>Vaccinium arboreum</i>	
Highbush blueberry	<i>Vaccinium corymbosum</i>	
Darrow's blueberry	<i>Vaccinium darrowii</i>	
Shiny blueberry	<i>Vaccinium myrsinites</i>	
Deerberry	<i>Vaccinium stamineum</i>	
Brazilian vervain	<i>Verbena brasiliensis</i> *	
Herb-of-the-cross.....	<i>Verbena officinalis</i> *	
Frostweed	<i>Verbesina virginica</i>	
Tall ironweed.....	<i>Vernonia angustifolia</i>	
Walter's viburnum	<i>Viburnum obovatum</i>	
Sandankwa viburnum	<i>Viburnum suspensum</i> *	
Lilac chastetree.....	<i>Vitex agnus-castus</i> *	
Summer grape.....	<i>Vitis aestivalis</i>	
Muscadine.....	<i>Vitis rotundifolia</i>	
Calloose grape	<i>Vitis shuttleworthii</i>	
Chinese wisteria.....	<i>Wisteria sinensis</i> *	
Hercules-club	<i>Zanthoxylum clava-herculis</i>	

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
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INVERTEBRATES

Ants, Bees, Wasps and Flies

Western Honey Bee	<i>Apis mellifra</i>	MTC
Parasitic Fly	<i>Belvosia bifasciata</i>	MTC
Greater Bee Fly	<i>Bombilius major</i>	MTC
American Bumble Bee	<i>Bombus americanus</i>	MTC
Common Eastern Bumble Bee.....	<i>Bombus impatiens</i>	MTC
Hentz Striped Scorpion	<i>Centroides hentzi</i>	MTC
Rufous-backed Cellophane Bee ...	<i>Colettes thorasicus</i>	SH
Giant Mayfly	<i>Hexagenia limbata</i>	SRST
Flat-tailed Leafcutter.....	<i>Megachile mendica</i>	SH, SCF, MF
Florida Harvester Ant	<i>Pogonomermex badius</i>	SH, SCF
Ringed Paper Wasp	<i>Polites annularis</i>	SRST
Great Golden Digger Wasp	<i>Sphex ichneumoneus</i>	MTC
Northern Fungus Farming Ant.....	<i>Trachymermex septentrionalis</i>	MTC
Owlfly	<i>Ululodes macleayanus</i>	MTC

Beetles, Bugs and Other

Flatheaded Bald Cypress Borer ...	<i>Acmaeodera pulchella</i>	MTC
Eastern Eyed Click Beetle.....	<i>Alaus oculatus</i>	MTC
S. Two-striped Walkingstick	<i>Anisomorpha buprestoides</i>	MTC
Punctuated Tiger Beetle.....	<i>Cincindelidia punctulata</i>	MTC
Festive Tiger Beetle	<i>Cincindella scutellaris unicolor</i>	SH, MF
Emerald Euphoria	<i>Euphoria fulgida</i>	MTC

* Non-native species ^ Garden species

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
Florida Woods Cockroach	<i>Eurycotis floridana</i>	MTC
Helmeted Squash Bug	<i>Euthochtha galeator</i>	MTC
Scale Feeding Lady Beetle.....	<i>Exochomus childreni children</i>	MTC
Leaf-footed bug	<i>Leptoglossus fulvicornis</i>	MTC
Air Potato Leaf Beetle.....	<i>Lilioceris cheni</i>	IEM
Larger Elm Leaf Beetle	<i>Monocestra coryli</i>	MTC
Blister Beetle	<i>Nemognatha punctulata</i>	MTC
Carolina Burying Beetle	<i>Nicrophorus carolina</i>	MTC
Shield-backed Bug.....	<i>Orsilochides guttata</i>	MTC
Florida Cebrionid Beetle.....	<i>Selonodon floridensis</i>	SH, SCF
Large-Jawed Cebrionid Beetle	<i>Selonodon mandibularis</i>	SH, SCF
Hunting Billbug	<i>Sphenophorus venatus vestitus</i>	MTC
Six-spotted Flower Longhorn	<i>Strangalia sexnotata</i>	MTC
Jewelbug.....	<i>Symphylus caribbeanus</i>	MTC
Delta Flower Beetle.....	<i>Trigonopeltastes delta</i>	MTC
Milkweed Assassin Bug	<i>Zelus longipes</i>	MTC

Butterflies

Gulf Fritillary.....	<i>Agraulis vanillae</i>	MTC
Least Skipper.....	<i>Anacyloxypha numitor</i>	MTC
Goatweed Leafwing.....	<i>Anaea andria</i>	SH
White Peacock	<i>Anartia jatrophae</i>	MTC
Delaware Skipper	<i>Anatrytone logan</i>	SH
Hackberry Emperor.....	<i>Asterocampa celtis</i>	MTC
Tawny Emperor.....	<i>Asterocampa clyton</i>	MTC
Sachem	<i>Atalopedes campestris</i>	MTC

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
Great Purple Hairstreak	<i>Atlides halesus</i>	MTC
Pipevine Swallowtail.....	<i>Battus philenor</i>	SH
Red-banded Hairstreak.....	<i>Calycopis cecrops</i>	MTC
Queen	<i>Danaus gilippus</i>	MTC
Monarch.....	<i>Danaus plexippus</i>	MTC
Silver-spotted Skipper.....	<i>Epargyreus clarus</i>	MTC
Sleepy Duskywing	<i>Erynnis brizo</i>	SH
Horace's Duskywing.....	<i>Erynnis horatius</i>	MTC
Zarucco Duskywing.....	<i>Erynnis zarucco</i>	SH
Barred Yellow.....	<i>Eurema daira</i>	MTC
Little Yellow	<i>Eurema lisa</i>	MTC
Sleepy Orange	<i>Eurema nicippe</i>	MTC
Zebra Swallowtail	<i>Eurytides marcellus</i>	SH
Zebra Heliconian	<i>Heliconius charithonia</i>	MTC
Ceraunus Blue	<i>Hemiargus ceraunus</i>	MTC
Carolina Satyr.....	<i>Hermeuptychia sosybius</i>	UHF, MH
Dotted Skipper.....	<i>Hesperia attalus</i>	SH
Fiery Skipper	<i>Hylephila phyleus</i>	SH
Buckeye.....	<i>Junonia coenia</i>	MTC
Red-spotted Purple	<i>Limenitis arthemis astyanax</i>	MTC
Zabulon Skipper.....	<i>Lon zabulon</i>	SH
Viola's Wood Satyr.....	<i>Megisto cymella viola</i>	UHF
Ocola Skipper	<i>Panoquina ocola</i>	MTC
Eastern Tiger Swallowtail	<i>Papilio glaucus</i>	MTC
Palamedes Swallowtail	<i>Papilio palamedes</i>	MTC
Spicebush Swallowtail	<i>Papilio troilus</i>	MTC

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
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White M Hairstreak	<i>Parrhasius m-album</i>	MTC
Cloudless Sulfur	<i>Phoebis sennae</i>	MTC
Phaon Crescent	<i>Phyciodes phaon</i>	MTC
Pearl Crescent.....	<i>Phyciodes tharos</i>	MTC
Baracoa Skipper	<i>Polites baracoa</i>	SH
Tanwy-edged Skipper.....	<i>Polites themistocles</i>	MTC
Whirlabout	<i>Polites vibex</i>	MTC
Checkered White	<i>Pontia protodice</i>	MTC
Byssus Skipper	<i>Problema byssus</i>	BS, FS, HH
Tropical Checkered-Skipper.....	<i>Pyrgus oileus</i>	MTC
Banded Hairstreak	<i>Satyrium calanus</i>	SH
Gray Hairstreak.....	<i>Strymon melinus</i>	MTC
Southern Cloudywing	<i>Thorybes bathyllus</i>	MTC
Confused Cloudywing	<i>Thorybes confuses</i>	SH, MF
Northern Cloudywing.....	<i>Thorybes pylades</i>	SH, MF
Dorantes Longtail	<i>Urbanus dorantes</i>	MTC
Long-tailed Skipper.....	<i>Urbanus proteus</i>	MTC
Northern Broken-dash	<i>Wallengrenia egeremet</i>	MTC
Southern Broken-dash.....	<i>Wallengrenia otho</i>	MTC
Southern Dogface.....	<i>Zerene cesonia</i>	SH

Moths

Luna Moth	<i>Actias luna</i>	MTC
Florida Oakworm Moth	<i>Anisota consularis</i>	SH
Polyphemus Moth	<i>Antherea polyphemus</i>	MTC
Azelea Catperpillar Moth	<i>Datana major</i>	MTC

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
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Milkweed Tussock Moth	<i>Euchaetes egle</i>	MTC
Hummingbird Clearwing	<i>Hemaris thysbe</i>	MTC
Giant Leopard Moth	<i>Hypercompe scribonia</i>	MTC
Small Purplish Gray	<i>Iridopsis humeria</i>	MTC
Bald Cypress Sphinx	<i>Isoparce cupressi</i>	BS
Edwards Wasp Moth.....	<i>Lymire edwardsii</i>	MTC
Fir Tussock Moth	<i>Orgyia dentrita</i>	MTC
Virginia Tiger Moth	<i>Spilosoma virginica</i>	MTC
Spanish Moth.....	<i>Xanthopastis regnatrix</i>	SRST

Dragonflies and Damselflies

Common Green Darner.....	<i>Anax junius</i>	MTC
Comet Darner	<i>Anax longipes</i>	DM
Two-striped Forceptail	<i>Aphylla williamsoni</i>	SH
Variable Dancer.....	<i>Argia fumipennis atra</i>	MTC
Powdered Dancer	<i>Argia moesta</i>	SRST
Blue-ringed Dancer	<i>Argia sedula</i>	SRST
Halloween Pennant	<i>Celithemis eponina</i>	DM
Regal Darner	<i>Coryphaeschna ingens</i>	BM, BS
Black-shouldered spinyleg.....	<i>Dromogomphus spinosus</i>	SRST
Atlantic bluet	<i>Enallagma doubledayi</i>	DM
Swamp Darner.....	<i>Epiaeschna heros</i>	BS, FS, HH
Prince Baskettail.....	<i>Epithea princeps</i>	SRST
Eastern Pondhawk	<i>Erythemis simplicicollis</i>	MTC
Little Blue Dragonlet	<i>Erythrodiplax miniscula</i>	MTC
Sandhill Clubtail	<i>Gomphus cavillaris</i>	DM

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
Cypress Clubtail	<i>Gomphus minutus</i>	BS, DM, SH, MF
Smokey Rubyspot.....	<i>Hetaerina titia</i>	SRST
Citrine Forktail	<i>Ischnura hastata</i>	SRST
Southern Spreadwing	<i>Lestes australis</i>	BS, DM
Swamp Spreadwing	<i>Lestes vigilax</i>	BS, HH
Bar-winged Skimmer.....	<i>Libellula axilena</i>	SRST
Slaty Skimmer	<i>Libellula incesta</i>	SRST
Needham Skimmer	<i>Libellula needhami</i>	DM
Georgia River Cruiser	<i>Macromia illinoensis</i>	SRST
Roseate Skimmer	<i>Orthemis ferruginea</i>	SH, SKLK
Blue Dasher.....	<i>Pachydiplax longipennis</i>	MTC
Wandering Glider.....	<i>Pantala flavescens</i>	MTC
Eastern Amberwing.....	<i>Perithemis tenera</i>	SRST
Duckweed Firetail	<i>Telebasis byersi</i>	SRST
Carolina Saddlebags.....	<i>Tamea carolina</i>	MTC
American Lady	<i>Vanessa virginiensis</i>	MTC

Grasshoppers and Allies

Long-headed Toothpick	<i>Achurum carinatum</i>	MTC
Brown Winter Grasshopper.....	<i>Amblytropidia mysteca</i>	MTC
Linear-winged Grasshopper.....	<i>Aptenopedes sphenaroides</i>	MTC
Southern Yellow-winged gh	<i>Arphia granulata</i>	MTC
Autumn Yellow-winged gh.....	<i>Arphia xanthoptera</i>	MTC
Southern Green-striped gh.....	<i>Chlotophaga australior</i>	MTC
Keeler's Spur-throat.....	<i>Melanoplus keeleri</i>	MTC
Red-legged Grasshopper.....	<i>Melanoplus propinquus</i>	MTC

* Non-native species ^ Garden species

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
Round-winged Grasshopper.....	<i>Melanoplus rotundipennis</i>	MTC
Eastern Mermeria	<i>Mermeria intertexta</i>	SH, MF
Lively Grasshopper	<i>Mermeria picta</i>	SH, MF
Clipped-winged Grasshopper	<i>Metaleptea brevicornis</i>	MTC
Spotted-winged Grasshopper.....	<i>Orphulella pelidna</i>	MTC
Orange-winged Grasshopper	<i>Pardalophora phoenicoptera</i>	MTC
Eastern Lubber Grasshopper	<i>Romalea microptera</i>	MTC
American Grasshopper	<i>Schistocera americana</i>	MTC
Mischievous Grasshopper.....	<i>Schistocera damnifica</i>	MTC
Obscure Bird Grasshopper.....	<i>Schistocera obscura</i>	MTC
Ridgeback Grasshopper	<i>Spharagemon cristatum</i>	SCF, SH
Marbled Grasshopper	<i>Spharagemon marmorata</i>	MTC
Giant Katydid.....	<i>Stilpnoclora coultoniana</i>	MTC
Handsome Grasshopper.....	<i>Syrabula admirabilis</i>	SH

Snails

Florida Apple Snail.....	<i>Pomacea paludosa</i>	SRST
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Spiders

Yellow Garden Spider	<i>Argiope aurantia</i>	MTC
White-banded Fishing Spider	<i>Dolomedes albineus</i>	MTC
Spinybacked Orbweaver	<i>Gasteracantha cancriformis</i>	MTC
Southern Black Widow.....	<i>Latrodectus mactans</i>	MTC
Goldenrod Crab Spider	<i>Misumena vatia</i>	MTC
White Banded Crab Spider	<i>Misumenoides formosipes</i>	MTC
Lynx Spider	<i>Peucezia viridans</i>	MTC

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	Primary Habitat Codes (for all species)
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Golden Silk Spider	Trichonephila clavipes	MTC
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FISH

Yellow Bullhead	Ameiurus natalis	SRST
Bowfin	Amia calva	SRST
Pirate Perch	Aphredoderus sayanus	SRST
American Gizzard Shad.....	Dorosoma cepedianum.....	SRST
Okefenokee Pygmy Sunfish	Elassoma okefenokee.....	SRST
Lake Chubsucker	Erimyzon sucetta	SRST
Seminole Killifish	Fundulus seminolis	SRST
Mosquitofish	Gambusia affinis	SRST
Least Killifish	Heterandria formosa.....	SRST
Longnose Gar	Lepisosteus ossens.....	SRST
Florida Gar	Lepisosteus platyrhincus	SRST
Redbreast Sunfish	Lepomis auritus	SRST
Warmouth.....	Lepomis gulosus	SRST
Bluegill	Lepomis macrochirus	SRST
Redear Sunfish.....	Lepomis microlophus	SRST
Spotted Sunfish.....	Lepomis punctatus	SRST
Bluefin Killifish	Lucania goodei.....	SRST
Inland Silverside	Menidia beryllina	SRST
Largemouth Bass.....	Micropterus salmoides	SRST
Golden Shiner.....	Notemigonus crysoleucas	SRST
Redeye Chub	Notropis harperi	SRST

* Non-native species ^ Garden species

Rainbow Springs State Park Animals

		Primary Habitat Codes
Common Name	Scientific Name	(for all species)
Sailfin Shiner	<i>Notropis hypselopterus</i>	SRST
Coastal Shiner	<i>Notropis petersoni</i>	SRST
Tadpole Madtom.....	<i>Noturus gyrinus</i>	SRST
Sailfin Molly	<i>Poecilia latipinna</i>	SRST
Black Crappie.....	<i>Pomoxis nigromaculatus</i>	SRST
Armored Sailfin Catfish.....	<i>Pterygoplichthys disjunctivus</i> *.....	SRST
Atlantic Needlefish	<i>Strongylura marina</i>	SRST

AMPHIBIANS

Frogs and Toads

Florida Cricket Frog.....	<i>Acris gryllus dorsalis</i>	MF, BS, DM
Oak Toad	<i>Anaxyrus quercicus</i>	MF, SF
Southern Toad	<i>Anaxyrus terrestris</i>	MTC
Greenhouse Frog	<i>Eleutherodactylus planirostris</i> *	MTC
Narrowmouth Toad	<i>Gastrophryne carolinensis</i>	SH, DM
Cope's Gray Treefrog	<i>Hyla chrysoscelis</i>	BS, HH
Green Treefrog.....	<i>Hyla cinerea</i>	MTC
Pine Woods Treefrog	<i>Hyla femoralis</i>	MF, BS
Barking Treefrog	<i>Hyla gratiosa</i>	SHF, SH
Squirrel Treefrog	<i>Hyla squirella</i>	MTC
Gopher Frog	<i>Lithobates capito</i>	SH, BS, DM
American Bullfrog	<i>Lithobates catesbeiana</i>	DM, BS
Pig Frog	<i>Lithobates grylio</i>	DM, BS, SRST
Southern Leopard Frog	<i>Lithobates sphenoccephala</i>	HH, BS, SRST

* Non-native species ^ Garden species

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	Primary Habitat Codes (for all species)
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Southern Chorus Frog	Pseudacris nigrita	HH, DM
Little Grass Frog	Pseudacris ocularis	BS, DM, MF
Eastern Spadefoot Toad.....	Scaphiopus holbrookii	SH

Salamanders

Mole Salamander.....	Ambystoma talpoideum	MF
Striped Newt.....	Notophthalmus perstriatus.....	BS, DM, SH
Peninsula Newt	Notophthalmus viridescens	BS, DM
Slimy Salamander	Plethodon glutinosus.....	SHF, HH

Amphiumas and Sirens

Two-toed Amphiuma.....	Amphiuma means	SRST, BS
Lesser Siren	Siren intermedia	SRST, BS

REPTILES

Crocodilians

American Alligator	Alligator mississippiensis	SRST
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Turtles

Florida Softshell Turtle	Apalone ferox	SRST
Florida Snapping Turtle	Chelydra serpentina osceola.....	SRST
Chicken Turtle.....	Deirochelys reticularia.....	BS, DM, SRST
Gopher Tortoise	Gopherus polyphemus	SH, ABP
Striped Mud Turtle.....	Kinosternon baurii	SRST, BS

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
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Eastern Mud Turtle	<i>Kinosternon subrubrum</i>	DM, BS
River Cooter	<i>Pseudemys concinna</i>	
Florida Cooter	<i>Pseudemys floridana</i>	SRST
Florida Redbelly Cooter.....	<i>Pseudemys nelsoni</i>	SRST
Peninsula Cooter	<i>Pseudemys peninsularis</i>	SRST
Suwannee Cooter	<i>Pseudemys suwanniensis</i>	SRST
Loggerhead Musk Turtle	<i>Sternotherus minor</i>	SRST
Eastern Musk Turtle; Stinkpot....	<i>Sternotherus odoratus</i>	SRST
Red-eared Slider	<i>Trachemys scripta elegans</i> *	SRST
Yellow-bellied Slider.....	<i>Trachemys scripta scripta</i>	SRST

Lizards

Green Anole	<i>Anolis carolinensis</i>	MF, BS
Brown Anole	<i>Anolis sagrei</i> *	DV
Six-lined Racerunner.....	<i>Aspidozelis sexlineata</i>	SH
Eastern Slender Glass Lizard	<i>Ophisaurus attenuatus longicaudus</i>	SH
Peninsula Mole Skink.....	<i>Plestiodon egregius onocrepis</i>	SH
Southeastern Five-lined Skink	<i>Plestiodon inexpectatus</i>	HH, SHF
Broad-headed Skink.....	<i>Plestiodon laticeps</i>	HH, SHF, DV
Eastern Fence Lizard	<i>Sceloporus undulatus</i>	SH
Ground Skink.....	<i>Scincella lateralis</i>	MTC

Snakes

Scarletsnake.....	<i>Cemophora coccinea</i>	MF, SF
Southern Black Racer	<i>Coluber constrictor priapus</i>	MTC
Eastern Coachwhip	<i>Coluber flagellum flagellum</i>	SH

* Non-native species ^ Garden species

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
E. Diamondback Rattlesnake	<i>Crotalus adamanteus</i>	SH, MF
Southern Ringnecked Snake	<i>Diadophis punctatus punctatus</i>	MF, ABP
Eastern Indigo Snake	<i>Drymarchon couperi</i>	SH, SHF
Eastern Mudsnake	<i>Farancia abacura</i>	FS, BS
Southern Hognose Snake	<i>Heterodon simus</i>	SH
Scarlet Kingsnake	<i>Lampropeltis elapsoides</i>	SH
Eastern Coral Snake	<i>Micrurus fulvius</i>	SH, SHF
Florida Water Snake	<i>Nerodia fasciata pictiventris</i>	DM
Brown Water Snake	<i>Nerodia taxispilota</i>	SRST, FS
Eastern Rat Snake	<i>Pantherophis alleghaniensis</i>	MTC
Eastern Corn Snake	<i>Pantherophis guttatus</i>	SH, DV
Florida Pine Snake	<i>Pituophis melanoleucus mugitus</i>	SH
Black Swamp Snake	<i>Seminatrix pygaea</i>	BS
Florida Red-bellied Snake	<i>Storeria occipitomaculata obscura</i>	HH, SHF
Florida Crowned Snake	<i>Tantilla relict</i>	SH
Peninsula Ribbon Snake	<i>Thamnophis sauritus sackerii</i>	BS

BIRDS

Waterfowl

Wood Duck	<i>Aix sponsa</i>	SRST, BS, FS
Mallard	<i>Anas platyrhynchos</i>	SRST
Blue-winged Teal	<i>Anas discors</i>	SRST
Green-winged Teal	<i>Anas crecca</i>	SRST
Hooded Merganser	<i>Lophodytes cucullatus</i>	SRST

* Non-native species ^ Garden species

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	Primary Habitat Codes (for all species)
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Turkeys

Wild Turkey *Meleagris gallopavo* SH, MF

New World Quails

Northern Bobwhite..... *Colinus virginianus* SH

Grebes

Pied-billed Grebe *Podilymbus podiceps*..... SRST

Cormorants

Double-crested Cormorant *Phalacrocorax auritus*..... SRST

Anhingas

Anhinga *Anhinga anhinga* SRST

Hérons and Egrets

Great Blue Heron..... *Ardea herodias* SRST

Great Egret *Ardea alba* SRST

Snowy Egret..... *Egretta thula* SRST

Little Blue Heron *Egretta caerulea* SRST

Tricolored Heron..... *Egretta tricolor* SRST

Cattle Egret..... *Bubulcus ibis* ABP, DV

Green Heron..... *Butorides virescens* SRST

Black-crowned Night-Heron..... *Nycticorax nycticorax*..... SRST

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
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Ibises

White Ibis	<i>Eudocimus albus</i>	SRST
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Storks

Wood Stork	<i>Mycteria americana</i>	BS, OF
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New World Vultures

Black Vulture	<i>Coragyps atratus</i>	MTC
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Turkey Vulture	<i>Cathartes aura</i>	MTC
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Hawks, Eagles, and Kites

Osprey	<i>Pandion haliaetus</i>	SRST
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Swallow-tailed Kite	<i>Elanoides forficatus</i>	SH, HH, OF
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Mississippi Kite.....	<i>Ictinia mississippiensis</i>	SH, HH, OF
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Bald Eagle	<i>Haliaeetus leucocephalus</i>	SRST
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Sharp-shinned Hawk	<i>Accipiter striatus</i>	SHF
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Cooper's Hawk	<i>Accipiter cooperi</i>	SHF
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Red-shouldered Hawk	<i>Buteo lineatus</i>	MTC, OF
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Broad-winged Hawk	<i>Buteo platypterus</i>	HH, FS, SHF
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Red-tailed Hawk.....	<i>Buteo jamaicensis</i>	SH, OF
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Falcons

American Kestrel	<i>Falco sparverius</i>	SH
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Coots

Common Gallinule	<i>Gallinula chloropus</i>	SRST
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* Non-native species ^ Garden species

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	Primary Habitat Codes (for all species)
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American Coot	Fulica americana	SRST
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Limpkins

Limpkin.....	Aramus guarauna.....	SRST
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Cranes

Sandhill Crane	Grus canadensis.....	OF
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Plovers

Killdeer	Charadrius vociferus	DV
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Sandpipers

Greater Yellowlegs.....	Tringa melanoleuca	SRST
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Lesser Yellowlegs	Tringa flavipes	SRST
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Spotted Sandpiper.....	Actitis macularia	SRST
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American Woodcock.....	Scolopax minor.....	FS, HH
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Gulls and Terns

Laughing Gull	Leucophaeus atricilla	SRST, OF
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Ring-billed Gull	Larus delawarensis	SRST, OF
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Pigeons and Doves

Rock Pigeon.....	Columba livia *	DV
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Eurasian Collared-Dove	Streptopelia decaocto *	DV
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White-winged Dove.....	Zenaida asiatica	DV
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Mourning Dove.....	Zenaida macroura	MTC
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* Non-native species ^ Garden species

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
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Common Ground-Dove	<i>Columbina passerina</i>	SH
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Cuckoos

Black-billed Cuckoo.....	<i>Coccyzus erythrophthalmus</i>	SHF
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Yellow-billed Cuckoo	<i>Coccyzus americanus</i>	SHF
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Barn-Owls

Barn Owl.....	<i>Tyto alba</i>	HH, SHF, DV
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Owls

Eastern Screech-Owl.....	<i>Otus asio</i>	SHF
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Great Horned Owl.....	<i>Bubo virginianus</i>	MTC
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Barred Owl	<i>Strix varia</i>	FS, BS
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Nightjars

Common Nighthawk.....	<i>Chordeiles minor</i>	SH, OF
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Chuck-will's-widow	<i>Caprimulgus carolinensis</i>	SHF
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Whip-poor-will	<i>Caprimulgus vociferus</i>	SHF
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Swifts

Chimney Swift	<i>Chaetura pelagica</i>	OF
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Hummingbirds

Ruby-throated Hummingbird	<i>Archilochus colubris</i>	SHF
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Kingfishers

* Non-native species ^ Garden species

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	Primary Habitat Codes (for all species)
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Belted Kingfisher	Ceryle alcyon.....	STST
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Woodpeckers

Redheaded Woodpecker	Melanerpes erythrocephalus.....	SH
Red-bellied Woodpecker	Melanerpes carolinus	MTC
Yellow-bellied Sapsucker.....	Sphyrapicus varius	SHF
Downy Woodpecker	Picoides pubescens.....	MTC
Northern Flicker	Colaptes auratus	SH
Pileated Woodpecker.....	Dryocopus pileatus	SHF

Tyrant Flycatchers

Eastern Wood Pewee.....	Contopus virens	SH
Acadian Flycatcher.....	Empidonax virescens	FS, BS, HH
Eastern Phoebe	Sayornis phoebe	MTC
Great Crested Flycatcher	Myiarchus crinitus	FS, BS, SHF
Eastern Kingbird.....	Tyrannus tyrannus	SH, ABP

Shrikes

Loggerhead Shrike.....	Lanius ludovicianus	SH
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Vireos

White-eyed Vireo.....	Vireo griseus	MF, SF, SHF
Yellow-throated Vireo	Vireo flavifrons	SH
Blue-headed Vireo	Vireo solitarius.....	SHF
Red-eyed Vireo	Vireo olivaceus	HH, SHF

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	Primary Habitat Codes (for all species)
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Crows and Jays

Blue Jay	Cyanocitta cristata	21
American Crow	Corvus brachyrhynchos	MTC
Fish Crow	Corvus ossifragus	MTC

Swallows

Purple Martin	Progne subis	MTC
Tree Swallow	Tachycineta bicolor	MTC
Northern Rough-winged Swallow	Stelgidopteryx serripennis	DV, OF
Barn Swallow	Hirundo rustica	DV, OF

Tits and Allies

Carolina Chickadee	Poecile carolinensis	MTC
Tufted Titmouse	Baeolophus bicolor	MYC

Nuthatches

Brown-headed Nuthatch	Sitta pusilla	SH, MF
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Wrens

Carolina Wren	Thryothorus ludovicianus	MTC
House Wren	Troglodytes aedon	ABP
Marsh Wren	Cistothorus palustris	SRST

Kinglets

Golden-crowned Kinglet	Regulus satrapa	SH, MF
Ruby-crowned Kinglet	Regulus calendula	MTC

* Non-native species ^ Garden species

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
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Old World Warblers

Blue-gray Gnatcatcher..... *Polioptila caerulea* SH, SHF

Thrushes

Eastern Bluebird..... *Sialia sialis* SH, ABP

Swainson's Thrush..... *Catharus ustulatus* SHF

Hermit Thrush..... *Catharus guttatus* SHF

Wood Thrush *Hylocichla mustelina* SHF

American Robin..... *Turdus migratorius* MTC

Mockingbirds and Thrashers

Gray Catbird *Dumetella carolinensis* SHF, DV

Northern Mockingbird..... *Mimus polyglottos* MTC

Brown Thrasher..... *Toxostoma rufum* SHF, DV

Starlings

European Starling *Sturnus vulgaris* * DV

Waxwings

Cedar Waxwing *Bombycilla cedrorum* MTC

New World Warblers

Ovenbird *Seiurus aurocapilla* SHF

Louisiana Waterthrush..... *Parkesia motacilla*SRST, FS, HH

Northern Waterthrush *Parkesia noveboracensis*.....SRST, FS, HH

* Non-native species ^ Garden species

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
Blue-winged Warbler.....	<i>Vermivora cyanoptera</i>	SHF, DV
Black-and-white Warbler.....	<i>Mniotilta varia</i>	SHF, DV
Prothonotary Warbler	<i>Protonotaria citrea</i>	FS, BS, HH
Tennessee Warbler	<i>Oreothlypis peregrina</i>	SHF, DV
Orange-crowned Warbler	<i>Oreothlypis celata</i>	SH, SHF
Common Yellowthroat	<i>Geothlypis trichas</i>	SRST, FS
American Redstart	<i>Setophaga ruticilla</i>	SHF, DV
Cape May Warbler	<i>Setophaga tigrina</i>	SH, SHF, DV
Cerulean Warbler	<i>Setophaga cerulea</i>	SHF, DV
Northern Parula.....	<i>Setophaga americana</i>	FS, BS, SH, SHF
Blackburnian Warbler	<i>Setophaga fusca</i>	SH, SHF
Chestnut-sided Warbler	<i>Setophaga pensylvanica</i>	SHF, DV
Blackpoll Warbler.....	<i>Setophaga striata</i>	SHF, DV
Black-throated Blue Warbler.....	<i>Setophaga caerulescens</i>	SHF, DV
Palm Warbler	<i>Setophaga palmarum</i>	SH, DV
Pine Warbler.....	<i>Setophaga pinus</i>	SH
Yellow-rumped Warbler	<i>Setophaga coronata</i>	MTC
Yellow-throated Warbler	<i>Setophaga dominica</i>	SHF, SH
Prairie Warbler	<i>Setophaga discolor</i>	SH

Tanagers

Summer Tanager.....	<i>Piranga rubra</i>	SH, SHF
Scarlet Tanager.....	<i>Piranga olivacea</i>	SHF

Sparrows and Allies

Eastern Towhee	<i>Pipilo erythrophthalmus</i>	MF, SF, SH
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* Non-native species ^ Garden species

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
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Bachman's Sparrow	Peucaea aestivalis	SH, MF
Chipping Sparrow	Spizella passerina.....	SH, ABP, DV
Grasshopper Sparrow.....	Ammodramus savannarum	SH, DV
Song Sparrow	Melospiza melodia	SH, SHF
Swamp Sparrow	Melospiza georgiana	FS, BS
White-throated Sparrow	Zonotrichia albicollis	MF, SHF

Cardinals, Grosbeaks and Buntings

Northern Cardinal	Cardinalis cardinalis	MTC
Rose-breasted Grosbeak.....	Pheucticus ludovicianus.....	SHF
Blue Grosbeak	Guiraca caerulea	SH
Indigo Bunting	Passerina cyanea	SH
Painted Bunting.....	Passerina ciris.....	SH, DV

Blackbirds and Allies

Red-winged Blackbird.....	Agelaius phoeniceus	MTC
Rusty Blackbird	Euphagus carolinus.....	FS, BS
Common Grackle.....	Quiscalus quiscula	MTC
Boat-tailed Grackle	Quiscalus major	MTC
Brown-headed Cowbird.....	Molothrus ater	MTC
Orchard Oriole	Icterus spurius.....	SH, SHF
Baltimore Oriole	Icterus galbula.....	SHF, DV

Finches and Allies

House Finch	Carpodacus mexicanus.....	DV
Pine Siskin	Spinus pinus.....	MTC

* Non-native species ^ Garden species

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	Primary Habitat Codes (for all species)
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American Goldfinch	Carduelis tristis	MTC
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Old World Sparrows

House Sparrow	Passer domesticus *	DV
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MAMMALS

Didelphids

Virginia Opossum	Didelphis virginiana	MTC
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Insectivores

Southern Short-tailed Shrew	Blarina carolinensis	SHF
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Least Shrew	Cryptotis parva	SH
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Eastern Mole	Scalopus aquaticus	SHF
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Southeastern Shrew	Sorex longirostris	SHF
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Bats

Eastern Pipistrelle	Pipistrellus subflavus	SHF, DV, OF
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Edentates

Nine-banded Armadillo	Dasypus novemcinctus *	MTC
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Lagomorphs

Eastern Cottontail	Sylvilagus floridanus	MTC
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* Non-native species ^ Garden species

Rainbow Springs State Park Animals

Primary Habitat Codes

Common Name	Scientific Name	(for all species)
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Rodents

Southeastern Pocket Gopher	Geomys pinetis	SH
Southern Flying Squirrel	Glaucomys volans	SHF
Golden Mouse	Ochrotomys nuttalli	SHF
Cotton Mouse.....	Peromyscus gossypinus.....	SH, SHF
Old Field Mouse.....	Peromyscus polionotus.....	SH
Florida Mouse	Podomys floridanus	SH
Eastern Gray Squirrel	Sciurus carolinensis	MTC
Southeastern Fox Squirrel.....	Sciurus niger	SH
Hispid Cotton Rat	Sigmodon hispidus	ABP

Carnivores

Coyote.....	Canis latrans *.....	MTC
River Otter	Lutra canadensis	SRST
Bobcat	Lynx rufus.....	MTC
Striped Skunk	Mephitis mephitis	SH
Raccoon.....	Procyon lotor	MTC
Gray Fox	Urocyon cinereoargenteus	SH
Black Bear.....	Ursus americanus.....	MTC
Red Fox	Vulpes vulpes *	MTC

Artiodactyls

White-tailed Deer	Odocoileus virginianus	MTC
Feral Hog	Sus scrofa *	MTC

Addendum 6—Imperiled Species Ranking Definitions

Imperiled Species Ranking Definitions

The Nature Conservancy and the Natural Heritage Program Network (of which FNAI is a part) define an element as any exemplary or rare component of the natural environment, such as a species, natural community, bird rookery, spring, sinkhole, cave or other ecological feature. An element occurrence (EO) is a single extant habitat that sustains or otherwise contributes to the survival of a population or a distinct, self-sustaining example of a particular element.

Using a ranking system developed by The Nature Conservancy and the Natural Heritage Program Network, the Florida Natural Areas Inventory assigns two ranks to each element. The global rank is based on an element's worldwide status; the state rank is based on the status of the element in Florida. Element ranks are based on many factors, the most important ones being estimated number of Element occurrences, estimated abundance (number of individuals for species; area for natural communities), range, estimated adequately protected EOs, relative threat of destruction, and ecological fragility.

Federal and State status information is from the U.S. Fish and Wildlife Service; and the Florida Fish and Wildlife Conservation Commission (animals), and the Florida Department of Agriculture and Consumer Services (plants), respectively.

FNAI GLOBAL RANK DEFINITIONS

- G1Critically imperiled globally because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or fabricated factor.
- G2Imperiled globally because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
- G3Either very rare or local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction of other factors.
- G4apparently secure globally (may be rare in parts of range)
- G5demonstrably secure globally
- GH.....of historical occurrence throughout its range may be rediscovered (e.g., ivory-billed woodpecker)
- GXbelieved to be extinct throughout range
- GXCextirpated from the wild but still known from captivity or cultivation
- G#?Tentative rank (e.g.,G2?)
- G#G#range of rank; insufficient data to assign specific global rank (e.g., G2G3)
- G#T#rank of a taxonomic subgroup such as a subspecies or variety; the G portion of the rank refers to the entire species and the T portion refers to the specific subgroup; numbers have same definition as above (e.g., G3T1)
- G#Qrank of questionable species - ranked as species but questionable whether it is species or subspecies; numbers have same definition as above (e.g., G2Q)

Imperiled Species Ranking Definitions

- G#T#Q.....same as above, but validity as subspecies or variety is questioned.
GU.....due to lack of information, no rank or range can be assigned (e.g., GUT2).
G?Not yet ranked (temporary)
S1Critically imperiled in Florida because of extreme rarity (5 or fewer occurrences or less than 1000 individuals) or because of extreme vulnerability to extinction due to some natural or man-made factor.
S2Imperiled in Florida because of rarity (6 to 20 occurrences or less than 3000 individuals) or because of vulnerability to extinction due to some natural or man-made factor.
S3Either very rare or local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction of other factors.
S4apparently secure in Florida (may be rare in parts of range)
S5demonstrably secure in Florida
SH.....of historical occurrence throughout its range, may be rediscovered (e.g., ivory-billed woodpecker)
SXbelieved to be extinct throughout range
SAaccidental in Florida, i.e., not part of the established biota
SEan exotic species established in Florida may be native elsewhere in North America
SNregularly occurring but widely and unreliably distributed; sites for conservation hard to determine
SU.....due to lack of information, no rank or range can be assigned (e.g., SUT2).
S?.....Not yet ranked (temporary)
NNot currently listed, nor currently being considered for listing, by state or federal agencies.

LEGAL STATUS

FEDERAL

(Listed by the U. S. Fish and Wildlife Service - USFWS)

- LE.....Listed as Endangered Species in the List of Endangered and Threatened Wildlife and Plants under the provisions of the Endangered Species Act. Defined as any species that is in danger of extinction throughout all or a significant portion of its range.
PE.....Proposed for addition to the List of Endangered and Threatened Wildlife and Plants as Endangered Species.
LT.....Listed as Threatened Species. Defined as any species that is likely to become an endangered species within the near future throughout all or a significant portion of its range.
PT.....Proposed for listing as Threatened Species.
CCandidate Species for addition to the list of Endangered and Threatened Wildlife and Plants. Defined as those species for which the USFWS currently has on file sufficient information on biological

Imperiled Species Ranking Definitions

vulnerability and threats to support proposing to list the species as endangered or threatened.

E(S/A).....Endangered due to similarity of appearance.

T(S/A).....Threatened due to similarity of appearance.

EXPE, XE.....Experimental essential population. A species listed as experimental and essential.

EXPN, XN....Experimental non-essential population. A species listed as experimental and non-essential. Experimental, nonessential populations of endangered species are treated as threatened species on public land, for consultation purposes.

STATE

ANIMALS .. (Listed by the Florida Fish and Wildlife Conservation Commission - FWC)

STListed as Threatened Species by the FWC. Defined as a species, subspecies, or isolated population, which is acutely vulnerable to environmental alteration, declining in number at a rapid rate, or whose range or habitat, is decreasing in area at a rapid rate and therefore is destined or very likely to become an endangered species within the near future.

SSCListed as Species of Special Concern by the FWC. Defined as a population which warrants special protection, recognition or consideration because it has an inherent significant vulnerability to habitat modification, environmental alteration, human disturbance or substantial human exploitation that, in the near future, may result in its becoming a threatened species.

PLANTS (Listed by the Florida Department of Agriculture and Consumer Services - FDACS)

LE.....Listed as Endangered Plants in the Preservation of Native Flora of Florida Act. Defined as species of plants native to the state that are in imminent danger of extinction within the state, the survival of which is unlikely if the causes of a decline in the number of plants continue, and includes all species determined to be endangered or threatened pursuant to the Federal Endangered Species Act of 1973, as amended.

LT.....Listed as Threatened Plants in the Preservation of Native Flora of Florida Act. Defined as species native to the state that are in rapid decline in the number of plants within the state, but which have not so decreased in such number as to cause them to be endangered.

Imperiled Species Ranking Definitions

Addendum 7—Cultural Information

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

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

A. General Discussion

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

B. Agency Responsibilities

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

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

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

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

C. Statutory Authority

Statutory Authority and more in depth information can be found at:
<http://www.flheritage.com/preservation/compliance/guidelines.cfm>

D. Management Implementation

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

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

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

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

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

E. Minimum Review Documentation Requirements

In order to have a proposed project reviewed by the Division, certain information must be submitted for comments and recommendations. The minimum review documentation requirements can be found at:

http://www.flheritage.com/preservation/compliance/docs/minimum_review_documentation_requirements.pdf .

* * *

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

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

Phone: (850) 245-6425

Toll Free: (800) 847-7278

Fax: (850) 245-6435

Eligibility Criteria for National Register of Historic Places

The criteria to be used for evaluating eligibility for listing in the National Register of Historic Places are as follows:

- 1)** Districts, sites, buildings, structures, and objects may be considered to have significance in American history, architecture, archaeology, engineering, and/or culture if they possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:
 - a)** are associated with events that have made a significant contribution to the broad patterns of our history; and/or
 - b)** are associated with the lives of persons significant in our past; and/or
 - c)** embody the distinctive characteristics of type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; and/or
 - d)** have yielded, or may be likely to yield, information important in prehistory or history.

- 2)** Ordinarily cemeteries, birthplaces, or graves of historical figures; properties owned by religious institutions or used for religious purposes; structures that have been moved from their original locations; reconstructed historic buildings; properties primarily commemorative in nature; and properties that have achieved significance within the past 50 years shall not be considered eligible for the *National Register*. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories:
 - a)** a religious property deriving its primary significance from architectural or artistic distinction or historical importance; or
 - b)** a building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event; or
 - c)** a birthplace or grave of an historical figure of outstanding importance if there is no appropriate site or building directly associated with his productive life; or
 - d)** a cemetery which derives its primary significance from graves of persons of transcendent importance, from age, distinctive design features, or association with historic events; or

Eligibility Criteria for National Register of Historic Places

- e)** a reconstructed building, when it is accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and no other building or structure with the same association has survived; or a property primarily commemorative in intent, if design, age, tradition, or symbolic value has invested it with its own exceptional significance; or
- f)** a property achieving significance within the past 50 years, if it is of exceptional importance.

Preservation Treatments as Defined by Secretary of Interior's Standards and Guidelines

Restoration is defined as the act or process of accurately depicting the form, features, and character of a property as it appeared at a particular period of time by means of the removal of features from other periods in its history and reconstruction of missing features from the restoration period. The limited and sensitive upgrading of mechanical, electrical and plumbing systems and other code-required work to make properties functional is appropriate within a restoration project.

Rehabilitation is defined as the act or process of making possible a compatible use for a property through repair, alterations and additions while preserving those portions or features that convey its historical, cultural or architectural values.

Stabilization is defined as the act or process of applying measures designed to reestablish a weather resistant enclosure and the structural stability of an unsafe or deteriorated property while maintaining the essential form as it exists at present.

Preservation is defined as the act or process of applying measures necessary to sustain the existing form, integrity and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the ongoing maintenance and repair of historic materials and features rather than extensive replacement and new construction. New exterior additions are not within the scope of this treatment; however, the limited and sensitive upgrading of mechanical, electrical and plumbing systems and other code-required work to make properties functional is appropriate within a preservation project.

Preservation Treatments as Defined by Secretary of Interior's Standards and Guidelines

Addendum 8—Timber Management Analysis

Addendum 8

Timber Management Analysis

1. Management Context and Best Management Practices

Timber management at Rainbow Springs State Park is based on the desired future condition (DFC) of a management zone or natural community (NatCom) as determined by the DRP Unit Management Plans, along with guidelines developed by the Florida Natural Areas Inventory (FNAI). In most cases, the DFC will be closely related to the historic NatCom. However, it is important to note, that in areas where the historic community has been severely altered by past land use practices, the DFC may not always be the same as the historic NatCom. All timber management activities undertaken will adhere to or exceed the current Florida Silvicultural Best Management Practices (BMPs) and Florida Forestry Wildlife BMPs for State Imperiled Species. DRP shall take all measures necessary to protect water quality and wildlife species of concern while conducting timber management activities. DRP has contracted with a private sector, professional forest management firm to complete this timber assessment: F4 Tech.

2. Purpose of Timber Management Activities

Timber management activities may be conducted to help improve or maintain current conditions to achieve the associated DFC. Timber management will primarily be conducted in upland NatComs. Candidate upland NatCom types may include mesic flatwoods, wet flatwoods, sandhill, upland pine, and upland mixed woodland along with scrubby flatwoods, scrub, and altered landcover types such as successional hardwood forest and pine plantations. There will likely be no scheduled timber management activities in historically hardwood-dominated or wetland NatCom types, e.g., upland hardwood forest, hydric hammock, and slope forest. In some circumstances, timber management may include the harvesting and removal of overstory invasive/exotic trees. Descriptions of community types are detailed in the in the Resource Management Component.

3. Potential Silvicultural Treatments

Several silvicultural treatments may be considered and utilized over the next ten years. The various types of timber harvests may include pine thinning, targeted hardwood overstory removal, and clearcutting. Silvicultural treatments will be selectively implemented to minimize potential impacts to water and soil resources, non-target vegetation, and wildlife (see BMPs). Depending upon the condition and marketability of the timber being manipulated, it is possible to generate revenue from the harvest. It is also possible the timber removal could be a cost to DRP. In all decisions, the mission of preserving and restoring natural communities will be the guiding factor.

Thinning is conducted to reduce the basal area (BA) or density of trees/stems in a stand to improve forest health and growth conditions for residual trees. Allowing trees more room to grow has the potential to increase tree and forest vigor, which helps mitigate the potential for damaging insect and disease outbreaks. Most tree harvesting/removals also increase sunlight reaching the forest floor and fine fuels that facilitate consistent fire return intervals and responses, which can benefit groundcover vegetation abundance, species richness, and overall ecological diversity. The disruption of natural fire regimes and fire return intervals can often result in the need to remove undesirable or overstocked hardwood stems that currently occupy growing space in the canopy and sub-canopy. Clearcutting may be used to support restoration goals by removing off-site pine or hardwood species and is a precursor to establishing site-appropriate species. It can also be used to control insect infestations that are damaging or threatening forest resources and ecosystem conditions.

On occasion, salvage cuts may need to be conducted to remove small volumes of wood damaged by fire, wind storm, insect or other natural causes. The decision whether or not to harvest the affected timber will depend on the threat to the surrounding stands, risk of collateral ecological

damage, and the volume/value of the trees involved. For example, small, isolated lightning-strike beetle kills are a natural part of a healthy ecosystem and normally would not be cut. However, if a drought caused the insect infestation to spread, the affected trees and buffer zone might have to be removed to prevent significant damage.

4. *Inventory Data and Potential Actions per Area of Interest or Management Zone*

Rainbow Springs comprises a total of 1,472 acres in Marion County. A total of 1,134 acres are associated with three (3) NatCom types that are potential candidates for timber management. In March 2016, an inventory based on field plots was conducted across and within these areas to quantify overstory, midstory and understory conditions. Various park-level and NatCom-level summary statistics can be found in the following tables.

This timber assessment was based on management zone and NatCom boundary GIS data provided by DRP in September 2018. It is not intended to be prescriptive. Stakeholders and DRP staff are encouraged to view this timber assessment and inventory data as supplemental information for future consideration. Given the dynamic nature of property ownership and land management activities at Rainbow Springs, together with the timeframe required to create or update a UMP, it is possible that some tabular data may be dated. Therefore, NatCom acreages and recent treatments that occurred after the September 2018 period may not be reflected in the following tables.

Florida State Parks Timber Management Analysis

Table 1. General summary statistics for Rainbow Springs State Park

Number of Management Zones within the Park	29
Upland NatCom acres	1,149

Mesic Flatwoods (140.8 acres)

Longleaf pine (*Pinus palustris*) is the preferred overstory pine species in the region. The FNAI reference site in this region for mesic flatwoods contains longleaf pine at a basal area (BA) of 10 to 50 square feet per acre with non-pine at a density of 0 trees per acre (TPA). The following table shows the overstory condition for this natural community at Rainbow Springs and target overstory condition for mesic flatwoods in this region.

MZ ID	Mesic Flatwoods (Acres)	Current Average Overstory Conditions							Target Overstory Conditions	
		Pine BA (ft ² /ac)	Pine TPA	Pine Volume (tons/ac)	Non-Pine BA (ft ² /ac)	Non-Pine TPA	Non-Pine Volume (tons/ac)	Total Pine and Non-Pine Volume (tons/ac)	FNAI Reference Condition Pine BA Range (ft ² /ac)	FNAI Reference Condition Non-Pine TPA Range
RS-1F	9.5	30.0	30.1	25.9	30.0	93.8	14.3	40.1	10 - 50	0 - 0
RS-2C	19.9	40.0	68.9	28.9	3.3	3.2	2.7	31.5	10 - 50	0 - 0
RS-2E	25.4	--	--	--	--	--	--	--	--	--
RS-3A	4.2	10.0	10.4	7.9	60.0	174.4	40.5	48.5	10 - 50	0 - 0
RS-3B	37.1	12.9	13.5	10.8	55.7	164.3	29.6	40.4	10 - 50	0 - 0
RS-3C	11.5	50.0	131.1	41.1	50.0	100.1	42.2	83.3	10 - 50	0 - 0
RS-4B	0.4	10.0	5.9	9.4	0.0	0.0	0.0	9.4	10 - 50	0 - 0
RS-4C	13.0	5.0	2.1	4.7	60.0	204.3	20.9	25.6	10 - 50	0 - 0
RS-5A	10.9	60.0	45.0	50.2	60.0	78.5	48.7	98.9	10 - 50	0 - 0
RS-5C	5.5	0.0	0.0	0.0	80.0	333.4	35.4	35.4	10 - 50	0 - 0
RS-5D	0.4	--	--	--	--	--	--	--	--	--
RS-5E	1.9	--	--	--	--	--	--	--	--	--
RS-5H	1.3	--	--	--	--	--	--	--	--	--
Total	140.8									

Sandhill (985.6 acres)

Longleaf pine (*Pinus palustris*) is the preferred overstory pine species in the region. The FNAI reference site in this region for sandhill contains longleaf pine at a basal area (BA) of 20 to 60 square feet per acre with non-pine species between 0 and 79 trees per acre (TPA). The following table shows the overstory condition for this natural community at Rainbow Springs and target overstory condition for sandhill in this region.

Florida State Parks Timber Management Analysis

MZ ID	Sandhill (Acres)	Current Average Overstory Conditions							Target Overstory Conditions	
		Pine BA (ft2/ac)	Pine TPA	Pine Volume (tons/ac)	Non-Pine BA (ft2/ac)	Non-Pine TPA	Non-Pine Volume (tons/ac)	Total Pine and Non-Pine Volume (tons/ac)	FNAI Reference Condition Pine BA Range (ft2/ac)	FNAI Reference Condition Non-Pine TPA Range
RS-1A	23.2	0.0	0.0	0.0	140.0	225.1	83.7	83.7	20 - 60	0 - 79
RS-1B	9.0	15.0	12.7	13.1	115.0	239.1	69.4	82.5	20 - 60	0 - 79
RS-1C	1.7	--	--	--	--	--	--	--	--	--
RS-1D	62.7	--	--	--	--	--	--	--	--	--
RS-1E	41.6	6.7	11.6	3.8	6.7	8.3	0.0	3.8	20 - 60	0 - 79
RS-1F	18.4	13.3	24.6	9.7	43.3	86.3	29.3	39.1	20 - 60	0 - 79
RS-1G	15.3	0.0	0.0	0.0	120.0	286.8	100.3	100.3	20 - 60	0 - 79
RS-1J	17.6	20.0	12.0	18.5	92.0	131.4	63.0	81.5	20 - 60	0 - 79
RS-1K	1.3	--	--	--	--	--	--	--	--	--
RS-2A	58.1	20.0	33.9	15.0	6.0	18.1	2.3	17.3	20 - 60	0 - 79
RS-2B	47.3	20.0	21.3	15.0	22.9	91.0	8.1	23.1	20 - 60	0 - 79
RS-2C	37.9	30.0	73.4	20.4	0.0	0.0	0.0	20.4	20 - 60	0 - 79
RS-2D	41.9	26.0	62.2	17.4	43.0	181.9	11.4	28.8	20 - 60	0 - 79
RS-2E	8.5	--	--	--	--	--	--	--	--	--
RS-3A	31.0	8.3	15.6	5.5	58.3	296.1	7.8	13.3	20 - 60	0 - 79
RS-3B	52.9	13.3	22.4	9.7	74.2	311.9	10.0	19.7	20 - 60	0 - 79
RS-3C	95.6	42.5	72.6	30.4	70.0	204.2	25.8	56.2	20 - 60	0 - 79
RS-4A	37.6	21.7	32.0	15.4	31.7	41.0	21.9	37.2	20 - 60	0 - 79
RS-4B	43.8	21.1	57.4	14.1	25.6	62.5	17.1	31.2	20 - 60	0 - 79
RS-4C	19.3	15.0	46.2	9.9	57.5	179.2	37.5	47.4	20 - 60	0 - 79
RS-5A	3.5	--	--	--	--	--	--	--	--	--
RS-5B	9.5	115.0	381.1	55.3	0.0	0.0	0.0	55.3	20 - 60	0 - 79
RS-5C	94.9	70.6	296.4	52.4	51.8	187.5	20.5	72.9	20 - 60	0 - 79
RS-5D	52.6	64.6	321.9	43.6	20.9	86.4	7.2	50.8	20 - 60	0 - 79
RS-5E	47.0	45.0	200.6	23.9	90.0	154.2	34.9	58.7	20 - 60	0 - 79
RS-5F*	37.1	--	--	--	--	--	--	--	--	--
RS-5G	75.3	56.4	289.1	36.3	40.0	106.4	25.6	61.9	20 - 60	0 - 79
RS-5H	1.6	--	--	--	--	--	--	--	--	--
Total	985.9									

Scrubby Flatwoods (7.1 acres)

Longleaf pine (*Pinus palustris*) is the preferred overstory pine species in the region. The FNAI reference site in this region for scrubby flatwoods contains longleaf pine at a basal area (BA) of 10 to 60 square feet per acre with non-pine at a density between 0 and 26 trees per acre (TPA). The following table shows the overstory condition for this natural community at Rainbow Springs and target overstory condition for scrubby flatwoods in this region.

**Florida State Parks
Timber Management Analysis**

MZ ID	Scrubby Flatwoods (Acres)	Current Average Overstory Conditions							Target Overstory Conditions	
		Pine BA (ft2/ac)	Pine TPA	Pine Volume (tons/ac)	Non- Pine BA (ft2/ac)	Non- Pine TPA	Non-Pine Volume (tons/ac)	Total Pine and Non- Pine Volume (tons/ac)	FNAI Reference Condition Pine BA Range (ft2/ac)	FNAI Reference Condition Non-Pine TPA Range
RS-2C	2.1	20.0	33.7	12.6	0.0	0.0	0.0	12.6	10 - 60	0 - 26
RS-2E*	2.4	--	--	--	--	--	--	--	--	--
RS-5A	2.6	0.0	0.0	0.0	20.0	254.0	0.0	0.0	10 - 60	0 - 26
Total	7.1									

**Florida State Parks
Timber Management Analysis**

RAINBOW SPRINGS STATE PARK

Griffitts Addition

MARION COUNTY, FLORIDA

Timber Management Assessment

Prepared by

John T. Marshall

Senior Forester

Florida Division of Forestry

May 2011

I. Purpose

This document is intended to fulfill the timber assessment requirement for the 2,548.58 acre Rainbow Spring State Park as required by Section 253.036, Florida Statutes. The goal of this Timber Assessment is to evaluate the potential and feasibility of utilizing silvicultural techniques in assisting managers in achieving objectives at Rainbow Springs State Park.

II. Forest Resource Background and History

The initial 1,084.58 acres of Rainbow Springs State Park was acquired in 1990 using Conservation and Recreational Lands Program (CARL) funds. The Griffitts Addition (379 Acres) was acquired in 2004 using funds from the Division of Recreation and Parks' Additions and Inholdings program. Historical records show many uses for the land in the past with one of them being timber harvesting. According to the park management plan it is designated as a single use property and is to be used for outdoor recreation and conservation.

III. Griffitts Addition

The Griffitts Addition is located south of the main park area on the east side of the river. It appears that approximately 244 acres of longleaf pine was clearcut on the sand hill site and was planted in sand pine. The resulting plantation was cut about 16 to 18 years ago resulting in a naturally seeded sand pine stand. Other areas of sandhill and mesic flatwoods were harvested leaving no longleaf seed trees. Fire has been excluded. The hydric hammock and the floodplain swamp seem to be in good shape.

Florida State Parks Timber Management Analysis

IV. Goals and Objectives:

The Goals and Objectives related to silviculture as stated in the Rainbow Springs State Park Management Plan are:

1. Restore natural communities by removing off site species such as sand pine and exotics like cogongrass and replanting with longleaf.
2. Construct fire breaks between management zones.
3. Restore fire regimes to maintain the desired natural stage of plant succession without removing desired species.

V. Recommendations:

The two main areas that are in need of some silvicultural practices are the 244 acre sand pine stand and the small patch of remnant sand hill that has not been burned in several years and has a longleaf seed source.

Sand Pine Stand

The sand pine stand needs to be harvested when the market will allow, starting the process of restoring the site back to longleaf pine. The nearest market for the sand pine is in Cross City now but there is supposed to be one opening in Gainesville next year. This stand will need to be burned a year or more after harvest to kill the sand pine regeneration that will follow the harvest. The cogongrass eradication will need to continue as it will increase growth with less shade. After the harvest and burning the site, it can be planted in longleaf seedlings using bare root seedlings or tublings and can be machine planted or hand planted. This will be a management decision.

Local development and the proximity of a school will make prescribed burning difficult, consequently, managers will have to take advantage of good burning weather and use extra caution when conducting prescribed burns.

VI. Summary:

Restoring the natural communities, removing the off site species and exotics, and restoring natural fire regimes to this area is going to be a long term task. The sand pine removal should not be a problem but the exotic control and the prescribed burning will be difficult due to the location and development in the surrounding area.

**Timber Management Analysis
Prepared by F4Tech, Tallahassee, FL January 2018**

1. *Management Context and Best Management Practices*

Timber management prescriptions and actions at Rainbow Springs State Park (RSSP) are based on the desired future condition (DFC) of a stand or natural community as determined by

Florida State Parks Timber Management Analysis

guidelines established by the DRP. In most cases, the DFC will be closely related to the historic natural community. However, it is important to note, that in areas where the historic community has been severely altered by past land use practices, the DFC may not always be the same as the historic natural community. All forest/stand/timber management activities undertaken will adhere to the current Florida Silvicultural Best Management Practices and Florida Forestry Wildlife Best Management Practices for State Imperiled Species. DRP is responsible for managing timber resources within corresponding management zones. This timber assessment was conducted by F4 Tech on behalf of DRP.

2. Purpose of Timber Management Activities

Timber management activities will be conducted to help restore and/or improve current conditions so that the associated DFC (typically an historic condition) can be achieved or maintained. Timber management will be primarily conducted in pine-dominated natural communities. Typically, upland communities include mesic flatwoods, sandhill, upland pine, upland mixed woodland, and altered landcover areas such as successional hardwood forest and pine plantations. Other historically hardwood-dominated natural communities will likely have little to no scheduled timber management activities. In some circumstances, actions may be conducted to remove overstory invasive/exotic trees such as Chinese tallow to help restore or maintain natural communities.

3. Potential Silvicultural Treatments

Several silvicultural treatments may be considered and utilized over the next ten years to achieve the long-term DFC for candidate natural communities at RSSP. These treatments include timber harvests, timber stand improvement, and reforestation. The various types of timber harvests may include pine thinning, targeted hardwood removal, and clearcutting. Silvicultural treatments should be implemented to minimize disturbance to non-target vegetation, soil, and wildlife.

Thinning is conducted to reduce the basal area (BA) or density of stems in a stand to improve forest health and growth conditions for residual trees. The “opening up” of high density forest stands increases tree and stand vigor, which helps mitigate the potential for damaging insect outbreaks. Thinning also increases sunlight reaching the forest floor, which when combined with routine prescribed fire, can increase groundcover vegetation abundance, species richness, and overall ecological diversity. The disruption of a historic natural fire regime and/or fire return interval can often result in the need to remove undesirable or overstocked hardwood trees/stems that currently occupy growing space in the canopy and sub-canopy. Tree removal/harvest also increases groundcover vegetation, ecological diversity, and fine fuels that facilitate consistent fire return intervals and responses.

Clearcutting supports restoration goals by removing offsite pine or hardwood species and is a precursor to establishing site-appropriate species. It is also used to control insect infestations that are damaging or threatening forest resources and ecosystem conditions on or off site. A tangible by-product of conducting timber harvests for restoring or improving forested communities is the generation of revenue.

Stand or natural community improvement activities are often conducted to reduce unwanted hardwood, palm, or palmetto competition. Stand improvement treatments reduce fuel or fuel

Florida State Parks Timber Management Analysis

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Reforestation is used to establish the appropriate southern pine species in areas that have been harvested and lack sufficient natural regeneration in terms of abundance (seedlings/acre) and/or species composition. Reforestation candidate areas can also include those that are fire suppressed or have been recently impacted by natural events such as windthrow, bark beetle attack, or wildfire. The two methods used to reestablish the overstory will be natural and artificial regeneration. Both methods may require site preparation to facilitate survival of the desired species. Site preparation activities may include the use of prescribed fire, herbicides, and/or mechanical treatments such as roller chopping. Site preparation technique(s) will be selected that address the current vegetative cover type and condition, and the need to minimize seedling competition while avoiding/minimizing any long-term impacts to native groundcover species and native wildlife. Natural generation may be used in areas where artificial regeneration is not needed, such as areas that have an adequate seed source of the desired tree species located on site or in the immediate vicinity. Artificial regeneration may include machine or hand planting. Hand planting is preferred on wetter sites, rougher sites, and/or sites where groundcover protection is a concern and a more natural appearance of randomly spaced trees is desired. Machine planting generally allows for more consistent planting and often allows higher survival rates if the site is properly prepared.

4. Inventory Data and Potential Actions per Area of Interest or Management Zone

RSSP comprises a total of 1,472 acres in Marion County. A total of 1,154 acres are associated with four upland natural community (NatCom) types that are common to the region and represent potential candidates for timber management. In March 2016, an inventory based on field plots was conducted across and within these areas to quantify overstory, midstory and understory conditions. Table 1 below provides general statistics generated by the inventory at RSSP. Table 2 below provides current stocking levels and potential management activities of candidate management zones and natural communities.

Florida State Parks Timber Management Analysis

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A review and analysis of this data suggests that current ecological conditions for multiple management zones and associated forested communities could benefit from vegetation treatments. This assessment was based on a comparison of current conditions and the corresponding NatCom analog or target conditions as defined per FNAI Reference Site descriptions. In general, inventory data indicates that upland habitats in some management zones have pine and non-pine components which are outside the acceptable range for the DFC of the NatCom types. Some natural communities considered may require midstory and overstory control to become, or remain, in compliance with FNAI defined ranges for non-pine midstory. Stands with low stocking levels or a complete lack of preferred tree species would likely benefit from midstory control and artificial regeneration. In areas where planting is deemed necessary, the site should be assessed for site preparation needs including midstory/understory reduction.

The following contains a general description of each management zone within RSSP that contains upland natural communities as well as their general condition and need for restoration and/or improvement actions via timber management.

Florida State Parks Timber Management Analysis

Table 1. General summary statistics for Rainbow Springs State Park

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Number of Management Zones needing timber management	29
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Upland Natural Community acres	1,154
Acres potentially needing timber management	1,154

Mesic Flatwoods (136 acres)

Dominant pines will usually be longleaf pine (*Pinus palustris*). Native herbaceous groundcover should be over at least 50 percent of the area and less than three feet in height. Saw palmetto (*Serenoa repens*) will comprise no more than 50 percent of total shrub species cover, and are less than three feet in height. Shrub species include saw palmetto, gallberry (*Ilex glabra*), fetterbush (*Lyonia lucida*), runner oak (*Quercus elliotii*), dwarf live oak (*Q. minima*), shiny blueberry (*Vaccinium myrsinites*), and dwarf huckleberry (*Gaylussacia dumosa*). Shrubs are generally knee-high or less, and there are few if any large trunks of saw palmetto along the ground. The optimal fire return interval for this community is one to three years. The preferred pine species, as determined by FNAI reference sites, is slash pine or longleaf pine and should be stocked at a level of 10 to 50 square feet per acre BA while non-pine species should remain between 0 and 26.2 stems or trees per acre. The following management zone(s) contain mesic flatwoods which could be considered for some form of timber management including overstory removal, midstory mitigation, site preparation, and planting of preferred pine species.

Management Zone(s)	Mesic Flatwoods (Acres)	Basal Area (ft ² /acre)	Basal Area Preferred Species	Basal Area Non-Preferred Species	Average Diameter at breast height (inches)
RS-1F	9	83	10	73	9.5
RS-3C	11	145	--	145	7.3
RS-3A	4	70	10	60	12.2
RS-2E*	25	--	--	--	--
RS-3B	37	84	22	61	6.8
RS-4C	13	88	20	68	6.9
RS-4B	<1	36	--	36	4.1

**Florida State Parks
Timber Management Analysis**

Management Zone(s)	Mesic Flatwoods (Acres)	Basal Area (ft ² /acre)	Basal Area Preferred Species	Basal Area Non-Preferred Species	Average Diameter at breast height (inches)
RS-2C	19	54	40	14	9.1
RS-5E*	1	--	--	--	--
RS-5D*	<1	--	--	--	--
RS-5H*	2	--	--	--	--
RS-5A	10	147	20	127	7.9
RS-5C	5	105	--	105	6.6

*Un-sampled upland areas are present in this analysis and could require vegetation management in the future.

Sandhill (972 acres)

Dominant pines will usually be longleaf pine (*Pinus palustris*). Herbaceous cover is 80 percent or greater, typically of wiregrass (*Aristida beyrichiana*), and is less than three feet in height. In addition to groundcover and pines characteristics, there will be scattered individual trees, clumps, or ridges of onsite oak species, usually turkey oak (*Quercus laevis*), sand post oak (*Q. margaretta*) and blue-jack oak (*Q. incana*). In old growth conditions, sand post oaks are commonly 150-200 years old, and some turkey oaks are over 100 years old. The optimal fire return interval for this community is one to three years. In this region, the preferred species, as determined by FNAI reference sites, is longleaf pine and should be stocked at a level of 20 to 60 square feet per acre BA while non-pine species should remain between 0 and 78.8 stems per acre. The following management zone(s) contain sandhill which could be considered for some form of timber management including midstory mitigation, site preparation, and planting of preferred pine species.

Management Zones	Sandhill (Acres)	Basal Area (ft ² /acre)	Basal Area Preferred Species	Basal Area Non-Preferred Species	Average Diameter at breast height (inches)
RS-1A	23	147	--	147	9.4
RS-1C*	1	--	--	--	--
RS-1F	18	67	13	54	8.8
RS-1B	8	141	15	126	8.5
RS-5G	75	107	63	44	6.2
RS-3C	95	123	38	84	7.9
RS-4A	37	77	23	53	7.9
RS-2E*	8	--	--	--	--
RS-3B	52	97	13	84	6.3
RS-4C	19	93	12	81	5.5

**Florida State Parks
Timber Management Analysis**

Management Zones	Sandhill (Acres)	Basal Area (ft ² /acre)	Basal Area Preferred Species	Basal Area Non-Preferred Species	Average Diameter at breast height (inches)
RS-3A	30	79	8	71	5.5
RS-4B	43	67	21	46	6.6
RS-2D	41	86	26	60	6.3
RS-1H*	<1	--	--	--	--
RS-1G	15	135	--	135	7.8
RS-2C	37	37	31	6	5.9
RS-5E	46	151	42	108	7.9
RS-2B	47	46	20	26	9
RS-5B	9	119	115	4	5.3
RS-1K*	1	--	--	--	--
RS-2A	58	32	20	12	7.8
RS-5D	52	98	70	27	5.2
RS-5A*	3	--	--	--	--
RS-1D*	62	--	--	--	--
RS-5F*	37	--	--	--	--
RS-5C	95	133	73	59	6.1
RS-1E	41	14	6	7	9.4
RS-1J	17	121	20	101	10
RS-5H*	2	--	--	--	--

*Un-sampled upland areas are present in this analysis and could require vegetation management in the future.

Scrubby Flatwoods (6 acres)

Dominant tree species of the interior will usually be longleaf pine (*Pinus palustris*). Mature sand pines (*P. clausa*) will typically not be present. There will be a diverse shrubby understory often with patches of bare white sand. A scrub-type oak “canopy” will vary in height from three to eight feet and there will be a variety of oak age classes/heights across the landscape. Dominant shrubs include sand live oak (*Quercus geminata*), myrtle oak (*Q. myrtifolia*), Chapman’s oak (*Q. chapmanii*), saw palmetto (*Serenoa repens*), rusty staggerbush (*Lyonia ferruginea*), and tarflower (*Bejaria racemosa*). Cover by herbaceous species is often well below 40 percent. The optimal fire return interval for this community is regionally variable. Areas may be burned as frequently as every three to eight years when burn prescriptions are designed to achieve a mosaic of burned and unburned areas. In this region, the preferred species, as determined by FNAI reference sites, is longleaf pine and should be stocked at a level of 10 to 60 square feet per acre BA while non-pine species should remain between 0 and 26.2 stems per acre. The following management zone(s) contain scrubby flatwoods which could be considered for some form of

Florida State Parks Timber Management Analysis

timber management including overstory removal, midstory mitigation, site preparation, and planting of preferred pine species.

Management Zones	Scrubby Flatwoods (Acres)	Basal Area (ft ² /acre)	Basal Area Preferred Species	Basal Area Non-Preferred Species	Average Diameter at breast height (inches)
RS-2E*	2	--	--	--	--
RS-4C*	<1	--	--	--	--
RS-2C	2	20	20	--	7.1
RS-5A	2	51	20	31	2

*Un-sampled upland areas are present in this analysis and could require vegetation management in the future.

Upland Hardwood Forest (12 acres)

Upland hardwood forest is a well-developed, closed-canopy forest dominated by deciduous hardwood trees on mesic soils in areas sheltered from fire. It typically has a diverse assemblage of deciduous and evergreen tree species in the canopy and midstory, shade-tolerant shrubs, and a sparse groundcover. Characteristic canopy trees include southern magnolia (*Magnolia grandiflora*), pignut hickory (*Carya glabra*), sweetgum (*Liquidambar styraciflua*), Florida maple (*Acer saccharum* ssp. *floridanum*), live oak (*Quercus virginiana*), laurel oak (*Q. hemisphaerica*), swamp chestnut oak (*Q. michauxii*), southern hackberry (*Celtis occidentalis*), white ash (*Fraxinus americana*), and loblolly pine (*Pinus taeda*). Species commonly found in Florida Panhandle and northern peninsula (but not farther south) include American beech (*Fagus grandifolia*), white oak (*Q. alba*), and spruce pine (*P. glabra*). There are currently no FNAI recommendations on preferred species or stocking levels for this natural community.

Management Zones	Upland Hardwood Forest (Acres)	Basal Area (ft ² /acre)	Basal Area Preferred Species	Basal Area Non-Preferred Species	Average Diameter at breast height (inches)
RS-1A	0	146	110	36	10.8
RS-1F*	4	--	--	--	--
RS-1H*	<1	--	--	--	--
RS-1G	8	91	80	11	8.1

*Un-sampled upland areas are present in this analysis and could require vegetation management in the future.

Rainbow Springs State Park Timber Management Analysis

Table 2. Summary of potential timber management actions for upland NatCom types to help restore or improve ecosystem conditions.

Management Zones	MZ (acres)	Candidate NatCom Type	Candidate NatCom Type Acres	Current Average Overstory Pine BA (ft2/AC)	Target Overstory Pine BA (ft2/AC)	Current Average Overstory Non-Pine TPA	Target Non-Pine Overstory TPA	Potential A	
								Harvest or Thin	Sta Improv
RS-1A	34	Sandhill	23	20	20 - 60	592	0 - 79	Y	Y
RS-1A	34	Upland Hardwood Forest	5	20	30 - 80	592	0 - 263	Y	Y
RS-1B	8	Sandhill	8	15	20 - 60	914	0 - 79	Y	Y
RS-1C*	2	Sandhill	1	--	--	--	--	N	N
RS-1D*	70	Sandhill	62	--	--	--	--	N	N
RS-1E	46	Sandhill	41	6	20 - 60	58	0 - 79	N	N
RS-1F	71	Mesic Flatwoods	9	6	10 - 50	528	0 - 0	Y	Y
RS-1F	71	Sandhill	18	6	20 - 60	528	0 - 79	Y	Y
RS-1F*	71	Upland Hardwood Forest	4	--	--	--	--	N	N
RS-1G*	66	Upland Hardwood Forest	8	--	30 - 80	695	0 - 263	Y	Y
RS-1G*	66	Sandhill	15	--	20 - 60	695	0 - 79	Y	Y
RS-1H*	12	Sandhill	<1	--	--	--	--	N	N
RS-1H*	12	Upland Hardwood Forest	<1	--	--	--	--	N	N
RS-1J	19	Sandhill	17	20	20 - 60	575	0 - 79	Y	Y
RS-1K*	3	Sandhill	1	--	--	--	--	N	N
RS-2A	58	Sandhill	58	20	20 - 60	798	0 - 79	Y	Y
RS-2B	62	Sandhill	47	38	20 - 60	567	0 - 79	Y	Y
RS-2C	79	Scrubby Flatwoods	2	20	20 - 60	1136	0 - 26	Y	Y
RS-2C	79	Mesic Flatwoods	19	20	10 - 50	1136	0 - 0	Y	Y
RS-2C	79	Sandhill	37	20	20 - 60	1136	0 - 79	Y	Y
RS-2D	41	Sandhill	41	26	20 - 60	1321	0 - 79	Y	Y
RS-2E*	53	Scrubby	2	--	--	--	--	N	N

Rainbow Springs State Park Timber Management Analysis

		Flatwood s							
RS-2E*	53	Mesic Flatwood s	25	--	--	--	--	N	N
RS-2E*	53	Sandhill	8	--	--	--	--	N	N
RS-3A	53	Sandhill	30	10	20 - 60	174	0 - 79	Y	Y
RS-3A	53	Mesic Flatwood s	4	10	10 - 50	174	0 - 0	Y	Y
RS-3B	133	Mesic Flatwood s	37	30	10 - 50	2	0 - 0	Y	Y
RS-3B	133	Sandhill	52	30	20 - 60	2	0 - 79	N	N
RS-3C	113	Mesic Flatwood s	11	50	10 - 50	1636	0 - 0	Y	Y
RS-3C	113	Sandhill	95	50	20 - 60	1636	0 - 79	Y	Y
RS-4A	38	Sandhill	37	23	20 - 60	1507	0 - 79	Y	Y
RS-4B	44	Sandhill	43	10	20 - 60	2900	0 - 79	Y	Y
RS-4B	44	Mesic Flatwood s	<1	10	10 - 50	2900	0 - 0	Y	Y
RS-4C	68	Sandhill	19	5	20 - 60	1760	0 - 79	Y	Y
RS-4C	68	Mesic Flatwood s	13	5	10 - 50	1760	0 - 0	Y	Y
RS-4C*	68	Scrubby Flatwood s	<1	--	--	--	--	N	N
RS-5A	49	Scrubby Flatwood s	2	50	20 - 60	1879	0 - 26	Y	Y
RS-5A	49	Mesic Flatwood s	10	50	10 - 50	1879	0 - 0	Y	Y
RS-5A*	49	Sandhill	3	--	--	--	--	N	N
RS-5B	9	Sandhill	9	115	20 - 60	450	0 - 79	Y	Y
RS-5C	107	Sandhill	95	73	20 - 60	1452	0 - 79	Y	Y
RS-5C	107	Mesic Flatwood s	5	73	10 - 50	1452	0 - 0	Y	Y
RS-5D	53	Sandhill	52	70	20 - 60	531	0 - 79	Y	Y

**Florida State Parks
Timber Management Analysis**

RAINBOW SPRINGS STATE PARK

Griffitts Addition

MARION COUNTY, FLORIDA

Timber Management Assessment

Prepared by

John T. Marshall

Senior Forester

Florida Division of Forestry

May 2011

I. Purpose

This document is intended to fulfill the timber assessment requirement for the 2,548.58 acre Rainbow Spring State Park as required by Section 253.036, Florida Statutes. The goal of this Timber Assessment is to evaluate the potential and feasibility of utilizing silvicultural techniques in assisting managers in achieving objectives at Rainbow Springs State Park.

II. Forest Resource Background and History

The initial 1,084.58 acres of Rainbow Springs State Park was acquired in 1990 using Conservation and Recreational Lands Program (CARL) funds. The Griffitts Addition (379 Acres) was acquired in 2004 using funds from the Division of Recreation and Parks' Additions and Inholdings program. Historical records show many uses for the land in the past with one of them being timber harvesting. According to the park management plan it is designated as a single use property and is to be used for outdoor recreation and conservation.

III. Griffitts Addition

The Griffitts Addition is located south of the main park area on the east side of the river. It appears that approximately 244 acres of longleaf pine was clearcut on the sand hill site and was planted in sand pine. The resulting plantation was cut about 16 to 18 years ago resulting in a naturally seeded sand pine stand. Other areas of sandhill and mesic flatwoods were harvested leaving no longleaf seed trees. Fire has been excluded. The hydric hammock and the floodplain swamp seem to be in good shape.

Florida State Parks Timber Management Analysis

IV. Goals and Objectives:

The Goals and Objectives related to silviculture as stated in the Rainbow Springs State Park Management Plan are:

1. Restore natural communities by removing off site species such as sand pine and exotics like cogongrass and replanting with longleaf.
2. Construct fire breaks between management zones.
3. Restore fire regimes to maintain the desired natural stage of plant succession without removing desired species.

V. Recommendations:

The two main areas that are in need of some silvicultural practices are the 244 acre sand pine stand and the small patch of remnant sand hill that has not been burned in several years and has a longleaf seed source.

Sand Pine Stand

The sand pine stand needs to be harvested when the market will allow, starting the process of restoring the site back to longleaf pine. The nearest market for the sand pine is in Cross City now but there is supposed to be one opening in Gainesville next year. This stand will need to be burned a year or more after harvest to kill the sand pine regeneration that will follow the harvest. The cogongrass eradication will need to continue as it will increase growth with less shade. After the harvest and burning the site, it can be planted in longleaf seedlings using bare root seedlings or tublings and can be machine planted or hand planted. This will be a management decision.

Local development and the proximity of a school will make prescribed burning difficult, consequently, managers will have to take advantage of good burning weather and use extra caution when conducting prescribed burns.

VI. Summary:

Restoring the natural communities, removing the off site species and exotics, and restoring natural fire regimes to this area is going to be a long term task. The sand pine removal should not be a problem but the exotic control and the prescribed burning will be difficult due to the location and development in the surrounding area.

**Timber Management Analysis
Prepared by F4Tech, Tallahassee, FL January 2018**

1. *Management Context and Best Management Practices*

Timber management prescriptions and actions at Rainbow Springs State Park (RSSP) are based on the desired future condition (DFC) of a stand or natural community as determined by

Florida State Parks Timber Management Analysis

guidelines established by the DRP. In most cases, the DFC will be closely related to the historic natural community. However, it is important to note, that in areas where the historic community has been severely altered by past land use practices, the DFC may not always be the same as the historic natural community. All forest/stand/timber management activities undertaken will adhere to the current Florida Silvicultural Best Management Practices and Florida Forestry Wildlife Best Management Practices for State Imperiled Species. DRP is responsible for managing timber resources within corresponding management zones. This timber assessment was conducted by F4 Tech on behalf of DRP.

2. Purpose of Timber Management Activities

Timber management activities will be conducted to help restore and/or improve current conditions so that the associated DFC (typically an historic condition) can be achieved or maintained. Timber management will be primarily conducted in pine-dominated natural communities. Typically, upland communities include mesic flatwoods, sandhill, upland pine, upland mixed woodland, and altered landcover areas such as successional hardwood forest and pine plantations. Other historically hardwood-dominated natural communities will likely have little to no scheduled timber management activities. In some circumstances, actions may be conducted to remove overstory invasive/exotic trees such as Chinese tallow to help restore or maintain natural communities.

3. Potential Silvicultural Treatments

Several silvicultural treatments may be considered and utilized over the next ten years to achieve the long-term DFC for candidate natural communities at RSSP. These treatments include timber harvests, timber stand improvement, and reforestation. The various types of timber harvests may include pine thinning, targeted hardwood removal, and clearcutting. Silvicultural treatments should be implemented to minimize disturbance to non-target vegetation, soil, and wildlife.

Thinning is conducted to reduce the basal area (BA) or density of stems in a stand to improve forest health and growth conditions for residual trees. The “opening up” of high density forest stands increases tree and stand vigor, which helps mitigate the potential for damaging insect outbreaks. Thinning also increases sunlight reaching the forest floor, which when combined with routine prescribed fire, can increase groundcover vegetation abundance, species richness, and overall ecological diversity. The disruption of a historic natural fire regime and/or fire return interval can often result in the need to remove undesirable or overstocked hardwood trees/stems that currently occupy growing space in the canopy and sub-canopy. Tree removal/harvest also increases groundcover vegetation, ecological diversity, and fine fuels that facilitate consistent fire return intervals and responses.

Clearcutting supports restoration goals by removing offsite pine or hardwood species and is a precursor to establishing site-appropriate species. It is also used to control insect infestations that are damaging or threatening forest resources and ecosystem conditions on or off site. A tangible by-product of conducting timber harvests for restoring or improving forested communities is the generation of revenue.

Stand or natural community improvement activities are often conducted to reduce unwanted hardwood, palm, or palmetto competition. Stand improvement treatments reduce fuel or fuel

Florida State Parks Timber Management Analysis

height, which can improve groundcover conditions and aid in maintaining proper prescribed burning return intervals. The two main stand improvement activities used on park property are herbicide treatments and mechanically cutting vegetation. Herbicides may be applied aerially, by mechanized ground-based equipment, or via backpack sprayers. Herbicides are used to reduce the amount of hardwood competition in areas that are unable to carry sufficient prescribed fire due to shading and lack of adequate groundcover fuels. Mechanical cutting is used to reduce the height of smaller shrub and hardwood competition, allowing for the establishment of fire-dependent herbs and grasses. Decreasing fuel loadings and enhancing groundcover allows prescribed fire to be reintroduced safely into a stand that has been unable to carry fire adequately. In select areas, mechanical or chemical control is also used to control excessive palm density promoted by past disturbance or fire exclusion to the same ends described above. Unlike hardwoods, these areas can burn with too much intensity under certain conditions.

Reforestation is used to establish the appropriate southern pine species in areas that have been harvested and lack sufficient natural regeneration in terms of abundance (seedlings/acre) and/or species composition. Reforestation candidate areas can also include those that are fire suppressed or have been recently impacted by natural events such as windthrow, bark beetle attack, or wildfire. The two methods used to reestablish the overstory will be natural and artificial regeneration. Both methods may require site preparation to facilitate survival of the desired species. Site preparation activities may include the use of prescribed fire, herbicides, and/or mechanical treatments such as roller chopping. Site preparation technique(s) will be selected that address the current vegetative cover type and condition, and the need to minimize seedling competition while avoiding/minimizing any long-term impacts to native groundcover species and native wildlife. Natural generation may be used in areas where artificial regeneration is not needed, such as areas that have an adequate seed source of the desired tree species located on site or in the immediate vicinity. Artificial regeneration may include machine or hand planting. Hand planting is preferred on wetter sites, rougher sites, and/or sites where groundcover protection is a concern and a more natural appearance of randomly spaced trees is desired. Machine planting generally allows for more consistent planting and often allows higher survival rates if the site is properly prepared.

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RSSP comprises a total of 1,472 acres in Marion County. A total of 1,154 acres are associated with four upland natural community (NatCom) types that are common to the region and represent potential candidates for timber management. In March 2016, an inventory based on field plots was conducted across and within these areas to quantify overstory, midstory and understory conditions. Table 1 below provides general statistics generated by the inventory at RSSP. Table 2 below provides current stocking levels and potential management activities of candidate management zones and natural communities.

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A review and analysis of this data suggests that current ecological conditions for multiple management zones and associated forested communities could benefit from vegetation treatments. This assessment was based on a comparison of current conditions and the corresponding NatCom analog or target conditions as defined per FNAI Reference Site descriptions. In general, inventory data indicates that upland habitats in some management zones have pine and non-pine components which are outside the acceptable range for the DFC of the NatCom types. Some natural communities considered may require midstory and overstory control to become, or remain, in compliance with FNAI defined ranges for non-pine midstory. Stands with low stocking levels or a complete lack of preferred tree species would likely benefit from midstory control and artificial regeneration. In areas where planting is deemed necessary, the site should be assessed for site preparation needs including midstory/understory reduction.

The following contains a general description of each management zone within RSSP that contains upland natural communities as well as their general condition and need for restoration and/or improvement actions via timber management.

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Timber Management Analysis**

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Upland Natural Community acres	1,154
Acres potentially needing timber management	1,154

Mesic Flatwoods (136 acres)

Dominant pines will usually be longleaf pine (*Pinus palustris*). Native herbaceous groundcover should be over at least 50 percent of the area and less than three feet in height. Saw palmetto (*Serenoa repens*) will comprise no more than 50 percent of total shrub species cover, and are less than three feet in height. Shrub species include saw palmetto, gallberry (*Ilex glabra*), fetterbush (*Lyonia lucida*), runner oak (*Quercus elliotii*), dwarf live oak (*Q. minima*), shiny blueberry (*Vaccinium myrsinites*), and dwarf huckleberry (*Gaylussacia dumosa*). Shrubs are generally knee-high or less, and there are few if any large trunks of saw palmetto along the ground. The optimal fire return interval for this community is one to three years. The preferred pine species, as determined by FNAI reference sites, is slash pine or longleaf pine and should be stocked at a level of 10 to 50 square feet per acre BA while non-pine species should remain between 0 and 26.2 stems or trees per acre. The following management zone(s) contain mesic flatwoods which could be considered for some form of timber management including overstory removal, midstory mitigation, site preparation, and planting of preferred pine species.

Management Zone(s)	Mesic Flatwoods (Acres)	Basal Area (ft ² /acre)	Basal Area Preferred Species	Basal Area Non-Preferred Species	Average Diameter at breast height (inches)
RS-1F	9	83	10	73	9.5
RS-3C	11	145	--	145	7.3
RS-3A	4	70	10	60	12.2
RS-2E*	25	--	--	--	--
RS-3B	37	84	22	61	6.8
RS-4C	13	88	20	68	6.9
RS-4B	<1	36	--	36	4.1

**Florida State Parks
Timber Management Analysis**

Management Zone(s)	Mesic Flatwoods (Acres)	Basal Area (ft ² /acre)	Basal Area Preferred Species	Basal Area Non-Preferred Species	Average Diameter at breast height (inches)
RS-2C	19	54	40	14	9.1
RS-5E*	1	--	--	--	--
RS-5D*	<1	--	--	--	--
RS-5H*	2	--	--	--	--
RS-5A	10	147	20	127	7.9
RS-5C	5	105	--	105	6.6

*Un-sampled upland areas are present in this analysis and could require vegetation management in the future.

Sandhill (972 acres)

Dominant pines will usually be longleaf pine (*Pinus palustris*). Herbaceous cover is 80 percent or greater, typically of wiregrass (*Aristida beyrichiana*), and is less than three feet in height. In addition to groundcover and pines characteristics, there will be scattered individual trees, clumps, or ridges of onsite oak species, usually turkey oak (*Quercus laevis*), sand post oak (*Q. margaretta*) and blue-jack oak (*Q. incana*). In old growth conditions, sand post oaks are commonly 150-200 years old, and some turkey oaks are over 100 years old. The optimal fire return interval for this community is one to three years. In this region, the preferred species, as determined by FNAI reference sites, is longleaf pine and should be stocked at a level of 20 to 60 square feet per acre BA while non-pine species should remain between 0 and 78.8 stems per acre. The following management zone(s) contain sandhill which could be considered for some form of timber management including midstory mitigation, site preparation, and planting of preferred pine species.

Management Zones	Sandhill (Acres)	Basal Area (ft ² /acre)	Basal Area Preferred Species	Basal Area Non-Preferred Species	Average Diameter at breast height (inches)
RS-1A	23	147	--	147	9.4
RS-1C*	1	--	--	--	--
RS-1F	18	67	13	54	8.8
RS-1B	8	141	15	126	8.5
RS-5G	75	107	63	44	6.2
RS-3C	95	123	38	84	7.9
RS-4A	37	77	23	53	7.9
RS-2E*	8	--	--	--	--
RS-3B	52	97	13	84	6.3
RS-4C	19	93	12	81	5.5

**Florida State Parks
Timber Management Analysis**

Management Zones	Sandhill (Acres)	Basal Area (ft ² /acre)	Basal Area Preferred Species	Basal Area Non-Preferred Species	Average Diameter at breast height (inches)
RS-3A	30	79	8	71	5.5
RS-4B	43	67	21	46	6.6
RS-2D	41	86	26	60	6.3
RS-1H*	<1	--	--	--	--
RS-1G	15	135	--	135	7.8
RS-2C	37	37	31	6	5.9
RS-5E	46	151	42	108	7.9
RS-2B	47	46	20	26	9
RS-5B	9	119	115	4	5.3
RS-1K*	1	--	--	--	--
RS-2A	58	32	20	12	7.8
RS-5D	52	98	70	27	5.2
RS-5A*	3	--	--	--	--
RS-1D*	62	--	--	--	--
RS-5F*	37	--	--	--	--
RS-5C	95	133	73	59	6.1
RS-1E	41	14	6	7	9.4
RS-1J	17	121	20	101	10
RS-5H*	2	--	--	--	--

*Un-sampled upland areas are present in this analysis and could require vegetation management in the future.

Scrubby Flatwoods (6 acres)

Dominant tree species of the interior will usually be longleaf pine (*Pinus palustris*). Mature sand pines (*P. clausa*) will typically not be present. There will be a diverse shrubby understory often with patches of bare white sand. A scrub-type oak “canopy” will vary in height from three to eight feet and there will be a variety of oak age classes/heights across the landscape. Dominant shrubs include sand live oak (*Quercus geminata*), myrtle oak (*Q. myrtifolia*), Chapman’s oak (*Q. chapmanii*), saw palmetto (*Serenoa repens*), rusty staggerbush (*Lyonia ferruginea*), and tarflower (*Bejaria racemosa*). Cover by herbaceous species is often well below 40 percent. The optimal fire return interval for this community is regionally variable. Areas may be burned as frequently as every three to eight years when burn prescriptions are designed to achieve a mosaic of burned and unburned areas. In this region, the preferred species, as determined by FNAI reference sites, is longleaf pine and should be stocked at a level of 10 to 60 square feet per acre BA while non-pine species should remain between 0 and 26.2 stems per acre. The following management zone(s) contain scrubby flatwoods which could be considered for some form of

Florida State Parks Timber Management Analysis

timber management including overstory removal, midstory mitigation, site preparation, and planting of preferred pine species.

Management Zones	Scrubby Flatwoods (Acres)	Basal Area (ft ² /acre)	Basal Area Preferred Species	Basal Area Non-Preferred Species	Average Diameter at breast height (inches)
RS-2E*	2	--	--	--	--
RS-4C*	<1	--	--	--	--
RS-2C	2	20	20	--	7.1
RS-5A	2	51	20	31	2

*Un-sampled upland areas are present in this analysis and could require vegetation management in the future.

Upland Hardwood Forest (12 acres)

Upland hardwood forest is a well-developed, closed-canopy forest dominated by deciduous hardwood trees on mesic soils in areas sheltered from fire. It typically has a diverse assemblage of deciduous and evergreen tree species in the canopy and midstory, shade-tolerant shrubs, and a sparse groundcover. Characteristic canopy trees include southern magnolia (*Magnolia grandiflora*), pignut hickory (*Carya glabra*), sweetgum (*Liquidambar styraciflua*), Florida maple (*Acer saccharum* ssp. *floridanum*), live oak (*Quercus virginiana*), laurel oak (*Q. hemisphaerica*), swamp chestnut oak (*Q. michauxii*), southern hackberry (*Celtis occidentalis*), white ash (*Fraxinus americana*), and loblolly pine (*Pinus taeda*). Species commonly found in Florida Panhandle and northern peninsula (but not farther south) include American beech (*Fagus grandifolia*), white oak (*Q. alba*), and spruce pine (*P. glabra*). There are currently no FNAI recommendations on preferred species or stocking levels for this natural community.

Management Zones	Upland Hardwood Forest (Acres)	Basal Area (ft ² /acre)	Basal Area Preferred Species	Basal Area Non-Preferred Species	Average Diameter at breast height (inches)
RS-1A	0	146	110	36	10.8
RS-1F*	4	--	--	--	--
RS-1H*	<1	--	--	--	--
RS-1G	8	91	80	11	8.1

*Un-sampled upland areas are present in this analysis and could require vegetation management in the future.

Rainbow Springs State Park Timber Management Analysis

Table 2. Summary of potential timber management actions for upland NatCom types to help restore or improve ecosystem conditions.

Management Zones	MZ (acres)	Candidate NatCom Type	Candidate NatCom Type Acres	Current Average Overstory Pine BA (ft2/AC)	Target Overstory Pine BA (ft2/AC)	Current Average Overstory Non-Pine TPA	Target Non-Pine Overstory TPA	Potential A	
								Harvest or Thin	Sta Improv
RS-1A	34	Sandhill	23	20	20 - 60	592	0 - 79	Y	Y
RS-1A	34	Upland Hardwood Forest	5	20	30 - 80	592	0 - 263	Y	Y
RS-1B	8	Sandhill	8	15	20 - 60	914	0 - 79	Y	Y
RS-1C*	2	Sandhill	1	--	--	--	--	N	N
RS-1D*	70	Sandhill	62	--	--	--	--	N	N
RS-1E	46	Sandhill	41	6	20 - 60	58	0 - 79	N	N
RS-1F	71	Mesic Flatwoods	9	6	10 - 50	528	0 - 0	Y	Y
RS-1F	71	Sandhill	18	6	20 - 60	528	0 - 79	Y	Y
RS-1F*	71	Upland Hardwood Forest	4	--	--	--	--	N	N
RS-1G*	66	Upland Hardwood Forest	8	--	30 - 80	695	0 - 263	Y	Y
RS-1G*	66	Sandhill	15	--	20 - 60	695	0 - 79	Y	Y
RS-1H*	12	Sandhill	<1	--	--	--	--	N	N
RS-1H*	12	Upland Hardwood Forest	<1	--	--	--	--	N	N
RS-1J	19	Sandhill	17	20	20 - 60	575	0 - 79	Y	Y
RS-1K*	3	Sandhill	1	--	--	--	--	N	N
RS-2A	58	Sandhill	58	20	20 - 60	798	0 - 79	Y	Y
RS-2B	62	Sandhill	47	38	20 - 60	567	0 - 79	Y	Y
RS-2C	79	Scrubby Flatwoods	2	20	20 - 60	1136	0 - 26	Y	Y
RS-2C	79	Mesic Flatwoods	19	20	10 - 50	1136	0 - 0	Y	Y
RS-2C	79	Sandhill	37	20	20 - 60	1136	0 - 79	Y	Y
RS-2D	41	Sandhill	41	26	20 - 60	1321	0 - 79	Y	Y
RS-2E*	53	Scrubby	2	--	--	--	--	N	N

Rainbow Springs State Park Timber Management Analysis

		Flatwood s							
RS-2E*	53	Mesic Flatwood s	25	--	--	--	--	N	N
RS-2E*	53	Sandhill	8	--	--	--	--	N	N
RS-3A	53	Sandhill	30	10	20 - 60	174	0 - 79	Y	Y
RS-3A	53	Mesic Flatwood s	4	10	10 - 50	174	0 - 0	Y	Y
RS-3B	133	Mesic Flatwood s	37	30	10 - 50	2	0 - 0	Y	Y
RS-3B	133	Sandhill	52	30	20 - 60	2	0 - 79	N	N
RS-3C	113	Mesic Flatwood s	11	50	10 - 50	1636	0 - 0	Y	Y
RS-3C	113	Sandhill	95	50	20 - 60	1636	0 - 79	Y	Y
RS-4A	38	Sandhill	37	23	20 - 60	1507	0 - 79	Y	Y
RS-4B	44	Sandhill	43	10	20 - 60	2900	0 - 79	Y	Y
RS-4B	44	Mesic Flatwood s	<1	10	10 - 50	2900	0 - 0	Y	Y
RS-4C	68	Sandhill	19	5	20 - 60	1760	0 - 79	Y	Y
RS-4C	68	Mesic Flatwood s	13	5	10 - 50	1760	0 - 0	Y	Y
RS-4C*	68	Scrubby Flatwood s	<1	--	--	--	--	N	N
RS-5A	49	Scrubby Flatwood s	2	50	20 - 60	1879	0 - 26	Y	Y
RS-5A	49	Mesic Flatwood s	10	50	10 - 50	1879	0 - 0	Y	Y
RS-5A*	49	Sandhill	3	--	--	--	--	N	N
RS-5B	9	Sandhill	9	115	20 - 60	450	0 - 79	Y	Y
RS-5C	107	Sandhill	95	73	20 - 60	1452	0 - 79	Y	Y
RS-5C	107	Mesic Flatwood s	5	73	10 - 50	1452	0 - 0	Y	Y
RS-5D	53	Sandhill	52	70	20 - 60	531	0 - 79	Y	Y

Rainbow Springs State Park Timber Management Analysis

RS-5D*	53	Mesic Flatwood s	<1	--	--	--	--	N	N
RS-5E	49	Sandhill	46	50	20 - 60	456	0 - 79	Y	Y
RS-5E*	49	Mesic Flatwood s	1	--	--	--	--	N	N
RS-5F*	37	Sandhill	37	--	--	--	--	Y	Y
RS-5G	75	Sandhill	75	64	20 - 60	212	0 - 79	Y	Y
RS-5H*	6	Sandhill	2	--	--	--	--	N	N
RS-5H*	6	Mesic Flatwood s	2	--	--	--	--	N	N

*Un-sampled upland areas are present in this analysis and could require vegetation management in

Rainbow Springs State Park Timber Management Analysis

RS-5D*	53	Mesic Flatwood s	<1	--	--	--	--	N	N
RS-5E	49	Sandhill	46	50	20 - 60	456	0 - 79	Y	Y
RS-5E*	49	Mesic Flatwood s	1	--	--	--	--	N	N
RS-5F*	37	Sandhill	37	--	--	--	--	Y	Y
RS-5G	75	Sandhill	75	64	20 - 60	212	0 - 79	Y	Y
RS-5H*	6	Sandhill	2	--	--	--	--	N	N
RS-5H*	6	Mesic Flatwood s	2	--	--	--	--	N	N

*Un-sampled upland areas are present in this analysis and could require vegetation management in

Addendum 9—Current Land Management Review

**FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION**

MEMORANDUM

TO: Keith Singleton, Program Consultant
Division of State Lands

FROM: Wes Howell, Chief, Bureau of Natural and Cultural Resources
Division of Recreation and Parks

Wes Howell Digitally signed by Wes Howell
Date: 2020.01.13 12:00:22
-05'00'

Steve Cutshaw, Chief, Office of Park Planning
Division of Recreation and Parks

Steven Cutshaw Digitally signed by Steven
Cutshaw
Date: 2020.01.13 12:25:44 -05'00'

SUBJECT: Response to Draft Land Management Review (LMR)
Rainbow Springs State Park

The Land Management Review draft report provided to Division of Recreation and Parks (DRP) determined that management of Rainbow Springs State Park by the DRP met the two tests prescribed by law. Namely, the review team concluded that the land is being managed for the purposes for which it was acquired and in accordance with the land management plan.

Attached is DRP's Managing Agency Response to the draft LMR report. The responses were prepared via a coordinated effort of the park, district office, and our offices.

Thank you for your attention.

/ca

2019 Land Management Review Team Report for Rainbow Springs State Park

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1. Introduction

Section 259.036, F.S. requires a periodic on-site review of conservation and recreation lands titled in the name of the Board of Trustees to determine (1) whether the lands are being managed for the purposes for which they were acquired and (2) whether they are being managed in accordance with their land management plan adopted pursuant to s. 259.032, F.S. In cases where the managed areas exceed 1,000 acres in size, such a review must be scheduled at least every five years. In conducting this review, a statutorily constructed review team “shall evaluate the extent to which the existing management plan provides sufficient protection to threatened or endangered species, unique or important natural or physical features, geological or hydrological functions or archaeological features. The review shall also evaluate the extent to which the land is being managed for the purposes for which it was acquired and the degree to which actual management practices, including public access, are in compliance with the adopted management plan.”

The land management review teams are coordinated by the Division of State Lands and consist of representatives from the Division of Recreation and Parks (DEP), the Florida Forest Service (DACS), the Fish and Wildlife Conservation Commission, the local government in which the property is located, the DEP District in which the parcel is located, the local soil and water conservation district or jurisdictional water management district, a conservation organization member, and a local private land manager.

Each Land Management Review Report is divided into three sections. Section 1 provides the details of the property being reviewed as well as the overall results of the report. Section 2 provides details of the Field Review, in which the Review Team inspects the results of management actions on the site. Section 3 provides details of the Land Management Plan Review, in which the team determines the extent to which the Management Plan provides for and documents adequate natural and recreational resource protection.

Finally, each report may also contain an Appendix that lists individual team member comments. This is a compilation of feedback, concerns or other thoughts raised by individual team members, but not necessarily indicative of the final consensus reached by the Land Management Review Team.

1.1. Property Reviewed in this Report

Name of Site: Rainbow Springs State Park

Managed by: Department of Environmental Protection, Florida Park Service

Acres: 1,472

County: Marion

Purpose(s) for Acquisition: To protect most of the undeveloped or minimally developed private land remaining along the Rainbow River.

Acquisition Program(s): CARL/P2000/Florida Forever

Original Acquisition Date: 10/24/1990

Area Reviewed: Entire Property

Last Management Plan Approval Date: 12/10/2002

Review Date: 10/11/2019

Agency Manager and Key Staff Present:

- Larry Steed, Park Manager
- Tina Miller, APM

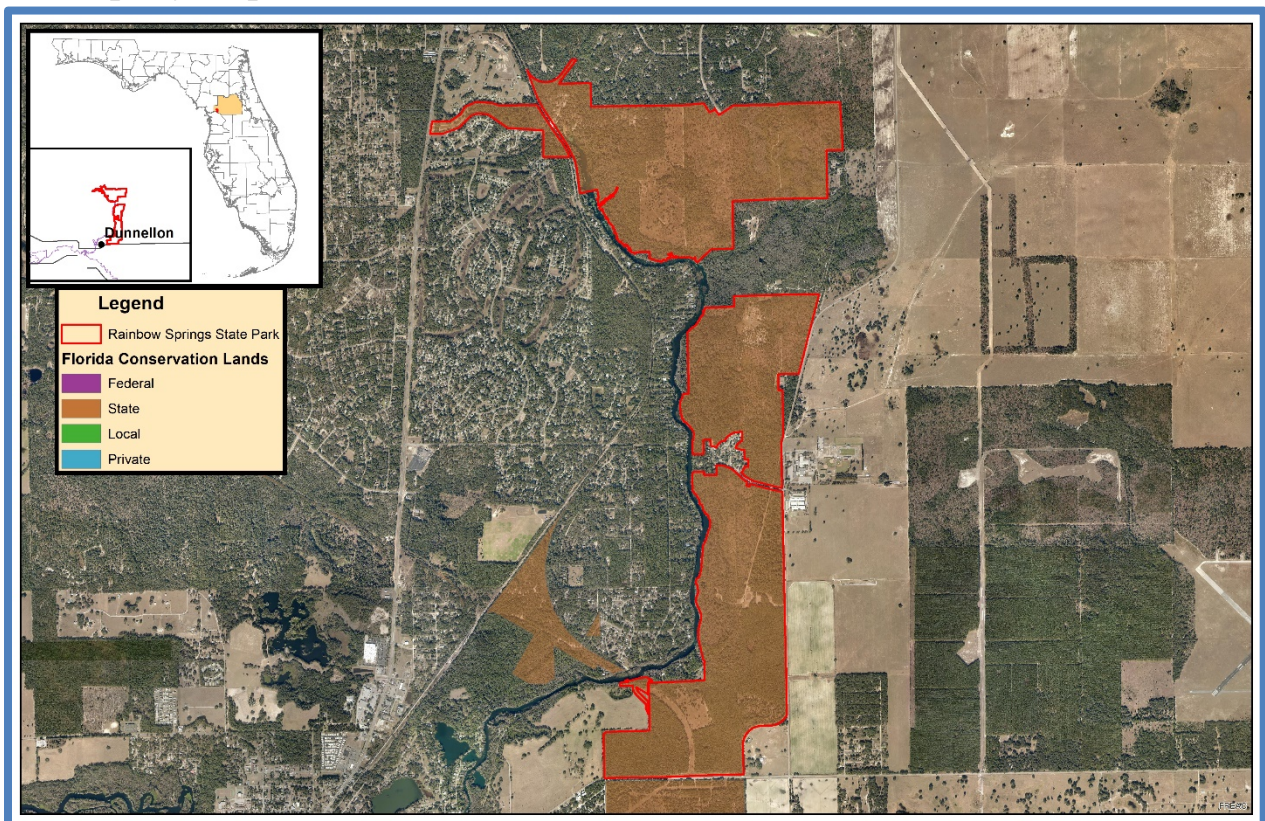
Review Team Members Present (voting)

- Rick Owen, DRP District
- Doug Longshore, FFS
- Rodney Sieg, Local Gov't.
- Chris McKendree, SWFWMD
- Alex Kropp, FWC
- Deborah L. Curry, Cons. Organization
- Hailey Ambrose, DEP District
- Private Land Manager, None

Other Non-Team Members Present (attending)

- Keith Singleton, DEP/DSL
- Ronda Sutphen, FFS
- Chris Boever, FWC/IPMS
- Cyndi Gates, SWFWMD
- Jeff Sowards, DEP/RCP

1.2 Property Map



1.3. Overview of Land Management Review Results

Is the property managed for purposes that are compatible with conservation, preservation, or recreation?

Yes = 7, No = 0

Are the management practices, including public access, in compliance with the management plan?

Yes = 7, No = 0

Table 1 shows the average scores received for each applicable category of review. *Field Review* scores refer to the adequacy of management actions in the field, while *Management Plan Review* scores refer to adequacy of discussion of these topics in the management plan. Scores range from 1 to 5 with 5 signifying excellence. For a more detailed key to the scores, please see Appendix A.

Table 1: Results at a glance.

Major Land Management Categories	Field Review	Management Plan Review
Natural Communities / Forest Management	4.31	3.07
Prescribed Fire / Habitat Restoration	4.14	3.29
Hydrology	4.58	3.36
Imperiled Species	3.54	3.38
Exotic / Invasive Species	4.12	2.93
Cultural Resources	4.57	3.14
Public Access / Education / Law Enforcement	4.39	3.54
Infrastructure / Equipment / Staffing	3.95	N/A
Color Code (See Appendix A for detail)		
Excellent	Above Average	Below Average
		Poor

1.3.1 Consensus Commendations for the Managing Agency

The following commendations resulted from discussion and vote of the review team members:

1. The team commends the Florida Park Service (FPS) staff for increasing burn frequency and acreage burned. (7+, 0-)
2. The team commends the staff on progress to restore Griffith's addition to sandhill community. (7+, 0-)
3. The team commends the staff on coordination with FWC and other partners to control invasive species. (7+, 0-)
4. The team commends the FPS staff on providing a wide array of recreational opportunities while managing visitor impacts. (7+, 0-)
5. The team commends the staff regarding enforcement and monitoring of water-based recreational activities. (7+, 0-)
6. The team commends the staff on communications with neighboring landowners, including for education and outreach. (7+, 0-)
7. The team commends the staff for coordination with the water management district and aquatic preserve staff on all water resource issues in the Rainbow River. (7+, 0-)
8. The team commends the FPS for the improvement of their prescribed burning teams and the good coordination from the park staff. (7+, 0-)
9. The team commends the staff for excellent partnership and coordination with the citizen support organization and volunteers. (7+, 0-)

1.3.2. Consensus Recommendations to the Managing Agency

The following recommendations resulted from a discussion and vote of review team members. The next management plan update should include information about how these recommendations have been addressed:

1. The management plan reviewed by this land management review team was prepared in 2002. This is the third time this plan has been reviewed. In order for the land management review process to function properly, the team recommends the management plan be updated in a timely manner. (7+, 0-)

Managing Agency Response: *The Division of Recreation and Parks are working to update the Unit Management Plan.*

2. The team recommends the FPS resume southeastern kestrel monitoring and nest box maintenance in coordination with FWC. (7+, 0-)

Managing Agency Response: *District and park staff will continue to coordinate with Florida Fish and Wildlife Conservation Commission (FWC) on monitoring and management strategies for the southeastern kestrel in the park.*

3. The team recommends the FPS resume Bachman's sparrow annual monitoring and brown-headed nuthatch monitoring in coordination with FWC. (7+, 0-)

Managing Agency Response: *District and park staff will continue to coordinate with FWC on monitoring and management strategies for imperiled species in the park.*

2. Field Review Details

2.1 Field Review Checklist Findings

The following items received high scores on the review team checklist, which indicates that management actions exceeded expectations.

1. Natural communities, specifically basin swamp, depression marsh, floodplain swamp, hydric hammock, and spring-run stream.
2. Listed species, animals, specifically gopher tortoise and plants in general.
3. Natural resource survey/monitoring resources, specifically listed species or their habitat monitoring, fire effects monitoring, and invasive species survey and monitoring.
4. Cultural Resources, specifically cultural resource survey, and protection and preservation.
5. Resource management (prescribed fire), specifically area being burned, frequency, and quality.
6. Restoration, specifically sand pine plantation to sandhill.
7. Forest management, specifically timber inventory.
8. Non-native, invasive, and problem species, specifically prevention and control of plants, and animals.
9. Hydro-alteration, specifically roads and culverts, and erosion.
10. Surface Water Monitoring, specifically quality and quantity.
11. Resource protection, specifically boundary survey, gates and fencing, signage, and law enforcement presence.
12. Public access, specifically roads, parking, and boat access.

13. Environmental education and outreach, specifically wildlife, invasive species, habitat management activities, interpretive facilities and signs, recreational opportunities, and management of visitor impacts.
14. Management resources, specifically waste disposal, sanitary facilities, buildings, and equipment.

2.2. Items Requiring Improvement Actions in the Field

The following items received low scores on the review team checklist, which indicates that management actions noted during the Field Review were not considered sufficient (less than 3.0 score on average). Please note that overall good scores do not preclude specific recommendations by the review team requiring remediation. **The management plan update should include information on how these items have been addressed:**

1. *The maintenance condition of the Natural Communities, specifically upland hardwood forest, received a below average score. The review team is asked to evaluate, based on their perspective, what percent of the natural community is in maintenance condition. The scores range from 1 to 5, with 1 being 0-20% in maintenance condition, 2 being 21-40%, 3 being 41-60%, 4 being 61-80% and 5 being 81-100%.*

Managing Agency Response: District and park staff are working to delineate upland hardwood forest and upland mixed woodland natural communities for the next Unit Management Plan.

2. *Listed species, specifically Southeastern American kestrel, received a below average score. The review team is asked to evaluate, based on their perspective, whether management actions are sufficient for protection and preservation of the species.*

Managing Agency Response: District and park staff will continue to coordinate with FWC on monitoring and management strategies for imperiled species in the park.

2.3. Field Review Checklist and Scores

Field Review Item	Reference #	Anonymous Team Members								Average
		1	2	3	4	5	6	7	8	
Natural Communities (I.A)										
Mesic Flatwoods	I.A.1	3	3	3	3	4	4	4		3.43
Sandhill	I.A.2	4	3	4	4	3	4	4		3.71
Scrubby Flatwoods	I.A.3	3	4	4	4	4	3	4		3.71
Upland Mixed Woodland	I.A.4	3	x	3	4	3	x	4		3.40
Basin Swamp	I.A.5	5	5	5	4	5	4	5		4.71
Depression Marsh	I.A.6	5	5	5	5	5	4	5		4.86
Floodplain Swamp	I.A.7	5	5	4	5	4	5	4		4.57
Hydric Hammock	I.A.8	5	5	5	5	5	5	4		4.86
Spring-Run Stream	I.A.9	5	5	4	4	4	5	4		4.43
Upland Hardwood Forest	I.A.10	3	x	3	3	1	4			2.80
Natural Communities Average Score										4.05

Listed species: Protection & Preservation (I.B)										
Animals	I.B.1	3	4	3	4	3	3	3		3.29
Southeastern American Kestrel	I.B.1.a	2	2	3	4	2	3	2		2.57
Gopher Tortoise	I.B.1.b	4	5	4	5	5	4	3		4.29
Plants	I.B.2	3	x	4	4	5	4	4		4.00
Listed Species Average Score										3.54
Natural Resources Survey/Management Resources (I.C)										
Listed species or their habitat monitoring	I.C.2	4	2	4	4	5	5	5		4.14
Other non-game species or their habitat monitoring	I.C.3	4	2	3	4	5	2	3		3.29
Fire effects monitoring	I.C.4	4	4	4	5	5	4	5		4.43
Invasive species survey / monitoring	I.C.6	4	4	4	5	5	5	4		4.43
Cultural Resources (Archeological & Historic sites) (II.A, II.B)										
Cultural Res. Survey	II.A	4	4	4	5	5	5	5		4.57
Protection and preservation	II.B	4	4	4	5	5	5	5		4.57
Cultural Resources Average Score										4.57
Resource Management, Prescribed Fire (III.A)										
Area Being Burned (no. acres)	III.A.1	4	4	4	5	5	4	5		4.43
Frequency	III.A.2	4	4	4	5	5	4	5		4.43
Quality	III.A.3	4	5	3	5	5	5	4		4.43
Resource Management, Prescribed Fire Average Score										4.43
Restoration (III.B)										
Sand Pine Plantation to Sandhill	III.B.1	2	4	4	4	4	4	5		3.86
Restoration Average Score										3.86
Forest Management (III.C)										
Timber Inventory	III.C.1	5	4	4	5	5	4	5		4.57
Forest Management Average Score										4.57
Non-Native, Invasive & Problem Species (III.D)										
Prevention										
prevention - plants	III.D.1.a	4	4	4	4	4	4	4		4.00
prevention - animals	III.D.1.b	4	4	4	4	5	5	4		4.29
prevention - pests/pathogens	III.D.1.c	4	4	4	4	3	4	4		3.86
Control										
control - plants	III.D.2.a	4	4	4	4	5	5	4		4.29
control - animals	III.D.2.b	5	4	4	4	5	5	4		4.43
control - pest/pathogens	III.D.2.c	4	4	4	4	3	4	4		3.86
Non-Native, Invasive & Problem Species Average Score										4.12
Hydrologic/Geologic function Hydro-Alteration (III.E.1)										
Roads/culverts	III.E.1.a	4	x	4	5	5	4	3		4.17
Erosion	III.E.1.f	5	5	4	4	5	5	5		4.71
Hydrologic/Geologic function, Hydro-Alteration Average Score										4.44

Surface Water Monitoring (III.E.3)										
Surface water quality	III.E.3.a	5	5	4	5	5	4	5		4.71
Surface water quantity	III.F.3.b	5	5	4	5	5	4	5		4.71
Surface Water Monitoring Average Score										4.71
Resource Protection (III.F)										
Boundary survey	III.F.1	5	4	4	5	5	5	4		4.57
Gates & fencing	III.F.2	4	4	4	4	5	4	4		4.14
Signage	III.F.3	4	4	4	4	5	4	4		4.14
Law enforcement presence	III.F.4	5	4	4	4	5	3	4		4.14
Resource Protection Average Score										4.25
Adjacent Property Concerns (III.G)										
Land Use										
Expanding development	III.G.1.a	4	4	4	4	5	4	4		4.14
Inholdings/additions	III.G.2	4	4	3	4	5	4	4		4.00
Public Access & Education (IV.1, IV.2, IV.3, IV.4, IV.5)										
Public Access										
Roads	IV.1.a	4	5	4	5	4	4	5		4.43
Parking	IV.1.b	5	5	4	5	5	5	4		4.71
Boat Access	IV.1.c	5	5	4	5	3	5	4		4.43
Environmental Education & Outreach										
Wildlife	IV.2.a	4	5	3	4	5	4	4		4.14
Invasive Species	IV.2.b	5	5	4	5	4	4	4		4.43
Habitat Management Activities	IV.2.c	5	5	4	4	5	5	4		4.57
Interpretive facilities and signs	IV.3	5	4	4	5	5	4	5		4.57
Recreational Opportunities	IV.4	5	5	5	4	5	5	5		4.86
Management of Visitor Impacts	IV.5	5	5	4	4	5	5	4		4.57
Public Access & Education Average Score										4.52
Management Resources (V.1, V.2, V.3, V.4)										
Maintenance										
Waste disposal	V.1.a	5	5	5	5	4	5	5		4.86
Sanitary facilities	V.1.b	5	5	5	5	3	5	5		4.71
Infrastructure										
Buildings	V.2.a	5	4	3	4	4	4	4		4.00
Equipment	V.2.b	5	4	3	4	4	4	4		4.00
Staff	V.3	3	2	2	3	4	3	4		3.00
Funding	V.4	4	2	2	2	4	4	4		3.14
Management Resources Average Score										3.95

Color Code:

Excellent

Above
Average

Below
Average

Poor

Missing
Vote

Insufficient
Information

See
Appendix A
for detail

3. Land Management Plan Review Details

3.1 Items Requiring Improvements in the Management Plan

The following items received low scores on the review team checklist, which indicates that the text noted in the Management Plan Review does not sufficiently address this issue (less than 3.0 score on average.). Please note that overall good scores do not preclude specific recommendations by the review team requiring remediation. The next management plan update should address the checklist items identified below:

1. *The maintenance condition of the Natural Communities, specifically upland mixed woodland and upland hardwood forest, received below average scores. The review team is asked to evaluate, based on their perspective, what percent of the natural community is in maintenance condition. The scores range from 1 to 5, with 1 being 0-20% in maintenance condition, 2 being 21-40%, 3 being 41-60%, 4 being 61-80% and 5 being 81-100%.*

Managing Agency Response: The next Unit Management Plan will be updated to reflect upland hardwood forest and upland mixed woodland natural community classifications.

2. *Non-Native, Invasive & Problem Species, specifically prevention of plants and animals, and prevention and control of pest/pathogens, received below average scores. The review team is asked to evaluate, based on information provided by the managing agency, as well as overall management actions, whether prevention and control are sufficient.*

Managing Agency Response: The Division will address this issue in the next management plan so that it reflects land management actions.

3. *Adjacent Property Concerns, specifically discussion of potential surplus land determination, received a below average score. The review team is asked to evaluate, based on information provided by the managing agency, whether adjacent property concerns are sufficiently addressed.*

Managing Agency Response: The Division will address adjacent property concerns and the determination of surplus lands in the update of the management plan.

3.2 Management Plan Review Checklist and Scores

Plan Review Item	Reference #	Anonymous Team Members								Average
		1	2	3	4	5	6	7	8	
Natural Communities (I.A)										
Mesic Flatwoods	I.A.1	1	3	3	4		4	3		3.00
Sandhill	I.A.2	1	3	3	4		4	3		3.00
Scrubby Flatwoods	I.A.3	1	3	3	4		4	4		3.17
Upland Mixed Woodland	I.A.4	1	2	3	3	1	1	1		1.71
Basin Swamp	I.A.5	1	3	5	3		4	4		3.33

Depression Marsh	I.A.6	1	3	5	3		4	4		3.33
Floodplain Swamp	I.A.7	1	3	4	3		4	5		3.33
Hydric Hammock	I.A.8	1	3	5	3		5	5		3.67
Spring-Run Stream	I.A.9	1	3	4	4		5	4		3.50
Upland Hardwood Forest	I.A.10	1	2	3	2	1	3	1		1.86
Natural Communities Average Score										2.99
Listed species: Protection & Preservation (I.B)										
Animals	I.B.1	1	3	3	4	3	4	5		3.29
Southeastern American Kestrel	I.B.1.a	1	4	3	4	5	5			3.67
Gopher Tortoise	I.B.1.b	1	3	4	4	5	1	5		3.29
Plants	I.B.2	1	3	4	4	3	4	4		3.29
Listed Species Average Score										3.38
Natural Resources Survey/Management Resources (I.C)										
Listed species or their habitat monitoring	I.C.2	1	4	4	3	3	4	5		3.43
Other non-game species or their habitat monitoring	I.C.3	1	4	3	3	3	4	3		3.00
Fire effects monitoring	I.C.4	1	4	4	4	3	5	5		3.71
Invasive species survey / monitoring	I.C.6	1	4	4	5	3	5	4		3.71
Cultural Resources (Archeological & Historic sites) (II.A, II.B)										
Cultural Res. Survey	II.A	1	3	4	4	3	4	3		3.14
Protection and preservation	II.B	1	3	4	4	3	4	3		3.14
Cultural Resources Average Score										3.14
Resource Management, Prescribed Fire (III.A)										
Area Being Burned (no. acres)	III.A.1	1	3	4	4	3	5	3		3.29
Frequency	III.A.2	1	3	4	4	3	4	3		3.14
Quality	III.A.3	1	3	3	4	3	4	3		3.00
Resource Management, Prescribed Fire Average Score										3.14
Restoration (III.B)										
Sand Pine Plantation to Sandhill	III.B.1	1	3	4	4	3	4	5		3.43
Restoration Average Score										3.43
Forest Management (III.C)										
Timber Inventory	III.C.1	1	3	4	4	3	4	3		3.14
Forest Management Average Score										3.14
Non-Native, Invasive & Problem Species (III.D)										
Prevention										
prevention - plants	III.E.1.a	1	3	3	3	3	4	3		2.86
prevention - animals	III.E.1.b	1	3	3	3	3	4	3		2.86
prevention - pests/pathogens	III.E.1.c	1	3	3	3	3	2	3		2.57
Control										
control - plants	III.E.2.a	1	3	3	4	3	5	4		3.29
control - animals	III.E.2.b	1	3	3	4	3	4	4		3.14
control - pest/pathogens	III.E.2.c	1	3	3	4	3	2	4		2.86
Non-Native, Invasive & Problem Species Average Score										2.93
Hydrologic/Geologic function, Hydro-Alteration (III.E.1)										

Roads/culverts	III.F.1.a	1	3	4	4	3	4	3		3.14
Erosion	III.F.1.f	1	3	4	4	3	4	3		3.14
Hydrologic/Geologic function, Hydro-Alteration Average Score										3.14
Surface Water Monitoring (III.E.3)										
Surface water quality	III.F.3.a	1	3	4	5	3	5	4		3.57
Surface water quantity	III.F.3.b	1	3	4	5	3	5	4		3.57
Surface Water Monitoring Average Score										3.57
Resource Protection (III.F)										
Boundary survey	III.G.1	1	3	4	4	3	5	4		3.43
Gates & fencing	III.G.2	1	3	4	4	3	4	4		3.29
Signage	III.G.3	1	3	4	4	3	4	5		3.43
Law enforcement presence	III.G.4	1	3	4	4	3	4	5		3.43
Resource Protection Average Score										3.39
Adjacent Property Concerns (III.G)										
Land Use										
Expanding development	III.H.1.a	1	3	3	4	3	4	4		3.14
Inholdings/additions	III.H.2	1	3	3	4	3	5	4		3.29
Discussion of Potential Surplus Land Determination	III.H.3	1	3	3	4	3	3	2		2.71
Surplus Lands Identified?	III.H.4	1	3	3	4	3	4	4		3.14
Public Access & Education (IV.1, IV.2, IV.3, IV.4, IV.5)										
Public Access										
Roads	IV.1.a		3	3	4	3	5	4		3.67
Parking	IV.1.b		3	3	4	3	5	4		3.67
Boat Access	IV.1.c		3	4	4	3	5	4		3.83
Environmental Education & Outreach										
Wildlife	IV.2.a		3	4	4	3	4	4		3.67
Invasive Species	IV.2.b		3	4	4	3	4	4		3.67
Habitat Management Activities	IV.2.c		3	4	4	3	4	4		3.67
Interpretive facilities and signs	IV.3		3	3	4	3	5	4		3.67
Recreational Opportunities	IV.4		3	4	4	3	5	4		3.83
Management of Visitor Impacts	IV.5		3	4	4	3	3	4		3.50
Public Access & Education Average Score										3.69
Managed Area Uses (VI.A, VI.B)										
Existing Uses										
Natural Resource Conservation	VI.A.1	5	5	4	4	5	5	5		4.71
Swimming	VI.A.2	5	5	4	4	5	5	3		4.43
Tubing	VI.A.3	5	5	4	4	5	5	4		4.57
Canoeing/Kayaking	VI.A.4	5	5	4	4	5	5	4		4.57
Wildlife Observation	VI.A.5	5	5	4	4	5	5	5		4.71
Hiking	VI.A.6	5	5	4	4	5	5	5		4.71
Camping	VI.A.7	5	5	4	4	5	5	4		4.57

Color Code:

Excellent

Above
Average

Below
Average

Poor

Missing
Vote

Insufficient
Information

See
Appendix A
for detail

Appendix A: Scoring System Detail

Explanation of Consensus Commendations:

Often, the exceptional condition of some of the property's attributes impress review team members. In those instances, team members are encouraged to offer positive feedback to the managing agency in the form of a commendation. The teams develop commendations generally by standard consensus processes or by majority vote if they cannot obtain a true consensus.

Explanation of Consensus Recommendations:

Subsection 259.036(2), F.S., specifically states that the managing entity shall consider the findings and recommendations of the land management review. We ask team members to provide general recommendations for improving the management or public access and use of the property. The teams discuss these recommendations and develop consensus recommendations as described above. We provide these recommendations to the managing agency to consider when finalizing the required ten-year management plan update. We encourage the manager to respond directly to these recommendations and include their responses in the final report when received in a timely manner.

Explanation of Field Review Checklist and Scores, and Management Plan Review Checklist and Scores:

We provide team members with a checklist to fill out during the evaluation workshop phase of the Land Management Review. The checklist is the uniform tool used to evaluate both the management actions and condition of the managed area, and the sufficiency of the management plan elements. During the evaluation workshop, team members individually provide scores on each issue on the checklist, from their individual perspective. Team members also base their evaluations on information provided by the managing agency staff as well as other team member discussions. Staff averages these scores to evaluate the overall conditions on the ground, and how the management plan addresses the issues. Team members must score each management issue 1 to 5: 1 being the management practices are clearly insufficient, and 5 being that the management practices are excellent. Members may choose to abstain if they have inadequate expertise or information to make a cardinal numeric choice, as indicated by an "X" on the checklist scores, or they may not provide a vote for other unknown reasons, as indicated by a blank. If a majority of members failed to vote on any issue, that issue is determined to be irrelevant to management of that property or it was inadequately reviewed by the team to make an intelligent choice. In either case staff eliminated the issue from the report to the manager.

Average scores are interpreted as follows:

Scores 4.0 to 5.0 are *Excellent*

Scores 3.0 to 3.99 are *Above Average*

Scores 2.0 to 2.99 are *Below Average*

Scores 1.0 to 1.99 are considered *Poor*

Addendum 10—Local Government Comprehensive Plan Compliance

Local Government Comprehensive Plan Compliance

Insert Local Government Comprehensive Plan Compliance

Local Government Comprehensive Plan Compliance
