Weeki Wachee Springs State Park

Draft Unit Management Plan - 2021

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Executive Summary

Weeki Wachee Springs State Park is a cultural icon that represents the early days of the tourism economy in Florida. The world-famous roadside attraction had its official grand opening in 1947 after a group of investors fulfilled the dream of creating a place where tourists could marvel at real-life mermaids performing underwater acrobatics in the crystal-clear waters of Weeki Wachee Springs. This vision was accomplished through the underwater skills and innovations of Newton Perry and the architectural brilliance of Robert E. Collins. Today, the Underwater Theater at Weeki Wachee Springs remains one of the state's most remarkable feats of engineering, architecture, and entertainment.

Newton Perry was an accomplished swimmer and underwater performer who had previously worked at both Silver Springs and Wakulla Springs. Perry was well-known in the film industry as a consultant for underwater scenes and was highly involved with movies being shot at all three locations. It was Perry who devised the underwater airlock (ca. 1956) and air hoses that allowed the performers to remain underwater for long periods of time without needing to surface for air.

The iconic Underwater Theater was the creation of architect Robert E. Collins. The original theater was completed in 1947 and early iterations of the underwater shows entertained audiences for 12 years until the American Broadcasting Company (ABC) purchased the themed attraction and began a complete renovation of the theater in 1959 to accommodate larger audiences. This is when Collins added the iconic clamshell roof, tile fish mosaics, auditorium seating, and 6-foot glass windows.

The visible groundwater features of the park consist primarily of the Weeki Wachee headspring and the smaller magnitude Twin Dees Spring. These two springs, together with several smaller springs outside the park make up the Weeki Wachee Springs Complex. The combined flow of these springs and the tributaries they feed make up the Weeki Wachee River. Weeki Wachee Spring is one of 33 first magnitude springs in Florida. To be classified as a first magnitude spring, median discharge of water must be at least 100 cubic feet/second (cfs). Discharge data from the 1931-2015 period of record indicate an average discharge of 171 cfs from the main spring.

Circa 1949 – Credit: Florida Memory

Weeki Wachee Springs State Park

Central Park Theme

The enchanting waters of Weeki Wachee Springs were transformed into a magical entertainment experience, which now depend on the health and maintenance of the spring and its vulnerable watershed.

Primary Interpretive Themes

Mermaid Shows

The roadside attraction's early innovations with underwater apparatuses led the mermaid shows of Weeki Wachee Springs to become a global cultural icon.

Uplands

Maintaining the scrub habitats surrounding the spring protects its remaining recharge area from development and contributes to maintenance of water quality.

Spring Run

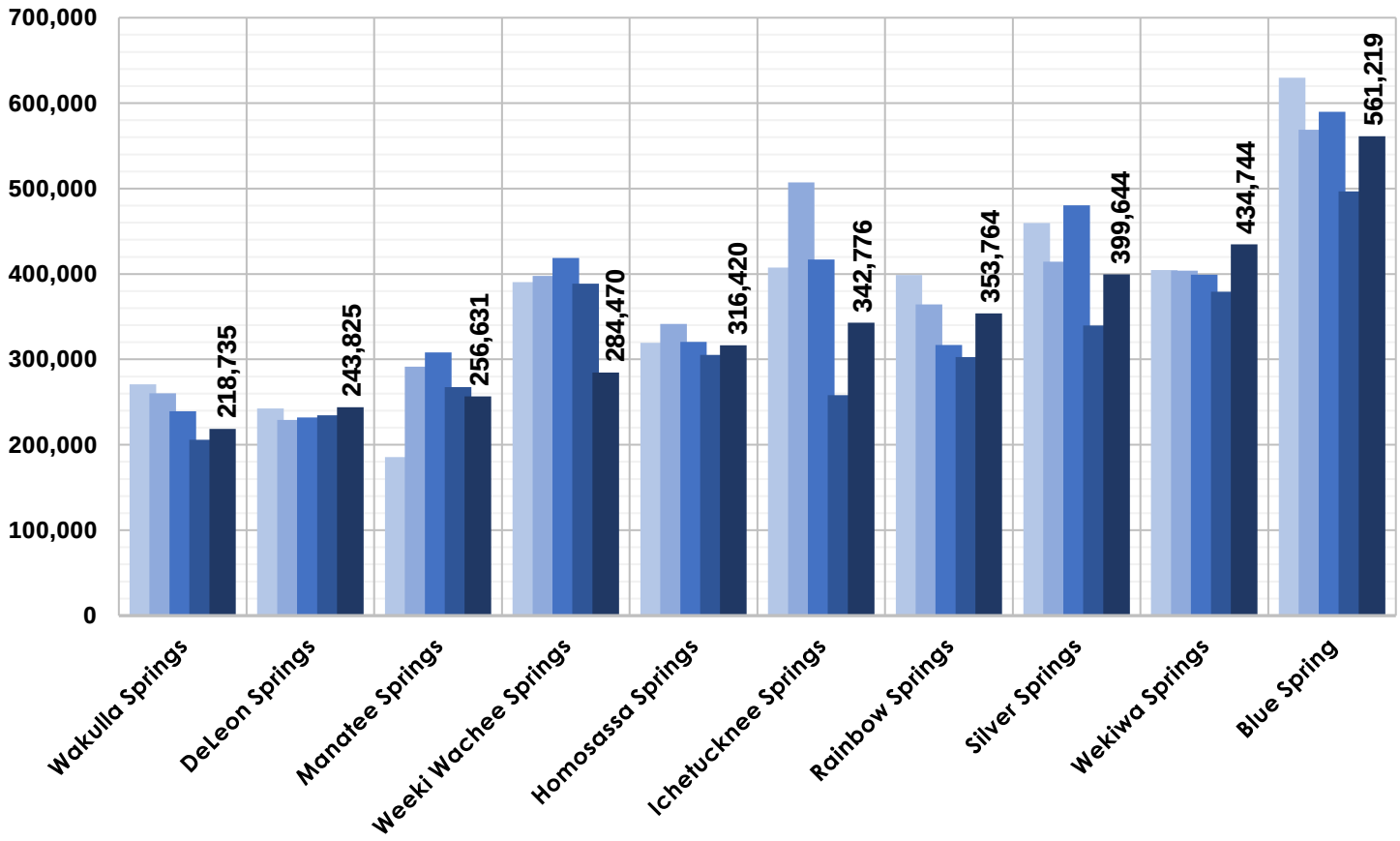
Responsible recreation on the Weeki Wachee River is a safeguard for the water clarity and delicate vegetation of this ecological treasure.

Water Quality and Quantity

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

Natural Communities and Altered Landcover Types		
Natural Communities	**Acreage**	**Percentage**
Scrub	560	60.4%
Hydric Hammock	150	16.2%
Baygall	48	5.2%
Basin Marsh	31	3.3%
Mesic Flatwoods	27	2.9%
Spring-Run Stream	27	2.9%
Sandhill	14	1.5%
Mesic Hammock	11	1.2%
Scrubby Flatwoods	8.9	0.9%
Depression Marsh	4.6	0.5%
Xeric Hammock	3.8	0.4%
Wet Flatwoods	1.3	0.1%
Dome Swamp	0.5	0.05%
Sinkhole	0.1	0.01%
Altered Landcovers	**Acreage**	**Percentage**
Developed	36	3.8%
Clearing/Regeneration	3.1	0.3%
Borrow Area	1.2	0.1%
Total Acreage	**927**	**100%**

Spring State Parks Annual Attendance: Fiscal Year (FY) 2014-2019



Weeki Wachee Springs State Park
Natural Community Map

0 0.25 0.5 1 Miles

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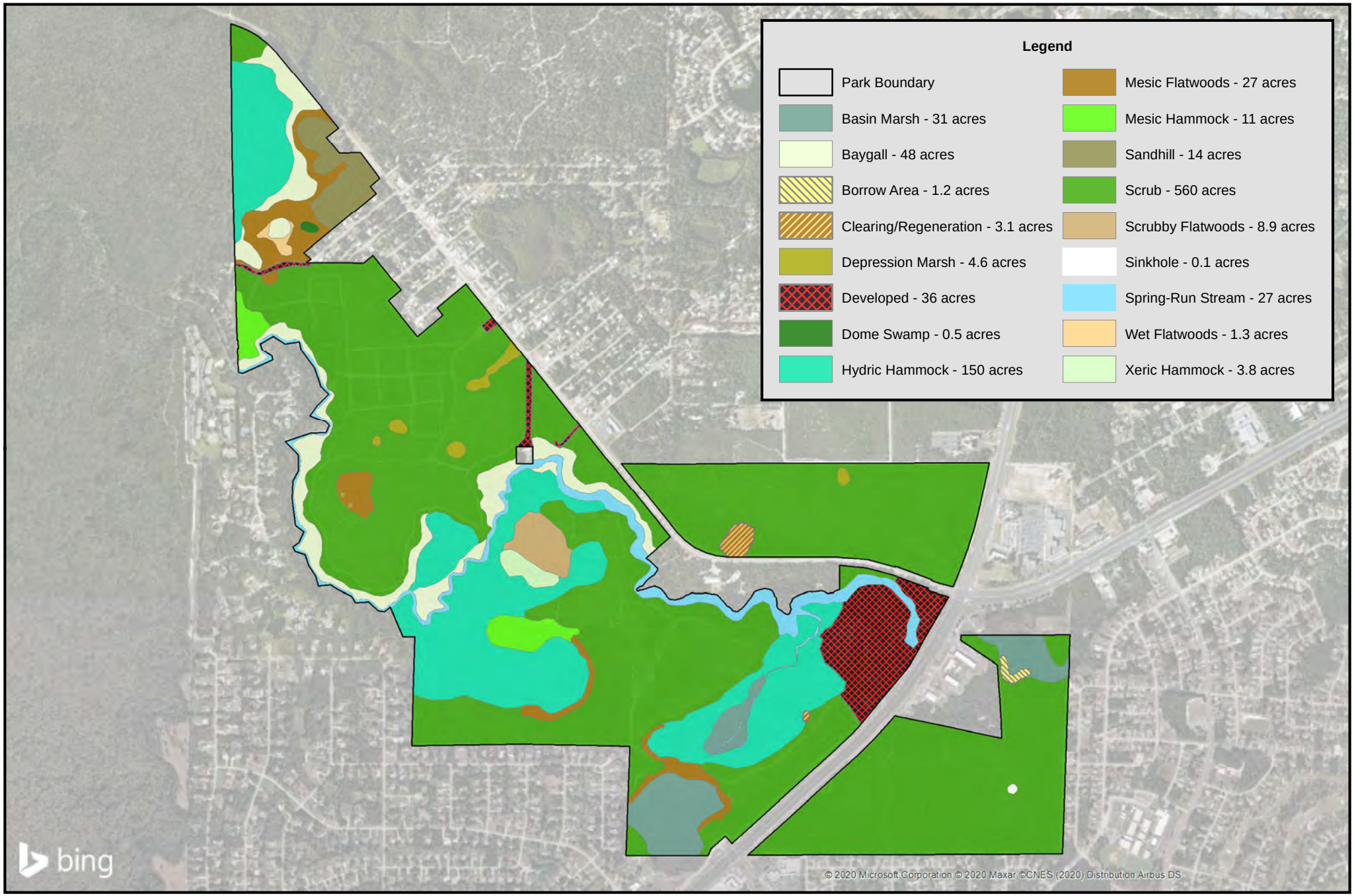
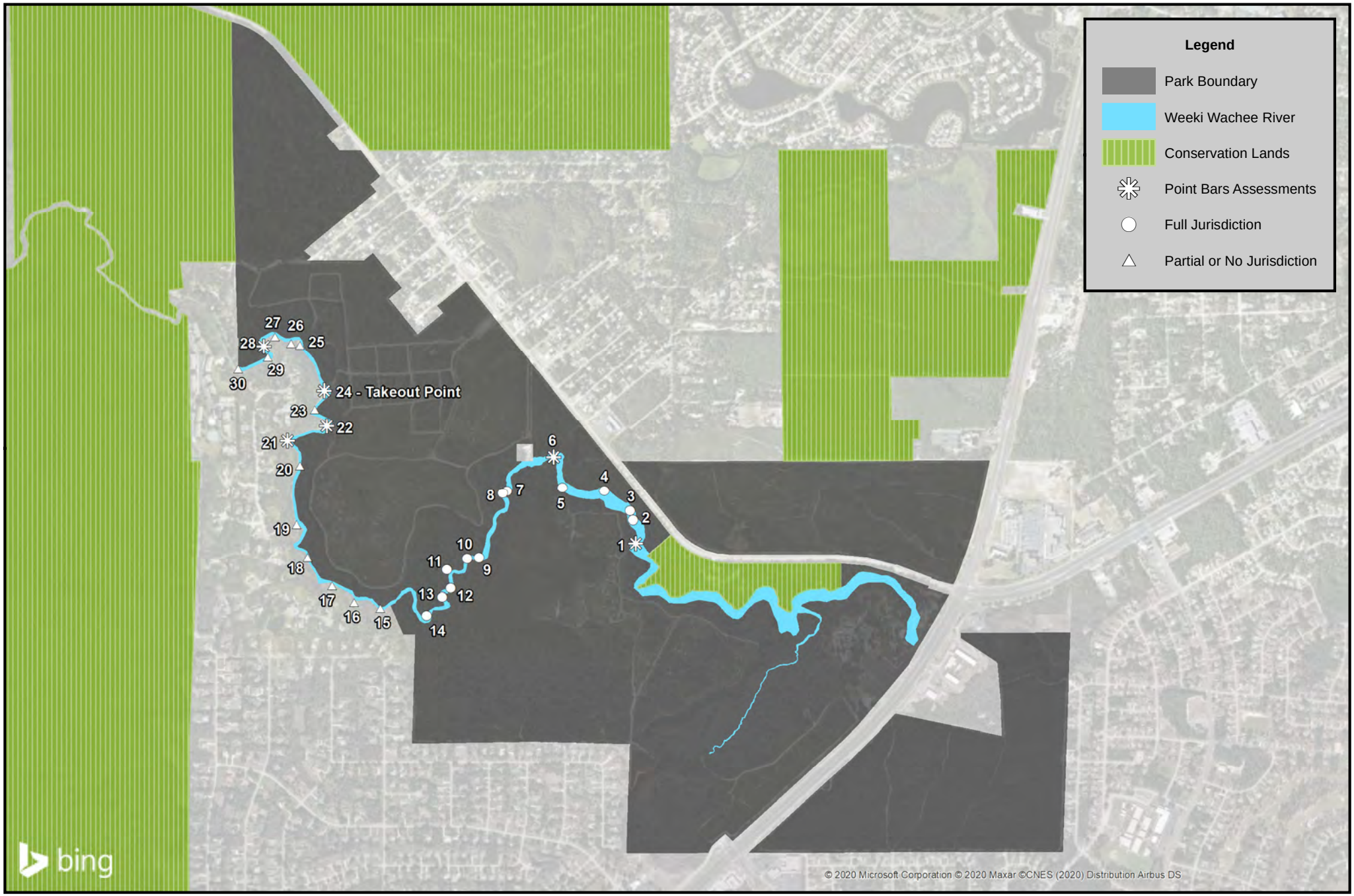


Ten-Year Resource Management Goals and Objectives	
Goal: Protect soil resources in the park.	
Objective A	Control erosion by monitoring, stabilization, and unauthorized trail closures.
Goal: Protect water quality/quantity and restore hydrology in the park.	
Objective A	Conduct an assessment of the park's hydrological restoration needs.
Goal: Restore and maintain natural communities/habitat of the park.	
Objective A	Develop and implement a point bar restoration plan for the spring-run.
Objective B	Continue to monitor submerged aquatic vegetation in the spring-run.
Objective C	Improve 575 acres of scrub, scrubby flatwoods, and sandhill.
Objective D	Maintain 615 acres of the park within the optimum fire return interval.
Objective E	Complete a comprehensive flora and fauna survey.
Goal: Maintain, improve, or restore imperiled species populations and habitats in the park.	
Objective A	Continue to update baseline imperiled species occurrence inventory lists.
Objective B	Monitor and document 1 selected imperiled animal species.
Goal: Remove exotic and invasive species from the park and maintain as necessary.	
Objective A	Annually treat at least 18 infested acres of exotic plant species in the park.
Objective B	Develop a comprehensive exotic plan management plan.
Objective C	Maintain and publish the landscaping manual for the park.
Objective D	Implement decontamination protocols for the park.
Objective E	Manage Lyngbya and other aquatic species.
Objective F	Implement control measures on 1 exotic animal species in the park.
Goal: Protect, preserve, and maintain the cultural resources of the park.	
Objective A	Continue to compile reliable documentation for all cultural resources.
Objective B	Assess and evaluate all recorded cultural resources in the park.
Objective C	Maintain all NR-eligible or listed resources in good condition.
Objective D	Complete DHR's Archaeological Resource Management (ARM) training.
Objective E	Complete historic preservation projects.

Weeki Wachee Springs State Park
Point Bar Map

0 0.25 0.5 1 Miles

N W E S



Point Bar Monitoring

The Carrying Capacity Study identified a total of 34 impacted point bars along the river within the study area. Thirty of the 34 points bars are within or adjacent to the park boundary, which is an important distinction that has management jurisdiction implications. The Carrying Capacity Study also conducted a point bar aerial assessment that involved interpreting historical aerial imagery from 2008 to 2017 and calculating an estimated loss of vegetation over the past decade. The calculations are shown in the table below. Six point bars with the clearest aerial imagery were selected, one of which is now the site associated with the new kayak takeout point. Point Bar 1 is shown in the images to the right, and Point Bar 24 is on the opposite side of the river from the new kayak takeout point. Establishing an increased staff and management presence at the new kayak takeout point should work to discourage docking and in-water activities at this point bar. For the purposes of visitor use management, the data shown below represents the baseline conditions of the point bars. All of these point bars will be monitored over the course of this planning period to help managers determine the effectiveness of management actions.

The six point bars that have been selected for long-term monitoring are intended to be representative samples that demonstrate the effectiveness of management actions on the river as a whole. Improving conditions at these six point bars will not only represent overall resource improvement on the river, but it will also suggest that user behavior has improved and indicate that docking and in-water activities have been reduced, if not eliminated altogether. Declining conditions would represent further resource degradation and signal to managers that user behavior has not been adequately addressed.

Point Bar Aerial Assessment – Vegetation Loss in Square Feet

Point Bar	PB 1	PB 6	PB 21	PB 22	PB 24	PB 28
2008 Aerial	7,031 ft^2	11,661 ft^2	7,493 ft^2	8,508 ft^2	7,012 ft^2	3,213 ft^2
2017 Aerial	5,337 ft^2	10,603 ft^2	6,063 ft^2	7,008 ft^2	6,201 ft^2	2,237 ft^2
Net Loss	**1,694 ft^2**	**1,058 ft^2**	**1,430 ft^2**	**1,500 ft^2**	**811 ft^2**	**976 ft^2**
Percent Loss	**-24%**	**-9%**	**-19%**	**-18%**	**-11%**	**-30%**

Visitor Use Management

The DRP manages visitor use to sustain the quality of park resources and the visitor experience in a manner that is 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. The DRP will be guided by the "precautionary principle" that states if there is a threat of irreversible harm to park resources, a lack of full scientific certainty will not delay management action (Kriebel et al., 2001).

Several management actions are planned to be implemented irrespective of any further observation of user impact to the river point bars. It is expected that these management actions will help enforce existing park rules, mitigate resource impacts, and improve user behavior. Objectives that will be implemented over the long term will be discussed in the VUM Objectives section. The management actions that will be implemented in the immediate term can be classified according to three categories: user education, rule enforcement, and resource protection.

Over the next two years, DRP staff will be working toward the short-term objective of developing and implementing the point bar monitoring protocol discussed in this management plan update. During these two years, it will be necessary to collect data to track resource conditions and identify the most effective adaptive management techniques. In addition to monitoring efforts, the paddle launch capacities will remain capped at 280 vessels per day. This capacity will be subject to adaptive management by park management, and any changes will be informed and supported by the data that will be collected over the long-term. The data will be documented and stored systematically in order to produce condition reports.

Management Actions
User Education
o Update kayak rental information to include emphasis on existing park rules and resource protection
o Improve concession area to highlight resource importance and interpret user responsibilities
o Conduct community outreach to provide information on river protection
Rule Enforcement
o Develop park signage to demarcate the new park boundary and inform users of the rules on the river within the park boundary
o Continue to work with local law enforcement and FWC to monitor river activity
o Consider establishing game cameras at known problem areas
Resource Protection
o Seek approval to deploy protective barriers to block access to point bars
o Develop signage at impacted point bars to inform river users on the resource impact of docking/wading
o Explore replanting native vegetation to encourage regrowth and discourage user access

Introduction

Weeki Wachee Springs State Park is a cultural icon that represents the early days of the tourism economy in Florida. The world-famous roadside attraction had its official grand opening in 1947 after a group of investors fulfilled the dream of creating a place where tourists could marvel at real-life mermaids performing underwater acrobatics in the crystal-clear waters of Weeki Wachee Springs. This vision was accomplished through the underwater skills and innovations of Newton Perry and the architectural brilliance of Robert E. Collins. Today, the Underwater Theater at Weeki Wachee Springs remains one of the state's most remarkable feats of engineering, architecture, and entertainment.

Significance of the Park

On January 22, 2020, the Weeki Wachee Springs District was listed on the National Register of Historic Places under all four criteria reviewed by the National Park Service. The four criteria include significant historical events, prominent persons, distinctive architecture, and the potential to yield valuable prehistoric or historic knowledge.

Newton Perry was an accomplished swimmer and underwater performer who had previously worked at both Silver Springs and Wakulla Springs. Perry was well-known in the film industry as a consultant for underwater scenes and was highly involved with movies being shot at all three locations. It was Perry who devised the underwater airlock (ca. 1956) and air hoses that allowed the performers to remain underwater for long periods of time without needing to surface for air.

The iconic Underwater Theater was the creation of architect Robert E. Collins. The original theater was completed in 1947 and early iterations of the underwater shows entertained audiences for 12 years until the American Broadcasting Company (ABC) purchased the themed attraction and began expanding the theater in 1959 to accommodate larger audiences. This is when Collins added the iconic clamshell roof, tile fish mosaics, auditorium seating, and 6-foot glass windows. Shortly after, Collins was also commissioned to design the Mermaid Wall (ca. 1963). Other notable pieces that correspond to ABC's emphasis on marketing and advertising include the adagio statue and marquee.

The spring itself has been used since prehistoric times as evidenced by artifacts found at archaeological sites on the property and the Safety Harbor burial mound. While the mound has been exposed to disturbance from construction, it is believed that enough of the mound is still intact for it to be listed in the NRHP. Information obtained from the undisturbed profile could add to our understanding of the people who lived in this area and their interactions with other cultures.

Circa 1947 - Credit: Florida Memory

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 and educational 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

The enchanting waters of Weeki Wachee Springs were transformed into a magical entertainment experience, which now depend on the health and maintenance of the spring and its vulnerable watershed.

Primary Interpretive Themes

Mermaid Shows
The roadside attraction's early innovations with underwater apparatuses led the mermaid shows of Weeki Wachee Springs to become a global cultural icon.

Uplands
Maintaining the scrub habitats surrounding the spring protects its remaining recharge area from development and contributes to maintenance of water quality.

Spring Run
Responsible recreation on the Weeki Wachee River is a safeguard for the water clarity and delicate vegetation of this ecological treasure.

Water Quality and Quantity
The health of the Weeki Wachee 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.

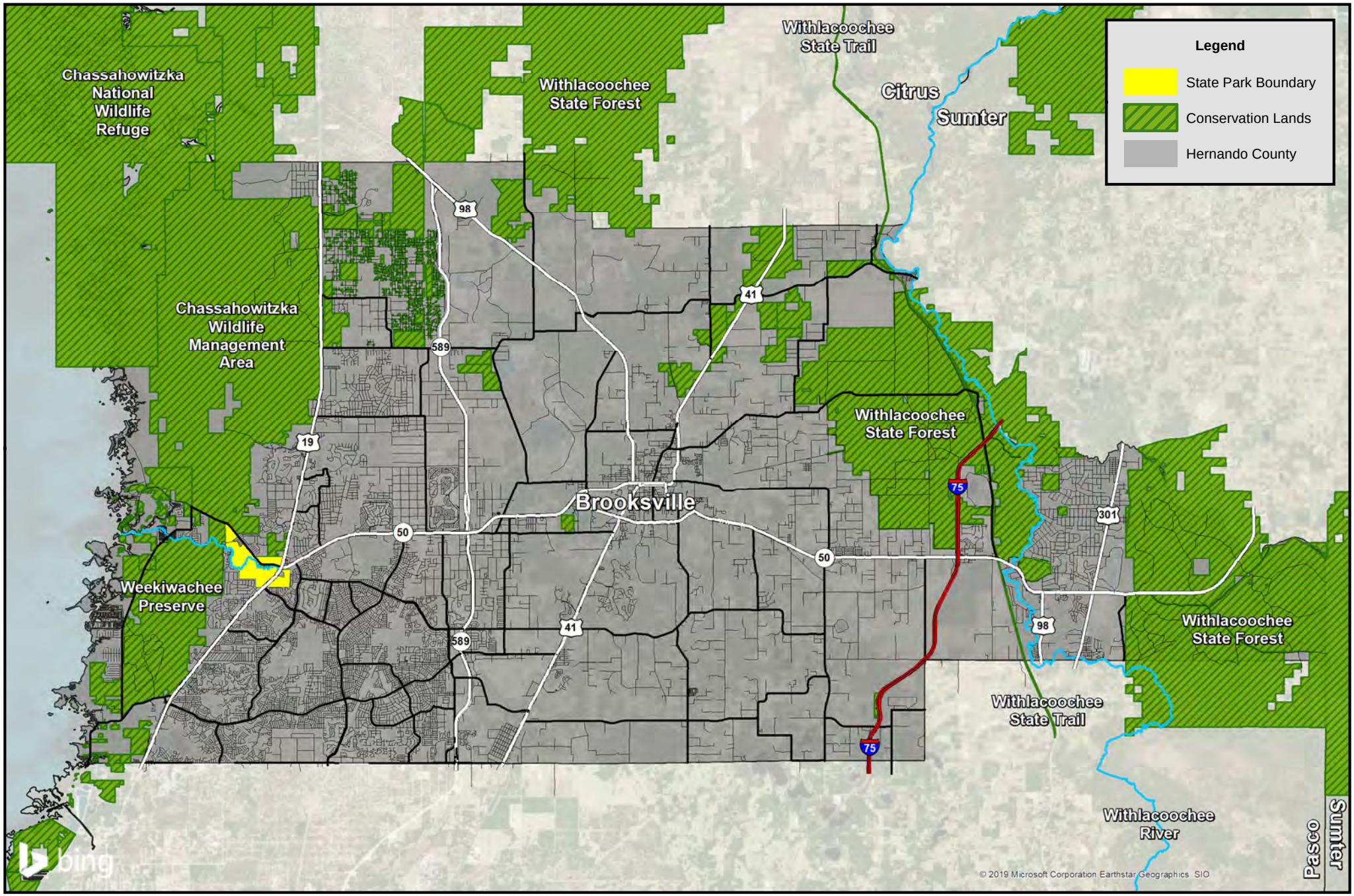
Non-Personal Interpretation
Interpretive elements which do not require a person to deliver a message (signs, exhibits, brochures, kiosks, etc.).

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

Weeki Wachee Springs State Park
Hernando County
Vicinity Map

0 4 8 16 Miles

N W E S



Purpose and Scope of the Plan

This plan serves as the basic statement of guidelines and direction for the management of Weeki Wachee Springs State Park as a unit of Florida's state park system. It identifies the goals, objectives, and actions that guide park management and sets forth the specific measures that will be implemented to meet short and long-term objectives. The plan is intended to meet the requirements of Sections 253.034 and 259.032 of Florida Statutes, Chapter 18-2 of the Florida Administrative Code, and is intended to be consistent with the Division of State Lands Management Plan requirements. Upon approval, this management plan will replace the 2011 approved plan. This updated plan consists of nine main sections and a set of nine accompanying appendices:

Main Sections	Appendices
Introduction	Acquisition History
Management Objectives	Public Outreach Report
Hydrology	References
Natural Communities	Soil Descriptions
Imperiled Species	Plant and Animal Species List
Exotic and Invasive Species	Imperiled Species Definitions
Cultural Resources	Cultural Resource Guidelines
Capital Facilities and Infrastructure	Comprehensive Plan Compliance
Visitor Use Management	Carrying Capacity Study

Public Participation

The DRP strives to facilitate numerous and varied opportunities to receive public opinion and input on unit management plan updates. Traditional public participation formats include open-house public meetings and stakeholder advisory group meetings. For Weeki Wachee Springs State Park, additional public meetings and engagement strategies were conducted. A preliminary advisory group meeting was convened on October 22, 2019. Stakeholders and interested residents attended to discuss issues at the park before a draft management plan was produced. In November and December of 2019, an online survey was shared to further gather public input and recommendations. The survey received 1,868 responses. The word cloud to the right was generated from one of the survey questions: Use one word to describe Weeki Wacheee Springs State Park.

The open-house public meeting and advisory group were held on [INSERT Dates], respectively, to discuss the draft unit management plan update. 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, promoted locally by stakeholders, and shared on social media. The advisory group summary and report, along with other public outreach information, is included in Appendix X.

Acquisition History

There are three leases associated with the management of Weeki Wachee Springs State Park. Two leases have been issues by the Board of Trustees of the Internal Improvement Trust Fund (Trustees), and the third involves the Southwest Florida Water Management District (SWFWMD). The terms of the three management leases are as follows:

Management Lease	**Date Originated**	**Term Length**
SWFWMD Lease Agreement	11/01/2008	50 Years
Submerged Lands Lease #270345153	11/25/2009	25 Years
Trustees Lease #4817	03/16/2018	10 Years

Weeki Wachee Springs State Park is designated single use to provide public outdoor recreation and conservation. There are no legislative or executive directives that constrain the use of this property (see Addendum 1). A legal description of the park property can be made available upon request to the Florida Department of Environmental Protection.

Weeki Wachee 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, aesthetic, and educational attributes.

Secondary and Incompatible Uses

In accordance with 253.034(5) F.S., the potential of the park to accommodate secondary management purposes was analyzed. These secondary purposes were considered within the context of the DRP's statutory responsibilities and the resource values of the park. For this park, it was determined that no secondary purposes could be accommodated.

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

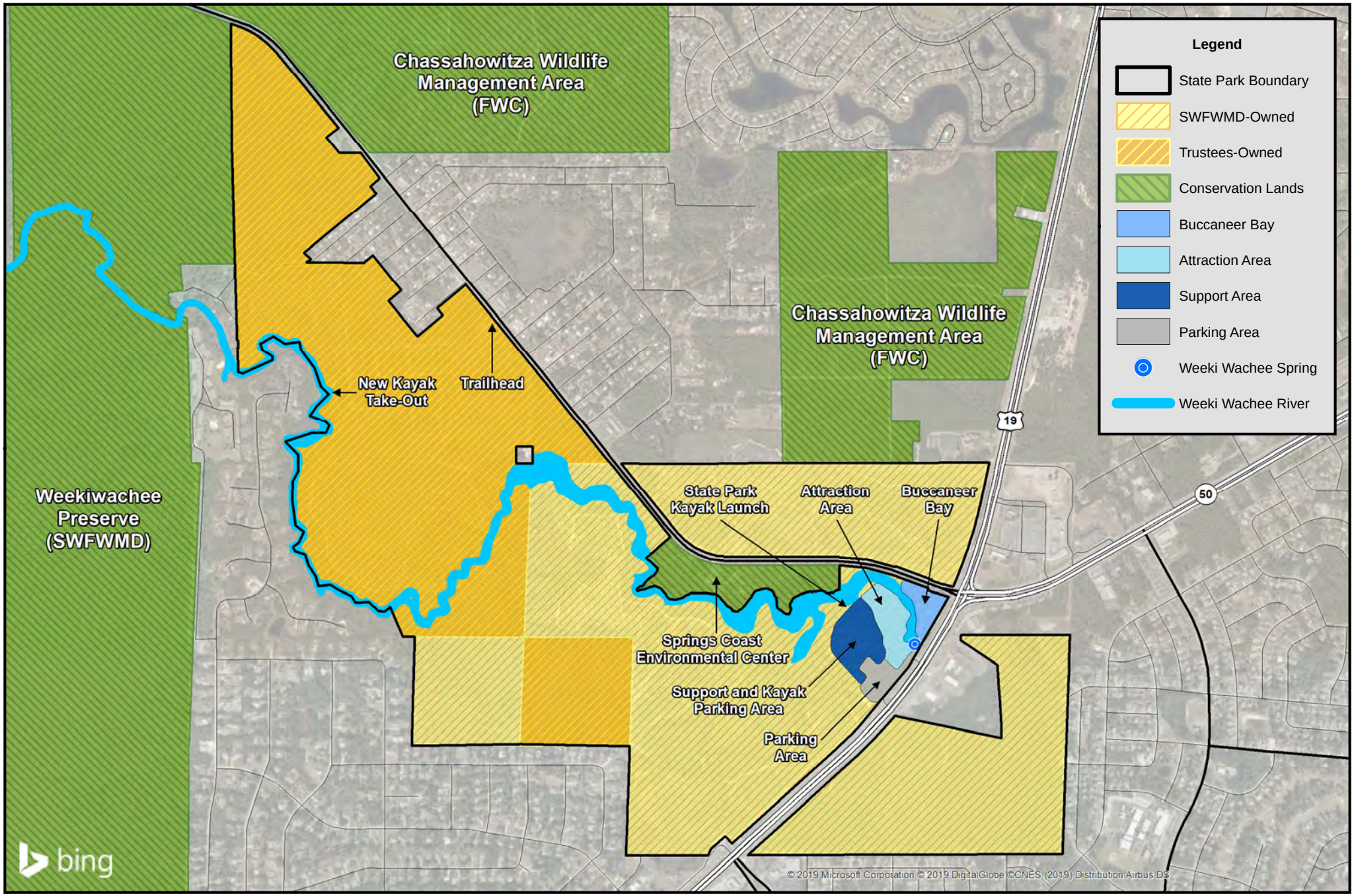
Contract Services

The 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 concessionaire may provide services to park visitors in order to enhance the visitor experience. A concessionaire may also be authorized to provide specialized services when the required capital investment exceeds that which DRP can elect to incur. Decisions regarding outsourcing, contracting with the private sector, the use of concessionaires, etc. are made on a case-by-case basis in accordance with the policies set forth in DRP's Operations Manual (OM).

Weeki Wachee Springs State Park
Reference Map

0 0.25 0.5 1 Miles

N W E S



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.*

Many operating procedures are standardized system-wide and are set by internal direction. These procedures are outlined in the OM that covers such areas as personnel management, uniforms and personal appearance, training, signs, communications, fiscal procedures, interpretation, concessions, public use regulations, resource management, law enforcement, protection, safety and maintenance.

General 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
- Restore hydrology to the extent feasible and maintain the restored condition.
- Restore and maintain the natural communities/habitats
- Maintain, improve, or restore imperiled species populations and habitats
- Remove exotic and invasive species and conduct needed maintenance-control.
- Protect, preserve and maintain the cultural resources
- Provide public access and recreational opportunities
- Develop and maintain necessary capital facilities and infrastructure

Management Coordination

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.

Management Objectives

This section compiles the management goals and objectives expressed in the separate parts of this management plan. Estimated costs for the ten-year planning period of this plan are provided for each objective, and the costs are summarized under standard categories of land management activities. Measures are identified for assessing progress toward completing each objective. The timeframes for completing each objective are:

- Continuous (C) – to be performed on a continuous basis
- Short-Term (ST) – to be completed within two years of the approval date
- Long-Term (LT) – to be completed or started within the plan's lifespan
- Unfunded Need (UFN) – to be identified for potential future funding

Many of the objectives 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 objectives, 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 objectives 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 planning period and estimated costs may need to be adjusted during the ten-year management planning cycle.

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	$2,575,000
Objective B	**Expand administrative support as new facilities are developed or as other needs arise.**	Administrative support expanded	UFN	$500,000

Goal II: Protect soil resources in the park.		Measure	Planning Period	Estimated Manpower and Expense Cost (10-years)
Objective A	**Control soil erosion through monitoring, stabilization, and unauthorized trail closures.**	# of square feet stabilized	C	$5,000
Goal III: 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 restoration needs.**	Assessment conducted or obtained	UFN	$10,000
Goal IV: Restore and maintain natural communities/habitat of the park.		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost (10-years)**
Objective A	**Develop and implement a point bar restoration plan for the spring-run stream.**	Restoration plan developed	ST	$15,000
Objective B	**Continue to monitor submerged aquatic vegetation in the spring-run stream.**	# of monitoring events conducted	C	$60,000
Objective C	**Conduct natural community improvement activities on 575 acres of scrub, scrubby flatwoods, and sandhill.**	# of acres improved	LT	$100,000
Objective D	**Maintain 615 acres of the park within the optimum fire return interval.**	# of acres maintained	LT	$54,000
Objective E	**Complete a comprehensive flora and fauna survey and update the park's baseline plant and animal list**	Plant and animal list updated	C	$10,000
Goal V: Maintain, improve, or restore imperiled species populations and habitats in the park.		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost (10-years)**
Objective A	**Continue to update baseline imperiled species occurrence inventory lists for plants and animals.**	Imperiled species lists updated	C	$5,000
Objective B	**Monitor and document 1 selected imperiled animal species.**	Population survey conducted	C	$15,000

Goal VI: 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 at least 18 infested acres of exotic plant species in the park.**	# of infested acres treated	C	$900,000
Objective B	**Develop a comprehensive exotic plan management (EPM) plan for the park.**	EPM plan developed	ST	$5,000
Objective C	**Maintain and publish the landscaping manual for the park.**	Landscaping manual published	ST	$2,500
Objective D	**Implement decontamination protocols for the park.**	# of protocols implemented	ST	$1,000
Objective E	**Manage Lyngbya and other aquatic species.**	# of acres treated	UFN	$50,000
Objective F	**Implement control measures on 1 exotic animal species in the park.**	# of hogs removed	C	$12,500
Goal VII: Protect, preserve, and maintain the cultural resources of the park.		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost (10-years)**
Objective A	**Continue to compile reliable documentation for all cultural resources.**	Documents compiled	C	$15,000
Objective B	**Assess and evaluate all recorded cultural resources in the park.**	# of resources evaluated	C	$20,000
Objective C	**Maintain all NR-eligible or listed resources in good condition.**	# of resources in good condition	C	$1,250,000
Objective D	**Send staff to complete DHR's Archaeological Resource Management (ARM) training.**	% of staff ARM trained	LT	$2,000
Objective E	**Complete historic preservation projects.**	# of projects completed	UFN	$15,000

Goal VIII: Provide public access and recreational opportunities at the park.		Measure	Planning Period	Estimated Manpower and Expense Cost (10-years)
Objective A	**Maintain the current public access and recreational uses at the park.**	Current access maintained	C	$8,570,000
Objective B	**Continue to provide and develop interpretive programs.**	# of interpretive programs	C	$50,000
Goal IX: Develop and maintain the capital facilities and infrastructure necessary to implement the recommendations of the Conceptual Land Use Plan (CLUP).		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost (10-years)**
Objective A	**Maintain all public and support facilities in the park.**	Facilities maintained	C	$3,500,000
Objective B	**Improve/repair facilities in 4 existing use areas.**	# of facilities improved	UFN	$9,378,000
Objective C	**Construct 0.75 miles of road and facilities in 2 new use areas.**	# of facilities constructed	UFN	$1,474,000
Goal X: Prevent resource degradation from user impacts and maintain a high-quality visitor experience		**Measure**	**Planning Period**	**Estimated Manpower and Expense Cost (10-years)**
Objective A	**Develop and implement visitor use management monitoring protocol.**	Monitoring protocol developed	ST	$5,000
Objective B	**Improve education and interpretation.**	# of new interpretation	ST	$10,000
Objective C	**Maintain paddle launch capacities at 280 vessels per day.**	# of vessels launched per day	ST	$10,000
Objective D	**Conduct biennial visitor satisfaction surveys.**	# of surveys conducted	UFN	$40,000

Physical Geology and Hydrology

Geology

The geology in the park is characteristic of that of most of the Springs Coast region, which extends from just south of the Big Bend to about the Anclote River (Noss and Bland 1990). In this region, the subsurface consists of thick layers of underlying limestone and dolomite that were deposited over millions of years in coral reefs. The upper limestone layers are often very near the surface and covered in mostly quartz-derived sandy soils of varying depths.

The formation nearest the surface is the Suwannee Limestone of the Oligocene series, deposited 30 to 37 million years ago. It is characterized as cream to tan, grainy to chalky, and highly fossiliferous. Beneath that lies the Ocala Group of the Eocene series, approximately 300 feet thick, formed of white, soft coquina limestone with hard micritic limestone in the deeper layers. Beneath that is the deepest formation to outcrop in Florida, the Avon Park Formation of the early Eocene. Formed nearly 45 million years ago, it is made up of hard dolomite in the upper layers and softer limestone in the lower layers (Noss and Bland 1990; Jones et al. 1997).

At the surface, Pleistocene era deposits form marine terraces. The Pamlico Terrace is the dominant terrace in western Hernando County. It is characterized by a gently sloping or nearly horizontal surface formed by wave action of an ancient sea (Noss and Bland 1990). The clays and quartz sands deposited on the ancient shoreline are still visible in the gently undulating topography of the region.

The karst features that underlay the Pamlico Terrace dominate the visible geologic landscape. These features are the result of dissolution of the underlying limestone by the action of surface and ground water movement. This movement of water slightly acidified by atmospheric and soil carbonic acid, over time has produced numerous sinkholes, underground drainage systems, and other subterranean conduits between otherwise confining layers. The results of this subterranean dissolution of rock often manifest in very visible surface features like springs, sinks and sinkhole lakes.

The four dominant visible karst features in the park are the two springs, Weeki Wachee Spring and Twin Dees, or Little Spring, a small sinkhole on the main park parcel, and the paleo-sink on the parcel east of U.S. Highway 19. The springs are karst openings to the Upper Floridan aquifer. In this part of the state, the freshwater part of the Floridan aquifer is formed by Suwannee and Ocala limestones and the Avon Park Formation (Knochenmus and Yobbi 2001).

Topography

The topography of Weeki Wachee Springs State Park is typical of the local physiography, classified as Gulf Coastal Lowland by White (1970), and more specifically as the Weeki Wachee Dune Field by Brooks (1981). The Weeki Wachee Dune Field is an approximately 32-mile long and 5- to 10-mile wide region characterized as an area of paleo-sand dunes and solution basins with elevations not exceeding 90 feet (Brooks 1981). These ancient dunes form a gently sloping relief in the uplands and nearly level lowlands. The park sits on the western edge of the Weeki Wachee Dune Field near the gradation to the Coastal Swamp or Chassahowitzka Coastal Strip physiographic region.

Weeki Wachee Springs State Park
Topography Map

0 0.25 0.5 1 Miles

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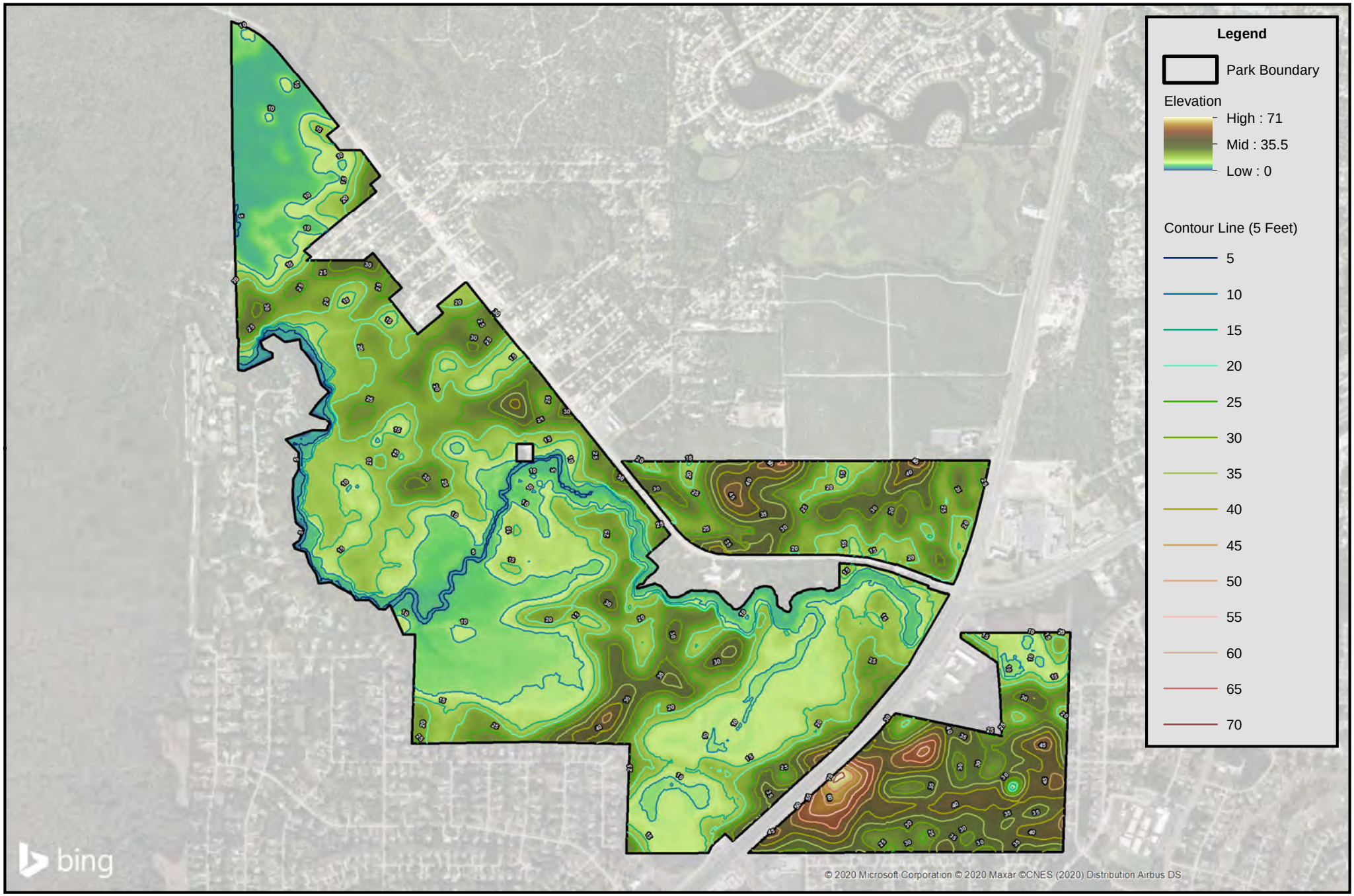

The topographic relief of the park is the result of changing sea levels during the Pleistocene Epoch that deposited quartz sand and clayey sand as dunes along ancient shorelines. The deposition of these soils resulted in the formation of marine terraces. This same wave action carved out the flat, horizontal coastline that currently supports hammocks and swamps west of the Dune Field.

Elevations in the upland scrub habitat in the park range from just over 70 feet above sea level to less than 20 feet above sea level. The elevations of the lowland hydric hammock habitats are nearly level, ranging from 20 feet to 10 feet above sea level over a much greater distance. The topography drops sharply and variably along the banks of the Weeki Wachee River. The outside bends of the river tend to be much steeper, while sand deposition on the inside of the bends tends to form more shallow slopes.

Soils

According to the Natural Resources Conservation Service, seven soil types are found at Weeki Wachee Springs State Park (see Soils Map). There are no known mineral resources at the park. For detailed information on soils, see Addendum 4. Soils associated with the different natural communities at the park are noted in the natural community descriptions in this plan.

Five of the soil types found in the park are classified as poorly drained, depressional soils typical of low lying or hydric habitats. These are designated as Anclote fine sand; Basinger fine sand; Basinger fine sand, depressional; Myakka fine sand; and Okeelanta-Terra Ceia association. The other soil types represented in the park are typical of more upland habitats, and include Myakka fine sand, Candler fine sand, and Paola fine sands, 0 to 8 percent slopes. Potential impacts to these soil types come from installation and maintenance of firebreaks, trails, feral hog rooting, and runoff from nearby roadways.

The soils of the hydric hammock and baygall bordering the Weeki Wachee River are vulnerable to erosion due to boat wakes. Several areas along the river have erosion where unauthorized recreational foot traffic along and up the riverbank has led to increased soil erosion along the river. Rooting by feral hogs (*Sus scrofa*) exposes bare soil and can lead to soil erosion.

Soil Management Objectives

Goal: Protect soils resources in the park.

A major factor contributing to the erosion potential of the upland soils are the numerous roads that have been installed both historically and more recently as a part of the restoration and routine management activities of the previous site manager. An additional concern with the roads is the direction and slope as it relates to conveyance of water. The park road along the buffer on the south side of the river is close to some of the steep slopes to the river. Heavy rain events and continued vehicle use may contribute to erosion of the road. Portions of the northwestern section of the road are as much as 30 centimeters lower than the adjacent vegetated scrub to the south, indicating that loss of soil may already be happening. Monitoring of this portion of the road will be required to quantify any further soil loss. If erosion continues, the road may be restricted to use only as a firebreak. Additional stabilization of the road may also be required.

Objective A: Control soil erosion through monitoring, stabilization, and unauthorized trail closures.

Action 1 Monitor firebreaks, service roads, trails, and the river bank for soil erosion.

Changes is in topography with areas of steep slope, plus generally loose sandy soils make erosion a concern after heavy rain events along unimproved service roads, firebreaks, and along the road shoulder of US-19, and CR-550, boat wakes and trails leading up the bank of the Weeki Wachee River, and in the area around Buccaneer Bay. Currently there is evidence of erosion in WW-03B, WW-07, WW-13, WW-15, WW-26, WW-28, WW-29, WW-35, WW-36. The erosion in WW-13, 35 and 36 is associated with the slopes along the road shoulder of US-19, and CR-550. This erosion should be addressed in coordination with FDOT and Hernando County Public Works. Erosion along service roads and firebreaks should be documented and addressed. Firebreaks should be maintained with the minimum amount of soil disturbance to keep them functional.

Action 2 Develop and implement plan to address erosion issues through stabilization, trail closures, or working with local roadway managers.

Coordinate with those responsible for local roadway shoulder maintenance at FDOT and Hernando County Public Works to address concerns about runoff from roadways leading to erosion, or sand deposition into the park. Develop an annual work plan to address erosion concerns by stabilizing some areas with rock or other approved material, elimination mineral firebreaks on steep slopes where it is possible and using vegetation and logs to block unauthorized trails.

Hydrology

The ***Weeki Wachee springshed*** is an approximately 260-mi^2 region, covering a portion of southern Hernando County and northern Pasco County within the Springs Coast Basin (FDEP 2015). The primary source of groundwater to the springshed is the Upper Floridan aquifer (UFA) (Champion and Starks 2001). The UFA is largely unconfined in this area of the state due to the absence or very thin presence of an intermediate confining unit (Sepulveda 2002). Recharge to the UFA is typically high in the central and eastern portions of the Springs Coast region due to the unconfined nature of the aquifer and the frequency of shallow limestone outcrops and surface sediments that contain low levels of potentially confining materials like clay (Champion and Starks 2001). Surface run-off is influenced by factors such as impervious surfaces, distance to receiving bodies of water, and substrate morphology. For more detailed information about the Weeki Wachee Springshed including on-going monitoring and restoration efforts see the Weeki Wachee Surface Water Improvement and Management (SWIM) Plan (SWFWMD 2017).

A positive correlation has been shown to occur between area rainfall and flow at the main headspring (Heyl 2008). The average annual rainfall for Hernando County is 55 inches per year (SWFWMD 2017). The publication of the minimum flows and levels (MFL) for the Weeki Wachee River in 2008 provided a synopsis of changes over time. The goal of the MFL determination is to set the limit of further withdrawals and thus prevent significant harm to water resources or river ecology. There has been a 63 cfs linear decline in discharge in the study period between 1961 and 2004 (Heyl 2008). A number of modeling strategies were applied to determine how much of the decline was attributable to anthropogenic impacts within the springshed compared to climatic factors.

Weeki Wachee Springs State Park
Regional Hydrology Map

0 5 10 20 Miles

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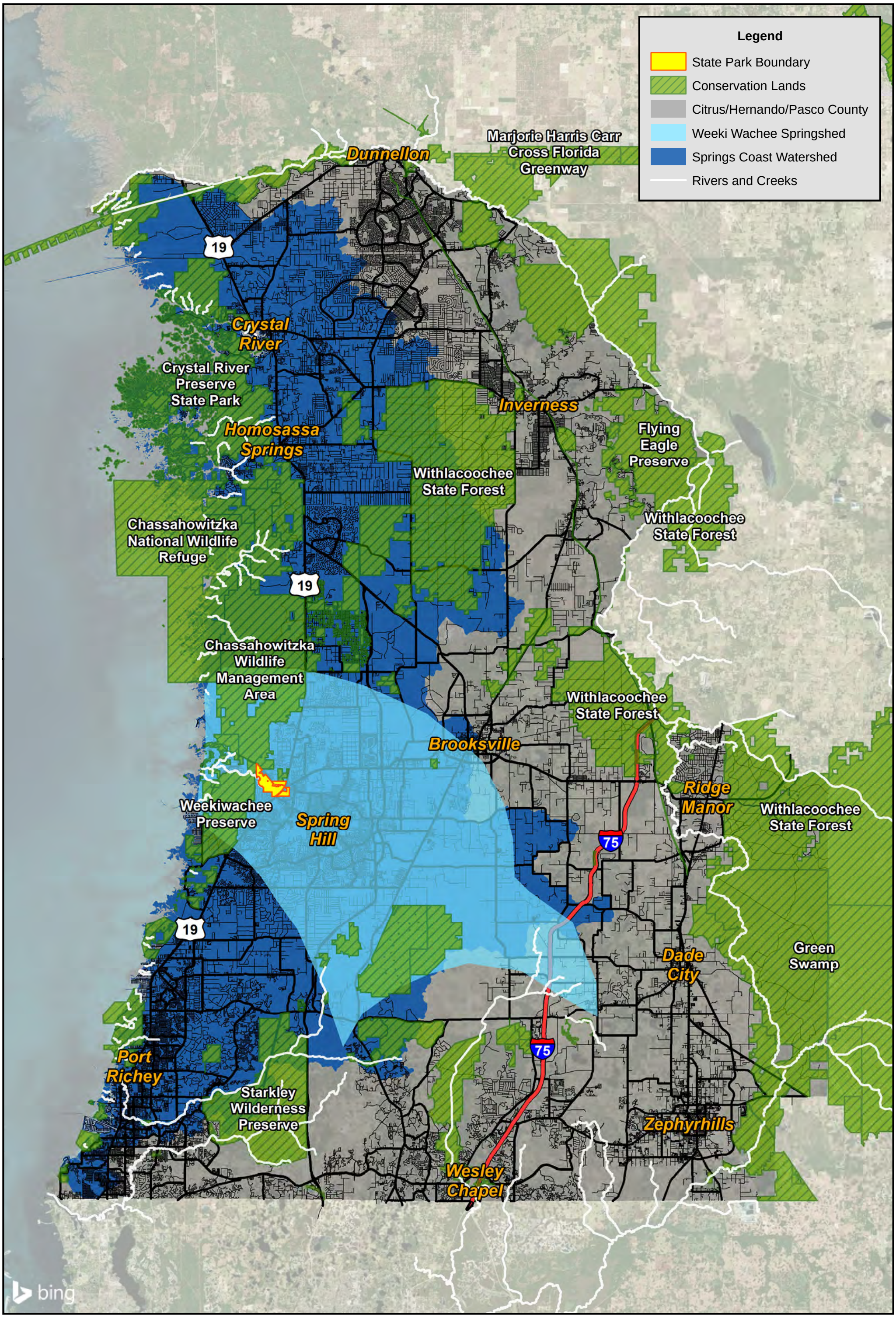

The average reduction in discharge due to anthropogenic impacts was estimated to be 17 cfs. While the MFL applies to the river, it is also intended to protect the spring as the main source of water flow.

The visible groundwater features of the park consist primarily of the Weeki Wachee headspring and the smaller magnitude Twin Dees or Little Spring. These two springs, together with several smaller springs outside the park (Salt Spring, Mud River Spring, and Hospital Hole) make up the Weeki Wachee Springs Complex (Jones et al. 1997; Champion and Starks 2001). The combined flow of these springs and the tributaries they feed make up the Weeki Wachee River.

Weeki Wachee Spring is one of 33 first magnitude springs in Florida (Florida Springs Task Force, 2000). To be classified as a first magnitude spring, median discharge of water must be at least 100 cubic feet/second (cfs) or 64.6 million gallons of water per day (mgd) (Scott 2004). Discharge data from the 1931-2015 period of record indicate an average discharge of 171 cfs from the main spring (SWFWMD 2017). Real-time water level data is readily available from USGS for the spring and river. The WMD's Weeki Wachee Springs Spring Dashboard has an overview of current metrics for the springhead and river with some historical context.

The spring is located approximately 800 feet southwest of the intersection of State Road 50 and U.S. Highway 19. The spring consists of a conical pool that is 165 ft wide east to west and 210 ft wide north to south (Scott 2004). The pool slopes gently down 10 feet to the start of the main vent. From there, the vent forms a north-south trending fracture that narrows at a depth of 185 feet to a small fracture, which is a 20-foot by 3-foot opening (Jones et al. 1997). During periods of peak flow, water can pass through the narrow fracture at 5 miles per hour. Limestone rock is exposed near the vent, but most of the pool is covered by sandy substrate (Scott 2004). Beyond the fracture, the cave turns to a more horizontal trajectory and forms a room-like tunnel that is 55 feet wide, 28 feet high and 220 feet long (Karst Underwater Research, Inc. 2008).

Twin Dees Spring**,** located about 0.5 miles southwest of Weeki Wachee Spring, is a much smaller third magnitude spring (1-10 cfs average discharge). The pool is 36 feet wide east to west and 75 feet wide north to south. Two vent openings separated by a natural dam make up the spring, giving the pool the appearance of two springs side by side when the spring is not flowing. The main spring vent is in the southwest pool and is about 4 feet in diameter and 50 feet deep (Rosenau 1977). Prior exploration and mapping of the subterranean caves and passages revealed no hydrogeologic connection between Twin Dees and Weeki Wachee Spring (Karst Underwater Research, Inc. 2008). However, in September 2014 a connection into the mainspring was discovered. And with this discovery, divers have been able to map and explore over 30,868 linear feet of subterranean passages and some areas with a depth of more than 400 feet (Karst Underwater Research, Inc. 2019).

Surface water**.** The major surface water features of the park are the Weeki Wachee River (Weeki Wachee Springs Run) and the Twin Dees Spring Run. Other surface water features include basin and depression marshes, and a sinkhole that periodically holds water (described in the natural community section of this plan).

The Weeki Wachee River flows approximately 7.52 miles to the Gulf of Mexico, but only approximately 3 miles of the river are within or along the boundary of the state park. The primary source of water in the river is the first magnitude headspring. When flowing,

Twin Dees Spring also contributes surface flow to the river within the park. The river also receives some surface run-off and seepage during periods of heavy rainfall as well as discharge from springs downriver. The surface watershed is estimated to cover 38 square miles of the central portion of western Hernando County (Heyl 2008). Average velocity for the river in the park as reported by Frazer et al. (2006) for the 2003-2005 study period was 0.16 m/s. Average depth in the river as measured for the same study period ranged from 0.8 to 2.0 meters deep, with depth within the park boundary averaging less than 1.5m (Frazer et al. 2006).

Twin Dees Spring Run is a shallow waterway, approximately 10 feet wide and 1.5 feet deep, that runs 0.2 miles from the headspring to the Weeki Wachee River (Scott 2004). Water flow through the run is intermittent. The headspring is the main source of water in the run, but it also receives surface run-off and likely some seepage flow from the adjacent hydric hammock to the east. The surrounding basin marsh is influenced by surface water from both the spring run as well as the adjacent hydric hammock.

***Water quality*.** The Weeki Wachee River and spring system is classified as an Outstanding Florida Water (OFW). Weeki Wachee Spring was designated an Outstanding Florida Spring (OFS) under the 2016 The Florida Springs and Aquifer Protection Act which requires FDEP to adopt a recovery or prevention strategy for each spring to ensure the MFL and nutrient reductions are met. Discharge from the Weeki Wachee headspring is freshwater and not influenced by tidal fluctuations. Average water temperature is 23.3ºC. The groundwater is considered hard and alkaline due to the presence of calcium carbonate dissolved from the limestone layers of the UFA. Dissolved oxygen, ammonia and phosphorus levels are low as is typical of groundwater discharge (Frazer et al. 2006).

Nitrate concentrations have been the main water quality concern for Weeki Wachee Spring. A water quality study to quantify declining water quality in 30 Springs Coast springs by Jones et al. (1997) found that nitrate concentrations were increasing across the region with nitrate concentrations in Weeki Wachee showing nitrate levels 50 times higher than background levels. In 2001 the Florida Department of Environmental Protection Florida Springs Initiative started collecting quarterly monitoring data; as well as, a number of other monitoring studies that have corroborated this trend in nitrates (Champion and Starks 2001, Frazer et al. 2001 and 2006, Haber 2005, Cohen et al. 2007; Harrington et al. 2008). This was followed by the verification of the nutrient impairment and the establishment of a Nutrient Total Maximum Daily Load (TMDLs) for the Weeki Wachee Spring and River in June 2014. The nutrient TMDLs goals are an annual arithmetic mean nitrate concentration of 0.28 mg/L at the spring vent of Weeki Wachee Spring and an in-stream annual arithmetic mean nitrate concentration of 0.20 mg/L for the Weeki Wachee River (freshwater segment) (FDEP 2014). In 2018 the Basin Management Action Plan (BMAP) was established by FDEP to provide the roadmap to meet these TDMLs requirements.

Data indicate that the majority of the nitrate in the system is inorganic in nature (Jones et al. 1997). Based on land use cover, inorganic sources in the springshed come primarily from inorganic fertilizers applied to agricultural fields and groves, golf courses, residential lawns, and improved pasture (Jones et al. 1997). Other nitrate sources are organic, most likely from septic tank leachate, livestock waste, other sources of human and animal waste, and algae. The elevated nitrate levels have contributed heavily to a drastic shift in vegetative composition in the spring. Historical photographs and reports on the spring indicate a lush growth of desirable submerged native aquatic vegetation.

Findings by Stevenson et al. (2007) showed that thick mattes of *Lyngbya wollei* algae could become a self-sustaining nitrate source. Data collected from within and below the matte indicate higher levels of nitrate than in the water column above. Possible sources are from nitrate present in the substrate and nitrate build-up from periodic breakdown of algae within the mat.

Water quality of stormwater run-off adjacent to the spring has also been a concern. The proximity of the headspring and river to major highways, coupled with decades of intensive use of the headspring environs have increased the potential for contaminants and nutrients to flow directly into the spring and river. In the recent past, projects completed by SWFWMD have improved the stormwater retention and run-off in certain areas, including the park kayak launch area.

The main challenges for the management of the natural resource for the future are the trends of increasing nitrate concentration in the system and reduction in historic flows (maintaining velocity) in the system. Decreasing water velocity and increasing nitrates are likely both drivers for several issues including changes in the plant and animal community. The decrease in velocity can increase sedimentation, particles that settle-out can smother SAV decreasing native plant coverage and allow algae to proliferate (King 2014). To resolve these issues, action is needed regionally and beyond the boundary of the park and will require the community to enact the elements of the 2017 SWIM Plan and BMAP.

Hydrological Management Objectives

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 was impaired prior to acquisition to one degree or another. Florida's ecosystems are 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. Hydrological restoration 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.

Action 1 Continue to support water quality and quantity and biological assessment monitoring in the aquatic cave system, spring, and spring run being conducted by SWFWMD, Florida Springs Institute, KARST Underwater research, and others.

As described in the water resources section of this plan water quality and quantity monitoring in the spring system is well documented by SWFWMD and other researchers. The Florida Park Service, through the research and collection permit program, will allow continued access to the park's water resources for these important monitoring efforts.

Natural Communities and Habitats

The system of classifying natural communities employed in this plan was developed by the Florida Natural Areas Inventory (FNAI). 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. Some physical influences, such as fire frequency, may vary from FNAI's descriptions for certain natural communities in this plan. The park contains 14 distinct natural communities as well as altered landcover types. A list of known plants and animals occurring in the park is contained in Appendix 5.

Table 1. Natural Communities and Altered Landcover Types		
Natural Communities	**Acreage**	**Percentage**
Scrub	560	60.4%
Hydric Hammock	150	16.2%
Baygall	48	5.2%
Basin Marsh	31	3.3%
Mesic Flatwoods	27	2.9%
Spring-Run Stream	27	2.9%
Sandhill	14	1.5%
Mesic Hammock	11	1.2%
Scrubby Flatwoods	8.9	0.9%
Depression Marsh	4.6	0.5%
Xeric Hammock	3.8	0.4%
Wet Flatwoods	1.3	0.1%
Dome Swamp	0.5	0.05%
Sinkhole	0.1	0.01%
Altered Landcovers	**Acreage**	**Percentage**
Developed	36	3.8%
Clearing/Regeneration	3.1	0.3%
Borrow Area	1.2	0.1%
Total Acreage	**927**	**100%**

Habitat/Landcover Types	**Acreage**	**Percentage**
Upland	626	67.5%
Wetland	234	25.2%
Altered	40	4.3%
Riverine	27	2.9%
Karst	0.1	0.01%

Weeki Wachee Springs State Park
Natural Community Map

0 0.25 0.5 1 Miles

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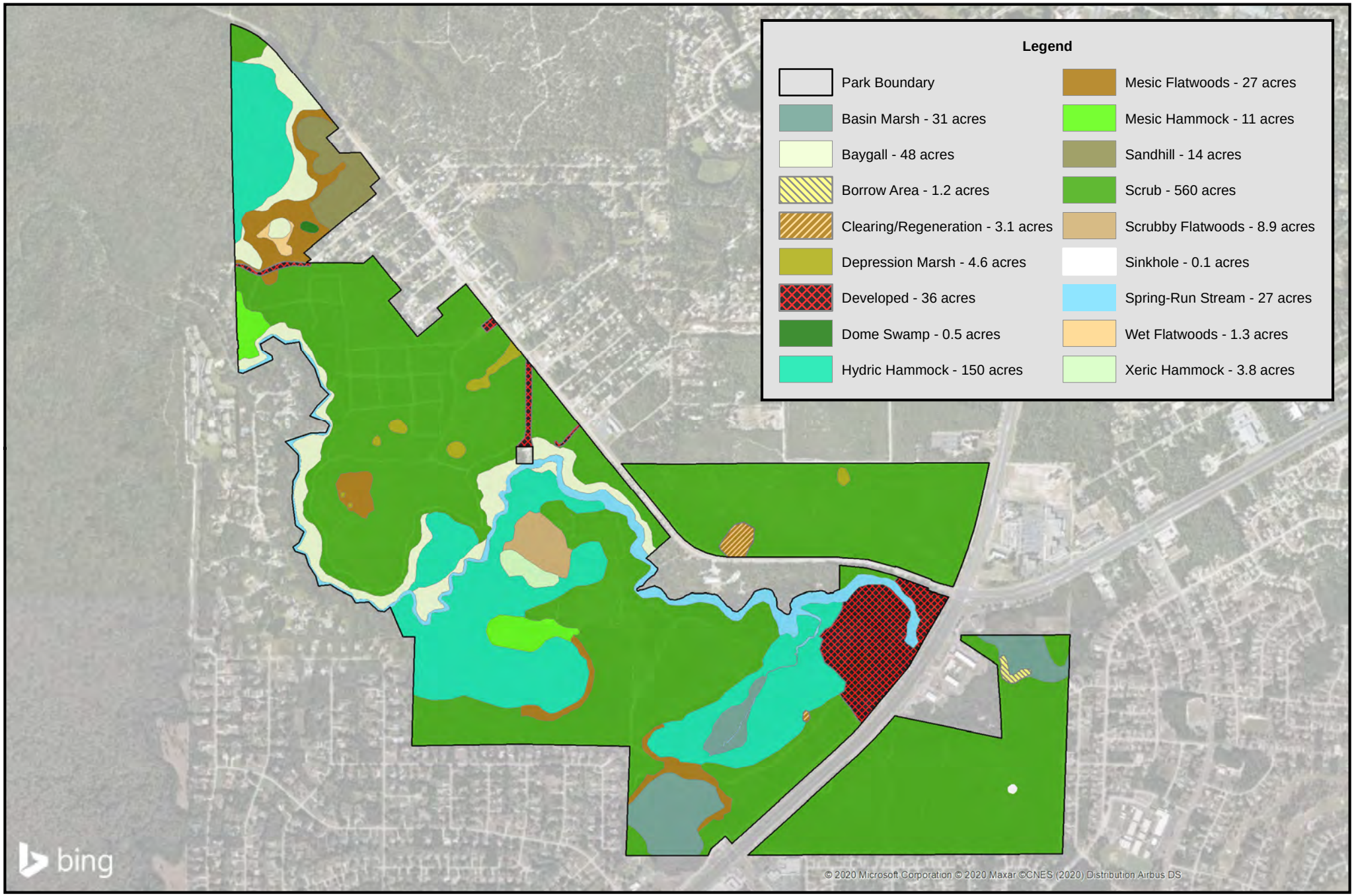

Mesic Flatwoods – 27 acres

The mesic flatwoods in the park exist primarily as an ecotonal community between the xeric scrub and sandhill communities and wetlands including baygall, basin marsh and hydric hammock communities. The habitat is characterized by the presence of a saw palmetto (*Serenoa repens*) understory and a sparse canopy of slash pine (*Pinus elliottii*). The mesic flatwoods at the park are commonly associated with the Myakka fine sands soil type.

At present the community is generally in poor condition because of a long absence of fire resulting in an invasion of laurel oak (*Quercus laurifolia*), loblolly bay (*Gordonia lasianthus*), and sweetbay magnolia (*Magnolia virginiana*) trees from the adjacent hydric hammock and baygall. These trees have shaded the habitat, resulting in decreased species diversity. Restoration of this community will require removal of the large hardwood trees and careful application of prescribed fire to restore the shrub diversity and herbaceous vegetation. Where feasible the mesic flatwoods should be allowed to burn into the ecotone of the adjacent wetland communities. To burn under drier conditions a mowed firebreak near the wetland is preferred over the construction of mineral breaks. Air potato (*Dioscorea bulbifera*), skunk vine (*Paederia foetida*) and cogongrass (*Imperata cylindrica*) are the priority invasive species for survey and treatment in the mesic flatwoods. Current coverage of invasive exotic plant species is less than one percent.

Following restorative resource management activities, the mesic flatwoods community should consist of an open canopy of slash pine and few hardwoods. Saw palmetto and native shrubs should comprise no more than 50 percent of the groundcover, with the remainder consisting of native herbs. The understory should be less than 3 feet in height. Shrub species will likely include saw palmetto, gallberry (*Ilex glabra*), fetterbush (*Lyonia lucida*), runner oak (*Quercus pumila*), shiny blueberry (*Vaccinium myrsinites*), wax myrtle (*Myrica cerifera*) and American beautyberry (*Callicarpa americana*). Herbaceous species will likely include crowngrass (*Paspalum* sp.) and threeawn grasses (*Aristida* sp.) and wildflowers like blackroot (*Pterocaulon pycnostachyum*), gayfeathers (*Liatris* sp.), Chapman's goldenrod *(Solidago odora* var. *chapmanii*), and rose-rush (*Lygodesmia aphylla*). The Optimal Fire Return Interval for this community is 1-3 years.

Mesic Hammock – 11 acres

Mesic hammock occurs in pockets in the ecotone between hydric hammock and scrub or the scrub and wetlands associated with the Weeki Wachee River. The canopy consists of live oaks (*Quercus virginiana*), pignut hickory (*Carya glabra*), southern magnolia (*Magnolia grandiflora*) and a few cabbage palms (*Sabal palmetto*) with an open understory of shrubs, a few saw palmetto. The groundcover is leaf litter with a few ferns and partridge berry (*Mitchella repens*). Air potato and skunk vine are the priority invasive plant species for survey and treatment in the mesic hammock. Current coverage of invasive exotic plant species is less than one percent. Some evidence of feral hog (*Sus scrofa*) rooting is evident in the hammock, and the hog population should be kept in check through trapping and removal. Mesic hammocks do not require fire, however fires in adjacent fire-type communities should be allowed to burn the ecotone between the scrub and hammock where feasible to do so. With the exception of a few invasive exotic plants, the mesic hammock appears to be in the desired condition.

Sandhill – 14 acres

Sandhill occurs in a pocket west of CR-550 and north of Cyclops Drive on property that was formerly managed by FWC. Excessively drained candler fine sand soils are associated with the sandhill. The sandhill is overgrown and in poor condition because of fire exclusion and has been invaded by several hardwood species, including laurel oak, myrtle oak (*Quercus myrtifolia*), Chapman's oak (*Q. chapmanii*), sand live oaks (*Q. geminata*), common persimmon (*Diospyros virginiana*), and two species of cherry Carolina laurel-cherry (*Prunus caroliniana*) and black cherry (*P. serotina*). A few sand pine (*Pinus clausa*) have also invaded the sandhill. Aerial imagery shows the sandhill was timbered in 2007 to thin dense pines, but there is no evidence of a follow-up prescribed burn. Longleaf pine (*Pinus palustris*) and turkey oak (*Q. laevis*) are present in the canopy and are the desired species. In addition to the species listed above the understory includes bluejack oak (*Q. incana*), big flower pawpaw (*Asimina obovata*), American beautyberry (*Callicarpa americana*), and saw palmetto. Where there are opening in the understory, Florida greeneyes (*Berlandiera subacaulis*), wiregrass (*Aristida* spp.), and Florida paintbrush (*Carphephorus corymbosus*). Gopher tortoises (*Gopherus polyphemus*) are observed from hatchlings to adults and their burrows are also found in these openings. In addition to the lack of fire, residents in the adjacent neighborhood have dumped rubbish (tires, glass, and other debris) plus yard waste into the sandhill. The boundary with the neighborhood is also the area where most invasive exotic plant species are located, including Camphor tree (*Cinnamomum camphora*), Chinaberry (*Melia azedarach*), air potato, skunk vine, lantana (*Lantana strigocamara*), and torpedograss (*Panicum repens*).

To get the sandhill to desired conditions, invasive and other exotic plant should be treated, understory hardwoods and sand pines will need to be harvested and removed, rubbish should be removed, then begin restoration burning. After the initial restoration burn the sandhill should be evaluated to determine if there should be supplemental plantings of longleaf pines and wiregrass in the groundcover.

Scrub – 560 acres

Two sub-types of scrub habitat occur in the park. The most widespread scrub type dominating the upland landscape is early successional oak scrub. It is characterized by deep, well-drained white sand soils (Paola fine sands), a shrub layer dominated by the xeric oak species *myrtle, sand live, and Chapman's*, and a sparse groundcover with persistent patches of open, bare sand. Up until 2002, the scrub was overgrown. Exclusion of fire for decades had resulted in invasion of the oak scrub by sand pine trees (*Pinus clausa*) and elimination of bare sand areas that are critical to many scrub endemics. In 2002, SWFWMD began restoration of 304 acres of the scrub. The restoration consisted mainly of removing the mature sand pine trees. In addition to timbering, 60 acres were mechanically mowed with a hydro-ax to reduce the height of the scrub oaks. A 94-acre prescribed fire was conducted in September 2004. A 70-foot buffer along the river corridor was left to protect water quality in the river (Barnwell 2004).

Surveys following the restoration showed a positive response by scrub vegetation. The rapid return of scrub endemic species such as Florida rosemary (*Ceratiola ericoides*), Curtiss' milkweed (*Asclepias curtissii*), garberia (*Garberia heterophylla*), and scarlet calamint (*Calaminthe coccinea*) along with numerous other herbaceous grasses and wildflowers was observed (Barnwell 2004). Other species observed in the early

successional oak scrub include southern black racer (*Coluber constrictor priapus*), eastern diamondback rattlesnake (*Crotalus adamanteus*), eastern towhee (*Pipilo erythrophthalmus*), and gopher tortoise (*Gopherus polyphemus*).

Prescribed fire has not yet been applied to the parcels east of U.S. Highway 19. Regrowth of sand pine trees on logged, but not burned, management zones is dense in some areas. Much of the scrub habitat that underwent logging without burning is currently in need of sand pine and hardwood removal before the reintroduction of prescribed burning.

Active management of the early successional scrub will require application of prescribed fire on a 5 to 15-year interval. Mechanical reduction of vegetation will likely be required in advance of prescribed burning to maintain safe burning conditions while still meeting ecological objectives. The river buffer has been included in the burn zone units of the park and will be burned on an interval appropriate to the habitat conditions. Since no restoration timbering was done within the buffer, some low impact removal of sand pine trees may be required prior to burning. Since the Weeki Wachee River is an Outstanding Florida Water, all resource management activities within the river buffer will be done in accordance with the FDACS Silviculture Best Management Practices (FDACS 1991, revised 2008).

The second sub-type of scrub known to occur in the park is sand pine scrub. Two areas of sand pine scrub are notable, with one located on the parcel east of U.S. Highway 19 and appears as a distinctive wedge of dense vegetation in 2004 and later aerial photographs, now it is management zone WW-14. The soil is identical, and the shrub layer is nearly identical, to the surrounding early successional oak scrub. The major distinction between the two is the presence of the mature sand pine trees. This area burned in a wildfire in 1976 and the wedge shape is enhanced by the fire plow roads persistent on either side. The fire killed the standing adult pines, but in the absence of prescribed fire since, sand pines have re-established. The second sand pine scrub area is in WW-30, which was added to the park in 2018, that was previously managed by FWC. This sand pine scrub is long-unburned and in senescence, with many leaning or fallen mature sand pines. Additional small pockets of mature sand pines can be found along the higher bluffs along the Weeki Wachee River.

Aerial photographs from 1944 and 1951 indicate a mosaic of vegetation in this area, with some presence of canopy trees, presumably sand pine. Photographs of the attraction taken in 1947 and 1948 also show mature sand pines on the parcel east of U.S. Highway 19. In a contiguous vegetative mosaic, fire would be expected to advance in a more natural pattern, consuming only receptive fuels and leaving areas unburned for some time, allowing establishment of mature sand pine scrub pockets in the landscape. Consequently, the historical presence of some climax sand pine community in this area is expected.

Due to the adjacent urban development, the catastrophic conditions of sand pine scrub fires will not permit the burning of this area in its present condition without mechanical removal of sand pines.

Following continued resource management activities in the scrub communities of the park, early successional oak scrub should predominate, and include sand live oak, myrtle oak and Chapman's oak. Saw palmetto, scrub wild olive (*Cartrema floridana*), Florida rosemary and rusty lyonia (*Lyonia ferruginea*) should also be present. The scrub oak

canopy should vary in height from 3 – 8 feet and there should be a variety of oak age classes/heights between different scrub patches. Bare patches of sand supporting imperiled and endemic plant species listed above, should be present. Sand pine should not be dominant in abundance, percent cover or height. Some areas of mature sand pine may persist. The Optimal Fire Return Interval for this community in the park will likely be between five and 15 years.

Within the scrub north of CR-550 in WW-19 and WW-20 there is approximately two-acres mapped as clearing/regeneration that were cleared in the past. Currently, weedy, early successional species, including ragweed (*Ambrosia artemisiifolia*), yankeeweed (*Eupatorium compositifolium*), blackberries (*Rubus* spp.), and exotic grasses including, cogongrass, rose natalgrass, and West Indian dropseed (*Sporobolus jacquemontii*). This area will be allowed to naturally succeed back to scrub, with invasive exotic plant treatment and prescribed fire as the management tools.

Scrubby Flatwoods – 8.9 acres

This habitat type occurs as a small section along the west side of the main park parcel. At present, the habitat is heavily overgrown due to the long absence of fire. The saw palmettos are extremely dense, having long ago crowded out most of the shrubs and groundcover species typical of scrubby flatwoods. Xeric oak species, primarily sand live oak and myrtle oak are present as very tall shrubs, most over ten feet tall. In addition, present, as overgrown shrubs are rusty lyonia and scrub wild olive. There are virtually no ground covers species present due to shading. A slash pine canopy of moderate density also occurs over most of the scrubby flatwoods. The needle fall from the pines has created a litter layer 2-3 feet thick in some areas. The first restoration burn was conducted November 14, 2014 which resulted in the reduction of duff and heavy ground fuels, and a reduction in the slash pine canopy. Shrubs, including saw palmetto, are still too dense and tall in the flatwoods. The scrubby flatwoods would benefit from restoration pine thinning, plus mechanical reduction in fuels followed by a growing season fire to help reduce hardwoods. Following active restoration, application of prescribed fire on a 5 to 8-year interval will maintain shrub height and density to that appropriate for scrubby flatwoods. More comprehensive species assessments will also be done over time.

It appears overall to be a small transitional zone between the scrub and hydric hammock. The Paola fine sand soil type and slightly higher elevation have contributed to the establishment of more xeric species.

Following restorative resource management activities in the scrubby flatwoods community, the canopy should be dominated by sparse (averaging 1-3 trees greater than 15 feet tall per acre) slash pine or longleaf pines. Mature sand pines should be few. The scrub oak mid-story should consist of myrtle oak, sand live oak, and Chapman's oak, which should vary in height from 3 – 8 feet representing a variety of age classes/heights. Other shrubs should include saw palmetto, rusty lyonia, shiny blueberry and tarflower (*Befaria racemosa*). Groundcover of herbaceous species should be less than 40 percent and bare open sandy patches should be present. The Optimal Fire Return Interval for this community is likely to be 5-8 years.

Sinkhole/Sinkhole Lake – 0.1 acres

There are two known sinkholes in the park. One, very small sinkhole is located in the northern portion of the main park parcel, just off the park road. It is characterized as a sandy, conical depression with limestone outcrops. Vegetation in the sinkhole is similar to that of the surrounding scrub/hammock ecotone near the river.

The larger sinkhole is located on the park parcel east of U.S. Highway 19 and is large enough to be visible on aerial photography (around 75 feet in diameter). Historical 1951 aerials show standing water in the sinkhole. During the development of the 2011 management plan, there was no standing water and the bottom was vegetated primarily with buttonbush (*Cephalanthes occidentalis*) and Carolina redroot (*Lachnanthes caroliniana*), indicating the occurrence of some seasonal inundation, or at least saturation. In October 2019, the sinkhole was filled with water. Buttonbush was growing in the water, with the pads of American white water lilies (*Nymphaea odorata*) floating at the surface. The perimeter of the sink is vegetated primarily with saw palmetto, gallberry (*Ilex glabra*), and scrubby oaks. The sinkhole is not easily accessible so dumping should not be an issue but it should be monitored for occurrences of invasive exotic plant species. The sinkhole should be monitored at least two times a year to determine if it holds water long enough to be reclassified as a sinkhole lake. If the sinkhole holds water for more than six months a year it should be considered a sinkhole lake. A hydrogeologic connection to Weeki Wachee Spring or Twin Dees Spring has yet to be determined for this sinkhole.

Management of the sinkhole will be done concurrent with management of the surrounding scrub natural community. The upland vegetation on the slopes will be protected from unnatural disturbance to prevent erosion. Regular application of prescribed fire to the surrounding scrub should carry into the sinkhole and maintain the low stature of the shrubs and saw palmetto that vegetate the sinkhole slopes. The sinkhole will be kept free of invasive exotic plant species.

Wet Flatwoods – 1.3 acres

Wet flatwoods occur as low pockets within mesic and scrubby flatwoods and as an ecotone along wetlands like baygall. Wet flatwoods have a canopy of slash pine, with an open understory of shrubs with pockets of gallberry (*Ilex glabra*), fetterbush (*Lyonia lucida*), and saw palmetto. The hydrophytic grass, warty panicum (*Kellochloa verrucosa*) and blue maidencane are common in the groundcover, with sedges (*Carex* spp.), and Baldwin's spikerush (*Eleocharis baldwinii*). Herbs like musky mint (*Hyptis alata*), and cinnamon fern are also common.

The wet flatwoods on the former FWC property had a dense cover of pine trees prior to 2007 and was logged with the adjacent mesic flatwoods and sandhill in 2007. It was not burned after the timber harvest. However, it still has an open understory, but loblolly bay (*Gordonia lasianthus*), oaks, and shrubs are encroaching from the nearby baygall and hydric hammock. The destructive rooting of feral hogs is evident in the wet flatwoods. To get to desired conditions, with a diverse groundcover and an open canopy of slash pines the wet flatwoods should be burned with the adjacent sandhill and mesic flatwoods at a 1-3 year fire return interval. Feral hog populations need to be controlled through trapping and removal to reduce the damage done to the groundcover and young pine trees (from rubbing) in the wet flatwoods.

Xeric Hammock – 3.8 acres

A pocket of xeric hammock occurs in WW-02, in a transitional area between scrubby flatwoods and hydric hammock in an area where it is sheltered from fire in most wind directions, with the exception of northeast. The xeric hammock is on well-drained Paola fine sands. The closed canopy consists of the xeric oak species found in the scrub and scrubby flatwoods (myrtle, sand live, and Chapman's), large rusty lyonia and a few scattered sand pines. The mid-story includes sparkleberry (*Vaccinium arboretum*) and scrub wild olive. There is no significant groundcover vegetation, with the ground covered in leaflitter. Fire from the adjacent scrubby flatwoods will be allowed to burn into the xeric hammock, and if intense enough, could revert the hammock back to scrub or scrubby flatwoods. During invasive exotic plant surveys in 2019, no invasive exotic species were detected, however skunk vine and cogongrass were observed in nearby areas. The hammock should be monitored for damage by hog rooting, especially during the seasonal acorn mast. The xeric hammock is considered in good condition. Hogs should be trapped and removed from the park to keep population levels low enough to prevent significant damage from rooting.

Basin Marsh – 31 acres

There are three basin marshes in the park. The Basinger fine sand, depressional soil type is characteristic of the basin marshes. The hydroperiod of these soils may be anywhere from six to nine months. The first is located on the north side of the parcel east of U.S. Highway 19. The marsh is relatively intact, except for an approximately ¾-acre area, shaped like a capital L, in the southwest corner that was excavated between 1959 and 1974. It is not clear why the wetland was excavated. The excavated area is mapped as borrow area, an altered landcover type. There are tussocks, or rafts of floating vegetation, in the borrow area, and on these tussocks the invasive Peruvian primrose-willow can be found. In the open water American white water lilies are common. Other than treating invasive exotic plant species, no restoration measures are planned for the borrow area.

This basin marsh wetland likely receives direct and indirect run-off from the adjacent highway and commercial property. There are several stormwater treatment/detention areas associated with roadways and more recent commercial developments that eventually discharge into this marsh. The northern portion of the marsh is not on state park property. There is little encroachment of hardwoods, likely due to lack of adjacent seed source. The marsh should be burned when the adjacent oak scrub is burned. Florida sandhill cranes (*Grus canadensis pratensis*) have been reported to nest in the marsh (Barnwell, pers. comm.). A survey for sandhill crane nesting will be done prior to any burning in the crane nesting season. Japanese climbing fern (*Lygodium japonicum*), skunk vine, and camphor trees are found around the perimeter of this marsh.

The second basin marsh is located on the south boundary of the main park parcel. It has also been impacted by urban run-off from the adjacent U.S. Highway 19 and urban housing development. As with the previous marsh, there is some stormwater treatment/detention associated with roadways and commercial development that eventually discharges into this marsh. The slope down to the marsh is steep on the south side but is somewhat protected by a berm formed from remnant uplands left undeveloped. The vegetative structure of the marsh is mostly herbaceous on the north and west sides, turning to wooded swamp in the center and to the south and west. Historical aerials indicate the swamp areas were previously covered by herbaceous

vegetation. The exclusion of fire and the altered hydrology of the marsh have likely permitted the establishment of woody species, including red maple (*Acer rubrum*), dahoon holly (*Ilex cassine*), swamp dogwood (*Cornus foemina*), and elderberry (*Sambucus nigra* subsp. *canadensis*). The marsh has been invaded by Chinese tallow (*Sapium sebiferum*), an invasive exotic tree, on the southwest side. The marsh should be burned as often as the adjacent upland community, and the invasive trees treated or removed. The seasonal high water line on the hardwoods is very high, indicating deep, standing water during seasonally wet periods. Therefore, fire alone may not eliminate the trees. If this is the case, the area may be managed as basin swamp. A population of the state-threatened Florida joint-tail grass (*Coelorachis tuberculosa*) has been documented in the marsh

The third basin marsh surrounds the Twin Dees Spring Run and forms the ecotone between the hydric hammock and the spring run. When viewed aerially the marsh has a drumstick shape that is the result of being wider around braiding in the spring run as it leaves the springhead. As the spring run nears the main river, the marsh gives way to hydric hammock. The herbaceous vegetation of the marsh consists primarily of sawgrass (*Cladium jamaicense*) and patches of marshhay cordgrass (*Spartina patens*). In the absence of fire, the marsh has also been invaded by woody species like Carolina willow (*Salix caroliniana*), red maple, saltbush (*Baccharis glomeruliflora*), and wax myrtle. The state-threatened cardinalflower (*Lobelia cardinalis*) is commonly observed in this marsh. There is no obvious impact to the marsh from direct anthropogenic hydrologic alteration. However, the hydrologic input to the marsh is dependent on flow from Twin Dees Spring, which is intermittent, and from seepage off the adjacent uplands. Both of these are dependent on local seasonal rainfall.

Management of the Twin Dees basin marsh will consist of monitoring for occurrence of invasive plant species and the application of prescribed fire on an appropriate interval with the ecological goal of eliminating and preventing further establishment of encroaching hardwood species.

Proposed management of the basin marsh communities at the park should result in emergent herbaceous and low shrub species dominant over most of the area, and an open vista. Trees should be few and in the deeper portions of the marshes. There should be little accumulation of dead grassy fuels due to frequent burning; the soil surface will likely be visible through the vegetation when the community is not inundated. Dominant vegetation should include maidencane (*Panicum hemitomum*), blue maidencane (*Amphicarpum muehlenbergianum*), cut grass (*Leersia* sp.), sawgrass, pickerel weed (*Pontederia cordata*), arrowheads (*Sagittaria* sp.), buttonbush, St. John's wort (*Hypericum* sp.), and Carolina willow. The Optimal Fire Return Interval for this community is 2-10 years depending on fire frequency of adjacent communities.

Baygall – 48 acres

The baygall at the park tends to be linear in nature and forms as bands between the upland communities and hydric hammock; or the uplands and Weeki Wachee River. The soils are peaty and receive seepage from the adjacent upland communities. The canopy consists of loblolly bay, sweetbay, and swamp bay (*Persea palustris*) with an occasional slash pine. The understory includes fetterbush, dahoon holly (*Ilex cassine*), wax myrtle, and saw palmetto. Vines are abundant, especially species of greenbriers (*Smilax* spp.), grapes (*Vitis* spp.), and sawtooth blackberry (*Rubus pensilvanicus*). Cinnamon fern (*Osmundastrum cinnamomeum*) and netted chain fern (*Woodwardia areolata*) are found

in the generally sparse groundcover. Laurel wilt is a fatal disease of swamp bays, and other species in the laurel family, has killed many of the red and swamp bays in the park. The disease has spread throughout Florida and is caused by an exotic fungus (*Raffaelea lauricola*) spread by an exotic pest redbay ambrosia beetle (*Xyleborus glabratus*). There are not successful management techniques for stopping the spread of this disease in wild bay trees. Baygall is not a fire dependent natural community, and frequent fire will keep baygall species from invading nearby fire-type natural communities like wet and mesic flatwoods. With a more aggressive prescribed fire program the acreage of baygall will likely decrease over what is currently mapped. Skunk vine, and Japanese climbing fern are invasive exotic plant species found in the baygall that will require management actions to keep them at maintenance levels.

Depression Marsh – 4.6 acres

Several depression marshes are located in the scrub. The depression marsh located on the park parcel north of County Road 550 is a slight depression in the surrounding scrub. To date the hydroperiod is unknown, but the vegetative structure in the marsh is indicative of the presence of some saturated soil for most of the year. The upper reaches of the marsh are dominated by broomsedge (*Andropogon* sp.), but closer to the center Carolina redroot dominates, which typically has more affinity for saturated soils. The ecotone between the scrub and the marsh is dominated by gallberry and ericaceous shrubs. The smaller depression marsh in WW-33B can be over three feet deep and has a hydroperiod long enough to support American white waterlily. The small marsh in WW-34 has sawgrass covering about a quarter of it. A couple of the depression marshes appear suitable as breeding ponds for gopher frogs (*Lithobates capito*). A frog call survey is recommended to inventory what species are using the wetlands in the park.

During dry periods hog damage can be severe, with most of the wetlands having soils disturbed by rooting. Hog trapping and removal is recommended.

Active management of the depression marsh will consist of monitoring for occurrences of invasive exotic plant species, hog activity and application of prescribed fire concurrent with burning the adjacent scrub to prevent encroachment of woody species.

Following regular application of proposed management activities in the depression marsh, emergent herbaceous species should dominate, and there should be an open vista. Trees should be absent. Dominant vegetation should include maidencane, bluestem, pickerel weed, arrowheads and St. John's wort. The Optimal Fire Return Interval for this community is 2-10 years depending on the fire frequency of the adjacent scrub community.

Dome Swamp – 0.5 acres

There is a small dome swamp of less than an acre north of Cyclops Drive. The dome canopy is a mixture of pond cypress (*Taxodium ascendens*), red maple (*Acer rubrum*), sweetbay, and swamp tupelo (*Nyssa biflora*). Groundcover is sparse with Royal ferns (*Osmunda regalis* var. *spectabilis*) and cinnamon ferns dominating. The perimeter of the dome swamp has a few invasive exotic species including Chinaberry, Chinese tallow, Brazilian pepper (*Schinus terebinthifolia*), air potato, and skunk vine, with some wild taro in the interior. Hydrology of the swamp does not appear to have been modified to drain it, and water level fluctuations support swamp trees.

Hydric Hammock – 150 acres

Hammock communities that are subject to periodic flooding are considered hydric hammocks. These hammocks often occur associated with springs and karst seepage (FNAI 1990). This climax community type primarily occurs adjacent to the spring-run communities in the park, and is part of a larger area known as the Weeki Wachee Swamp, at elevations less than 20 feet above sea level. The hydric soils are predominantly Okeelanta-Terra Ceia association and Anclote fine sand, and may be inundated during the rainy season for three to six months, or more. Despite the proximity to a major spring-run river, this community type is not considered a bottomland or floodplain community due to its hydrology. While the flow from Weeki Wachee Spring varies seasonally, the variation is not so much as to regularly overflow the riverbanks and flood the adjacent low-lying land. Rather, the water source of this hammock is groundwater flowing down slope over the underlying limestone, as well as some surface water in the rainy season. The organic sediment is not thick, indicating a shorter hydroperiod than that typical of a swamp community type. The frequency of fire occurring in the hammock is very low. The hydrology, fire frequency and organic matter accumulation justify the classification of this community type as hydric hammock (Ewel 1990).

The underlying karst topography results in lowland depressions or bowls along the course of both the Weeki Wachee Spring run and the Twin Dees Spring Run. While the plant species in the hammocks are similar, the microclimate created by proximity to the spring runs and hammock creeks results in some species variability. Typical plants found in the canopy are cabbage palm (*Sabal palmetto*), laurel oak, sweetgum (*Liquidambar styracifolia*), American elm (*Ulmus americana*) and sweetbay magnolia. Mid-story species generally consist of elderberry, laurel cherry (*Prunus caroliniana*), swamp bay, wax myrtle (*Myrica cerifera*), and highbush blueberry (*Vaccinium corymbosum*). Groundcover species are typically ephemeral forbs, sedges, and ferns, such as lizard tail (*Saururus cernua*), marsh fern (*Thelypteris kunthii*), netted chain fern (*Woodwardia aureolata*), and common blue violet (*Viola sororia*). Southern magnolia and red cedar (*Juniperus virginiana*) are also scattered throughout.

In the more hydric parts of the hammock loblolly bay, Virginia willow (*Itea virginica*), royal fern, swamp dogwood, jack-in the-pulpit (*Arisaema triphyllum*), swamp tupelo, and needle palm (*Rhapidophyllum hystrix*) can be found. Typical birds include red-bellied woodpecker (*Melanerpes carolinus*), white-eyed vireo (*Vireo griseus*), Carolina wren (*Thryothorus ludovicianus*), and northern cardinal (*Cardinalis cardinalis*).

No active management of the hydric hammock is required other than monitoring for negative impacts such as hydrologic alteration, erosion, invasive exotic plant infestation, anthropogenic impacts and monitoring any species of special concern such as threatened or endangered species. Hydrologic impacts would likely come primarily from alterations to the community's upslope, altering the input of surface water and flow of karst seepage. Invasive exotic plant species documented in the hydric hammock are skunk vine, Japanese climbing fern, and various ornamentals escaped from cultivation at the attraction. Most ornamentals are confined to the areas near the attraction, with those in natural areas to be eliminated or managed.

Spring-run Stream – 27 acres

Vegetation in the river is primarily submerged aquatic macrophytes and filamentous algae. Southern water nymph (*Najas guadalupensis*) and eelgrass (*Vallisneria americana*) are common occurrences as well as the occasional occurrence of spring tape (*Sagittaria* kurziana) and the invasive hydrilla (*Hydrilla verticillata*). Supplemental plantings of spring tape, eelgrass and emergent aquatic plants were installed in the headspring and upper river as part of the 2008 spring restoration by SWFWMD. The initial infestation of the nuisance algae, *Lyngbia wollei*, was removed in 2008, but it continues to persist as re-growth in the headspring and on submerged vegetation in the upper river. Florida manatee (*Trichechus manatus latirostris*), alligator (*Alligator mississippiensis*), striped mullet (*Mugil cephalus*), bluegill (*Lepomis macrochirus*), mangrove snapper (*Lutjanus griseus*), peninsular cooter (*Pseudemys floridana peninsularis*) and Florida red-bellied turtle (*Pseudemys nelsoni*) are present. The spring-run stream has a diverse assemblage of native aquatic turtles, with nine species documented by researchers in 2015 (Munscher et al., 2017).

Emergent vegetation along the banks of the spring run and on vegetated sand bars include areas of point bar marsh with sawgrass, crinum lily (*Crinum americanum*), bull-tongue sagittaria (*Sagittaria lancifolia*), herb-of-grace (*Bacopa monnieri*), and smallfruit beggarticks (*Bidens mitis*). On these point bars there is also some woody vegetation including cypress, Virginia willow, saltbush and Carolina willow. On some point bars, recreational activities along the river has impacted the vegetation through trampling and loss of vegetation when people exit their vessels. This leads to increasing erosion, and increased turbidity in the river (Wood 2020). Existing conditions of point bars in the park will be documented (within 6 months); this will be followed by quarterly monitoring. For those point bars showing vegetation loss or erosion from recreational use, a restoration plan will be developed which could include signage and barriers to allow for natural recovery, or in areas with significant vegetation loss or erosion, other restoration measures to be taken, including replanting and erosion control.

Vegetation in the Twin Dees spring run is sparse, but red-top panicum (*Coleataenia rigidula*), crinum lily, lanceleaf sagittaria (*Sagittaria latifolia*), and smallfruit beggarticks are present. Invertebrates such as the native bivalve, *Villos amygdala* and native apple snail (*Pomacea paludosa*) are also present. Numerous tracks from wading birds and raccoons (*Procyon lotor*) are obvious in the bed of the run in the absence of flow.

In addition to removing the nuisance algae, invasive exotic species along the spring run will need to be removed or treated. The FWC aquatic plant permit for herbicide treatment and hand removal will need to be amended to include wild taro (*Colocasia esculenta*), water lettuce (*Pistia stratiotes*), Japanese climbing fern, torpedograss (*Panicum repens*), and other invasive species commonly found along the shoreline.

The desired condition for the spring-run stream is to have flows, water clarity, and temperatures maintained to benefit desirable native submerged aquatic vegetation, with reduced nitrate levels and coverage of nuisance algae. Point bars will be vegetated with native emergent wetland vegetation, and not eroding. Invasive exotic plant coverage will be less than one percent.

Aquatic Cave – No acreage available

This natural community is not represented on the natural communities map. The underground cave system at the park is quite extensive, and ongoing research by Karst Underwater Research has mapped much of the system and the interconnection between Twin Dees vents and the head spring. There are several imperiled cave adapted invertebrates found in the system, including Hobbs cave amphipod (*Cranogonyx hobbsi*), Florida cave amphipod (*C. grandimanus*), and north Florida spider cave crayfish (*Trogocambarus maclanei*).

The caves are formations that have resulted from dissolution of the upper limestone layer by the movement of water. The caves of both springs have been explored by divers. On-going exploration efforts by cave divers will continue to investigate the water chemistry, sedimentation, geology and species of the subterranean caves. Blind cave crayfish (*Cambarus* sp.) have been observed. The aquatic caves will be protected against disturbance and alterations that may affect water flow and microclimate, or that may cause increases in pollution.

Natural Community Management Objectives

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

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.

Natural Community Restoration

In some cases, the reintroduction and maintenance of natural processes is not enough to reach the desired future conditions for natural communities 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 community 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 will 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, and small-scale vegetation management.

Objective A: Develop and implement a point bar restoration plan for the spring-run stream.

Action 1	Develop monitoring protocols, survey and document condition of all point bars identified in the park on the Weeki Wachee River.
Action 2	Monitor 6 point bars quarterly and an additional 14 point bars annually
Action 3	Develop improvement or restoration plans for point bars where recreation use (visitor impacts) have reduced vegetation coverage or increased erosion.
Action 4	Implement restoration plan

Within six months of UMP approval have monitoring protocols in place and document all of the point bars under state park management identified in the Carrying Capacity Study (SWFWMD et al. 2020). Six point bars identified in the Visitor Use Management section of this plan will then be monitored quarterly to document improvements or deterioration. Fourteen additional point bars under the park's jurisdiction will be monitored annually. In addition to point bars, other areas of bank erosion will be monitored and documented. For point bars and other areas of erosion, a restoration plan will be developed that will include options like signage, closing off areas, and planting vegetation. These efforts will be conducted in collaboration with the Southwest Florida Water Management District.

Objective B Continue to monitor submerged aquatic vegetation in the spring run stream.

Action 1	Continue to monitor six transects using the quadrat protocol.
Action 2	Summarize survey data in an annual report

Continue monitoring submerged aquatic vegetation to determine if the actions taken to restore point bars improves the cover of submerged aquatic vegetation, of if additional measures are required. Erosion from point bars can lead to smothering of submerged aquatic vegetation (SAV). SAV can also be uprooted by boat propellers and unauthorized swimming and wading. Monitoring will be conducted in collaboration with SWFWMD.

<u>Natural Community Improvement</u>

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 C: Conduct natural community/habitat improvement activities on 575 acres of scrub, scrubby flatwoods, and sandhill natural community.

Action 1	Selectively timber approximately 240 acres of sand pines and hardwood prior to restoration prescribed burning.
Action 2	Mechanically treat overgrown understory vegetation prior to restoration prescribed burning.
Action 3	Develop and implement restoration/habitat improvement plan for sandhill where groundcover will not support frequent, low intensity, prescribed fire treatment.

In 2018 approximately 240 acres of sand pines were identified for removal in multiple management zones. Sand pines and larger hardwoods (scrub oaks), will need to be cut prior to the reintroduction of fire into many of the scrub management zones and the areas of mesic flatwoods and sandhill. Sand pines and hardwoods will need to be harvested and taken offsite to reduce the amount of smoke produced during the planned restoration prescribed fires to follow the harvest. Silviculture best management practices will be followed for any selective thinning in near the buffer to the Weeki Wachee River, designated outstanding Florida water (DACS 2008). Post-harvest zones will be evaluated to see if additional mechanical treatment would be required prior to prescribed burning.

In a few smaller pockets of uplands (WW-3A, 10, 16, and 17) mechanical treatment (mowing) of overgrown understory vegetation is needed prior to restoration burning. The understory in the scrubby flatwoods of WW-02 would also benefit from mechanical treatment to reduce the height of saw palmetto and some of the larger shrubs/hardwoods prior to burning. Twenty-five total acres of mechanical treatment is required for these zones however this excludes acreage that needs to be treated after the proposed timber harvest and management zone evaluation listed above.

Because of the long period of fire exclusion, thick understory and shading in the sandhill (WW-37), supplemental planting of wiregrass and longleaf pines on approximately 20 acres will likely need to follow a sand pine/hardwood harvest, and post-harvest fuel reduction (timber litter) prescribed burn.

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 plant and 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 wildland fuels. All prescribed burns and wildlife suppression in the Florida state park system are conducted with authorization from the FDACS, Florida Forest Service (FFS).

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. In order to track fire management activities, the DRP maintains the Natural Resource Tracking System (NRTS). NRTS allows staff to track various aspects of each park's fire management program. NRTS is used for annual burn planning which allows the DRP to document fire management goals and objectives on an annual basis. Each annual burn plan is developed to support and implement the broader objectives and actions outlined in this ten-year management plan. Each quarter reports are produced that track progress towards meeting annual burn objectives.

Objective D: Maintain 615 acres of the park within the optimum fire return interval.

Action 1	Develop/update annual burn plan
Action 2	Manage fire-dependent communities by burning between 53-170 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	**Acreage**	**Optimal Fire Return Interval (Years)**
Scrub	560	5-15
Sandhill	14	1-3
Mesic Flatwoods	27	1-3
Scrubby Flatwoods/Xeric Hammock	12	5-15
Wet Flatwoods	1	1-3
Depression Marsh	4	5-15
Basin Marsh	31	2-10
Annual Target Acreage	**53 – 170**	

Prescribed fire at the park is complicated by the fact the park is bisected by major high use roadways including US-19, SR-50, and CR-550. In addition to the roadways, most of the park boundary is considered urban interface, with residential or commercial development adjacent to the park. A great deal of care, planning, and outreach is needed to successfully burn at the park.

Most of the burnable acres at the park is scrub with a fire return interval (FRI) of 5-15 years. Some areas in the park would be classified as the sand pine scrub variant (WW-3B, 6B, 14, 30, and a few other pockets) with a mature sand pine canopy, and understory of oaks and rosemary. The goal is to manage the scrub closer to early successional without a canopy of mature sand pines because of difficulty of controlling fire in sand pine scrub near the urban interface. Prior to state park management (on both former SWFWMD and FWC sites), sand pines were harvested, with some prescribed burning done afterwards. Areas that were not burned within a couple of years of the sand pine harvest, now have stands of 10-15 year old sand pines established that will need to be removed. Recent attempts to burn the management zones with stands of the 10-15 year old sand pines have not been successful in any significant reduction in their number. Half of the scrub acreage would benefit from hardwood removal and sand pine harvest, before prescribed fires are attempted, this is especially true for the zones east of US-19 (WW-13-18), and the mature sand pine scrub in WW-30. After the sand pine harvest/hardwood removal, management zones will be assessed for any additional mechanical treatment needs to safely burn. Because of smoke management concerns, the zones east of US-19 will likely need to be divided and burned in smaller acreage than the existing management zones. Scrub along the river corridor has also not been burned or harvested. Care should be taken to ensure burning adjacent to the river does not exacerbate any erosion issues along the river. In areas of scrub with Florida rosemary, an attempt should be made to leave pockets of rosemary unburned if the area being burned is less than 15 years post-burn, and there are no mature seed producing rosemary in the zone.

The sandhill, mesic flatwoods, and wet flatwoods, will be treated together, since they are in the same management zone WW-37 and will be under the same FRI of 1-3 years. Under FWC management, pine thinning was conducted in 2007, but there is no evidence that it was followed by a prescribed burn. Currently most of the area has a thick understory of hardwoods and a few sand pines that will need to be removed before restoration burning is conducted. The existing firebreak that was maintained by FWC around the outparcel does not appear to be fully within the park boundary. A fire break along the west boundary will need to be established by tying the upland fire-type community to the hydric hammock which will serve as a natural fire break. In the ecotone between the uplands and the wetlands being used as natural fire breaks a corridor of taller vegetation will be allowed to persist in an area identified by FWC as a buffer for black bear movement along the baygall and hydric hammock.

Scrubby flatwoods and xeric hammock will be treated together, since they are both in the same management zone WW-02 and have similar species composition. The scrubby flatwoods was burned in 2014 after a long period of fire exclusion. The burn was successful in reducing some of the thick duff found in the zone, reducing the pine canopy. Before the next prescribed burn the zone would benefit from additional pine thinning and hardwoods reduction plus mechanical treatment of the shrub layer. After the mechanical treatment additional restoration burns should be conducted to continue to reduce the dead fuels and incrementally reduce the amount of duff. The xeric hammock will not receive mechanical treatment but fire from the adjacent scrubby flatwoods will be allowed to burn into it. After mechanical treatment and a restoration burn, a FRI of 5-15 years is appropriate.

Two of the three basin marshes are not completely within the boundary of the state park, so they will require additional planning and prep before prescribed burning is attempted. The third, is surrounded by the hydric hammock associated with Twin Dees spring and spring run. The optimum FRI would be 2-10 years to keep hardwoods from overtaking and turning the area into a swamp. The depression marshes are embedded in scrub, so the FRI will be set with the upland natural community of 5-15 years.

Because of the changes in elevation and topography at the park and potential for erosion, firebreaks should be maintained with as little soil disturbance as needed to keep them functional. In some area, a light surface raking should be sufficient to break up the fuels and keep the break functional. Special care should be taken near cultural sites.

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

Action 1 Complete a comprehensive survey.
Action 2 Update the baseline plant and animal list.

The addition of 389 acres to the lease in 2018 added natural communities previously not found within the park that will require additional plant and animal surveys and updates to the plant and animal list. Since November 2008 when Weeki Wachee became a state park, an understanding of the diversity of plant and animals in the park has greatly improved through observations, herbarium collections, and documentation research done in the park. Additional work is still needed to identify the grass and sedge species, reptiles and amphibians, and small mammals. Plant inventories after prescribed fire will be a priority to help document some of the more ephemeral species that bloom shortly after fire.

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 the U.S. Fish and Wildlife Service (USFWS), National Oceanic and Atmospheric Administration (NOAA)– National Marine Fisheries Service (NMFS), Florida Fish and Wildlife Conservation Commission (FWC) or the Florida Department of Agriculture and Consumer Services (FDACS) as endangered, threatened or of special concern.

The scrub habitat type in the park is not only imperiled globally and within Florida (G2/S2 - FNAI), it has high potential for the occurrence of imperiled species. A combination of fire suppression and habitat fragmentation due to urbanization has greatly reduced not only the amount of scrub habitat in Florida, but also the quality of the available habitat. The survival of a number of species endemic to the scrub community is dependent on the open sandy gaps and reduction of competing species that result from the cyclical occurrence of fire. Species such as the Florida scrub jay, scrub pinweed and Curtiss' milkweed can become locally extirpated in the absence of fire.

Significant scrub restoration was done by SWFWMD in 2002 by removing sand pines and reducing climax vegetation height and density using mechanical treatment and prescribed fire. Soon after restoration, field surveys indicated a strong positive response by a number of species. Surveys conducted in June 2003 located more than 100 occurrences of Curtiss' milkweed. The state-endangered Curtiss' milkweed is a scrub endemic documented as rare and occurring patchily in the dry, sterile white sands of peninsular Florida scrubs (Ward 1979). Herbarium records indicate that Curtiss' milkweed was documented near Weeki Wachee Spring by John K. Small in 1922 (Putz and Minno 1995). Positive responses of imperiled plant species were also noted in post restoration surveys by SWFWMD for the state-threatened garberia and nodding pinweed (*Lechea cernua*) (Barnwell 2004). Habitat condition will be monitored as an indicator of the general status of endemic, threatened and/or endangered scrub plants. Additional species-specific monitoring will be conducted as necessary in conjunction with resource management activities, primarily prescribed burning and mechanical treatment.

While Florida scrub jays are not currently known to occur in the park, they have been historically documented. An adult jay was last seen in 2006 in the eastern portion of the main park parcel, near U.S. Highway 19, by SWFWMD staff (Barnwell, pers. comm.). The closest known occurrence of scrub jays is in the city of Hudson, about 14 miles south of Weeki Wachee in a residential development. Birds have also been documented in eastern Hernando County in the Richloam tract of the Withlacoochee State Forest (FWC). Continued maintenance of the scrub through application of prescribed fire and mechanical treatment where needed should ensure habitat conditions suitable to imperiled scrub species, both plant and animal.

Gopher tortoises have been well documented in the park. A burrow survey conducted by SWFWMD following scrub restoration efforts found 35 burrows (Barnwell 2004), and additional surveys that followed found over 100 active or inactive burrows. In January of 2019 FWC conducted a pilot survey using the Line Transect Distance Sampling protocols to determine tortoise encounter rates prior to conducting a full survey to estimate the tortoise population. During the pilot survey 12 burrows were found along the transects with 6 of them occupied. The encounter rate was deemed too low to conduct a full survey until the condition of the scrub, scrubby flatwoods, mesic flatwoods, and sandhill

is improved. The FWC recommendations for gopher tortoise habitat improvements are similar to what has already been suggested in the natural community description and assessment section, with sand pine and hardwood removal and mechanical treatment being a priority to improve tortoise herbaceous forage (Cobble 2019). Restoration of the flatwoods communities should benefit the gopher tortoise population since the density of desirable herbaceous species is typically higher in mesic flatwoods than scrub.

West Indian manatees have been well-documented in the Weeki Wachee River. Employees of Weeki Wachee Spring's attraction have observed manatees consistently in the spring during the winter months. Manatees typically number about six to seven but can number up to as many as 13 (Athanason, pers. comm.). The United States Fish and Wildlife Service (USFWS) has designated Weeki Wachee Spring as a primary warm-water refuge site due to the constant temperature of groundwater from the main headspring, consistent use of the spring and river by manatees, and the location of the spring relative to other thermal refuge sites (USFWS 2007). The freshwater and macrophytic vegetation make the river a year-round refuge.

The factors influencing manatee numbers in the spring are not well understood. One concern for manatees in the headspring is the lack of submerged aquatic vegetation for manatees to feed on. Historical photos of performers in the spring basin clearly show a thick carpet of vegetation, most likely spring tape (*Sagittaria kurziana*) and eelgrass (*Vallisneria americana*). Currently the spring basin has very little macrophytic vegetation. Up until 2008, a dense growth of undesirable algae, primarily *Lyngbya wollei*, smothered the bottom, likely preventing the growth and establishment of aquatic plants. A restoration effort, begun in 2008 by SWFWMD, to remove the fouling algae and sediments and replant native vegetation has been completed.

A 2006 survey to determine the accessibility of major Florida springs to manatees found that accumulation of sand near the mouth of the spring pool, presumably from Buccaneer Bay, may create a hindrance to manatee passage and should be monitored (Taylor 2006). Historical 1944 aerials, as well as old attraction photographs, show a large sandy area clearly visible at the mouth of the headspring. However, since upland vegetation had already been cleared up slope, the source of the sand is questionable. A site visit by FWC and Nature Conservancy staff in July 2009 to determine what, if any, improvements to the Weeki Wachee River may be needed to improve manatee access to the headspring found no obvious impediments to access present at that time. Corrective actions will be taken to eliminate any future impediments to manatee use of the upper river or headspring.

Recreational use of the Weeki Wachee River has the potential to negatively impact manatees. Two incidents of manatee mortality due to collision with watercraft were documented at the confluence of the Mud River and the Weeki Wachee River, in 1998 and 2004 (FWC-FWRI). More recently a manatee was also struck and killed July 30, 2019 on the Weeki Wachee River.

American alligators regularly occur on the river and occasionally in the headspring. No special management action is called for at this time but monitoring for any negative interactions between alligators and recreational users is needed.

Florida black bears are no-longer listed and have not been documented on the state park property, but they have been well documented on the adjacent Weeki Wachee Preserve and Chassahowitzka Wildlife Management Area (Kelly et al. 1997). The state park is

within the documented primary range of the Chassahowitzka subpopulation of the Florida black bear (FWC 2009). Park staff should coordinate with FWC on management actions that may impact the Chassahowitzka subpopulation. An area in WW-37 was identified as a bear travel corridor/buffer, and vegetation within this area will not be mechanically reduced in the ecotone along the hydric hammock as a bear travel corridor. Although no-longer listed as imperiled, southern bald eagles have been observed at the park and a nest has been documented in the park south of the river. National Bald Eagle Management Guidelines will be followed to reduce disturbance near nesting eagles (USFWS 2007).

Table 3 contains a list of all known imperiled species within the park and identifies their status as defined by various authorities. It also identifies the types of management actions that are currently being taken by DRP staff or others and identifies the current level of monitoring effort. Explanations for federal and state status as well as FNAI global and state rank are provided in Addendum 6.

Monitoring will consist of non-targeted observation and documentation (Tier 1), as well as targeted presence and absence monitoring (Tier 2). Non-targeted observation and 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. Targeted presence and absence monitoring efforts include monitoring methods/activities that are specifically intended to document presence/absence of a particular species or suite of species.

The main management actions will include managing imperiled species habitat through prescribed fire (1), exotic plant removal (2), hydrological maintenance/restoration (4), hardwood removal (6), and mechanical treatment (7). Other management actions involve protection from visitor impacts (10) and outreach/education efforts (13). Imperiled bird species management could include the creation of artificial cavities (5).

Table 3. Imperiled Species Inventory

Common Name *Scientific Name*	Imperiled Species Status				Management Actions	Monitoring Level
	FWC	USFWS	FDACS	FNAI		
PLANTS						
Curtiss' milkweed *Asclepias curtissii*			LE		1,2 6,7	Tier 1 Tier 2
Chapman's sedge *Carex chapmannii*			LT	G3S3	2,4	Tier 1
Florida jointtail grass *Coelorachis tuberculosa*			LT	G3S3	1,2,4	Tier 1
Garberia *Garberia heterophylla*			LT		1,2 6,7	Tier 1
Nodding pinweed *Lechea cernua*			LT	G3S3	1,2 6,7	Tier 1 Tier 2

Table 3. Imperiled Species Inventory						
Common Name ***Scientific Name***	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
Cardinal flower *Lobelia cardinalis*			LT		2,4	Tier 1
Southern tubercled orchid *Platanthera flava*			LT		2,4	Tier 1
Atamasco-lily *Zephyranthes atamasca*			LT		2,10	Tier 1
INVERTEBRATES						
Florida cave amphipod *Cranogonyx grandimanus*				G2G3 S2S3	4	Tier 1
Hobbs cave amphipod *Cranogonyx hobbsi*				G2G3 S2S3	4	Tier 1
North Florida spider crayfish *Troglocambarus maclanei*				G2S2	4	Tier 1
REPTILES						
American alligator *Alligator mississipiensis*	FT (S/A)	SAT		G5,S4	4,10, 13	Tier 1
Gopher tortoise *Gopherus polyphemus*	ST			G3,S3	1,2,6,71 0,13	Tier 1 Tier 2
BIRDS						
Florida sandhill crane *Antigone canadensis pratensis*	ST			G5T2,S 2	1,2 7,4	Tier 1
*Florida scrub-jay *Aphelocoma coerulescens*	FT	T		G2?, S2	1,2 6,7	Tier 1
Little blue heron *Egretta caerulea*	ST			G5,S4	2,4	Tier 1
Tricolored heron *Egretta tricolor*	ST			G5,S4	2,4	Tier 1
Southeastern American kestrel *Falco sparverius paulus*	ST			G5T4,S 3	1,2,5 6,7	Tier 1
Wood stork *Mycteria americana*	FT	T		G4,S2	2,4	Tier 1
Roseate spoonbill *Platalea ajaja*	ST			G5,S2	2,4	Tier 1
American redstart *Setophaga ruticilla*				G5,S2	2	Tier 1
MAMMALS						
Florida Manatee *Trichechus manatus latirostris*	FT	T		G2,S2	4,10 13	Tier 1

Imperiled Species Management Objectives

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

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 provide 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.

In the preparation of this management plan, DRP staff consulted with staff of the FWC's Imperiled Species Management Section 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 impact imperiled species in the park.

Objective A: Continue to update baseline imperiled species occurrence inventory lists for plants and animals.

Action 1 Update imperiled species list as new species are discovered in the park

Imperiled species are well-documented at the park. As the plant and animal inventories for the park are improved, if new imperiled species are observed and documented they will be added to the park inventory list.

Objective B: Monitor and document 1 selected imperiled animal species.

Action 1 Implement monitoring protocols for 1 imperiled animal species, including those listed in Action 1 above and

The gopher tortoise is the only species currently in need of population monitoring at the park. A program following the Line Transect Distance Sampling (LTDS) protocol (USACOE ERDC 2009) will be instituted after natural community improvements are conducted in the scrub, sandhill and scrubby flatwoods communities. This will be used as a baseline to monitor the effects of habitat improvement on the park's tortoise population. Most tortoises are currently encountered on the periphery of management zones where there is less shading and availability of groundcover vegetation for food is better. FWC tortoise conservation biologists recommended a full LTDS survey after conducting a pilot survey for tortoises at the park.

Exotic, Invasive, and Nuisance Species

Exotic species are plants or animals not native to Florida. Invasive exotic species 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 and predatory insects. If left unchecked, invasive exotic plants and animals alter the character, productivity and conservation values of the natural areas they invade.

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 and cultural resources attributed to exotic animals, the DRP actively removes exotic animals from state parks, with priority given to 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 venomous snakes, raccoons 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.

Plants

Exotics plant management data is maintained using DEP's Natural Resources Tracking System (NRTS) database. Species surveys and treatment data are recorded in the database to help assess the presence of problematic aquatic and uplands species, formulate treatment plans, and evaluate changes in populations and cover class over time. The DRP calculates the acreage of exotic plants proposed for treatment using the mathematical concept of "infested area." This concept takes a defined area of land (Gross Area Acres) and multiplies that number of acres by a defined percent cover of exotic plants (Cover Class) to estimate the infested acres. This calculation provides an estimation of acres covered by the exotic plants if the plants were accumulated into one area. This methodology helps to estimate the actual acres of infestation, which can be useful for estimating chemical needs and, if the numbers of gross acres evaluated are consistent over time, a change in infested acres can tell the story of change in infestation over time. However, "infested acres" are not in reality accumulated into one area, so they cannot provide the information needed to plan the effort and time required to manage those acres. For instance, to achieve the treatment of one infested acre with an average Cover Class of 2 (16%), up to 16 gross acres may need to be worked – that is: accessed, traversed, examined for species presence, when species found apply treatment, track the treatment, continue traversing, examining, etc.

Currently, the most problematic FLEPPC-listed invasive exotic species in the natural communities' uplands are skunk vine, air-potato, camphor tree, Chinaberry, Chinese tallow, tuberous sword fern, and several invasive grasses, including cogongrass. In the main headspring and spring run, wild taro is the main challenge. Generally, the cover of invasive plants in the uplands natural areas is low, at less than 5%. In the uplands, except for skunk vine and air potato, most infestations are within 75 feet of the park boundary, with the highest concentrations along fence-lines shared with private residences. In most of those areas, it is clear the infestation is the result of plants used in landscaping growing into the park; in other instances, dumping of yard waste into the park is the likely culprit.

In the developed area (WW-29), there are several invasive plant species planted and maintained in the landscaping; these are sources for continued and expanded invasion. This is immediately visible in the peripheral areas of the attraction, where the adjacent natural communities are infested with these plants, encroaching well into WW-27. Nearly all of the park's exotic plant management resources are taken up with this area and its adjacent zones. Species such as wild taro, elephant ear (*Xanthosoma sagittifolium)*, wedelia (*Sphagneticola trilobata)*, camphor-tree (*Cinnamomum camphora),* and American evergreen (*Syngonium podophyllum*) have escaped cultivation or spread from landscape-clearing debris left in the park, to form often dense patches and spread over the adjacent native plants. Other invasive plant species are present as scattered or localized occurrences, such as cogon grass (*Imperata cylindrica*), torpedo grass (*Panicum repens*), and Chinese tallow. Overall, the infestations of FLEPPC-listed invasives are around 40% cover in the developed area. Removal of FLEPPC species, even in the historic landscaping sites, is imperative. Maintaining these is too costly, to the environment and to park resources, and it also misleads our visitors into thinking that they are acceptable as landscaping in our state. If any of these species are ones which the park would like to present from a historic aspect, interpretive signage or other educational strategies should be used.

There are aquatic invasive and nuisance species at the park. The primary nuisance species at the park is the blue-green algae, *Lyngbya wollei*. Dense mats of this alga formed in the headspring because of increased nitrate levels in groundwater flowing from the spring. The SWFWMD restoration of the main spring in 2008 removed the primary infestation of *L. wollei* and provided for contractor treatment of invasive exotics on the south bank of the river east of the tour boat dock. Since the initial removal work, SWFWMD staff and park staff and volunteers have worked diligently to minimize the presence of the alga.

Invasive plant species use many strategies for spreading, and preventing infestation is difficult. Seeds, spores, and vegetative plant parts that can grow into new plants, are carried by the wind or water, or dropped by birds, animals, visitors and equipment. The predominant introduction sites are on and along such vectors. But there are a few preventive activities that are key: do not introduce or plant non-native plants at the park; decontaminate equipment, such as mowers, boats, trucks, etc., before coming into the park or moving within the park to the next site; and watch for early emergence of a non-native plant patch, with a rapid response to remove it (Early Detection – Rapid Response or EDRR) if needed.

To know what is appropriate to plant at the park, a draft Landscaping Guide has been created; this guide includes a landscaping map and plant lists to describe which non-native plants to remove from the developed areas, and which plants are safe to continue planting and where they can be planted. Regarding decontamination, to be effective, clear protocols for equipment cleaning need to be developed and followed at the park, whether by staff, volunteers or contractors. The protocols should also address ways to encourage visitors to follow the same habits, by providing interpretive programs and materials and offering cleaning stations.

EDRR is essential to good infestation management, is more likely to result in eradication of a problem and should be included in every exotics management plan. This is true whether the plant is an acknowledged FLEPPC category species or if it is a non-native plant emerging as invasive at the park and not yet part of a FLEPPC list. Some examples of the important "non-FLEPPC" invasive exotic plants at the park that were deliberately

introduced, but that now need to be managed, include: loquat (*Eriobotrya japonica*); giant reed (*Arundo donax*); bamboo (*Pseudosasa japonica*, *Bambusa* spp. and others); citrus (*Citrus* x *aurantium* and others); and banana trees (*Musa* spp.). Major challenges to effective EDRR of non-FLEPPC invasives management are knowing what "belongs" in the park, determining a non-native plant's threat potential, and then determining the best strategies for removing those that pose a threat.

No formal exotic plant management plan has been developed for the park to date, beyond applying the NRTS tool for creating an Annual Treatment Plan at the beginning of each Fiscal Year. The NRTS tool allows the park to select infestation areas to target for the year and offers a Notes section to allow for an explanation of the choice or provide direction to staff for that area for that year. Successful planning requires that the data in NRTS is as accurate is possible, which means that all "infestable" gross acres are surveyed, that the surveys are less than two years old, and that the surveyors can identify a broad spectrum of problematic plant species. A more comprehensive park-specific exotic plant treatment plan will be developed for the park following more intensive surveys and GPS mapping of infested sites. Treatment priority is normally given to occurrences of invasive plants in the intact natural communities, where infestations can be quickly brought under control, and to areas where infestations threaten rare plant or animal species. This certainly should be implemented at the park, however, the developed area in the park is such a serious concern, therefore the first few years of this plan the immediate priority should be a major removal of most of the park's source invasives, starting with those demonstrating the highest potential to spread to adjacent natural communities. A comprehensive plan will also address species-specific concerns, such as how to manage air-potato without harming beetles if present, or how to manage plants, such as the grasses, that require multiple chemical treatments annually or that require other tools be included, such as fire or mowing, or both.

To remove or treat invasive exotic plants in the spring, spring run, or along the shoreline of the river an aquatic plant control permit is required from FWC. The 2018(9) permit currently allows for mechanical or hand removal of *Lyngbya.* The permit will need to be amended to include a longer stretch of the river to cover the addition of the former FWC managed property, and to treat/remove other invasive exotic species in addition to *Lyngbya*.

Animals

Feral hogs (wild pigs) occur in the undeveloped areas of the park and cause significant ecological damage unless their numbers are kept low. They are predators of ground-nesting birds and snakes, plus they dig up large areas looking for tubers and roots. The rooted areas alter fire behavior and hydrologic flow. The upturned soil also provides a planting bed for exotic plant species. Hog damage is most notable in and around wetlands in the park, with depression marshes and wet flatwoods natural communities showing the most evidence of hog rooting. A hog removal program should be instituted to reduce the population and limit negative ecological effects and damage caused by hogs. Hiring a hog trapper, or training park staff to trap and remove hogs should be investigated.

Exotic Species Management Objectives

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 most ecological damage. Removal techniques may include mechanical treatment, prescribed fire, herbicides or biocontrol agents.

Objective A: Annually treat at least 18 infested acres of exotic plant species in the park.

Action 1	Annually update the park's Annual Treatment Plan in NRTS. Every annual plan will include at least one full treatment across all *gross* acres of WW-29 (estimated at about 24 "infestable" acres) and the 14 gross acres across north WW-27.
Action 2	Annually provide adequate chemical, equipment and staff or volunteers to meet the treatment goals of the work plan.

This Objective's goal is high to reflect the need for more intense management of the worst infestations at the park. As WW-27, WW-29 and all of the more heavily infested areas around the park's boundaries are worked each year (approximately 150 to 250 gross acres), then reasonable adaptive management would allow for a decrease in numbers of infested acres required to be treated annually. The true goal for those areas is to continue active annual control until a Cover Class of 1 or less for each area is reached.

Objective B: Develop a comprehensive exotic plant management (EPM) plan for the park.

Action 1	Assess current conditions for the park and whether all surveys are complete and current.
Action 2	From Survey Summary reports, determine the park's approach to prioritizing their work.
Action 3	Develop a plan that incorporates frequency and timing of repeat treatments, types of treatments, recipes, based on the priorities.

Surveys are considered to be complete if all "infestable" acres (acres where plants can grow, e.g., acres not under concrete, pavement, buildings, etc.) have been surveyed. Surveys are current if they are less than two years old. If surveys are not complete or current, managing such issues are to be part of the EPM plan. To determine the treatment plans, while priorities can be organized by species, zone, cover class, etc., the priority management needs to balance a focus on the park's worst areas while still managing the threat of infestations spreading along the park boundaries. From there, develop a plan that incorporates frequency and timing of repeat treatments, types of treatments, and recipes based on the priorities.

Objective C: Maintain and publish the landscaping manual for the park.

Action 1	Update the existing draft – incorporate species' name changes, changes in status with FLEPPC and the UF/IFAS Weed Risk Assessment (WRA) tool.
Action 2	Emphasize that native plant species found naturally occurring at the park are always the first choice for landscaping.
Action 3	For the historic landscaping plots within the designated mapped area, verify that only benign non-natives are on the "OK to Plant" list. If and as these species are planted or maintained in the park, their appearance elsewhere in the park is to be monitored; if spreading occurs, the species is removed from this list and from the park.
Action 4	Make this manual readily available to all staff and volunteers, with printed and electronic copies.
Action 5	Repeat Actions 1-4 every three to five years, as plant names and habits can change.

Objective D: Implement decontamination protocols for the park.

Action 1	Work with BNCR to develop protocols and obtain training.
Action 2	Implement the protocols and continue to train staff.
Action 3	Verify that vendors (mowers, landscapers, outfitters, etc.) are also observing the protocols.

There are many ways to manage equipment decontamination. For example, many parks keep an air compressor with the vehicle to blow seed and plant materials into the currently infested area before moving to another part of the park. At the time of writing, BNCR is working to develop a protocol and training requirements to help parks manage this issue.

Objective E: Manage Lyngbya and other aquatic species.

Action 1	Amend FWC aquatic plant control permit to include additional river frontage and include all exotic species to be treated.
Action 2	Set annual goals for the river area and species to be worked.

Establish an annual budget with sufficient resources to complete the goals.

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

Action 1	Contract or develop an in-house feral hog removal program at the park.

Feral hogs are damaging the groundcover in the wet flatwoods, depression marshes, and dome swamp. To limit this damage hog populations will need to be reduced through trapping and removal. This can be done through a contract trapper, or in-house by trained park staff.

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 (NRHP). 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 NRHP, and the Secretary of the Interior's Standards and Guidelines definitions for the various preservation treatments (Restoration-RS, Rehabilitation-RH, Stabilization-ST, and Preservation-P). 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 NRHP. Archaeological site, historic structure, or historic landscape refer to resources that are 50 years of age or those that will be during the term of this plan.

Condition Assessment

Evaluating the condition of cultural resources will be accomplished using a three-part evaluation scale expressed as good, fair, and poor.

Historic Buildings and Structures

- **Good** describes a condition in which only normal scheduled maintenance or minor repairs are required.
- **Fair** describes a condition in which there are several larger repairs required which cause the resource to not be able to function as intended if left in disrepair. A fair assessment is usually a cause for concern and should be acted on before the physical integrity is compromised.
- **Poor** describes an unstable condition where there is palpable, accelerating decline, and physical integrity is being compromised quickly. A resource in poor condition requires significant major repairs and is not able to fully function as intended. A poor condition suggests immediate action is needed to reestablish physical stability.

Archaeological Sites

- **Good** describes a condition of stability and physical wholeness, where no obvious deterioration other than normal occurs.
- **Fair** describes a condition in which there is a discernible decline in the condition between inspections. This decline is typically from an isolated event rather from repetitive or continuous ones. Some examples include a storm event, or a single case of looting where no additional repeat damage is observed. 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, such as from coastal erosion or continuous looting. A poor condition suggests immediate action is needed.

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 later in this section. Only the State Historic Preservation Office can make a final determination of significance.

There are no criteria for determining the significance of collections or archival material. Usually, the significance of a collection is based on what or whom it may represent, and what information it can provide. Any records depicting critical events in the park's history, including construction and resource management efforts, would all be significant.

National Register of Historic Places

The National Park Service's National Register of Historic Places is the official list of sites and properties throughout the country that reflect the prehistoric occupation and historical development of our nation, states, and local communities. This list includes sites, buildings, structures, objects, and districts that have been documented and identified as being significant in American history, architecture, archaeology, engineering or culture.

In order to be listed in the National Register, the State Historic Preservation Office (SHPO) must first make a determination of eligibility for the property. The SHPO will look at the property's age, significance, and integrity. Properties must be significant at the local, state, or national level under at least one of four criteria in order to be determined to be eligible for listing.

A: Event – The property is associated with an event that has made a significant contribution to the broad patterns of our history.

B: Person – The property is associated with the life of a person significant in our history.

C: Design/Construction – The property embodies the distinctive characteristics of a type, period, method of construction, artistic value, or work of a master.

D: Information Potential – The property has yielded or is likely to yield important information about our history or prehistory.

If the property is deemed to be eligible, a formal nomination proposal will be written and submitted to the SHPO. Upon Receipt of a nomination proposal for an eligible property, the following procedures will be carried out:

1. The nomination proposal and all accompanying documentation will be evaluated by the professional staff of the Bureau of Historic Preservation. If possible, a staff member will visit the site as a part of the evaluation process.

2. The owner(s) of the property and the chief local elected officials will be notified in writing that the property is being proposed for nomination and given the opportunity to comment on the property.
3. The proposal will be submitted for consideration and recommendation by the Florida National Register Review Board which is charged with reviewing all nomination proposals to the National Register of Historic Places from the State of Florida.
4. Upon the favorable recommendation of the Review Board, a final draft of the nomination will be prepared for the submission by the State Historic Preservation Officer to the Keeper of the National Register in Washington, D.C.
5. The Keeper of the National Register will undertake the final review and make the final decision whether or not to list the property. The Keeper has 45 days to make a formal determination.
6. The owner is then notified in writing as to the final decision.

On January 22, 2020, the Weeki Wachee Springs District was listed on the National Register of Historic Places under all four criteria.

Criteria A: Entertainment/Recreation
Criteria B: Newton Perry
Criteria C: Architecture (Robert E. Collins)
Criteria D: Prehistoric/Historic Archaeology

National Register Contributing Cultural Resources

Nine historic structures and four historic objects are associated with the development of the Weeki Wachee tourist attraction from the late 1950's until the early 1970's. The most significant of these structures is the 1959-60 Weeki Wachee Spring Mermaid Theater (8HE391), designed by architect Robert Collins. This structure, which replaced the 1947 underwater theater, features an underwater diving tube which allows performers to enter the spring underwater and large glass windows designed specifically to showcase underwater performances. Notable architectural features are a scalloped roof and an elaborate interior tile mosaic of underwater scenes.

One historic airlock (HE877) remains at the bottom of the spring and was a key component of early underwater shows. This airlock was constructed sometime before 1956 and is comprised of a plastic dome bolted to a steel ring. It was created by Newt Perry to extend time underwater by allowing mermaids to swim beneath the dome and breath the compressed air that is pumped into the dome portion of the airlock.

The remaining structures and objects are remnant decorative or support structures of the Weeki Wachee attraction. The original marquee (HE878), mermaid entrance walls and the Adagio Statue (HE658) (relocated in 1978 from a fountain in front of the original entrance walls (HE659) to its present location) were designed to enhance the front entrance to the park and to entice passing tourists on US 19. The maintenance shop and prop shed provided necessary support functions for the attraction, while the cottages provided housing for Weeki Wachee performers and staff.

The Weekiwachee mound (8HE12) is the most prominent of the six archaeological sites in the park. This sand burial mound is located about 180 meters north of the spring and is currently roped off and marked by signage. Analysis of pottery from the mound indicated construction during the Safety Harbor period (AD 900 – 1650), the terminal

pre-contact and initial contact cultural period. More intriguing was the presence of Spanish glass beads, dating from the earliest known period of European contact, interred in the mound with Native American burials. There may be a village site associated with the mound that has since been obscured by development. The Weekiwachee mound is one of three important Safety Harbor sites in this region that along with prehistoric artifacts contained a significant number of European beads. At all three sites glass beads were found with aboriginal burials, indicating contact with the Spanish during the early 16th century (c. 1525 AD -1550 AD).

Table 4. National Register Contributing Cultural Resources

Resource Groups					
FMSF#	**Name**	**Period of Significance**			
HE880	Weeki Wachee Springs District	1947-1969 1525-1550			
HE660	Weeki Wachee Springs Support Structures	1960-1969			
Historic Structures					
FMSF#	**Name**	**Culture/Period**	**Significance**	**Condition**	**Treatment**
HE391	Underwater Theater	1960	NRL	G	P
HE649	Employee Cottage #1	1969	NRL	G	P
HE650	Employee Cottage #2	1969	NRL	G	P
HE651	Employee Cottage #3	1969	NRL	G	P
HE652	Employee Cottage #4	1969	NRL	G	P
HE653	Manager Cottage #1	1969	NRL	G	P
HE654	Manager Cottage #2	1969	NRL	G	P
HE655	Utility & Storage Bldg.	1962	NRL	G	P
HE656	Prop Building	1962	NRL	G	P
HE658	Adagio Statue	ca. 1966	NRL	G	P
HE659	Mermaid Wall	1963	NRL	G	P
HE878	Marquee	ca. 1966	NRL	F	P
HE877	Underwater Airlock	ca. 1956	NRL	G	P
Archaeological Sites					
HE012	Weekiwachee	Archaic (8500 BC–1000 BC) Safety Harbor (1000 AD– 1500 AD) First Spanish (1513-1599)	NRL	G	P

Non-Contributing Cultural Resources

Eight buildings and structures are currently considered non-contributing the National Register district, however, these could potentially be reevaluated and incorporated in when they turn 50 years of age in 2027. Since these buildings and structures will become historic during the span of this plan, any potential projects involving these should take into account the need for DHR consultation starting in 2027.

Fifteen archaeological sites are currently recorded within the park boundary that do not contribute to the National Register district. These sites are mostly scatterings of prehistoric and/or historic artifacts such as pieces of broken pottery, stone tools, and metal fragments. Within the park boundary are artifact scatters left behind from prehistoric campsites, prehistoric and historic trash piles, military activities, and activities related to the construction of the Weeki Wachee attraction. In many cases, there is not enough information currently known about a site to determine a time period more specific than “prehistoric” or “historic”, but in some of the sites do have identifying artifacts that associate them with the Archaic (8500 B.C. -1000 B.C.) and Weeden Island (A.D. 450-1000) cultures, as well as the American Civil War to present times.

All of the archaeological sites listed shall be managed using preservation treatments. Preservation includes protection from damage from resource management, natural causes, construction or human damage including looting.

Table 5. Non-Contributing Cultural Resources

Historic Structures					
FMSF#	**Name**	**Culture/Period**	**Significance**	**Condition**	**Treatment**
HE881	Admission Building	ca. 1977	NE	G	P
HE882	Gift Shop	ca. 1977	NE	G	P
HE883	Banquet Hall	ca. 1977	NE	G	P
HE884	Mermaid Galley Restaurant	ca. 1977	NE	G	P
HE885	Grandstand	ca. 1977	NE	G	P
HE886	Arbor	ca. 1977	NE	G	P
HE887	Cedar Bridge	ca. 1977	NE	G	P
HE888	Observation Deck	ca. 1977	NE	F	P
	Picnic Pavilions (3)	Unknown	NE		
	Exotic Bird Theater	Unknown	NE		
	Metal Utility Building	Unknown	NE		
	Wildlife Office	Unknown	NE		
	Captain's Quarters	Unknown	NE		

Table 5. Non-Contributing Cultural Resources					
Historic Structures					
FMSF#	**Name**	**Culture/Period**	**Significance**	**Condition**	**Treatment**
	Kayak Rental Building	Unknown	NE		
	Gift Stand	Unknown	NE		
	Administration Building	Unknown	NE		
	Wilderness Building	Unknown	NE		
	Restroom	Unknown	NE		
Archaeological Sites					
HE059	Lykes 4	Unknown	NE		P
HE393	Winding Waters	Prehistoric	NE		P
HE057	Lykes 2	Weeden Island (A.D. 450-1000)	NE		P
HE056	Lykes 1	Weeden Island (A.D. 450-1000)	NE		P
HE392	Weeki Wachee Wall	20th Century	NE		P
HE058	Lykes 3	Weeden Island (A.D. 450-1000)	NE		P
HE309	Military Landing	19th Century	NE		P
HE060	Lykes 5	Unknown	NE		P
HE436	River Country	Archaic (8500 B.C. -1000 B.C.)	NE		P
HE031	Berkeley 1	Weeden Island (A.D. 450-1000)	NS		NA
HE572	Weeki Wachee Pond #1	Archaic	NS		NA
HE703	Weeki Wachee Canoe Launch	Archaic	NS		NA
HE490	US19/SR 50 Intersection	Archaic	NS		NA
HE704	Weeki Wachee Lithic Scatter	Prehistoric	NE		P
HE365	Pond A Site	Prehistoric (see survey #18266)	NS	NA	NA

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

Collections

Most of the park's collection contains objects associated with the Weeki Wachee tourist attraction and the mermaids. The collection constitutes approximately 100 to 125 cubic feet of archival material. Some of these items have remained on park grounds since its days as an attraction, but many items were saved from destruction by former mermaids and staff and then donated back to the park. The majority of the archival material is film, photographs, and slides. A few historic documents, props, and costumes also are included in the collection.

The collections are currently stored in several places and are in fair to poor condition. Historic films, photographs, slides, and paper archives are currently stored in an air-conditioned room in the administration building. Some of the films are under refrigeration. A few historic costumes still exist and are located in the mermaid theater in a poorly climate-controlled area. Several historic props are located in an un-air-conditioned maintenance building.

The historic films are the most critically threatened items in the Weeki Wachee collection and need immediate attention. As these films have been stored under a variety of conditions over the years, they are in varying degrees of deterioration. Some of the films have been refrigerated to slow the process of their decline, but they may be lost forever if they are not properly treated by a professional film conservator within the near future.

The historic costumes and props are also important as there are very few of these items still in existence. Many of these remnants of the Weeki Wachee attraction have been lost or destroyed. The costumes and the props which are currently stored in the maintenance building need to be in an air-conditioned, insect-free, low humidity (30-50%) environment to assure their preservation. The props need to be evaluated as to their condition and conservation needs. Currently, the park has no organized collections management program. A Scope of Collection Statement needs to be developed, as well an inventory or catalog, a housekeeping manual, and a record keeping system.

1969 Postcard Collection – Credit: Florida Memory

Cultural Resource Management Objectives

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 will implement the following goals, objectives and actions, as funding becomes available, to preserve the cultural resources found in Weeki Wachee 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.

> *Activities related to land clearing, ground disturbing activities, major repairs, alterations, or additions to historic structures listed or eligible for listing in the National Register of Historic Places, or that have not had a formal determination of eligibility must be submitted to the FDOS, Division of Historical Resources (DHR) for review and comment prior to undertaking the proposed project.*

Recommendations may include, but are not limited to, concurrence with the project as submitted, monitoring of the project site by a DHR certified archaeological monitor, cultural resource assessment survey by a qualified professional archaeologist, modifications to the proposed project to avoid or mitigation of potential adverse effects. In addition, any demolition or substantial alteration to any historic structure or resource must be submitted to the 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 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 the DHR.

DHR Matrix for Ground Disturbing Activities on State Lands

The DHR Matrix for ground disturbing activities on state lands is a tool that DHR developed and designed to help streamline the DHR Compliance and Review process for state land managers. While it does not eliminate the need for DHR consultation for ground disturbing projects, it does narrow down the scope of what does and does not need to be submitted. Projects will fall into one of three categories depending on the extent of ground disturbance, and where the project is occurring.

- Proceed with project as planned.
- Proceed with ARM monitoring during project activities.
- DHR will need to be consulted.

Ground disturbance is categorized as either minor or major. See below. Map # is a graphic representation of the matrix applied to Weeki Wachee Springs State Park.

Weeki Wachee Springs State Park
DHR Matrix for Ground Disturbance

0 0.25 0.5 1 Miles

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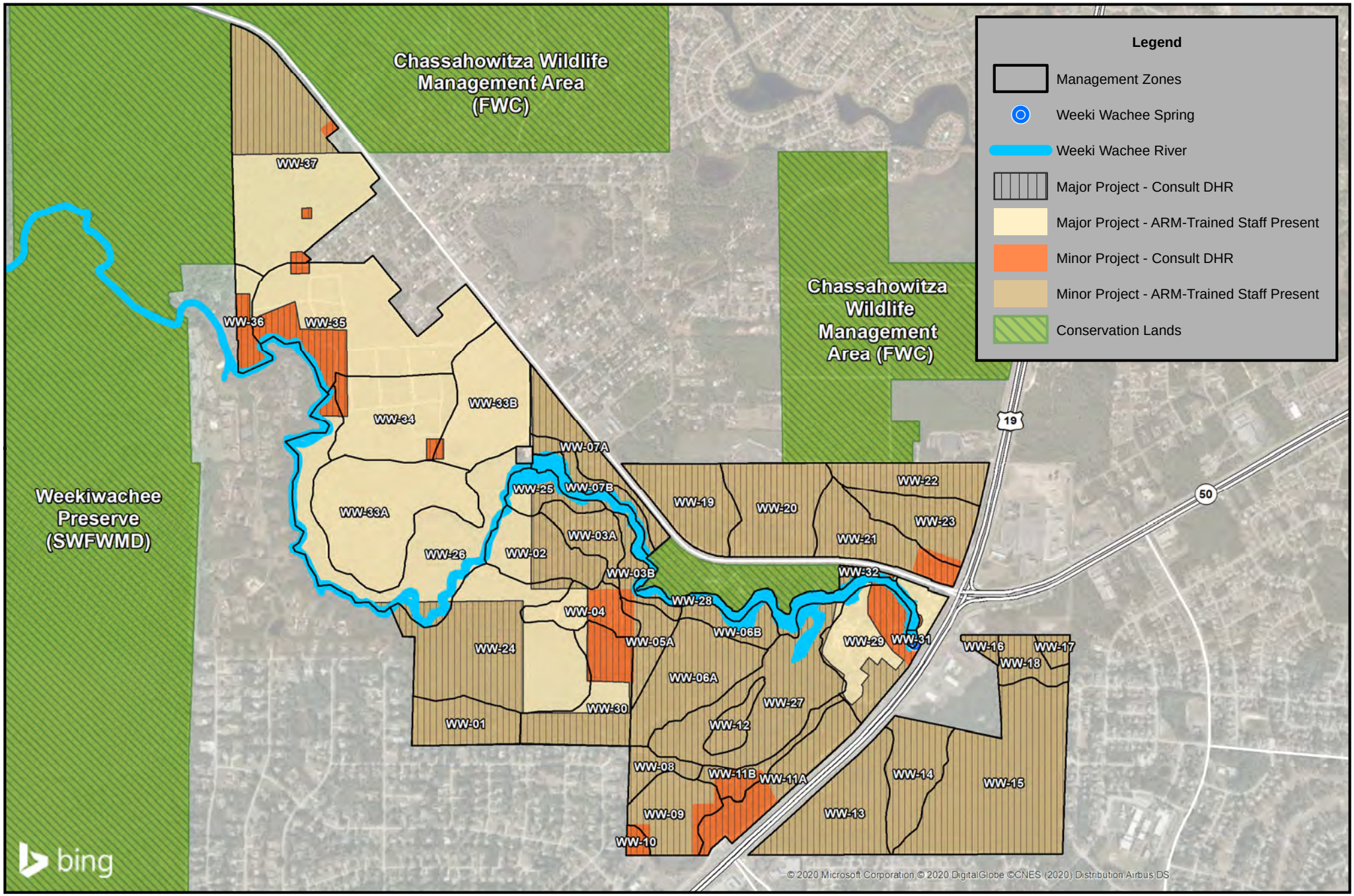

Minor Disturbances

- Bicycle racks
- Cable burial with blade-type devices
- Campsite markers
- Emergency holes (for safety, accident or emergency repairs)
- Fireplaces/grills
- Flagpoles
- Garbage can or recycle bin posts
- Gardening (existing activity)
- Horse hitching posts
- Kiosks on post
- Lifeguard stands
- Lightning arresters
- Plantings (shrubbery, seedlings or plugs)
- Poles for utilities, lights, speakers
- Prescribed burns (not initial)
- Road/trail barriers & signs
- Roller chopping (light-empty tank)
- Sign posts
- Fire ring installation
- Boardwalks, catwalks or piers
- Equipment racks
- Fire lane maintenance
- Playground equipment installation
- Temporary open shelter construction
- Septic tank/drainage (replacement, no enlargement)
- Stabilizing existing unpaved roads (not historic)
- Unpaved road maintenance (disking, harrowing, plowing, etc.)
- Decks or Platforms
- Drainage swale maintenance
- Fence posts and railings
- Parking lot boundary posts
- Monument construction
- Tower construction
- Well drilling (includes catchment basins)

Major Disturbances

- Prescribed burns (initial)
- Mechanized exotic plant removal (not hand pulling)
- Concrete slab installation
- Docks
- Dredging
- Public utilities (trenched)
- New fire line construction
- Beach construction
- Initial roller chopping
- Sewage treatment plant construction
- Water/sewer line installation
- Tree trunk removal (big trees)
- Tree or big plant planting or root ball removal
- Drainage swale construction
- Foundation repair or stabilization
- Mobile home installation
- Telephone lines (trenched)
- Terracing for erosion control
- Water retention area construction
- Septic tank/drain field installation (new or enlargement)
- Bridge Construction
- Garden installation (new areas)
- Animal burials
- Clivis (restroom) installation
- Sidewalk installation
- Picnic shelter with slab
- Borrow pits

Objective A: Continue to compile reliable documentation for all cultural resources.

Action 1	Ensure all known sites, buildings, and structures are recorded or updated in the Florida Master Site File.
Action 2	Conduct Phase 1 archaeological survey for areas that have not been professionally surveyed to identify any currently unknown resources.
Action 3	Continue to catalog and record collections objects, photos, and archives into DRP database (PastPerfect).

A thorough inventory of all cultural recourses is critical to their preservation and protection.

Objective B: Assess and evaluate all recorded cultural resources in the park.

Action 1	Implement yearly monitoring of all cultural resources within the park.
Action 2	Complete an Historic Structures Report for each historic building and structure determined to be eligible for listing in the National Register that receives a condition assessment of Fair or Poor. Emphasis should be placed on prioritizing stabilization, restoration and rehabilitation projects over the life of the plan for these resources.
Action 3	Complete National Register eligibility determinations for archaeological sites, historic buildings, and structures that have not been formally evaluated by the SHPO.
Action 4	Complete a Scope of Collections.
Action 5	Create a Collections Management Plan.

All cultural resources should be monitored on a yearly basis to note any signs of deterioration, and to provide park staff with insights into any foreseeable actions that may need to be taken in order to prevent further and/or higher cost remediations. Below is a list of the kinds of information that should be gathered during monitoring.

Archaeological Sites

- Location?
- Are any artifacts visible?
- Any observed threats to the site?
- Overall condition of site?

Historic Buildings and Structures

- Location?
- Current use?
- Internal repair needs?
- External repair needs?
- Any evidence of infestation or mold?
- Evidence of damage (natural or otherwise)?

Collections Storage Facilities

- Is the temperature between 68 and 72 degrees Fahrenheit and relative humidity between 30% and 50% constantly?).
- Is pest control being done regularly?
- What is the housekeeping plan?
- How are collections being kept secure?

A Scope of Collections needs to be developed to guide acquisition of collection items, along with an administrative history, which will help interpret the history of the park.

The University of Central Florida conducted a History Harvest on September 14, 2019 to collect and digitize historic memorabilia and oral histories. Park staff should contact this program to ensure that the park also has copies of the information collected.

To assist with the creation of a collections management plan, the park should apply for the Collections Assessment for Preservation (CAP) Program through the American Institute for Conservation and the Foundation for Advancement in Conservation. The assessment is a study of all of an institution's collections, buildings, and building systems, as well as its policies and procedures relating to collections care. Participants who complete the program receive an assessment report with prioritized recommendations to improve collections care. CAP is often a first step for small institutions that wish to improve the condition of their collections.

Objective C: Maintain all NR-eligible or listed resources in good condition.

Action 1 NR-listed or eligible structures should be prioritized for yearly maintenance funds.
Action 2 Staff should report any NR listed or eligible resources that are not in good condition to BNCR.

Information obtained from yearly monitoring should be used to coordinate preventative maintenance and to plan for foreseeable high-cost expenses. BNCR will work with park staff to create an action plan for any resources that are not in good condition.

Objective D: Continue to have staff complete DHR's Archaeological Resource Management (ARM) training.

Action 1 All staff who have not previously completed the two-day ARM training course, and those who completed it prior to 2012, should complete this training at least once during the span of this management plan.

The ARM Training course is revised and updated regularly as new information and procedural changes are made. Due to potential changes, only a small selection of staff should be sent at a time staggered over the span of the plan to ensure that the park has the most up-to-date information.

Objective E: Complete the following historic preservation projects.

Action 1 Repoint stonework on marquee sign.
Action 2 Repoint stonework on base of adagio statue.
Action 3 Clean and repaint adagio statue.
Action 4 Clean and repaint mermaid wall.
Action 5 Plant native vegetation around the employee cottages.
Action 6 Plant native vegetation around the arbor.
Action 7 Digitize and preserve film and photo collections.
Action 8 Create a plan for interpreting cultural resources to the public.

These are potential projects that should be completed as time and funds allow. Most of these would be ideal candidates for CSO projects, DHR historic preservation grants, or volunteer opportunities.

Repointing projects should confirm to the guidelines set forth in the National Park Service Preservation Briefs 2: Repointing Mortar Joints in Historic Masonry Buildings. A proper repointing job should last at least 30 years. If done improperly, it could cause damage to the masonry units, will require repointing again much sooner, and will diminish the appearance of the structure. If the project is to be bid out, ensure that the specifications stipulate that masons must have a minimum of five years' experience with repointing historic masonry to be eligible to bid on the project.

Preservation and digitization of film and photo collections are time sensitive priority. Park staff should consider contacting the University of Central Florida's History Harvest Program for possible a potential partnership in this endeavor.

Capital Facilities and Infrastructure

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 opportunities and preservation of Florida's resources is the main priority when developing recreation and land use proposals.

The general recreation 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 on 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 section 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 Capital Facilities section then summarizes the Conceptual Land Use Plan (CLUP) for the park and identifies large-scale repair/renovation projects, new building/infrastructure projects, and/or new recreational amenities that are recommended to be implemented over the next ten-year planning period. Any adjacent lands that should be acquired to improve management of the park are also identified as a part of the park's Optimum Boundary.

Existing Facilities

Prior to 2018, the park's acreage was 538 acres. In 2018, the park added 389 acres to its management boundary and the park's acreage now totals approximately 927 acres. This recently added acreage was previously managed by FWC as a part of the Chassahowitzka Wildlife Management Area and had relatively few management facilities or recreational amenities. A network of management roads divided the land into smaller management units, and a small trailhead on Cortez Boulevard allowed visitors to hike the dirt roads. An erosion-control terraced structure was developed by FWC in 1999, and following an amendment to the 2011 UMP, this structure was utilized to construct a takeout point for visitors paddling the river from the state park launching point near the springhead. One segment of the existing management roads was stabilized and will be used as a tram road for the concession shuttle service to pick up and transport visitors back to the kayak launching area.

Although the park totals nearly 930 acres, a majority of the park's visitation and activity occurs within about 32 acres concentrated around the Weeki Wachee springhead. These 32 acres can be grouped into four main categories: the historic attraction area, the Buccaneer Bay waterpark, staff support areas, and the two main parking areas. Accessed from an area adjacent to the park's support facilities, the kayak launch and river corridor receive significant visitor usage, and paddling has remained one of the most popular recreational activities at the park. The two following maps show the park in its entirety (Base Map Page 1) and the main use areas of the park (Base Map Page 2).

Weeki Wachee Springs State Park
Base Map - Existing Facilities

0 0.25 0.5 1 Miles

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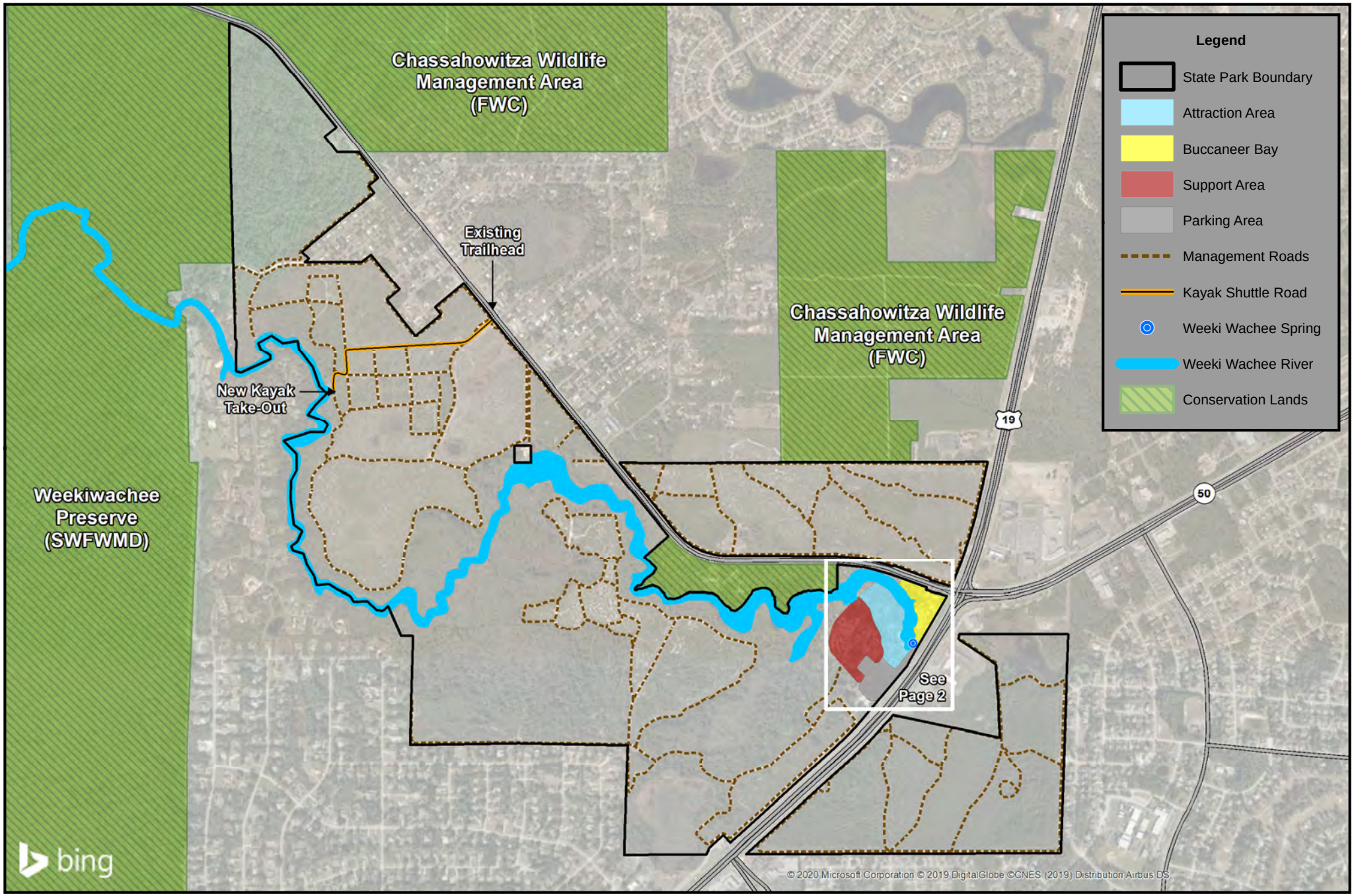
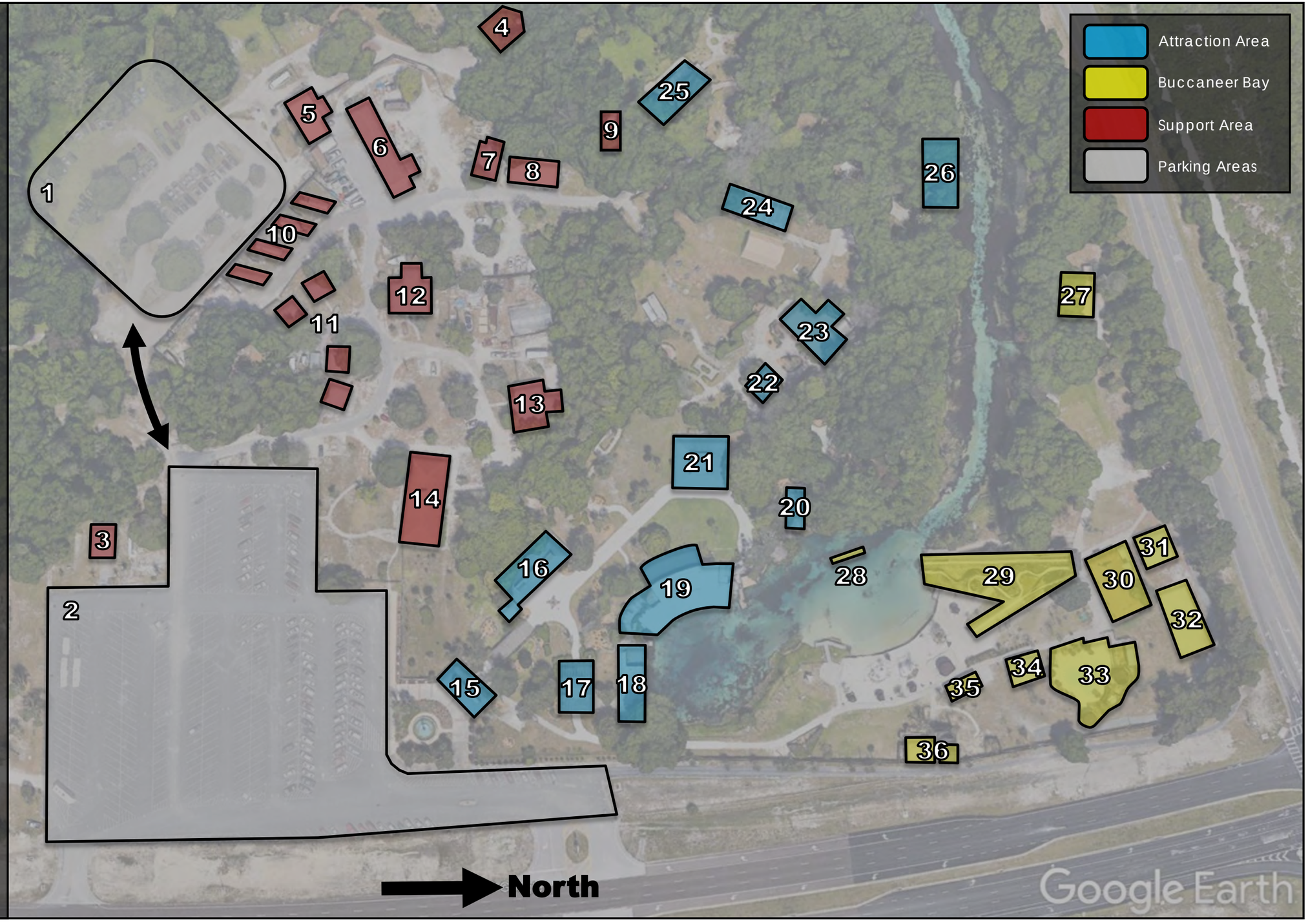


Weeki Wachee Springs State Park
Base Map — Existing Facilities Page 2

Main Recreational Use and Staff Support Areas
Attraction Area — Buccaneer Bay — Support Area — Parking

1 — Kayak Parking Area (~85 spaces)
2 — Main Parking Area (~300 spaces)
3 — Storage Building
4 — Kayak Storage & Launch Area
5 — Kayak Concession Building
6 — Maintenance Shop Building
7 — Shop & Storage Building
8 — Employee Office & Breakroom
9 — Wildlife Office
10 — Volunteer RV Campsites (4)
11 — Historic Cottages (4)
12 — Assistant Park Manager Residence
13 — Park Manager Residence
14 — Administrative Offices Building
15 — Visitor Entrance & Ticket Booths
16 — Gift Shop
17 — Decorative Arbor
18 — Spring Overlook & Waiting Area
19 — Mermaid Theater
20 — Captain's Quarters
21 — Banquet Hall
22 — Restroom
23 — Galley Restaurant
24 — Grandstand Seating Area
25 — Wildlife Theater & Seating
26 — Tour Boat Dock
27 — Pavilion
28 — Floating Platform & Swim Area
29 — Buccaneer Bay Slides
30 — Food & Beverage Concession
31 — Pavilion
32 — Sand Volleyball Court
33 — Splash Pool Area
34 — Tube Storage Corral
35 — Tiki Bar
36 — Tower & First Aid Building



The park entrance from US 19 and the two parking areas allow visitors to access the main use areas at the park. The larger of the two parking areas services the attraction area and Buccaneer Bay, while the smaller parking area is adjacent to kayak concession building and launch area. The following lists inventory the facilities found at the park, organized by the use areas in which the facilities are located (Base Map Page 1/2).

Attraction Area

- Ticketing Booths
- Gift Shop
- Decorative Arbor
- Covered Waiting Area
- Mermaid Theater
- Banquet Hall
- Captain's Quarters
- Restroom
- Galley Restaurant
- Grandstand Seating
- Wildlife Theater
- Tour Boat Dock

Buccaneer Bay

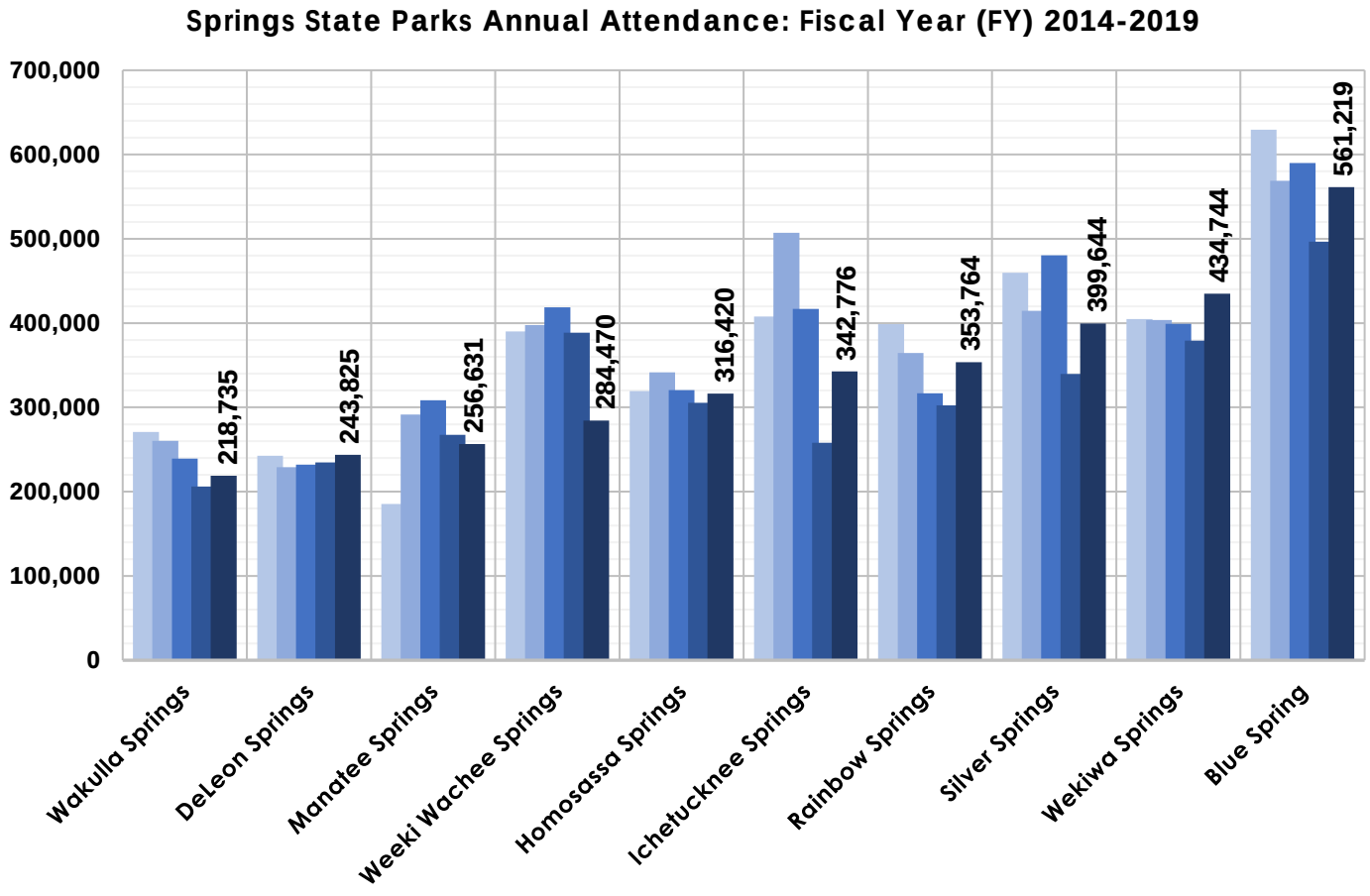
- Pavilions (2)
- Concession Building
- Sand Volleyball Court
- Waterpark Slides (3)
- Splash Pool Area
- Inflatable Tube Corral
- First Aid/Staff Building
- Former Slide Tower
- Floating Swim Platform

Support Area

- Residences (2)
- Administrative Office
- Employee Offices (2)
- Storage Buildings (2)
- Maintenance Shop
- Historic Cottages (4)
- Volunteer RV Sites (4)
- Concession Area
- Vessel Storage Area
- Paddle Launch

Recreational Use and Visitor Attendance

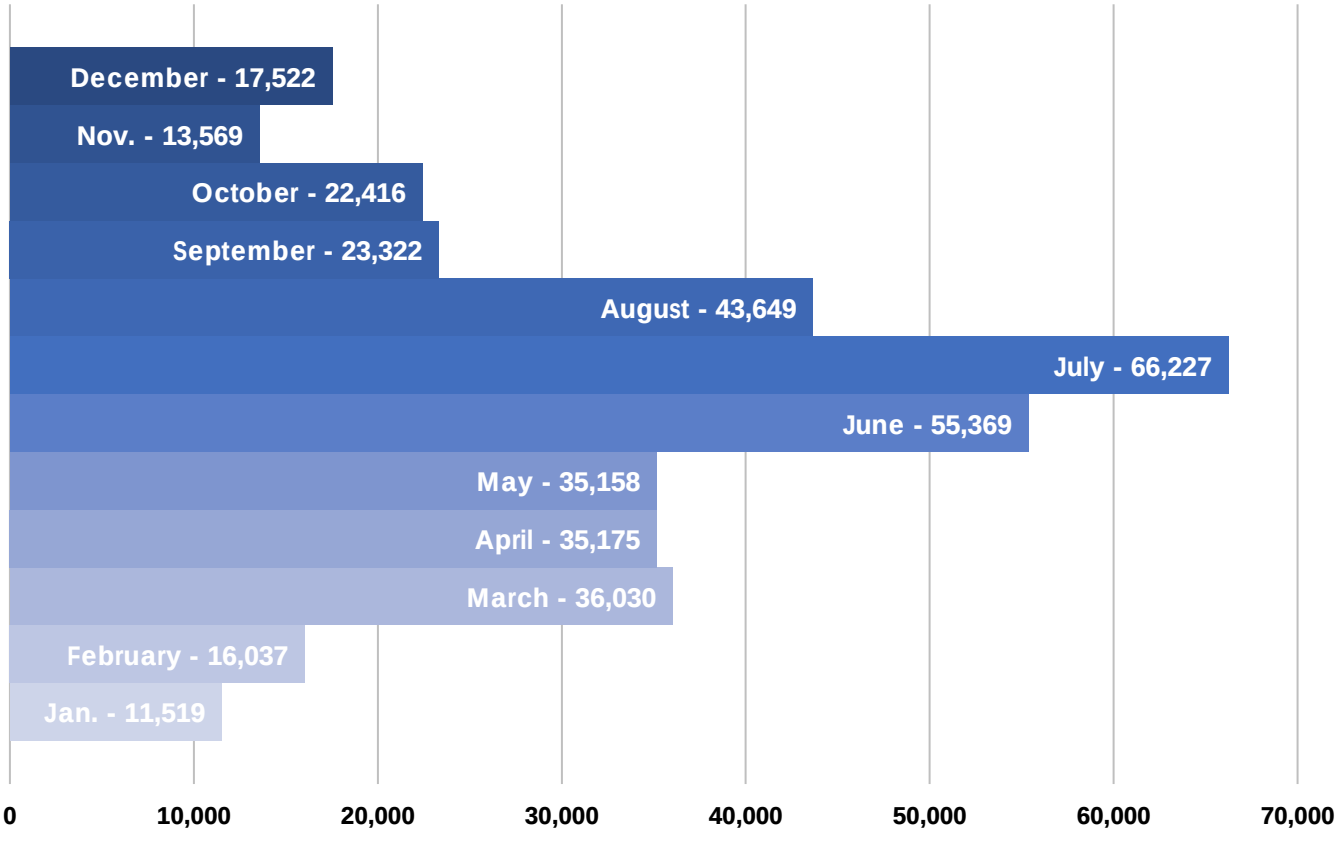
Weeki Wachee Springs State Park recorded 284,470 visitors in FY 2018/2019. By DRP estimates, the FY 2018/2019 visitors contributed $29.3 million in direct economic impact to the region, the equivalent of adding 410 jobs to the local economy (FDEP 2019). Over the past five years, the park has averaged about 376,000 visitors and $35 million in direct economic impact per year.



The hundreds of thousands of visitors that visit Weeki Wachee Springs State Park every year are attracted to the park by three main recreational features: the underwater mermaid shows at the Mermaid Theater, waterpark activities at Buccaneer Bay, and paddling trips on the Weeki Wachee River. Interpretation and shows are the main recreational uses at the attraction area, the area of the park in which the Mermaid Theater is located. The underwater mermaid show is the main attraction in this area, but there are also other interpretive opportunities such as the wildlife shows at the wildlife theater and interpretive boat tours that transport visitors along a segment of the Weeki Wachee River. A gift shop, small concession, and full-service restaurant supplement the day use recreational activities taking place at the attraction area. Buccaneer Bay was developed in 1982 prior to the establishment as Weeki Wachee Springs State Park (2008) and provides typical waterpark amenities, albeit at a much smaller scale compared to modern waterparks. The waterpark contains three waterslides, springhead swimming area, splash pool area, food and beverage concession, tiki bar, inflatable tube rental, beach lounging area, and two shaded pavilion structures. The third major attraction for the park is paddling the Weeki Wachee River. This recreational opportunity allows visitors to launch their own paddling vessel or offers concession-managed rental vessels. Management strategies for paddling on the Weeki Wachee River will be discussed in the Visitor Use Management (VUM) section of this plan.

As shown in the graph below, the month that has averaged the most visitation over the past five years is July. The monthly visitation in July accounts for nearly 18% of the total annual attendance, and the visitation between May-August accounts for approximately 53% of the yearly total. Adding March and April to that four-month time period pushes the six-month percentage of annual attendance to 72%. In other words, the Fall and Winter months (September-February) typically account for less than 30% of the total annual attendance at Weeki Wachee Springs State Park. Historical attendance data has implications for visitor use management and will be discussed further in the VUM section.

Weeki Wachee Springs State Park Average Monthly Attendance: FY 14-19



Conceptual Land Use Plan

The Conceptual Land Use Plan (CLUP) is the long-term, optimal development plan for Weeki Wachee Springs State Park based on current conditions and knowledge of the park's resources, landscape, and social setting. If a conceptual land use proposal from previous updates to a park's management plan has not been completed over the specified planning period, it can be carried over into subsequent updates if it continues to conform with the overall vision for the park. The Conceptual Land Use Plan and proposals can be modified or revised as new information becomes available regarding the park's natural and cultural resources or as trends in recreational use change over time. In addition, the acquisition of new parkland can present new recreational opportunities or support facility needs. These modifications routinely take place during the management plan update process but can also be accomplished through a management plan amendment process. The planning period for this management plan is ten years, and conceptual land use proposals can be implemented at any time during this ten-year period, as funding becomes available.

During the development of the Conceptual Land Use Plan, the DRP assessed the potential impact of development proposals on the park resources and applied this generalized assessment to the overall vision for future infrastructure and recreational amenities. Once a conceptual land use proposal receives funding to be implemented, resource impacts are assessed at the site-specific level and are evaluated by the DRP. 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. Development 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/or avoid resource impacts. Federal, state, and local permitting and regulatory requirements are addressed during the design and construction phase of implementation. This includes the design of all new park facilities to be consistent with the universal access requirements of the Americans with Disabilities Act (ADA).

Future Land Use and Zoning

A majority of the land adjacent to and surrounding the park is developed through a combination of suburban, low-to-medium density residential and US 19 frontage for commercial businesses. Substantial land acreage to the west of the park is under conservation managed by FWC and SWFWMD. Given the current residential footprints and conservation lands, it does not seem likely that large development projects will impact the park boundary. In addition, there are no plans to widen US 19. Expansion and widening of SR 50 could potentially impact the park boundary, but there are no plans for such an expansion.

The DRP works with local governments to apply land use designations to parks that provide consistency with comprehensive plans and zoning codes, as well as permit typical state park uses and facilities necessary for resource-based recreation.

The park itself is currently zoned for conservation and recreation. All concepts to be discussed as a part of the CLUP are supported by the mission of the DRP and Florida Park Service, and all projects to be implemented over the next ten years will abide by local zoning and permitting regulations.

Public Access and Recreational Opportunities

Goal: Provide public access and recreational opportunities at 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.

Physical Capacity

Managing public access at all Florida State Parks is inherently linked to how visitors physically transport themselves to the park and, once there, navigate between the different use areas within the park. In some cases, parks near dense urban areas can be accessed by public transit or alternative transportation like bicycles. However, in most cases, state parks are outside of urban areas and are destinations for out-of-state visitors and can only be accessed by personal vehicles or tour buses. Given the reliance on personal vehicles, the size of parking areas is considered a physical constraint and has a significant influence on the number of visitors that can access a park.

For most state parks, visitors enter the park through a single entrance and ranger station. Each different use area within the park is usually serviced by a dedicated parking area, and visitors can navigate between the use areas. Weeki Wachee Springs State Park is unique in that there are two main parking areas that exist outside of the formal entrances to the park. The main paved parking area and its overflow parking area service the entrance to the attraction area and Buccaneer Bay, while the kayak launch parking area services the paddling launch and access to the river. There is a small trailhead parking area on the north side of the park, which receives minimal use and does not factor significantly into the park's physical capacity. These parking areas determine the physical capacity of the park, and therefore also determine the number of visitors that can access the park. The figures in the table below represent how many visitors the parking areas can support and do not represent how many visitors should be allowed to access the park's resources. Determinations on the number of visitors and the ideal experience the park should accommodate will be discussed in the VUM section.

Table 6. Parking Area Physical Capacities

Parking Area	Main Paved Parking	Overflow Main Parking	Kayak Launch Parking	Trailhead Parking	Total
Number of Parking Spaces	300	50	85	5	440
Visitors per Vehicle	3	3	3	3	
Visitors at One Time	900	150	255	15	1,320
Turnover Rate	3	3	2	2	
Visitors Daily	2,700	450	510	30	3,690

The physical capacity for Weeki Wachee Springs State Park has been determined by identifying the recreational uses and activities available to visitors, approximately the physical constraints associated with accessing those uses, and applying a median number of visitors per vehicle. This calculation establishes the visitors at one time figure for each parking area. The one-time number is then multiplied by a daily turnover rate that estimates how many times the parking areas will be cycled through by different groups of visitors throughout the day. The totals for each parking area are added together to determine the total visitors at one time and total daily visitors.

The table above inventories all of the existing parking areas at the park. For these areas, the physical or operational constraints of accessing and utilizing the parking spaces are considered constant, non-variable inputs into the physical capacity equation. These constants are then multiplied by visitors per vehicle, which is considered to be a variable input. It is known that some vehicles will have one to two visitors while others could contain six to eight. For the purposes of this plan, the established assumption is that each vehicle contains three visitors. The other assumption is that visitors utilizing the main parking area will spend about three hours in the attraction area and Buccaneer Bay, which determines the turnover rate that is used to calculate total daily visitors.

The Turnover Rate is calculated by dividing a 9-hour summer day by the estimated number of hours spent in the park.

9 Hours = Turnover Rate of 1
8 Hours = Turnover Rate of 1.125
7 Hours = Turnover Rate of 1.285
6 Hours = Turnover Rate of 1.5
5 Hours = Turnover Rate of 1.8
4 Hours = Turnover Rate of 2.25
3 Hours = Turnover Rate of 3
2 Hours = Turnover Rate of 4.5
1 Hour = Turnover Rate of 9

These calculations of the park's physical capacity are based on the idea that parking spaces are considered physical constraints that only allow a certain number of visitors to access the park's use areas at one time. A single parking space cannot be used simultaneously by multiple vehicles. Although vehicles can contain a variable number of visitors, the total number of parking spaces physically limits the number of visitors that can access the park's resources. Without an increase to the physical space allocated to parking, an increase in the physical capacity of the park cannot take place. Conversely, a reduction in allocated parking can lower the maximum capacity of visitors able to access the park. These calculations, however, do not attempt to establish how many people should be allowed to access the park.

Objective A: Maintain the current public access and uses at the park.

The park will continue to maintain the parking areas used to access the park and will continue to offer the historical recreational opportunities found at Weeki Wachee Springs State Park. The main recreational uses will continue to be the underwater mermaid shows, waterpark activities at Buccaneer Bay, and paddling on the Weeki Wachee River.

Objective B: Continue to provide and develop interpretive programs.

Interpretation of the cultural history and legacy of the mermaids will continue to be one of the main interpretive themes at the park. Other interpretation that will continue includes shows at the wildlife theater and interpretation of the sensitive natural ecosystem that supports the first magnitude spring and spring-run. One development proposal to be discussed below is the potential for a visitor center that could be used to showcase the legacy of the roadside attraction and mermaids with an interpretive museum. Curation of park artifacts and the development of interpretive programs will be needed if this new visitor center facility is funded and constructed.

Capital Facilities and Infrastructure

Goal: Develop and maintain the capital facilities and infrastructure necessary to implement the recommendations of the Conceptual Land Use Plan (CLUP).

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 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. The following is a summary of the improved, renovated, and new facilities needed to implement the Conceptual Land Use Plan (CLUP) for Weeki Wachee Springs State Park.

A majority of the proposals in the CLUP are aimed at improving the visitor experience in the park's main use areas. Development and improvement concepts in the attraction area and the main paved parking area are largely aligned with the vision set forth in the park's 2014 Master Plan, which will be discussed further below and is found in Appendix X. Given a headspring retaining wall and stormwater management project taking place in Buccaneer Bay, the 2014 Master Plan vision for that portion of the park cannot be achieved and alternative concepts are proposed. The major new development proposal involves the creation of a new park entrance and establishment of a traditional ranger station entrance area. The parking area redesign and stormwater improvement proposals of the master plan will continue to be pursued. The new entrance road, however, will connect with the existing main parking area from the south as opposed to directly from US 19. Developing a new entrance and rerouting visitors into the parking areas will allow the current entrance to be abandoned and revegetated to create a natural buffer between US 19 and Weeki Wachee Spring. All proposed concepts are discussed below.

Objective A: Maintain all public 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 B: Improve/repair facilities in 4 existing use areas.

Major repair projects for park facilities may be accomplished within the ten-year planning period 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 recommended improvements are organized by use area within the park.

<u>Attraction Area</u>

- Add Pavilions (2)
- Improve Walkway Lighting
- Relocate Banquet Hall
- Improve Captain's Quarters
- Develop Visitor Center
- Assess Grandstand

The underwater mermaid theater is the most notable feature of the attraction area. This facility has recently undergone an extensive renovation process and will continue to be one of the park's main attractions. A majority of the proposal concepts for this area of the park are intended to implement the vision of the 2014 Master Plan. The graphic on the next page shows the redesigned attraction area.

The main redesign element of the master plan is the development of a central corridor with clear sightlines from the entrance of the park to a newly created fountain in the center of the use area and then to the tour boat dock. The fountain concept is located at the site of the Banquet Hall facility, which would require that structure to be relocated. The Banquet Hall space could be integrated into the proposed visitor/interpretive center. This new facility would house an interpretive museum dedicated to the history of the park and the cultural legacy associated with the mermaid shows and underwater theater. The visitor center would also have reservable meeting space and could be used to accommodate community events. To the west of the Banquet Hall and future fountain site, the Garden of the Stars area will be improved through walkway lighting updates and the addition of two pavilions. To the east, Captain's Quarters will be improved, and a deck will be constructed to allow outdoor seating overlooking the springhead. Lastly, an assessment should be completed on the grandstand seating structure to determine the feasibility of renovating or demolishing the amenity. Consideration should also be given to incorporating the grandstand into an event area that would utilize the open space between the grandstand and visitor center concept. Proper orientation of the visitor center could allow the structure to be aligned with and centered on the orientation of the grandstand, and a stage could be constructed on the backside of the visitor center to create an event space that would use the grandstand for seating. The specific design, siting, and orientation of these proposed improvements would be determined during the design and construction process if project funding is allocated.

<u>Buccaneer Bay</u>

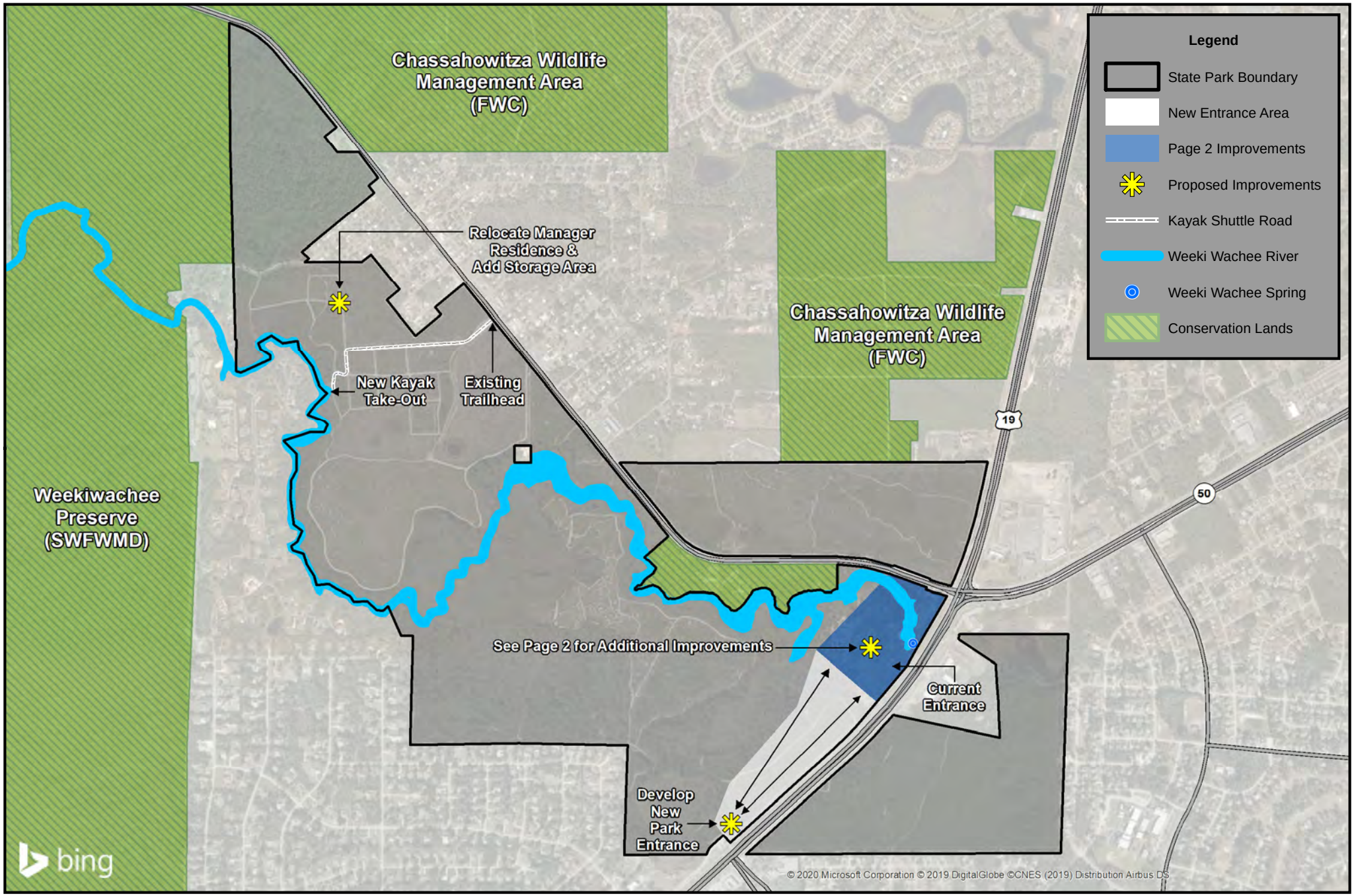
- Improve Retaining Wall
- New Stormwater Facility
- Relocate Office
- Remove Tower
- Add Pavilions (6)
- Expand Splash Pool Area
- Expand Concession Building
- Relocate Tube Corral

The 2014 Master Plan also laid out a vision for the redevelopment of the waterpark activities at Buccaneer Bay. Due to project conflicts, the Buccaneer Bay concepts in the master plan will be unable to be implemented in full. A project to improve the retaining wall around the springhead is in the process of being implemented, and the project will include a new stormwater facility north of the slides and existing concession building.

Weeki Wachee Springs State Park
Conceptual Land Use Plan (CLUP) Map

0 0.25 0.5 1 Miles

N W E S

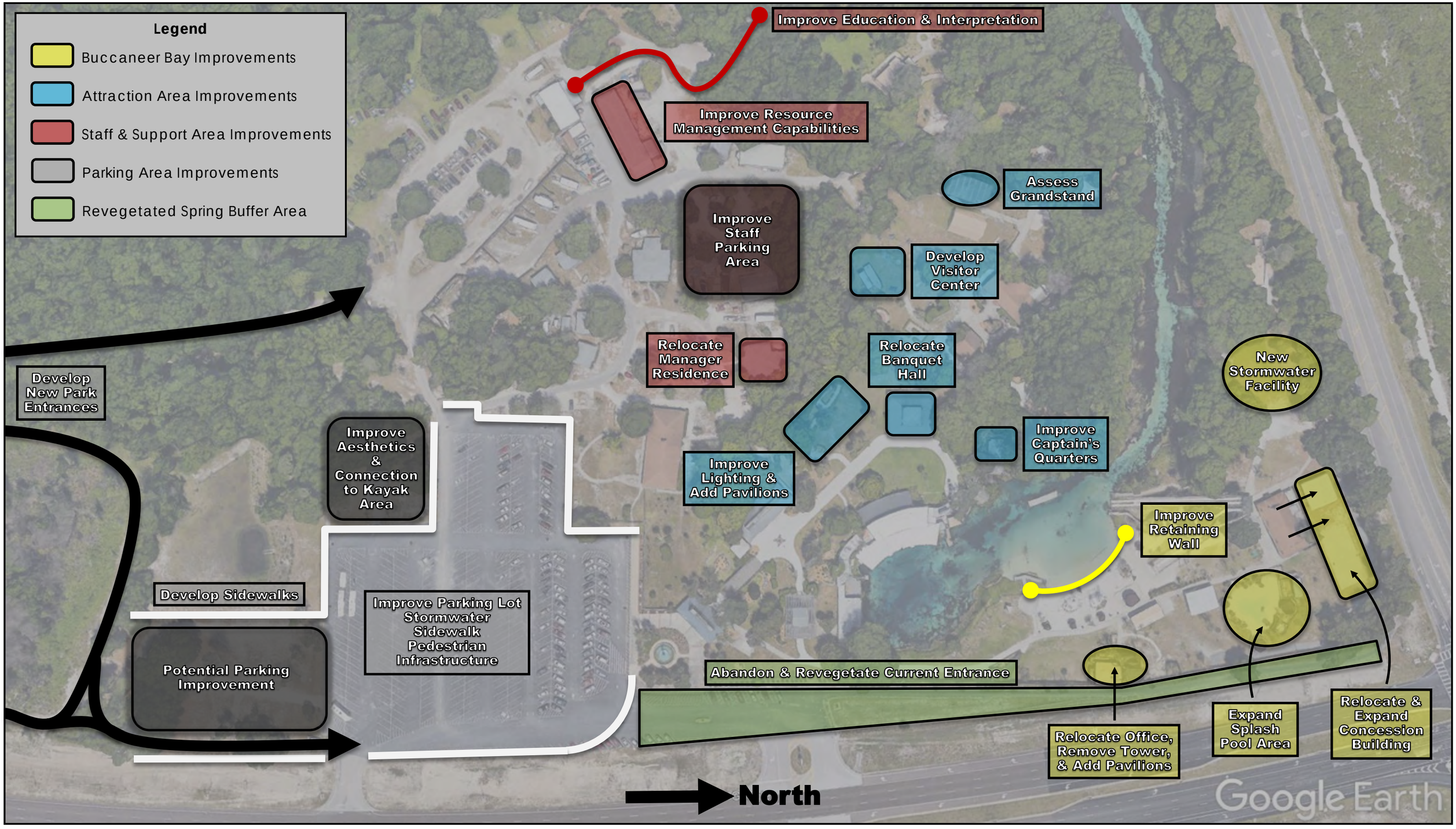


Weeki Wachee Springs State Park
Conceptual Land Use Plan (CLUP) Map — Page 2

Future Capital Improvement Projects — Ten-Year Planning Period

*Intended for planning purposes and external communication

**Not to scale



The springhead retaining wall and stormwater improvement project takes precedent over the concepts proposed in the master plan, and only development proposals expressed in this management plan update will be considered for Buccaneer Bay. In order to streamline operations and reallocate underutilized spaces, the existing concession building should be moved and expanded to replace the footprints of the existing pavilion and sand volleyball court. The new concession building will include the traditionally offered services and should also include office space to house the relocated first aid and lifeguard functions of the building adjacent to the former slide tower. Once these functions are re-established at the new concession building, the first aid building and former slide tower should be removed. Several small and medium pavilions (up to 4 and 2, respectively) are proposed to be developed in the footprints of the removed and relocated existing structures. The existing inflatable tube corral should be relocated and repurposed as a pavilion. Finally, the expansion of the splash pool area to include an additional play area should be explored. In general, the long-term vision for Buccaneer Bay is to transition toward a more resource-oriented recreational area. As stated in the previous approved UMP, the water slides at Buccaneer Bay will be maintained until it is no longer economically feasible.

Parking Areas

- Redesign Main Parking Area
- Improve Connectivity
- Develop Sidewalks
- Redevelop Overflow Area

The main paved parking area at the park is approximately 4 acres in size and accommodates about 300 vehicles. In addition, there is an unpaved area south of the main paved parking that is used for overflow parking and can accommodate another 50 vehicles. The size of unpaved parking area is about 1.5 acres. These two parking areas service the main entrance to the park, which manages access to the attraction area and Buccaneer Bay. The current configuration of the main parking area can cause vehicle stacking issues on US 19 as drivers attempt to drop visitors off in front of the gate and creates conflict if vehicles try to navigate around stopped and waiting vehicles. The configuration, traffic flow, and design elements of the main parking area should be redesigned to accommodate a similar number of vehicles, help improve traffic circulation and pedestrian safety within the parking area, and update stormwater management green and gray infrastructure.

The graphic to the right shows a redesigned main parking area as proposed by the 2014 Master Plan. As funding is allocated, alternative parking area designs can be proposed as a part of the design and construction process. However, any alternative developed should share similar design elements and considerations.

Design elements to be considered should include a similar vehicle capacity relative to the existing parking area. The redesigned parking area should also have dedicated large bus and RV parking spaces. To improve traffic circulation, the visitor drop-off area should be separated from parking spaces and include a dedicated drop-off lane in order to minimize conflict between the visitors already parked unloading their vehicles and the visitors trying to drop off. Native vegetation and bioswales should be incorporated throughout the redesigned parking area to improve stormwater management capabilities and to create natural buffers that could potentially provide shading and reduce the heat island effect, creating a more pleasant visitor experience on hot summer days. Lastly, connectivity within the redesigned parking area and with the kayak parking area should be improved. Sightlines between the two parking areas are obstructed and need to be addressed to improve vehicle and pedestrian safety. Sidewalks and other pedestrian infrastructure should also be explored. All redesign concepts should consider how the redesigned parking area will be incorporated into the new entrance road concept, which will be discussed in further detail below.

Support Area

- Relocate Manager Residence
- Improve Staff Parking Area
- Improve Capabilities
- Improve Kayak Launch Area

The Park Manager and Assistant Park Manager residences are both located in the park's support area, which is directly adjacent to the attraction area and main paved parking area. In order to develop additional resource management facilities and capabilities, the Park Manager residence should be relocated to a different area of the park. This will allow the structure to be repurposed for office, shop, or storage space. The staff parking area near the residence will also be improved and expanded to provide space for all staff to park in the support area, freeing up parking spaces in the main paved parking area. While not fully within the staff support area, the kayak launch for concession rentals and personal vessels is located adjacent to a privacy fence separating this recreational area from the maintenance shop. As a part of the park's visitor use management strategies, interpretive and educational amenities should be improved along the walkway to the kayak launch. This concept will be discussed further in the VUM section.

Objective C: Construct 0.75 miles of road and facilities in 2 new use areas.

The development proposals in this objective differ from the previous objective because these concepts are located in areas that are not currently developed and impacts to the natural landscape could take place. These concepts have been proposed in areas that have been determined to be areas where impacts are minimal and deemed acceptable. If these projects are funded for implementation, design alternatives will be developed, and impacts will be minimized and/or avoided to the extent possible.

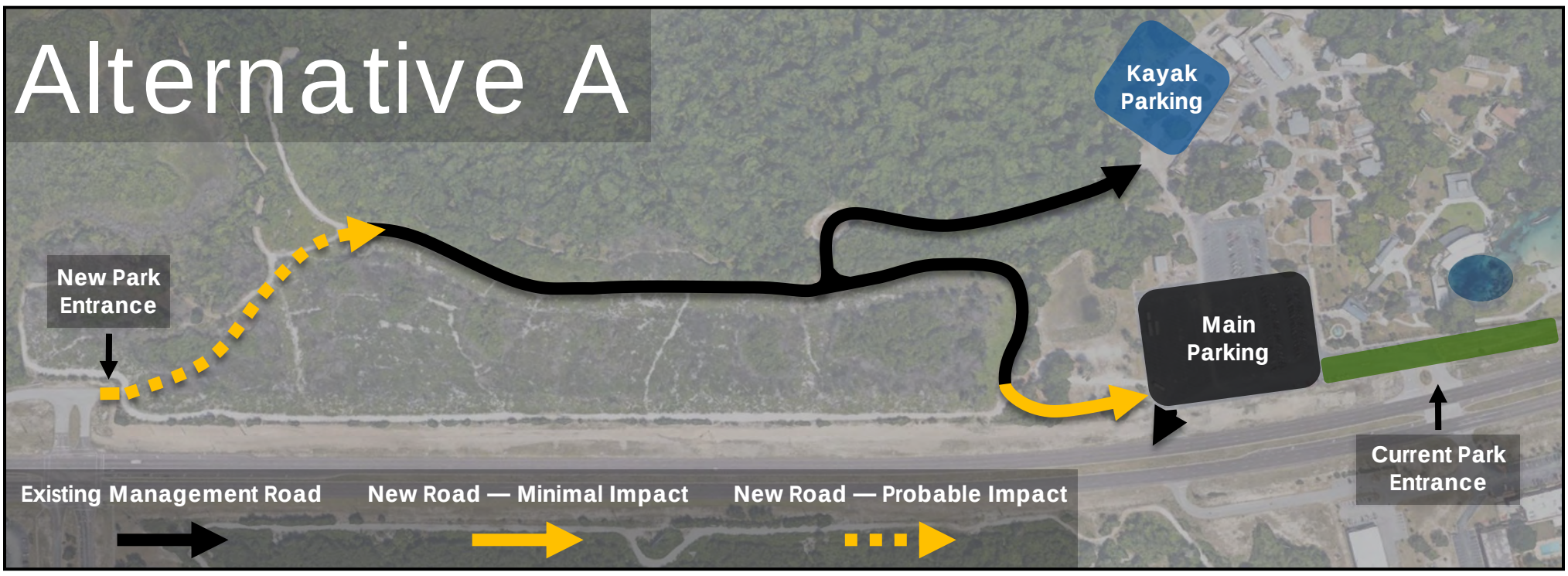
Entrance Area

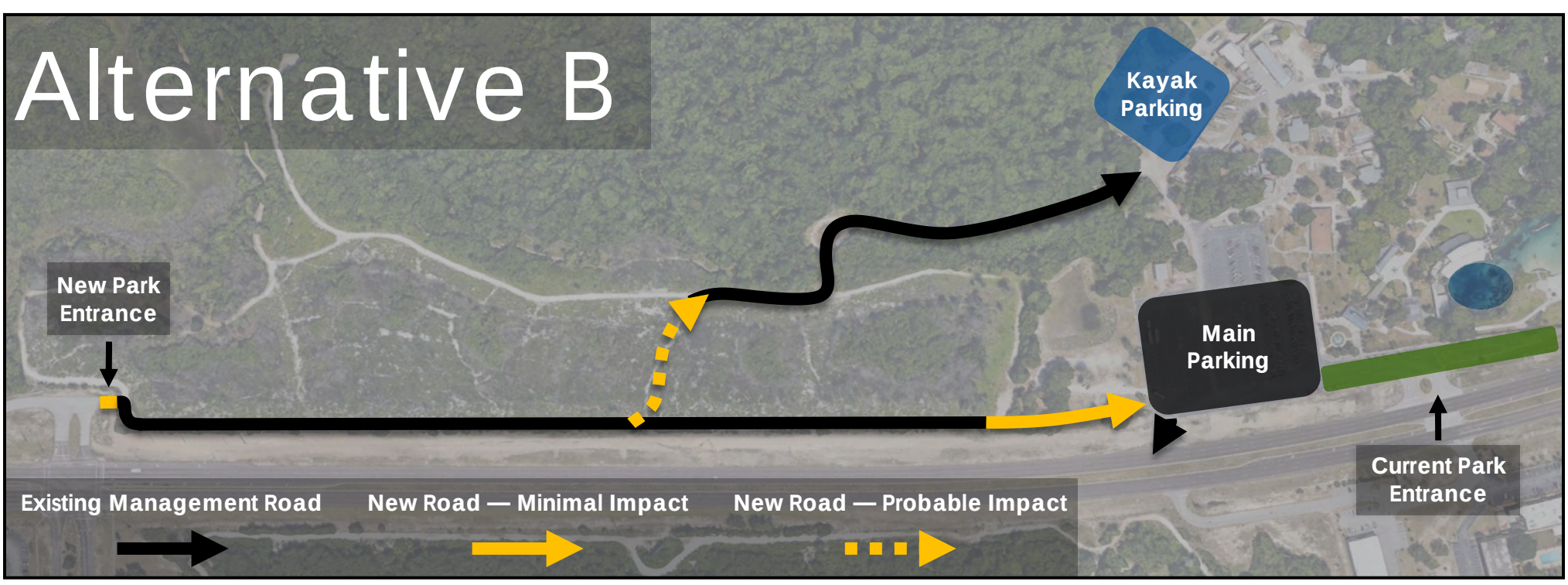
- New Entrance Road
- Construct Ranger Station

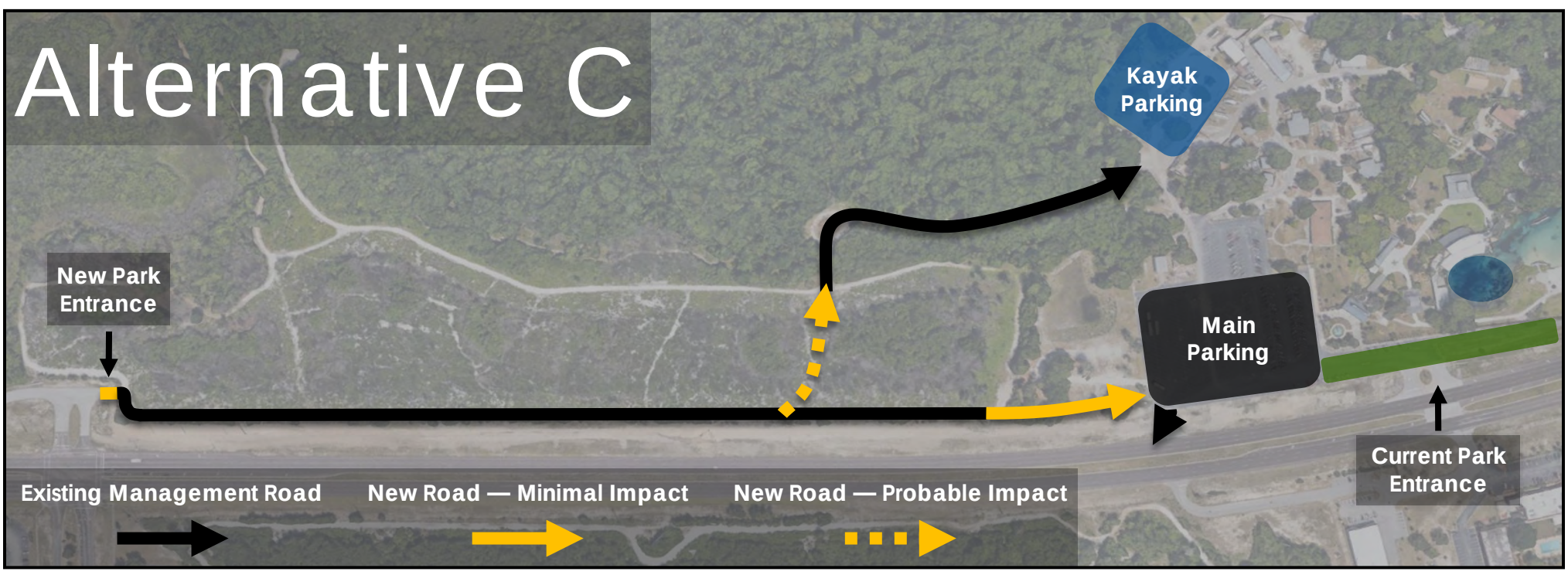
Traditionally, state park units are accessed by one main park entrance and roadway that clearly delineates a transition from urban, suburban, or rural context to a natural area and creates a sense of arrival once in the park. The map on the following page illustrates possible new entrance alignments to facilitate a typical state park visitor experience and improve park ingress and egress safety.

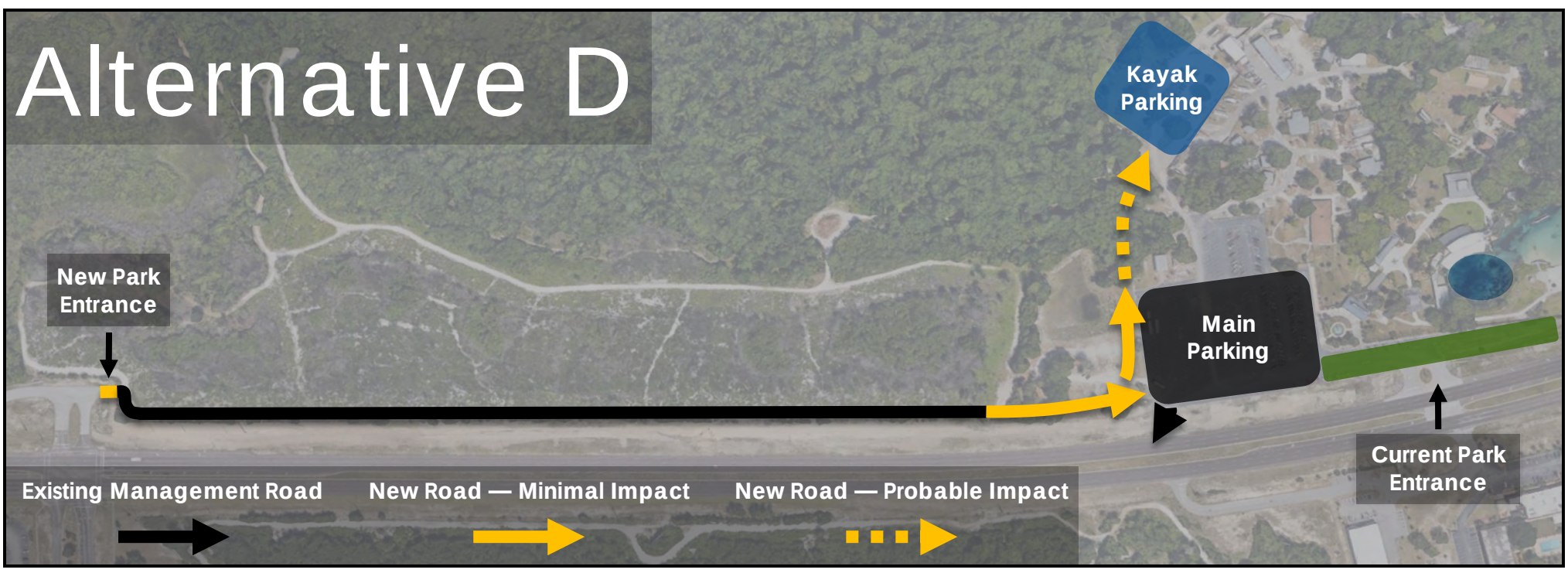
Weeki Wachee Springs State Park
Entrance Alignment Potential Alternatives

* Intended for planning purposes only
** Other alternatives could be developed
*** Not to scale









Similar to the main paved parking area redesign concept, additional alternatives can be considered as a part of the design and construction phase once funding has been allocated for the project. The entrance alternatives map is intended to showcase a range of possible options and is not necessarily intended to determine a preferred alternative. Resource impacts will need to be further analyzed and studied in-depth prior to making a final decision. However, certain goals of a new entrance road and ranger station should be considered during the design phase. The main goals of a new park entrance road are to create a traditional state park visitor experience and to develop independent entrance roads to the main paved parking area and the kayak parking area. The current entrance to the park is used by all visitors, which can cause conflicts between vehicles travelling to and from the kayak parking area and visitors in the main parking area. In addition, the current park entrance is also used as an exit and visitors travelling north on US 19 have to cross up to six lanes of traffic when exiting the park. The new entrance should improve visitor safety within in the park, as well as for vehicles leaving the park.

A four-way traffic signal currently exists at the intersection of Northcliffe Boulevard and US 19. On the west side of US 19, Northcliffe Boulevard terminates into the park boundary and turns south, creating the Beryl Road service road. The northern extension of Beryl Road also terminates into the park boundary. In addition, northbound US 19 traffic has a 400-foot left turn lane onto Northcliffe Boulevard and southbound traffic has a 350-foot right turn lane at the intersection. These roadway characteristics are perfectly suited to facilitate traffic in and out of the park in a safe and efficient manner. Moving the current entrance about 0.6 miles south on US 19 would require building new infrastructure, including an entrance/ranger station and approximately 0.75 miles of road. Existing management roads should be stabilized and/or paved for the new entrance road to the largest extent possible, and the ranger station should be sited in a location that services visitors before the road split off toward the two main parking areas. One-way roads are preferred in order to mitigate natural community impact, but two-way roads could be accommodated if narrow road widths are pursued. Natural community impacts should be carefully considered given the nearby basin marsh habitat and the scrub habitat through which the management roads traverse. The existing management road that forks toward the kayak parking area traverses through hydric hammock natural communities, likely limiting the extent to which that road could be widened and/or paved. Regarding Alternatives A-D and any other possible alignments, considerations for the visitor experience and natural community impact should be carefully weighed and balanced appropriately. For example, Alternative A may offer the most benefits in terms of the visitor experience but also represents potentially the most impact to the natural communities. On the other hand, Alternatives B-D have varying levels of minimal impact but do not provide as desirable of a visitor experience given their proximity to US 19. If funding becomes available for this concept, resource impacts should be incorporated into a cost-benefit analysis for each alternative developed.

<u>Residence Area</u>

- Construct New Residence
- Add Small Storage Area

As proposed above, the Park Manager residence should be relocated from the park's main support area. The new residence should be located on the portion of the property that was recently added to the park boundary and should be sited north of the kayak concession shuttle road. To supplement resource management efforts, a small storage area should be included to help with staging prescribed fire equipment. Flammable storage facilities and a pole barn are desirable.

Capital Facilities & Infrastructure – Estimated Costs

Attraction Area		***$3,135,000***
o	***Add Pavilions (2)***	***$54,000***
o	***Improve Captain's Quarters***	***$138,000***
o	***Assess Grandstand***	***$35,000***
o	***Develop Visitor Center***	***$2,500,000***
o	***Relocate Banquet Hall***	***$353,000***
o	***Develop Aesthetic Fountain***	***$55,000***
Buccaneer Bay		***$5,304,000***
o	***Improve Retaining Wall***	***$700,000***
o	***Develop Stormwater Facility***	***$300,000***
o	***Expand Concession Building***	***$2,100,000***
o	***Add pavilions (6)***	***$204,000***
o	***Expand Splash Pool***	***$2,000,000***
Parking Areas		***$924,000***
o	***Develop Parking Redesign***	***$35,000***
o	***Redesign Main Parking Area***	***$525,000***
o	***Plant Native Vegetation***	***$364,000***
Support Area		***$15,000***
o	***Improve Staff Parking Area***	***$10,000***
o	***Update Interpretation***	***$5,000***
Entrance Area		***$1,068,000***
o	***Develop New Entrance Road***	***$794,000***
o	***Construct Ranger Station***	***$274,000***
Residence Area		***$406,000***
o	***Construct Residence***	***$373,000***
o	***Add Small Storage Area***	***$33,000***
Total		***$10,852,000***

Land Acquisition and Optimum Boundary

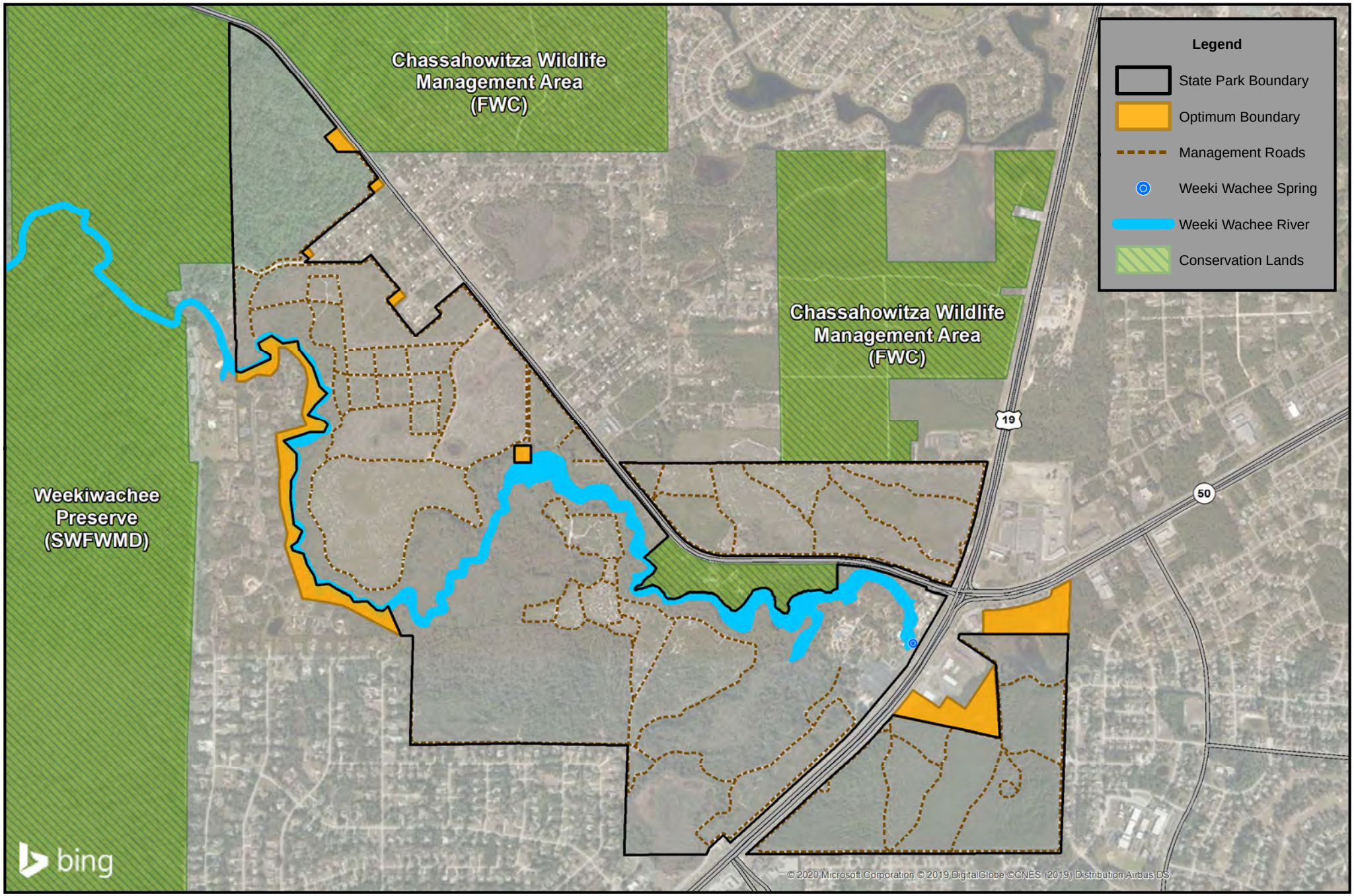
The optimum boundary map reflects lands considered desirable for direct management by the DRP as part of the state park. These parcels may include public or privately-owned land that would improve the continuity of existing parklands, provide the most efficient boundary configuration, improve access 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.

Adjacent lands identified for the park's optimum boundary and potential acquisition include ten parcels totaling approximately 42.6 acres. Most of the parcels identified represent land acquisition opportunities to improve resource management access and expand the acreage under management authority of the DRP. One small parcel that is less than one acre in the center of the property is an inholding, and the DRP routinely seeks to acquire inholdings to improve operational management capabilities for park staff. The largest of the parcels identified is about 19 acres and is owned by the Waters of Weeki Wachee Property Owners Association. Acquisition of this parcel would extend the areas on the Weeki Wachee River in which the DRP can legally enforce Florida Administrative Code (FAC) 62-D rules and regulations. Currently, the areas on the river where the DRP can legally enforce FAC 62-D are only the areas where the DRP has management authority of the uplands on both sides of the river. The recent addition of property into the park boundary extended the management authority of DRP further downriver, but that legal authority now stops at the area where the DRP only manages the northern and eastern bank of the river. Adding this parcel would allow the park to extend its management authority on the river to where the new park boundary ends.

At this time, there are no lands within the park boundary that are identified as surplus to the management needs of the park. Lands considered for surplus will be re-evaluated during the next management plan update process.

Weeki Wachee Springs State Park
Optimum Boundary Map



Visitor Use Management

The mission of the Florida Park Service directs staff to maintain an appropriate and proportional balance between recreational use and resource protection. The inherent challenge in achieving this mission is highlighted by growing public concern over potential resource impacts from popular recreational activities at many state parks. Previous attempts to manage visitor capacity at state parks were borrowed from the biological sciences and the concept of ecological carrying capacity. The DRP adapted this concept and developed recreational carrying capacity guidelines that were based on the recreational suitability of a given natural community, the type of recreational activity, the square footage associated with the activity, and the personal space needed to achieve a desirable visitor experience. Using this information, an optimal number of visitors per activity was calculated and identified in state park management plans.

In order to improve visitor capacity guidelines, the DRP researched alternative visitor management strategies and a new management strategy was adopted. This new Visitor Use Management (VUM) strategy is intended to provide guidelines for park staff to adaptively manage appropriate visitor capacities and quality visitor experiences while preserving natural and cultural resources. The Visitor Use Management Framework developed by the Federal Interagency Visitor Use Management Council was used as the guiding framework for DRP's VUM strategy. The Weeki Wachee Natural System Carrying Capacity Study (referred to as the Carrying Capacity Study) commissioned by SWFWMD and Hernando County has been carefully considered, and the overall goals and objectives of the park's VUM strategy have been significantly influenced by the results of the study.

Purpose of VUM

The purpose of the Weeki Wachee Springs State Park VUM strategy is to identify potential management actions to address visitor capacity issues at the park. Over the past ten years, paddling the Weeki Wachee River has exploded in popularity and visitors from around the country and world travel to the park for the opportunity to experience this unique resource. In addition, the first magnitude spring and world-renowned underwater mermaid performances attract visitors to the main day use areas. The park's popularity has seen attendance grow from 147,000 visitors in 2010 to its peak of nearly 419,000 visitors in 2016 and down to about 285,000 visitors in 2019. Major repair and renovation projects were implemented between 2018-2019, and it can be expected that attendance will rebound and sustain yearly visitor attendance closer to the five-year average annual attendance of approximately 376,000 visitors per year.

While the attraction area and Buccaneer Bay is better equipped to handle large volumes of visitation and still provide a high-quality visitor experience, the Weeki Wachee River is more sensitive to increased visitor use and susceptible to significant resource damage as a result of visitor impact. As was confirmed by the Carrying Capacity Study, the river has experienced resource degradation from visitor behavior that is not entirely linked to the total number of visitors that recreate on the river. This is one of the main reasons the traditional numerically based recreational carrying capacity is unable to achieve a desirable outcome. In this case, visitor behavior has been shown to have a direct impact to the resource, and a cap on the number of users alone cannot address the underlying cause of resource impacts.

Instead, this VUM strategy recommends addressing visitor use through a holistic approach that considers visitor capacity, behavior, and experience to inform a range of management options and responses. An emphasis will be placed on resource monitoring efforts to track and analyze visitor impacts over time. As opposed to calculating a recreational carrying capacity number for each activity at the park, the VUM strategy will be focused on tracking specific resource indicators over time and setting thresholds that signal to managers that corrective measures should be taken. In this strategy, a suite of management actions will be offered that range from increased education and improved interpretation to partial or complete restrictions of certain recreational activities. The VUM strategy sets the foundation for long-term monitoring efforts to help adaptively manage visitor use. However, given the results of the Carrying Capacity Study, proactive management actions should also be implemented in the short-term. Short and long-term objectives will be discussed below. Prior to outlining the goals and objectives of this VUM strategy, the main issues at the park will be identified and the key points of the Carrying Capacity Study will be summarized.

Identification of Key Issues

Most issues that have been raised at public meetings are related to the management of the Weeki Wachee River. These issues have been categorized according to the five themes below. The concerns expressed are largely interrelated and some will require collaboration among key stakeholders and managers of the river.

- *Natural Resource Impacts:* Chief among the issues that have been both anecdotally expressed and confirmed by the Carrying Capacity Study, impacts to the submerged aquatic and emergent vegetation and erosion of the riverbanks have had a cumulative effect over years of visitor use. These impacts have been shown to be related to users docking at point bars for in-water activities and trampling vegetation.

- *Overcrowding on Busy Days:* Although overcrowding would presumably be related to resource impact, overcrowding may have a larger impact on a visitor's experience while on the river. Many busy days throughout the year attract visitors seeking a social and group experience and could discourage use by visitors in search of a serene and tranquil experience.

- *Perceived Lack of Paddling Experience:* One of the main issues raised by local residents is the perceived lack of paddling experience by visitors to the state park. This undereducation on proper paddling techniques can lead to conflicts between users and could exacerbate resource impacts. Inexperienced paddlers may also understand less about the sensitive habitat associated with the river.

- *Vessel and User Conflicts:* In addition to varying levels of paddling experience, the number of vessels and users on the river at given times during the busy season can cause conflicts not only with other paddlers but also with motorized boats that share recreational access to the river. These conflicts can cause an impact to river resources, as well as diminish the visitor experience.

- *Multiple Access Points:* Compounding the complexity of issues on the river, users can access the river from multiple locations including private homes, private businesses, private parks, county parks, and the state park. Respecting the lawful enjoyment of the river by property owners must be carefully considered alongside enforcement and user education efforts conducted by local, regional, and state jurisdictions.

Weeki Wachee Natural System Carrying Capacity Study

Between June 2018 and June 2019, Wood Environment and Infrastructure Solutions, Inc. conducted the data gathering and analysis process for the Carrying Capacity Study. According to Wood (2019), "The intention of the study was not to set a specific value of vessels or users allowed on the river, but to collect and analyze data that relates human use to water quality, hydrologic, geomorphic, or ecological degradation of the river". The study area spanned from the headspring at Weeki Wachee Springs State Park to Rogers Park. In order to frame the study, the river was segmented by similar characteristics into four Functional Process Zones (FPZ), and four monitoring stations were selected in each FPZ in areas that could be representative of overall activity within the given FPZ. A fifth monitoring station was added for five of the nine field sampling dates after a lightning strike knocked over a tree frequently used for rope swinging. Wood staff collected observational data, social surveys, and water samples on the nine field sampling dates to the right. Video cameras and water quality data collectors were deployed for two weeks at a time at each monitoring station, and the equipment was deployed six times over the course of the study. An experimental trampling assessment, comparative spring-run assessment, and turbidity trend analysis was also conducted as a part of the final study. The entire Carrying Capacity Study can be found in Appendix X.

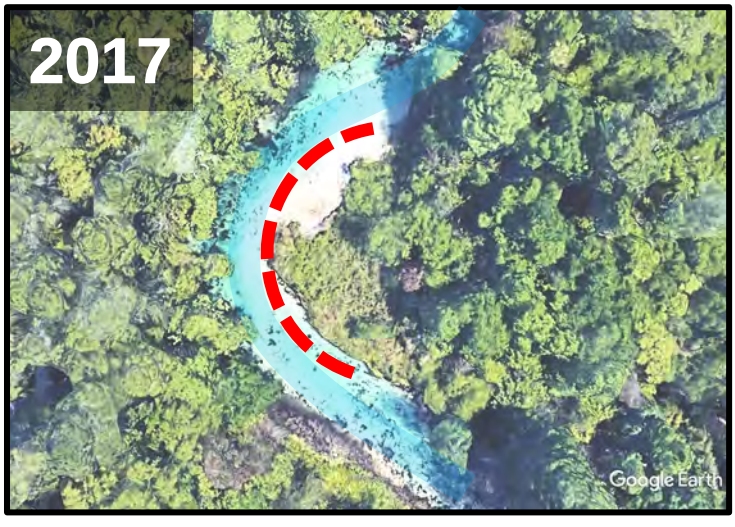
Equipment Deployment

- June 29 - July 16, 2018
- Aug. 28 - Sept. 17, 2018
- Dec. 5 - Dec 19, 2018
- Feb. 6 - Feb. 19, 2019
- April 10 - April 24, 2019
- May 22 - June 5, 2019

Field Sampling Dates

- July 5, 2018
- Aug. 7, 2018
- Sept. 3, 2018
- Oct. 2, 2018
- Dec. 19, 2018
- Feb. 19, 2019
- April 24, 2019
- May 27, 2019
- June 23, 2019

The main component of the Carrying Capacity Study that informs this VUM strategy is the assessment of recreational use on the river. It was shown that the majority (87%) of users were kayaking on the river, and although the number of kayaks (vessels) is correlated with an increase in turbidity, the number of vessels alone cannot be attributed to the resource damage shown in the two images below. The images show the same point bar in the river in 2008 and 2016. The image from 2008 represents a relatively healthy, ecologically intact point bar. Over years of use, the cumulative effect of users docking their vessels and trampling the vegetation has significantly impacted the point bar, as shown in the 2016 image. A key takeaway by the DRP is that while a restriction on the number of users allowed to access the river could certainly help reduce the probability of resource impacts, a capacity limit alone cannot address resource impacts if docking and in-water activities are not sufficiently addressed.



Goal of VUM

Although there will be management objectives associated with maintaining appropriate visitor use of the attraction area and Buccaneer Bay, the main goal of the park's VUM strategy is to prevent further resource degradation and sustain a high-quality visitor experience on the Weeki Wachee River. The image of the impacted point bar on the previous page is only one such example of cumulative visitor impact, and the Carrying Capacity Study identified 30 point bars with varying degrees of resource impact within or adjacent to the park boundary. A VUM strategy requires consistent resource monitoring efforts sustained over time, and the point bars identified by the Carrying Capacity Study represent areas of the river that should be monitored to determine if management actions are improving resource conditions or if additional management measures are needed. Resource monitoring efforts will be detailed in the VUM components section.

In addition to regularly documenting resource conditions, it is also important to track visitor satisfaction to ensure that the desirable visitor experience is consistently achieved. Acknowledging that visitor experience parameters are inherently subjective, it should be noted that the visitor experience zones to be established for the park are intended to be generalized characterizations that inform visitors and managers on the type of experience that should be expected when recreating in certain areas of the park. These zones are effective in contrasting different use areas within the park and creating distinctions between the different types of experiences that should be promoted. The desired visitor experience for various areas of the park will be coupled with resource monitoring efforts to develop visitor use and capacity guidelines for this VUM strategy.

Visitor Experience Zones

In order to maintain a satisfactory visitor experience, it is important to determine the type of experience that is desired within different areas throughout the park. Visitor experience zones (VEZ) are a series of geographic designations that will help guide visitor use and experience expectations in different areas of a state park. These designations allow the DRP to improve communication with stakeholders on the desired visitor experience within areas of the park and help preserve a diversity of recreational opportunities. The VEZ designations can also help guide management of appropriate visitor capacities based on the desired visitor experience for each designation. The following designations are used for Weeki Wachee Springs State Park (see VEZ Map).

Developed

The developed areas include the large majority of day use and support areas within parks. Recreation infrastructure, including parking, roads, walking paths, and picnic areas are mostly paved and provide a level of visitor comfort most commonly associated with conventional day use activities. Landscapes are mostly altered and include native vegetation in a modified natural setting that allows recreational activities to take place in largely open spaces. Socialization within and outside groups is typical, and the presence of other visitors is expected. Areas designated as developed are usually the most visited areas within parks, and a high concentration of visitors should be expected. This designation typically incorporates a primarily vehicle-oriented site layout with substantial parking and meandering roads. There is an obvious and highly visible management presence throughout the visitor areas with groupings of support buildings separated from the main visitor use areas.

Natural

The natural designation is most often associated with a scenic transportation or activity corridor. It is the area that characterizes the experience of the visitor while traveling between use areas. Natural areas may also transition into fully undeveloped areas. Most park visitors will experience this setting from a vehicle travelling to a use area along a park road. These areas can be used as multi-modal corridors where visitors recreate in the roadway or on shared-use paths alongside vehicles travelling to a park's various use areas. The presence of others is expected and tolerated, although the density of visitors is much less than would be expected in areas designated as developed. Most visitor activities are limited to passive day use recreational opportunities such as hiking, biking, paddling, and wildlife viewing. Recreational amenities in natural areas are typically linear trails and/or observation areas that facilitate active physical activities and confine recreation to discrete areas to minimize wider impacts to natural resources. Occasional support facilities are found in the natural area, and unpaved management roads can be found in these areas for access to undeveloped areas that undergo resource management activities.

River Corridor

The river corridor designation was established specifically for Weeki Wachee Springs State Park. On the spectrum of desired visitor experiences, the river corridor designation falls between the developed and natural designations. It shares similarities with both designations in that the river corridor is a linear paddling trail that confines visitors to a discrete recreational area while inviting high levels of recreational use, including social and interpretive experiences. In other words, the river corridor receives forms of visitation associated with areas designated as developed but has characteristics more closely associated with natural areas. The key distinction that should be made with the developed designation is the river corridor is not equipped from an ecological perspective to handle the levels of visitation that are designated for developed areas. Desired visitor experiences for the river corridor range from a wilderness experience that can be enjoyed by individuals or small groups throughout the weekdays to a more social and interpretive experience that allows higher recreational use on the weekends. All desired experiences prioritize the ecological sensitives of the river's natural resources.

Undeveloped

A sense of tranquility and immersion in nature are the desired experiences for the undeveloped designation. The opportunity to experience a mostly undisturbed area with little human imprint and feel senses of challenge, adventure, risk, and minimalism are all important characteristics of the undeveloped designation. This is where longer distance hiking trails, primitive camping, and wildlife viewing opportunities are located. Undeveloped areas have very limited to no recreational development or amenities, with development footprints minimized to unpaved roads and firebreaks used for resource management activities. Priority is given to creating an austere and rustic visitor experience. There is little evidence of visitor presence with a leave no trace policy promoted. Given the effort and advanced preparation required to experience these areas, it can be expected that undeveloped areas will be visited most frequently by nature enthusiasts and more experienced outdoor recreationists. Smaller acreage parks will likely offer hiking and/or wildlife viewing opportunities in these areas, as opposed to larger parks that may offer primitive tent-camping in these areas.

Weeki Wachee Springs State Park
Visitor Experience Zones (VEZ) Designations

*Park images as representative examples

Wilderness	Undeveloped	Natural	River Corridor	Developed	Urban
					
Kissimmee Prairie	O'Leno	Wakulla Springs	Weeki Wachee	Faver-Dykes	Silver Springs
Characteristics * Undisturbed * Solitude * Isolated **Recreation** * Permit-based * Primitive camps * Long hikes **Experience** * Limited access * Self-reliance * Low use areas	**Characteristics** * Tranquil * Minimalism * Challenging **Recreation** * Hiking/biking * Wildlife viewing * Primitive camps **Experience** * Immersive * Leave no trace * Low use areas	**Characteristics** * Connectivity * Multi-modal * Curated **Recreation** * Road biking * Fitness walking * Hiking **Experience** * Exercise/fitness * Multi-use * Low-mid use	**Characteristics** * Sensitive * Ecological * Unique **Recreation** * Paddling * Boat tours * Wildlife viewing **Experience** * Nature-based * Social activity * Mid-high use	**Characteristics** * Central * Slightly altered * Group-based **Recreation** * Picnicking * RV Camping * Interpretation **Experience** * Family friendly * Park quality * High use areas	**Characteristics** * Densely built * Impervious * Concentrated **Recreation** * Attractions * Restaurants * Lodging **Experience** * Park-specific * Concessions * High use areas

Sparse to no visitation ——— **Physically active recreation** ——— **Concentrated visitation and high use areas**

Weeki Wachee Springs State Park
Visitor Experience Zones (VEZ) Map

0 0.25 0.5 1 Miles

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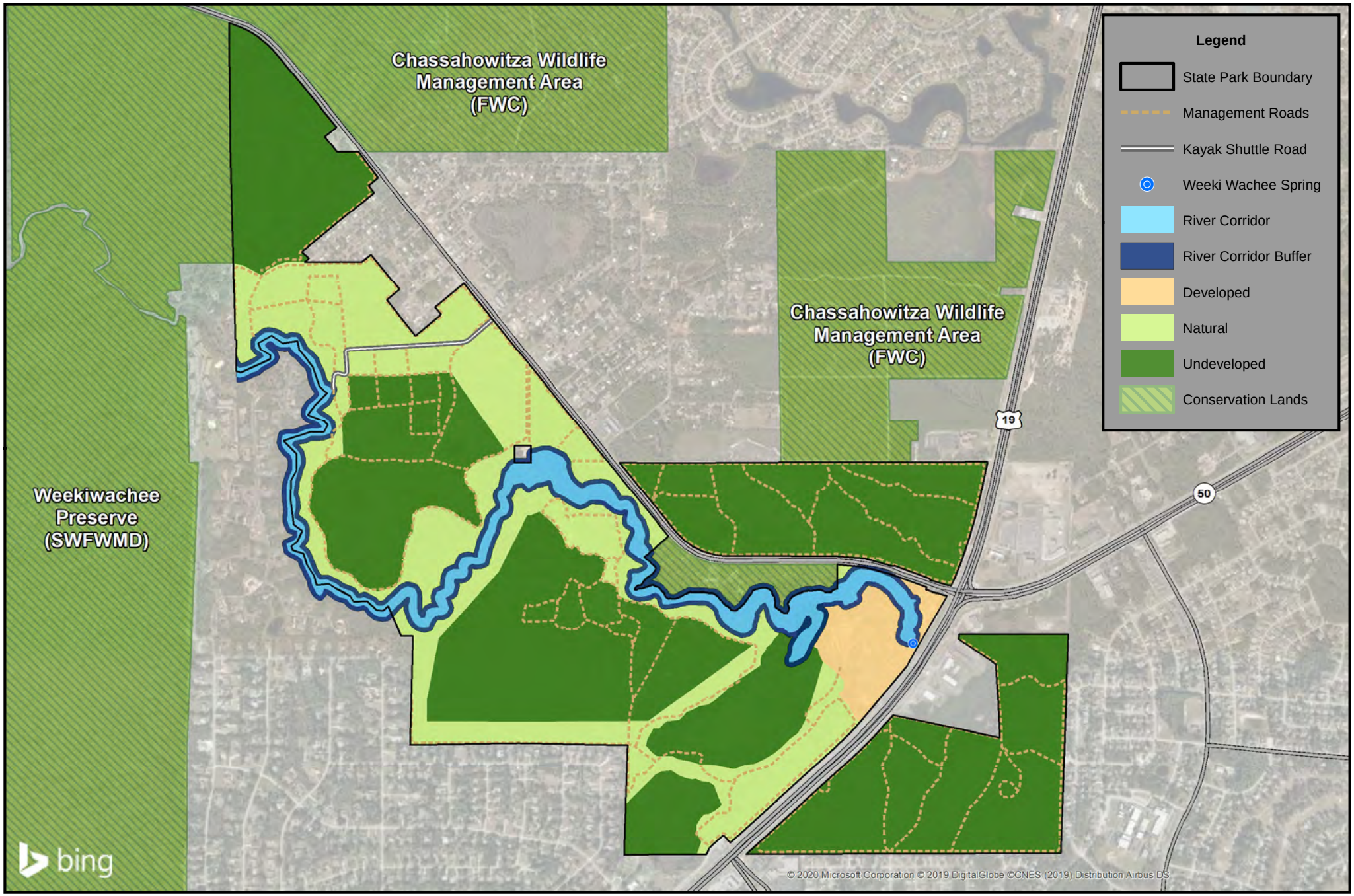


Key Components of VUM

It has been observed and documented that as a result of years of cumulative user impact, the Weeki Wachee River has experienced significant resource degradation. There is evidence that a majority, if not all, of the resource impacts observed on the river can be attributed to in-water user activity. State Park rules require that visitors remain in their vessels while on the river, but as shown by the Carrying Capacity Study, the observed resource impacts are related to in-water activities when users dock their vessels at point bars and trample the submerged and emergent vegetation. These trampled areas become sandy beach point bars, which invites further impactful usage and creates destination points for river users. In order to achieve the overall goal of this VUM strategy, monitoring efforts will be established to track the conditions of point bars on the river to help managers determine if conditions are improving or if additional management actions are required. In addition to resource monitoring, objectives will be proposed to improve education and encourage rule compliance on the river. Four key components of this VUM strategy include:

- Determine the **CURRENT CONDITIONS** of the areas to be monitored
- Select **INDICATORS** that will represent improving or declining conditions
- Identify **MANAGEMENT ACTIONS** directed at influencing user behavior
- Implement **MONITORING** program to determine if further action is needed

Current Conditions

The Carrying Capacity Study identified a total of 34 impacted point bars along the river within the study area. Among the 34 points bars, 30 are within or adjacent to the park boundary. This is an important distinction that will be discussed in the Objectives section. The Carrying Capacity Study also conducted an aerial point bar assessment that involved interpreting historical aerial imagery from 2008 to 2017 and calculating an estimated loss of vegetation over the past decade. Six point bars with the clearest aerial imagery were selected, one of which is now the site associated with the new kayak takeout point. The table below summarizes the Carrying Capacity Study's findings. Point Bar 1 is the same point bar shown in the images in the Carrying Capacity Study section above, and Point Bar 24 is on the opposite side of the river from the new kayak takeout point. Establishing an increased staff and management presence at the new kayak takeout point should work to discourage docking and in-water activities at this point bar. The data shown below represents the baseline conditions of the point bars. All of these point bars will be monitored over the course of this plan to help managers determine the effectiveness of management actions.

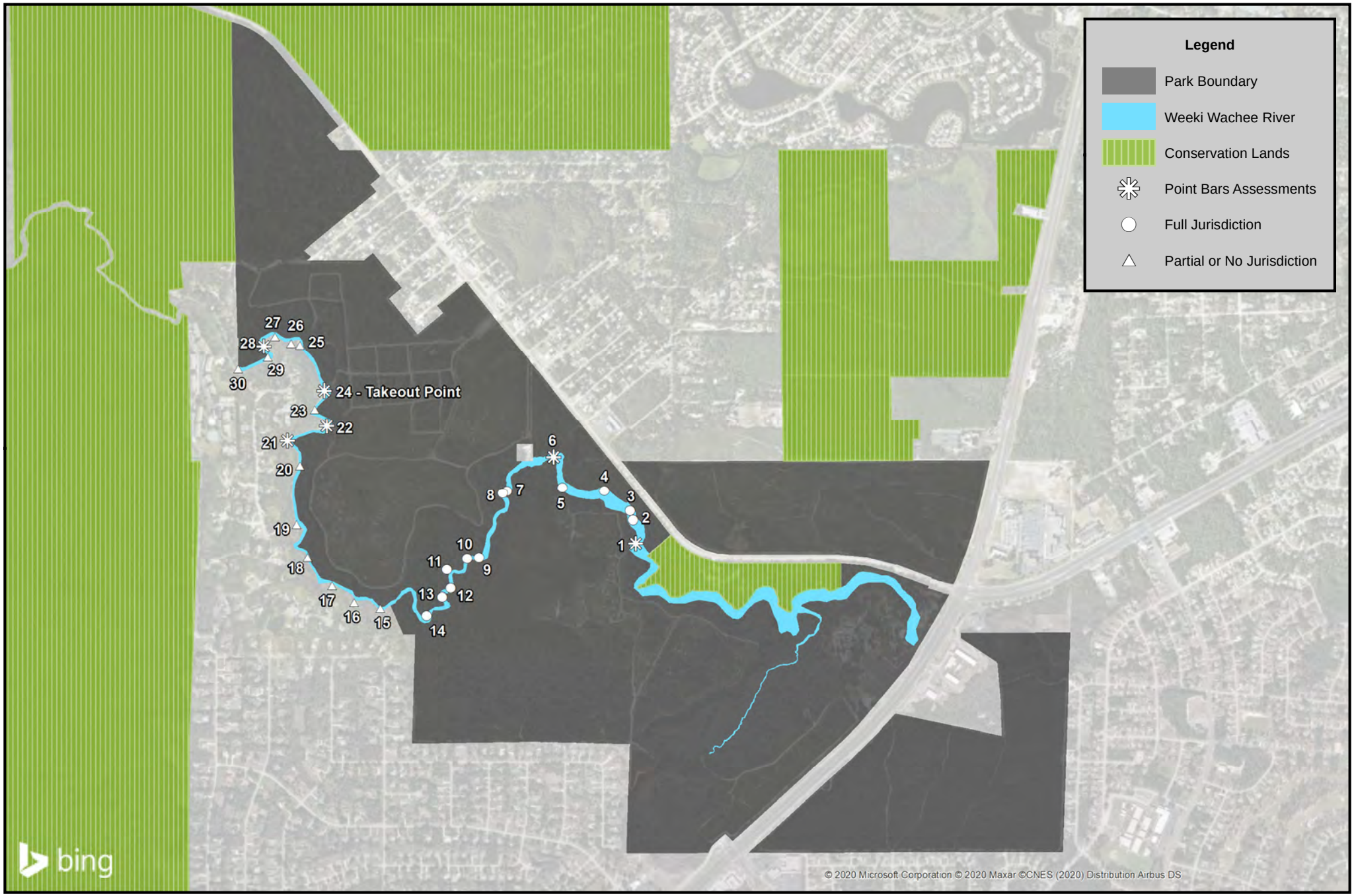
Table 7. Point Bar Aerial Assessment – Vegetation Loss in Square Feet

Point Bar	PB 1	PB 6	PB 21	PB 22	PB 24	PB 28
2008 Aerial	7,031 ft^2	11,661 ft^2	7,493 ft^2	8,508 ft^2	7,012 ft^2	3,213 ft^2
2017 Aerial	5,337 ft^2	10,603 ft^2	6,063 ft^2	7,008 ft^2	6,201 ft^2	2,237 ft^2
Net Loss	**1,694 ft^2**	**1,058 ft^2**	**1,430 ft^2**	**1,500 ft^2**	**811 ft^2**	**976 ft^2**
Percent Loss	**-24%**	**-9%**	**-19%**	**-18%**	**-11%**	**-30%**

Weeki Wachee Springs State Park
Point Bar Map

0 0.25 0.5 1 Miles

N W E S



Indicators

The six point bars that have been selected for long-term monitoring are intended to be representative samples that demonstrate the effectiveness of management actions on the river as a whole. Improving conditions at these six point bars will not only indicate overall resource improvement on the river, but it will also suggest that user behavior has improved and indicate that docking and in-water activities have been reduced, if not eliminated altogether. Declining conditions would indicate further resource degradation and signal to managers that user behavior has not been adequately addressed.

The main indicator associated with these monitoring efforts will be the square footage of vegetation at each point bar. Given that aerial imagery does not update as regularly as needed for this monitoring, it is recommended that monitoring is conducted with drone photography. This will require dedicated park staff or volunteers that have completed the necessary drone pilot certifications, or the images can be obtained from a third-party. Imagery and vegetation square footage data should be documented routinely and stored systematically in order to prepare publicly available condition reports.

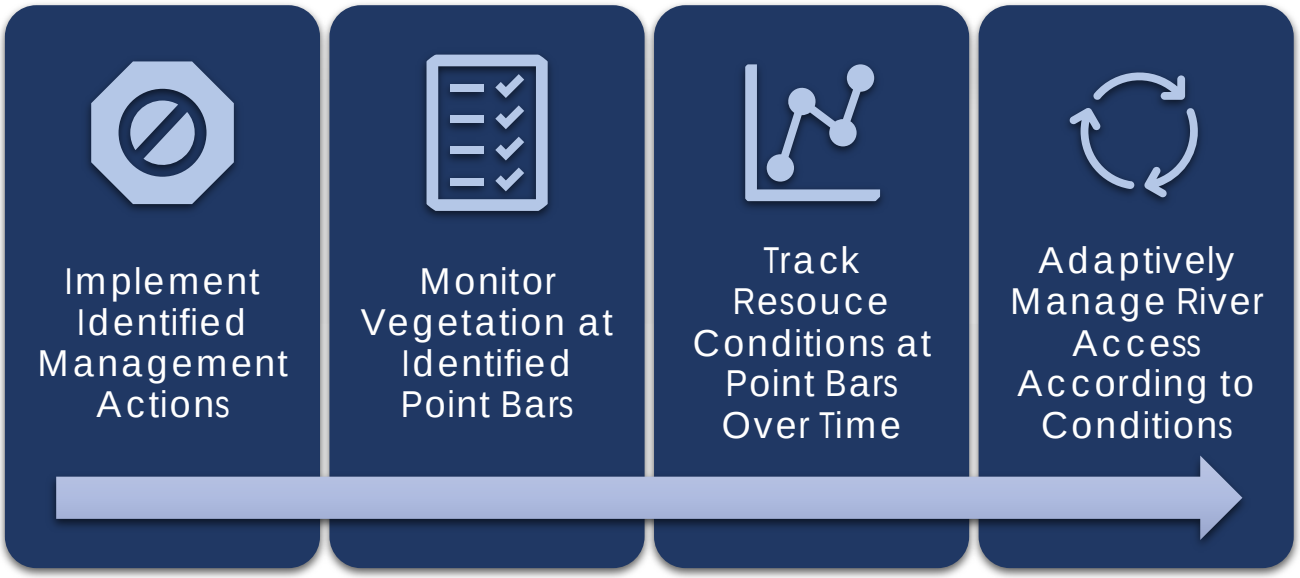
Management Actions

The DRP manages visitor use to sustain the quality of park resources and the visitor experience in a manner that is 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. The DRP will be guided by the "precautionary principle" that states if there is a threat of irreversible harm to park resources, a lack of full scientific certainty will not delay management action (Kriebel et al., 2001).

Several management actions are planned to be implemented irrespective of any further observation of user impact to the river point bars. It is expected that these management actions will help enforce existing park rules, mitigate resource impacts, and improve user behavior. Objectives that will be implemented over the long term will be discussed in the VUM Objectives section. The management actions that will be implemented in the immediate term can be classified according to three categories: user education, rule enforcement, and resource protection.

Table 8. Management Actions

User Education	Rule Enforcement	Resource Protection
o Update kayak rental information to include emphasis on existing park rules and resource protection o Improve concession area to highlight resource importance and interpret user responsibilities o Conduct community outreach to provide information on river protection	o Develop park signage to demarcate the new park boundary and inform users of the rules on the river within the park boundary o Continue to work with local law enforcement and FWC to monitor river activity o Consider establishing game cameras at known problem areas	o Seek approval to deploy protective barriers to block access to point bars o Develop signage at impacted point bars to inform river users on the resource impact of docking and wading o Explore replanting native vegetation to encourage regrowth and discourage user access



VUM Objectives

The Key Components section outlines the monitoring efforts that should be implemented over the long-term as a part of this VUM strategy. However, there are also management objectives that should be implemented in the immediately to work toward encouraging desirable user behavior on the river and ensuring a positive visitor experience at the park overall. Short and long-term objectives are proposed to further these efforts. The diagram above represents the order of operations for VUM at the park. Management actions will be implemented immediately, resources conditions at the point bars will be monitored over time, and access to the river will be adaptively managed.

Objective A: Develop and implement monitoring protocol.

It is recommended that all six point bars identified previously should be monitored at least quarterly for the next ten years. Dedicated DRP/SWFWMD staff should be assigned to coordinating the monitoring efforts discussed throughout this VUM strategy, and district staff should assist where needed. Central office staff can support the park and district with database management and report production. Annual monitoring efforts should be expanded to the 14 point bars that are fully within the park boundary. While there are also 16 other point bars that are adjacent to the park boundary, the DRP does not have management authority to enforce FAC 62-D on the river in areas where the park boundary does not include the uplands on both sides of the river. The 14 point bars that are fully within the park boundary are subject to the enforcement of FAC 62-D.

Objective B: Improve education and interpretation.

One of the most effective ways to encourage appropriate user behavior on the river is through improved education and interpretation. The infrastructure around the support area and kayak launch should be improved and upgraded when funding becoming available to implement new educational and interpretive efforts. In addition, the interpretive panels along the kayak launch should be updated with a combination of attractive interpretive displays and scientific information related to the spring run habitat and protection efforts. The goal of these educational and interpretive updates is to remind visitors of the sensitivity associated with the unique natural resource and encourage users to join park staff in the protection of the river.

Objective C: Maintain paddle launch capacities at 280 vessels per day.

The VUM strategy discussed throughout this section is based on the adaptive management framework, which is an iterative process in which management decisions are continuously informed and improved in accordance with observed and documented resource conditions. Resource indicators are monitored, management actions are implemented when necessary, and adjustments are made as appropriate. Although the purpose of this new VUM strategy is to replace the traditional recreational carrying capacity tables found in previous UMPs, it has been deemed necessary to continue to cap the number of vessels launching from the park. This capacity objective will be subject to adaptive management by park management, and any changes will be informed and supported by the data that will be collected over the long-term.

Objective D: Conduct or obtain biennial visitor satisfaction surveys.

The DRP should conduct or obtain visitor satisfaction surveys at least once every two years. The purpose of the survey will be to inform management decisions on the visitor experience throughout the park and provide park staff with data to manage an ideal capacity at Buccaneer Bay and the attraction area. Unlike the observable impacts from users on the river, visitors to the main areas of the park have a negligible impact to the surrounding natural resources, and the main concern for park management should be maintaining a high-quality visitor experience. In order to better understand visitor expectations regarding an ideal experience, visitor satisfaction surveys should collect quality of experience data to be used to implement best management practices.