WACCASASSA BAY PRESERVE STATE PARK

Park Chapter

GULF COAST REGION

WACCASASSA BAY PRESERVE STATE PARK

LEVY COUNTY, FLORIDA

0 1 2 Miles

N W E S

Waccasassa Bay

Gulf of Mexico

CEDAR KEY

Piney Pt.

ATSENA OTIE KEY

SNAKE KEY

DOG I.

LIVE OAK KEY

CEDAR KEY SCRUB STATE RESERVE

CEDAR KEY MUSEUM STATE PARK

CEDAR KEYS NATIONAL WILDLIFE REFUGE

LOWER SUWANNEE NATIONAL WILDLIFE REFUGE

FLORIDA GULF COAST MITIGATION BANK

Cedar Key Scrub/ Waccasassa Bay Support Area

MESIC FLATWOODS

HYDRIC BASIN MARSHES

HAMMOCK

Hall Creek

MCENANY CONSERVATION EASEMENT

NATC GULF HAMMOCK CONSERVATION EASEMENT

HYDRIC HAMMOCK

Kelly Creek

Kelly Cr.

Rocky Cr.

Tripod Pt.

Kelly Creek Pt.

SALT MARSH

Compass Pt.

South Pt.

Waccasassa River

Cow Creek

Sheep Pen Cr.

SALT MARSH

HYDRIC HAMMOCK

Ramsey Pt.

Turtle Cr.

Turtle Creek

Turtle Creek Pt.

MARSH

HYDRIC

Spring Run

S. Mangrove Pt.

Lows Bay

BIRD ISLAND

Porpoise Pt.

HAMMOCK

Withlacoochee Bay

YANKEETOWN

Withlacoochee River

YANKEETOWN CONSERVATION AREA

MARJORIE HARRIS-CARR CROSS-FLORIDA GREENWAY

TO OTTER CREEK

TO INGLIS

347

326

24

19

98

40A

40

PARK FEATURES

- Park Boundary
- Structures
- Stabilized Park Roads
- Unstabilized Park Roads
- Paddling Camps

SURROUNDING LAND COVER

- Agriculture
- Salt Marsh
- Forests
- Silviculture
- Wetlands

INTRODUCTION

LOCATION AND ACQUISITION HISTORY

Waccasassa Bay Preserve State Park is located in Levy County (see Vicinity Map). This remote property is recreationally accessible via paddling and only has one public trailhead which is accessed via adjacent Cedar Key Scrub State Reserve off State Road 24. The Vicinity Map also reflects significant land and water resources existing near the park.

Waccasassa Bay Preserve State Park was initially acquired on Dec. 10, 1971, with funds from the Land Acquisition Trust Fund (LATF). Currently, the park comprises 34,397.02 acres. The Board of Trustees of the Internal Improvement Trust Fund (Trustees) hold fee simple title to the park and on April 6, 1972, the Trustees leased (Lease No. 2599) the property to the Division of Recreation and Parks (DRP) under a 99-year lease. The current lease will expire on April 5, 2071.

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

SECONDARY AND INCOMPATIBLE USES

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

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

In accordance with 253.034(5) F.S., the potential for generating revenue to enhance management was also analyzed. Visitor fees and charges are the principal source of revenue generated by the park. It was determined that no additional revenue generating activities are appropriate during this planning cycle. Generating revenue from consumptive uses or from activities that are not expressly related to resource management and conservation is not under consideration.

PURPOSE AND SIGNIFICANCE OF THE PARK

Park Purpose

The purpose of Waccasassa Bay Preserve State Park is to protect the diverse natural communities and the imperiled species dependent on those communities. The park was acquired to provide outdoor recreation opportunities to the public and conserve sensitive environmental lands.

Park Significance

- The park is the sixth largest in the Florida State Parks system, with 34,000 acres containing 19,000 acres of tidal marshes along 20 miles of coastline. These marshes support an important estuarine habitat.

- Along the upland edge of the tidal marshes are the remnants of Gulf Hammock, which was once Florida's largest hydric hammock natural community, covering some 100,000 acres.

- Sea level rise is impacting natural communities such as hydric hammock, as well as numerous archaeological sites, several of which are likely eligible for listing on the National Register of Historic Places.

- The park protects numerous imperiled species such as the wide-ranging Florida panther, manatee and several wading birds and shorebirds, and offers unique wildlife viewing opportunities.

- The park offers resource-based recreation in the form of fishing and paddling and contains four primitive campsites. The park is only accessible by private boat or canoe/kayak.

Central Park Theme

The expansive tidal flats and palm tree islands of Waccasassa Bay Preserve may hold the secrets to the future of Florida's gulf coast and its increasingly threatened coastal hammocks.

Waccasassa Bay Preserve State Park is classified as a preserve in the DRP unit classification system. In the management of a preserve, preservation and enhancement of natural conditions is the priority. Resource considerations are given priority over user considerations and development is restricted to the minimum necessary for ensuring its protection and maintenance, limiting access, user safety and convenience, and appropriate interpretation. Permitted uses are primarily of passive nature, related to the aesthetic, interpretive/educational and recreational use of the preserve, although other compatible uses may be permitted within preservation-oriented limitations. Program emphasis is placed on interpretation of the natural and cultural attributes of the preserve.

OTHER DESIGNATIONS

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

All waters within the park have been designated as Outstanding Florida Waters, pursuant to Chapter 62-302, Florida Administrative Code. Surface waters in this park are also classified as Class II and Class III waters by DEP. The park is adjacent to the Big Bend Seagrasses Aquatic Preserve as designated under the Florida Aquatic Preserve Act of 1975 (Section 258.35, Florida Statutes).

PARK ACCOMPLISHMENTS

- Worked with the Florida Fish and Wildlife Conservation Commission (FWC) to add the primitive campsites to the Big Bend Saltwater Paddling Trail.
- Unit Management Plan approved in 2019 with enhanced natural community mapping.
- Obtained funding for updated survey of Brazilian Pepper by the Florida Natural Areas Inventory (FNAI).

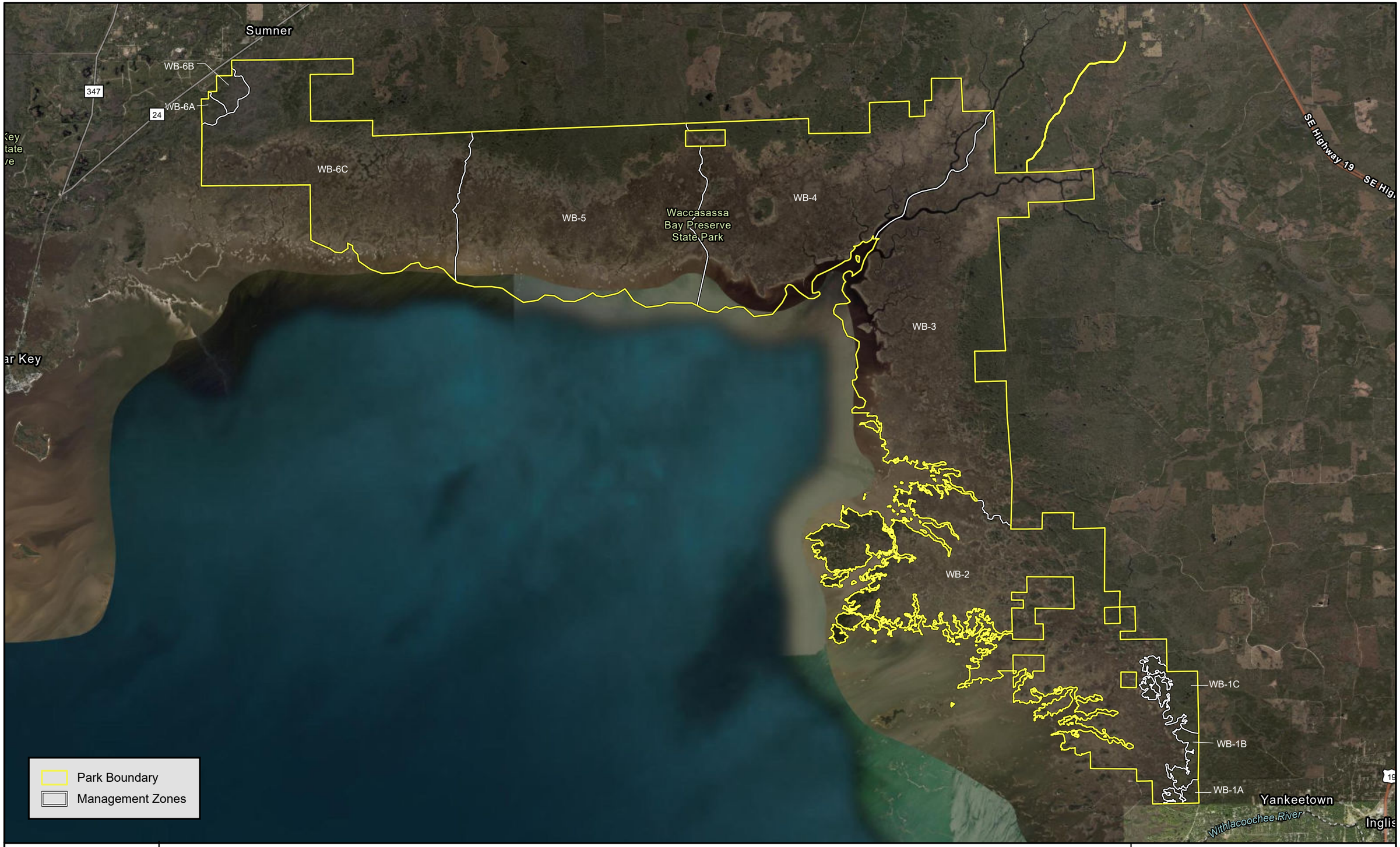
RESOURCE MANAGEMENT COMPONENT

Waccasassa Bay Preserve State Park Management Zones			
Management Zone	**Acres**	**Managed With Prescribed Fire**	**Contains Known Cultural Resources**
WB-1A	84.05	Y	N
WB-1B	170.92	Y	N
WB-1C	401.32	N	N
WB-2	7624.63	N	Y
WB-3	7435.97	N	Y
WB-4	6345.01	N	Y
WB-5	6725.09	N	Y
WB-6A	87.07	Y	N
WB-6B	156.93	Y	N
WB-6C	5356.61	N	Y

TOPOGRAPHY

Waccasassa Bay Preserve State Park (Waccasassa Bay) is located within the Gulf Coastal Lowlands of Florida in the heart of the Big Bend region, which is an expansive eight-county coastal area extending from Wakulla County in the north to Pasco County in the south (White 1970; Hine et al. 1988; Davis 1997). The portion of the Big Bend coastline from Waccasassa Bay north to the Suwannee Sound lies within a physiographic formation known as the Gulf Coastal Swamps, which is an area of low elevation coastal wetlands and drowned karst topography. It is a disjunct formation where a scarcity of sand prevents beaches from forming (White 1970; Hine et al. 1988; Wolfe 1990; Rupert and Arthur 1990). The Gulf Coastal Swamps serve as a major discharge zone for the Floridan aquifer system (SRWMD 2006; Raabe et al. 2010).

Elevations in the park range from below mean sea level (msl) within tidal flats along the western boundary to slightly higher than 10 feet msl at the northwest corner. The generally flat aspect of the park is disrupted only by winding stream channels, shallow wetland depressions, and occasional knolls or mounds, some of which may be of aboriginal origin. Drainage is primarily toward the Gulf through the numerous tidal creeks and marshes that extend into the park. The only known human-related topographic disturbances in the park are unimproved roads and tramways and the mounds produced by aboriginal activities.

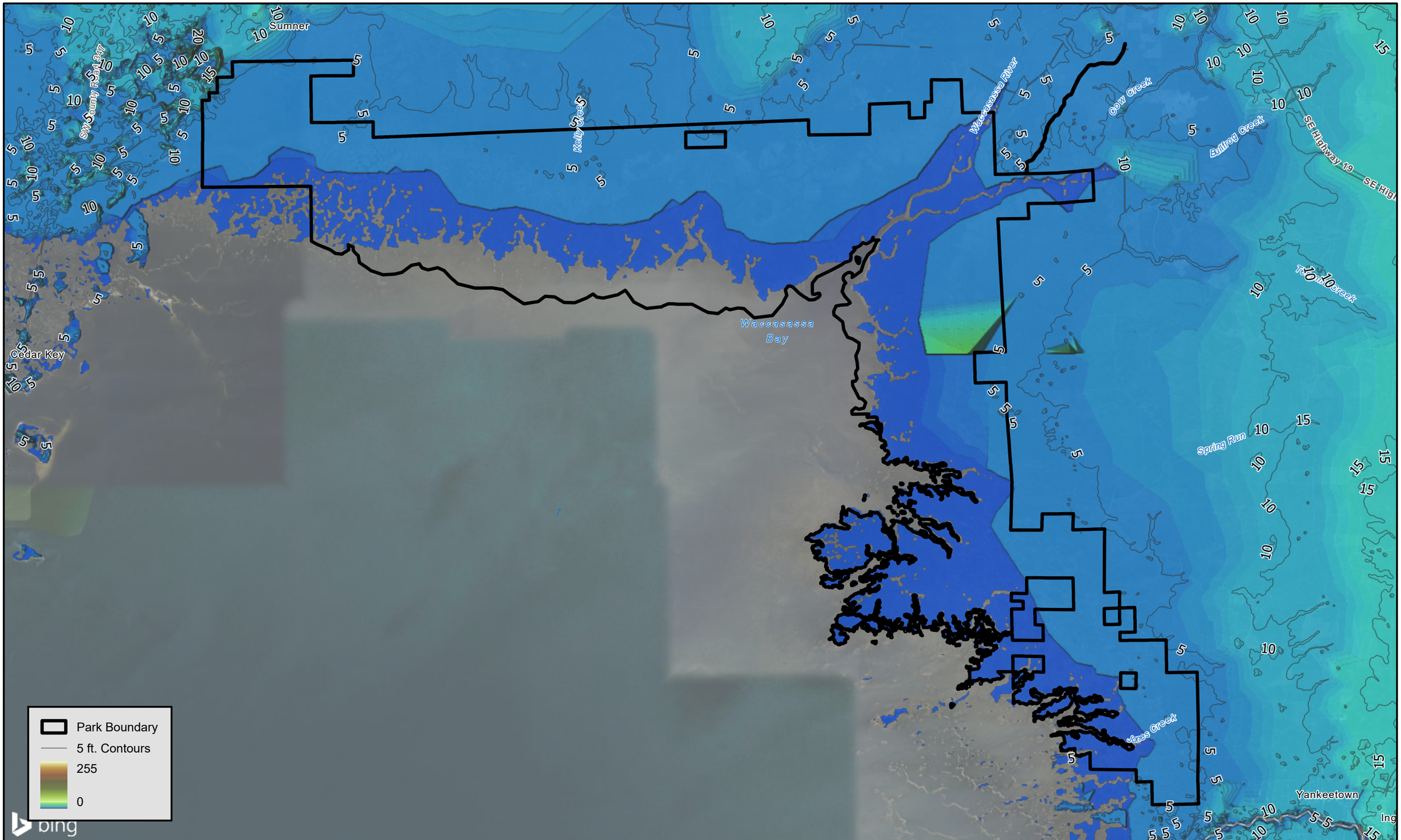


WACCASASSA BAY PRESERVE STATE PARK
Management Zones

N

0 1 2 Miles

Sources: ESRI; Florida Department of Environmental Protection
This graphical representation is provided for informational purposes and should not be considered authoritative for navigational, engineering, legal, and other uses.



WACCASSASA BAY PRESERVE STATE PARK
Topography

N

Miles
0 0.5 1 2

Sources: ESRI; Florida Department of Environmental Protection
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Given the low elevation nature of this preserve, potential impacts of sea level rise to the property's natural and cultural resources are an important management concern (Scavia et al. 2002; Ellis et al. 2004; Dean et al. 2004).

SOILS

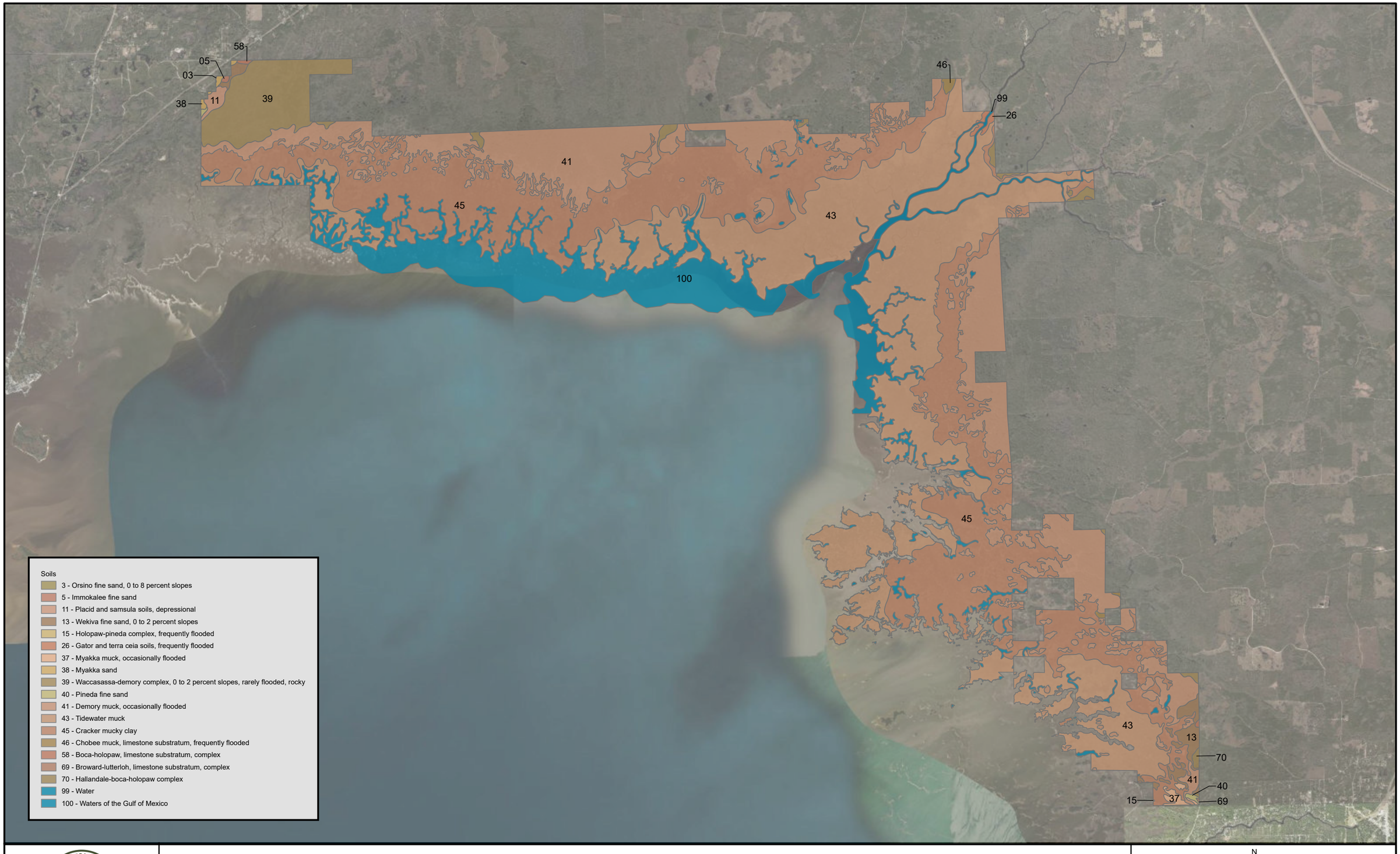
There are 17 soil types within Waccasassa Bay Preserve State Park (Slabaugh et al. 1996) (see Soils Map). Appendix contains a list of these soils and complete soil descriptions. Nearly all of these soils are wet, ranging from somewhat poorly drained to flooded, with the majority being frequently flooded. Many of the soils are shallow and have limestone bedrock near the surface, commonly within six to 80 inches of the surface. The shallowest soils occur on low islands in the tidal marshes where soils overlying limestone are commonly only six inches deep or less. In low hydric hammocks, soils are commonly 11 - 18 inches deep. Deeper, mucky soils tend to be in wetland sloughs, along floodplains of creeks and rivers, and in some tidal marshes. Limited areas of better drained soils occur in the northwest corner of the park adjacent to Cedar Key Scrub State Reserve.

Some of the soil erosion along creeks and rivers within the park may be attributable to boat wakes. Other soil disturbances occurred during logging activities in the park conducted to suppress southern pine beetle outbreaks. Agricultural and road building activities have also caused some soil disturbance in the past. Management activities will follow the most up-to-date best management practices (BMPs) available (e.g., silvicultural BMPs) to prevent soil erosion and conserve soil and water resources on site (FDACS 2016).

HYDROLOGY

Among the many prominent hydrological features within Waccasassa Bay Preserve State Park are the Waccasassa River, numerous named tidal creeks, hundreds of coastal and submarine groundwater discharge (SGD) fractures, and one of the largest stands of hydric hammock remaining in Florida (Simons et al. 1989; Xinya et al. 2009). All these features contribute to the maintenance of a large, relatively stable estuarine environment at Waccasassa Bay. Much of Waccasassa Bay is encompassed within the Big Bend Sea Grasses Aquatic Preserve, which contains some of the largest seagrass beds in the state and is perhaps Florida's most significant publicly managed estuary (Mattson et al. 2007; DEP 2014; Jones et al. 2015). Waccasassa Bay alone contains 72% of the known, mapped contiguous seagrass beds in the Suwannee River to Withlacoochee River region (Yarbro and Carlson 2013, 2016).

In the complex karst environment of the Waccasassa region, groundwater discharge often takes place through openings in the limestone, including SGD fractures, that are scattered about in nearshore estuaries and embedded within the matrix of coastal hydric hammock, mangrove swamp, salt marsh and seagrass beds of the region. The limestone openings provide a constant supply of fresh water to the Waccasassa estuarine system (Zieman and Zieman 1989; Raabe and Stumpf 1996). Maintenance of adequate groundwater discharge is critical to the health and productivity of this biologically diverse ecosystem (Cable et al. 1996; Taniguchi et al. 2002). Various researchers have documented the origin, density, and locations of important underground fracture traces in western Levy County (Vernon 1951; Raabe and Bialkowska-Jelinska 2010; Lines et al. 2012; Xu et al. 2016).



Soils
- 3 - Orsino fine sand, 0 to 8 percent slopes
- 5 - Immokalee fine sand
- 11 - Placid and samsula soils, depressional
- 13 - Wekiva fine sand, 0 to 2 percent slopes
- 15 - Holopaw-pineda complex, frequently flooded
- 26 - Gator and terra ceia soils, frequently flooded
- 37 - Myakka muck, occasionally flooded
- 38 - Myakka sand
- 39 - Waccasassa-demory complex, 0 to 2 percent slopes, rarely flooded, rocky
- 40 - Pineda fine sand
- 41 - Demory muck, occasionally flooded
- 43 - Tidewater muck
- 45 - Cracker mucky clay
- 46 - Chobee muck, limestone substratum, frequently flooded
- 58 - Boca-holopaw, limestone substratum, complex
- 69 - Broward-lutterloh, limestone substratum, complex
- 70 - Hallandale-boca-holopaw complex
- 99 - Water
- 100 - Waters of the Gulf of Mexico

WACCASASSAA BAY PRESERVE STATE PARK
Soils

N

0 1 2 Miles

Sources: ESRI; Florida Department of Environmental Protection
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Coastal and SGD limestone features at the land surface is closely aligned with these traces, which developed over geologic time in response to sea level changes and fluctuations in freshwater discharge (Kindinger et al. 2000; Raabe and Bialkowska-Jelinska 2010).

Sustained groundwater discharge from coastal and SGD features is dependent on sea levels, tides, and specific aquifer levels (Cable et al. 1996). Coastal and SGD fractures at Waccasassa Bay are directly connected to the Floridan aquifer (Vernon 1951; Hine et al. 1988). Within the Waccasassa Bay region alone, water scientists have identified 864 to 1,165 independent Floridan aquifer discharge points associated with limestone fractures (Raabe and Bialkowska-Jelinska 2010). The amount of groundwater discharged across the entire Waccasassa Bay area is roughly equivalent to one first magnitude spring for every 1.5 to 2 miles of coastline, which would correspond to a total of about 70-90 first magnitude springs along the entire Waccasassa coastline (Raabe et al. 2011).

Waccasassa Bay is part of the Big Bend region, but it is also positioned at the northern edge of a unique karst-dominated landscape called the Springs Coast (Wolfe 1990). In the northernmost reaches of the Springs Coast, fresh water from at least six named springs and numerous groundwater-supplied creek systems flows westerly through an immense matrix of forested wetlands and coastal marshes before eventually draining into the Waccasassa Bay estuarine system. The six named springs are LEV719991, Levy Blue Spring, Wekiva Spring, Lancaster Spring, Big Spring and Little Spring (Spechler and Schiffer 1995), while the river/creek systems include the Waccasassa River, Spring Run, Winzy Creek, Jacks Creek, Kelly Creek and Demory Creek. Although discharge points for most of the abovementioned springs are not actually located within Waccasassa Bay Preserve State Park, much of their freshwater flow eventually passes through the park's upland and wetland systems in route to Waccasassa Bay. Levy Blue and Wekiva springs, for example, are both historic second magnitude springs that contribute to the upper tributaries of the Waccasassa River.

The Floridan aquifer is the principal groundwater source for the Waccasassa Bay region (Jones et al. 1997). Other groundwater sources include localized surficial aquifers such as those found in flatwoods and certain isolated wetlands where development of hardpans or impermeable organic layers may occur, creating perched water tables that can function at least temporarily as surficial aquifers. However, a distinct widespread surficial aquifer is not present in the coastal uplands of the Waccasassa Bay region (Fretwell 1983).

Relative proportions of groundwater contributions to the Waccasassa Bay region from sources such as coastal and SGD fractures and Levy County springs are still unknown.

The Floridan aquifer is unconfined in Waccasassa Bay Preserve State Park. The upper boundary of the Floridan aquifer is at or very near the land surface, as evidenced by the predominance of various sized, scattered karst dissolution features such as limestone outcroppings (Raabe and Bialkowska-Jelinska 2010). Discharge from the Floridan aquifer occurs via groundwater seepage and springs. An intermediate confining layer is virtually absent, and the limestone and dolomite formations are overlain by discontinuous and relatively thin sand deposits. This allows surface water runoff from uplands to freely enter the aquifer, creating the potential for significant local groundwater pollution to occur. During periods of low groundwater levels, saltwater from the Gulf of Mexico flowing inland via tidal creeks may enter coastal and SGD fracture channels and mix with the Upper Floridan aquifer in a process called reverse flow (Tihansky 2004).

Kelly Creek is a significant 1- to 1.5-acre limestone outcropping located in the northern part of the park. Some of the park's largest surface outcroppings, such as at Beetree Slough, can reach 3 acres in size. Hundreds of wetlands scattered throughout the Waccasassa Bay region have limestone outcroppings

that contain fractures and discharge groundwater. These wetlands, located either partially or entirely within the park, include more than 40 named and numerous unnamed creeks, an abundant number of small ponds and lakes, and one of the state's largest public holdings of hydric hammock natural community.

Most of the creeks that drain the park's forested wetlands are blackwater streams. A smaller number are spring-fed streams that gradually transform into tidal creeks that wind through the salt marsh into the estuary. Generally, the water source for the forested wetlands is local rainfall, however groundwater feeds a large proportion as well. Discharge from freshwater wetlands directly interfaces with saltwater from the gulf within the salt marsh community, creating a complex and biologically productive estuarine ecosystem. Because many of the freshwater wetlands are intimately connected with salt marsh, their flora are apt to be tolerant of brackish water. Nonetheless, wetlands that are situated closer to specific groundwater discharge sites, especially wetlands embedded within uplands, will often support a vastly different set of freshwater-adapted species (Abbott 1998, Abbott and Judd 2000; Raabe et al. 2011).

Over the past three decades, scientists have documented that shoreline natural communities along Florida's Gulf Coast have experienced dramatic changes from systems that were once freshwater-based to those that are now predominately saltwater influenced (Casteneda and Putz 2007). It is unknown how many freshwater wetlands in the preserve, especially those that contain groundwater fractures, have transformed into brackish wetlands as a result of lowered aquifer levels from significant historic droughts, increased groundwater demand or changes associated with global sea level rise (Johnston and Bush 1988; Williams et al. 1999; Williams et al. 2003; Raabe et al. 2004; Knight 2015). Many water management experts acknowledge that the two most recent long-term droughts in north Florida, in combination with the increased consumptive use of groundwater after 1970, have caused significant lowering of water tables and increased saltwater encroachment in coastal areas, as well as decreased discharge at several springs across the entire state (Mirti 2001; Swihart 2011; Still 2010; Copeland et al. 2011; Knight 2016). In 2012, for example, during a record regional drought, groundwater discharge from Levy Blue Spring ceased altogether (Moran 2013). Spring flows in not only Levy Blue Spring but also Wekiva Spring are predicted to decrease due to projected increases in cumulative groundwater withdrawals (Sepulveda 2002; SRWMD 2010). Because of the cumulative effects of increased post-1970 groundwater withdrawals from the Upper Floridan, groundwater resources at Waccasassa Bay Preserve State Park are currently considered to be in fair to poor condition.

The Waccasassa River, which roughly divides the park in half, is a hydrologically unique, 29-mile long, tidally influenced, highly braided blackwater stream. Numerous unnamed creeks and six major tributaries join it on its way to the gulf, including Little Waccasassa River, Otter Creek, Magee Branch, Wekiva River, Cow Creek and Tenmile Creek (Suwannee River Water Management District (SRWMD) 2006). One of the more important complexities of the Waccasassa River and its embayment is that while several drainage areas within the Waccasassa Bay groundwater basin play an integral part in the overall contribution to the Waccasassa Bay estuaries, not all areas necessarily contribute to the flow of the Waccasassa River as well (Col et al. 1997; SRWMD 2006). Groundwater sources within the basin appear to be equally as important to the Waccasassa embayment as surface water flows. For example, three significant drainage areas that do not directly contribute surface water to the Waccasassa River but do discharge surface water and groundwater to Waccasassa Bay are located west of Otter Creek, south of Tenmile Creek, and east of Waccasassa Flats. Within the first two drainage areas, there are at least 34 named streams, including Lancaster Creek, Kelly Creek, Spring Run and Demory Creek. Similarly, there is a large disjunct area included within the Waccasassa groundwater basin that lies within a major karst plateau in southwestern Alachua and northern Levy counties. Overall, the surface/groundwater basin

contributing area for Waccasassa Bay encompasses a total of 936 square miles, the majority of which lies outside the park boundary (Florida Rivers Assessment 1989; Hornsby et al. 1999; SRWMD 2006).

The headwaters of the Waccasassa River lie in Waccasassa Flats, a generally north-south aligned karstic landscape feature composed of a mosaic of depression wetlands located in southeastern Gilchrist and northeastern Levy counties. Waccasassa Flats contains numerous perched wetlands and karst depressions where surface waters funnel through numerous small swallets into the Upper Floridan aquifer and groundwater then moves westward toward the Waccasassa Bay (Vernon 1951; Col et al. 1997). At least two second order spring systems significantly augment the flow of the Waccasassa River, namely Levy Blue and Wekiva. Levy Blue Spring and its close partner LEV719991 join the upper portion of the Waccasassa River just above a large, forested wetland called Devil's Hammock, while the Wekiva joins the river much further downstream, approximately 2 miles outside the park boundary. The Wekiva generally contributes about 30% of the total discharge of the Waccasassa River during median flow conditions, but during droughts it can total as much as 60% (SRWMD 2006). A minimum flows and levels (MFL) determination was set for the Waccasassa River in 2006 (SRWMD 2006). Discharge from the Waccasassa River is variable and tidally influenced. For the period of record, the annual mean flow of the river is 283 cubic feet per second. The lowest daily mean flow is –2,310 cubic feet per second (i.e., negative indicating a reversal of flow) recorded on Aug. 31, 1985. The highest daily mean flow is 11,400 cubic feet per second, recorded on Sept. 12, 1964 (U.S. Geological Survey (USGS) 2016).

Within the park, the Waccasassa River has been designated as an Outstanding Florida Water and its entire length below the confluence with the Wekiva River is considered a Class II water body (i.e., open for shellfish harvesting, but often restricted). Upstream from the Wekiva confluence, the Waccasassa is a Class III system. Nearly all freshwater creeks within the park that drain to the gulf are also considered Class II, but streams not flowing directly into the estuary are predominantly considered Class III water bodies (DEP 2016a). Average annual rainfall for the Waccasassa region approaches 60 inches per year (Fernald and Purdum 1998).

For the most part, surface water drainage within Waccasassa Bay Preserve State Park is poor and large areas often flood. Most of the park's upland areas drain directly into hydric hammock, salt marsh and tidal creeks, and eventually to estuarine waters. Tidal fluctuations occur throughout the park, transporting large quantities of brackish water through networks of perennial freshwater streams and tidal creeks. Wetlands are distributed through much of the park, including numerous brackish and freshwater karst ponds. Salinity levels in individual ponds generally determine their biotic nature (Abbott and Judd 2000). Water sources for the ponds may include the Floridan aquifer, rainfall, and tidal input from the Gulf of Mexico. The coastal hydric hammock natural community, which occurs inland from the salt marsh, has a significant impact on hydrologic processes within the landscape (Wharton et al. 1977; Vince et al. 1989). During periods of heavy rainfall, hydric hammocks often flood. Surface water travels through this community as sheetflow, eventually entering streams that connect to estuarine waters. Through the temporary storage of surface water, hydric hammocks improve water quality and attenuate freshwater pulses into estuarine systems (Vince et al. 1989; Wolfe 1990). For at least 25 years, sea level rise has played a pivotal role in the conversion of numerous hydric hammock stands within the Waccasassa Bay Preserve and Crystal River Preserve state parks into salt-dominated communities (e.g., salt marsh/mangrove) (Williams 2003; Ellis et al. 2004).

The natural functions of hydric hammock in the Waccasassa Bay area can be disrupted by various land use practices, particularly the conversion of hammock to pine plantation that has occurred in large areas of Gulf Hammock. Past road building activities and drainage improvements associated with silvicultural operations both inside and outside the park have also affected natural hydrologic patterns. The

channelization of surface waters by ditching and the impoundment of water by road building can contribute to the loss of natural functions in hydric hammocks and are therefore likely to affect estuarine systems within the park. Complex interactions between surface waters and groundwater play a significant role in steering ecological processes in coastal ecosystems of the Waccasassa Bay (Raabe and Bialkowska-Jelinska 2007). Within the broad interface between estuarine and terrestrial systems in the region, major issues of concern include watershed alteration (especially within the hydric hammock natural community), saltwater encroachment and nutrient enrichment.

Watershed Alteration

Land use development, excavation of mine pits and ditches, disruption, or impoundment of natural sheet flow, and withdrawal of groundwater in the region are examples of watershed alterations that could negatively affect natural hydrological regimes in the park.

Large-scale development has not yet occurred within the Waccasassa region, however, there continues to be scattered small-scale land-use development within the upland areas. There have been a number of camps and permanent residences that have been established near the park boundary along Tenmile Creek (a tributary of Cow Creek). This development may be responsible for lowered water quality as noted by Florida Marine Research Institute (FMRI) staff at the mouth of Cow Creek.

Several limestone and sand mining operations adjacent to the park (e.g., Gulf Hammock Quarries, Knight Farm and Inglis Quarry) are currently active, including a nearly 5,000-acre operation on the eastern park boundary that in 2014 was issued the necessary state and federal approvals to proceed (i.e., King Road or Tarmac Mine). The potential cumulative impacts of these operations on water resources in the park are unknown, however water scientists suggest that extraction mining can adversely influence natural groundwater hydrology and ecological functions of natural communities (Bacchus 2006; Kinkaid and Meyer 2009; Lines et al. 2012; Xu et al. 2016).

In addition, past records indicate that sediment loads in the Waccasassa River have measured as high, possibly due to runoff from logging operations (Hand et al. 1994; Florida Department of Natural Resources 1989). In 2002, logging operations to control a southern pine beetle outbreak in some of the park's mesic flatwoods and hydric hammock likely altered natural hydrologic patterns. Ruts created by heavy equipment channeled surface waters and temporary roads built to accommodate logging trucks disrupted sheet flow (District 2 files).

Other wetland alterations in the park have also caused disruption of natural sheetflow regimes. Access roads that pass through the park in various locations have fragmented some forested wetlands and tidally influenced communities to varying degrees. It is not uncommon for DRP personnel to observe flooded conditions along various access roads within the park. In fact, certain roads in tidally influenced wetlands can also be particularly vulnerable to washouts. Elevations of many of the access roads that pass through the park were raised by using stockpiled dredge material from canal/ditch excavations that were conducted prior to state acquisition. Some of the ditch excavations are associated with retention ponds or with roadside drainage improvements. Mitigation of sheetflow disruptions caused by unpaved roadways within the park should be a focus of DRP restoration activities.

Many water managers have long been concerned about the unsustainable depletion of groundwater resources in the Floridan aquifer (Bush and Johnston 1988; Grubbs and Crandall 2007; Copeland et al. 2011; Knight and Clarke 2016). Concerns were heightened during the 1998-2002 and 2010-2012 droughts, as water scientists documented significant declines in spring discharge at nearly all of Florida's first magnitude springs, including those within the Waccasassa basin (Copeland et al. 2011; Pittman 2012; Moran 2013). One recent statewide analysis concluded that the drought of 1999-2001 had

precipitated significant negative health trends in all the spring systems in the state, including Crystal and Homosassa springs, because of lowered groundwater levels, significant saline encroachment and simultaneous increases in groundwater use during one of Florida's worst droughts on record (Verdi et al. 2006).

Whether the evidence indicates that fluctuations in groundwater supply are natural (i.e., due to Atlantic multi-decadal oscillation) or anthropogenic (i.e., due to water supply withdrawals) is still being debated (Kelly 2004; Williams et al. 2011). Nonetheless, coastal springs have experienced significant increases in lateral saline encroachment compared to inland systems because of their proximity to the fresh/saline interface (Marella and Berndt 2005; Hydrogeologic Inc. 2011).

Saltwater Encroachment

Saltwater encroachment along Florida's coasts has long been recognized as a threat to groundwater quality (Fairchild and Bentley 1977; Fretwell 1983). In the Waccasassa Bay region, a natural saltwater wedge that diminishes in thickness landward extends inland from the Gulf of Mexico, intruding into the Floridan aquifer. The depth of the saline wedge ranges from zero at the coast to around 250 feet inland (Fernald and Purdum 1998; Guvanasen et al. 2011). Boundaries of the zone of transition from saltwater (19,000 milligrams per liter chloride) to freshwater (25 milligrams per liter chloride) can fluctuate in response to changes in aquifer recharge and discharge (Fretwell 1983).

A recent statewide analysis of water quantity and quality variables compared groundwater and spring water parameters from 1991 to 2003 (Copeland et al. 2011). During that period, analysis specifically indicated that the Floridan aquifer's freshwater "lens" had decreased significantly in volume and that significant saltwater encroachment had occurred throughout most of the state. It is highly probable that saltwater encroachment within the Floridan aquifer contributes to the brackish nature of surface waters within the park, and that this phenomenon may continue to alter the water chemistry of the park's freshwater ponds over time.

As stated above, seawater can move inland through existing dissolution channels and mix directly with waters of the Floridan aquifer, especially during periods of low groundwater levels (Tihansky 2004; Shaban et al. 2005). In addition to these unique aquifer conduits (i.e., coastal and SGD channels), the limestone bedrock underlying the Floridan aquifer contains large, interconnected fractures and faults that trend either northeast or northwest. These are referred to as "preferential flow pathways" (Lines et al. 2012). Flow pathways have the ability to extend adverse water quality or quantity impacts over a much larger region than just at a local point source (Bacchus et al. 2015). For example, saltwater intrusion in Pinellas County expanded significantly through preferential flow paths when groundwater levels were artificially lowered during localized extractions from water supply fields that were placed too close to the coastline (Tihansky 2004). During the statewide drought of 2010-12, drinking water wells in the town of Cedar Key were significantly impacted by saltwater intrusion. Similarly, during the major drought of 1998-2002, statewide water managers were equally concerned about the significant human-induced influence on surface water and groundwater resources statewide (Copeland et al. 2011). Water scientists now believe that the deteriorating estuarine and freshwater resources in this region are attributable to the cumulative effects of increased groundwater consumption, saltwater encroachment, and nutrient enrichment (Copeland et al. 2011).

Nutrient Enrichment

As one might expect from the discussion above, water quality issues within the various watersheds of the Waccasassa basin are complex. Regular monitoring of water quality in the basin will be essential for maintaining ecosystem health. Surface water monitoring in the Waccasassa basin has occurred and still occurs at numerous locations, including freshwater and tidal creeks, oyster bars (DeHaven 2004; Kuhman 2007) and seagrass beds (Frazer and Hale 2001; Frazer et al. 2007). The Suwannee River Water Management District (SRWMD) maintains several surface water quality and biological monitoring stations along the Waccasassa River, including the two main spring systems, Levy and Wekiva (Hornsby et al. 1999; SRWMD 2016).

Groundwater monitoring data collected from hundreds of permanent wells that are scattered throughout the Waccasassa basin are used to track changes in water quality within the basin (Putnam 1967; Dixon 1986; DEP 2013b; DEP 2016a; SRWMD 2016; DEP 2016d). Project COAST, a long-term study led by University of Florida researchers, has been monitoring water quality along much of the lower Big Bend region since 1997 (Frazer et al. 2007).

Coordinated statewide assessments of shellfish (Florida Department of Agriculture and Consumer Services) and seagrass beds have been occurring for over 40 years (Kuhman 2007; Yarbro and Carlson 2013, 2016). In addition, DEP maintains biological monitoring stations on numerous tributaries along the Waccasassa River as part of the statewide total maximum daily load (TMDL) assessment program (DEP 2016a).

In 1996, DEP initiated a formal statewide program for monitoring surface waters and groundwater, including those within the Waccasassa River basin (Maddox et al. 1992; DEP 2009). This Integrated Water Resource Monitoring Program (IWRMP) took a comprehensive watershed approach based on natural hydrologic units. The 52 hydrologic basins in Florida were placed on a five-year rotating schedule, which allows water resource issues to be addressed at different geographic scales (Livingston 2003). In addition, the IWRMP assigned a waterbody identification number (WBID) to each waterbody. The WBID for the section of Waccasassa River in the park is 3699B. This watershed approach provides a framework for implementing TMDL requirements that will attempt to restore and protect waterbodies that have been declared impaired (Clark and DeBusk 2008). In the Waccasassa region, there are more than 12 different watersheds within the park that have been issued waterbody identification numbers and are directly connected to estuaries. These waterbodies have all undergone TMDL evaluation (DEP 2016b), and based on various parameters, nearly all of them have been declared impaired.

According to DEP basin status reports, the water quality of several water bodies in the Waccasassa basin became potentially impaired in 2003 because of excessive nutrients, total and fecal coliform bacteria, and mercury in fish tissue (Silvanima et al. 2008; DEP 2003; DEP 2013a). Based on the Impaired Waters Rule (IWR), the U.S. Environmental Protection Agency (EPA) in 2003 verified that those waterbodies were indeed impaired, which meant that their surface waters did not meet applicable state water quality standards (IWR, Chapter 62-303 F.A.C.). This designation triggered a long chain of mandatory requirements that Florida would have to accomplish to achieve compliance with EPA regulations concerning polluted waterbodies. For the Waccasassa River, the compliance process started in 2013 with the assignment of a TMDL Numeric Nutrient Criteria (DEP 2013b) and the initiation of a Basin Management Action Plan (BMAP). As of 2023, the BMAP for the waterbodies in the Waccasassa River basin had not been completed.

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

- Action 1 - Continue to cooperate with other agencies and independent researchers in hydrological research and monitoring programs, including the continuation of thermal imagery research.
- Action 2 - Continue to monitor and track surface and groundwater quality issues within the region, especially concerning natural and cultural resource impacts associated with sea level rise.
- Action 3 - Continue to monitor land-use or zoning changes in the region and offer comments as appropriate.
- Action 4 - Seek funding for dye trace studies to determine groundwater sources for karst features within the park.
- Action 5 - Conduct dye trace studies to determine groundwater sources for karst features within the park.
- Action 6 - Continue to cooperate with the SRWMD in implementation of MFLs for the park to ensure maintenance of historic groundwater levels.

Significant hydrological features in Waccasassa Bay Preserve State Park include coastal hydric hammocks, brackish ecosystems containing portions of over 40 major tidal creeks, and hundreds of submarine groundwater discharge karst fractures. Preservation of surface water and groundwater quality, plus control of erosion and sedimentation into the park's freshwater wetlands, estuarine creek systems and karst features, will remain top priorities for DRP. The following are hydrological assessment actions recommended for the park.

DRP will continue its tradition of close cooperation with state and federal agencies and independent researchers engaged in hydrological research and monitoring programs within the park and the adjacent coastal resources, and it will encourage and facilitate additional research in those areas. Agencies such as the SRWMD, USGS and DEP will be relied upon to keep DRP apprised of any declines in surface water quality or any suspected contamination of groundwater in the region. DRP staff will continue to monitor and document any potential changes within hydric hammock or coastal forest communities as well as any known archeological resources that might be impacted by sea level rise. District 2 staff will continue to monitor Environmental Resource Permit (ERP) and Water Use Permit (WUP) requests for the region in order to provide timely and constructive comments that promote protection of the park's water resources. Additional cooperative efforts may include facilitating the review and approval of research permits and providing researchers with assistance in the field. Recommendations derived from the monitoring and research activities will be essential to the decision-making process during management planning.

The proximal sources of flow from the Floridan aquifer to SGD karst features in the park are still unknown. To remedy that, DRP should continue to encourage hydrological research that would help identify those sources. Thermal imagery research has been an important tool to help identify these groundwater resources. For water managers to be able to protect water quality and potentially restore groundwater levels to their historic levels, they will need to know the extent of those groundwater sources. DRP should also seek funding for dye trace studies to determine groundwater sources for SGD karst features in the park.

Staff will continue to monitor land-use or zoning changes within lands bordering the park. Major ground disturbances on neighboring properties or inadequate treatment of runoff into local streams could ultimately cause significant degradation of resources in the park. When appropriate, District 2 staff will provide comments to other agencies regarding proposed changes in land use or zoning that may affect

the park. In addition, District 2 staff will closely monitor major mining operations in the watershed upstream of the park and watch for significant changes that may adversely affect resources in the park.

DRP will continue to work closely with the SRWMD to ensure that MFLs developed for the Waccasassa River are implemented conscientiously and that historic groundwater flows are protected.

Objective B: Restore natural hydrological conditions and functions to approximately 10 acres of hydric hammock natural community.

- Action 1 - Conduct assessments and evaluate hydrological impacts in the park, including drainage ditches and areas where natural sheetflow has been interrupted.
- Action 2 - Develop a hydrological restoration plan that includes prioritized projects for the park.

Staff will initiate hydrological restoration measures for natural systems in the park wherever wetland communities have been artificially impounded or ditched and where ecological functions have been disrupted. If it is determined that roads passing through wetland communities are significantly altering natural hydrological regimes, then DRP, using best management practices, will initiate corrective actions such as installing low water crossings or culverts in appropriate locations. In some cases, complete removal of above-grade roads may be warranted, especially if they no longer serve a useful purpose. These roads should be abandoned, and elevations restored to the historic grade of the adjacent natural landscape.

NATURAL COMMUNITIES

The park contains 16 distinct natural communities as well as altered landcover types (see Natural Communities Map). A list of known plants and animals occurring in the park is contained in Appendix 5.

Limestone Outcrop

As might be expected given the karst landscape prevalent in the area, Waccasassa Bay Preserve State Park contains numerous limestone exposures. These occur as limestone outcrops situated along the sides of depressions and as limestone boulders of varying sizes. Raised areas within the hydric hammock are often underlain by limestone which may be exposed in some cases. Due to their limited size and erratic distribution within a large area, limestone outcrops are not mapped but are included within the hydric hammock.

The limestone outcrops in the park are considered to be in good to excellent condition. Most are located well away from trails or roads or are screened from public view by abundant vegetation. At this time, the only apparent threat from invasive plant infestations is Chinese brake fern (*Pteris vittata*).

Limestone outcrops in the park must be protected from disturbance. Staff should take measures to prevent runoff and erosion from degrading the outcrops, particularly near existing trails or roadways. Mapping of significant limestone outcrops, accompanied by surveys for imperiled plant species, will be necessary to ensure their long-term protection.

Mesic Flatwoods

Mesic flatwoods are found at the northwest end of the park and at the south end at slightly higher elevations than the hydric hammock and tidal marsh. The mesic flatwoods at the southern end are somewhat uncharacteristic in composition, possibly due to long-term fire exclusion, former timbering operations, and the influence of sea level rise. Loblolly pine (*Pinus taeda*), cabbage palm (*Sabal palmetto*) and intermixed hydric hammock species occur along with slash pines. The understory is dominated by shrubs, primarily saw palmetto and yaupon holly. In scattered locales, there are remnant

herbaceous species, and on some islands in the tidal marsh, certain scrub species have become established, possibly due to fire exclusion. Portions of the mesic flatwoods in the southern part of the park were logged in 1997 and 2000 to control outbreaks of southern pine beetles. Hydrologic patterns and water quality may have been affected by the logging as discussed above in the *Hydrology* section.

More typical mesic flatwoods occur in the northwest portion of the park. Although much of this area was logged and planted with loblolly pines, the native shrub layer is relatively intact and remnant slash and longleaf pines are common. Several areas were more recently planted with slash pines. Removal of off-site loblolly pines from these areas would help prevent or limit future outbreaks of southern pine beetles. Restoration activities have included a thinning of the planted pines in 2013 to a basal area of approximately 40 square feet and subsequent prescribed fire.

Remnant slash pines occur in several locations within the mesic flatwoods of the park. These older trees may retain some of the original characteristics of the slash pines along the Gulf Coast. Historically the South Florida slash pine, a variety or ecotype that more closely resembles the longleaf pine, may have extended into Levy County in the coastal flatwoods. These older slash pines will be preserved and protected during any thinning operations designed to remove planted slash pines. In general, the majority of the mesic flatwoods of the park are in fair condition. This condition is expected to improve with removal of off-site pines and regular prescribed fires.

Additional prescribed fire will be the primary restoration action needed for the mesic flatwoods. Additional longleaf pines or South Florida slash pines will be planted if necessary. Staff will continue to monitor these areas for invasive plants.

Scrubby Flatwoods

A very limited area of scrubby flatwoods occurs within the park along the boundary with Cedar Key Scrub State Reserve. Although quite small, it is contiguous with larger areas of scrubby flatwoods within the adjacent reserve. Abbott (1998) describes some of the more xeric areas of mesic flatwoods that border tidal marshes in the southern flatwoods as being similar to scrubby flatwoods. These areas have been mapped as mesic flatwoods since they are probably not true scrubby flatwoods. The scrubby flatwoods at Waccasassa Bay Preserve State Park will be burned along with the adjacent scrubby flatwoods within Cedar Key Scrub State Reserve.

Basin Swamp

A large area of basin swamp occurs in the northwestern part of the park. It is dominated by bald cypress (*Taxodium distichum*) but also contains some hardwood species like red maple, black gum, and ashes (*Fraxinus* spp). The basin swamp is intermingled with the hydric hammock. A few inches of elevation determine community type in this area. The understory of the basin swamp and hydric hammock is unusual in that it is dominated by needle palm (*Rhapidophyllum hystrix*). A small basin swamp located in the southern part of the park is dominated by cypress, sweetbay and ash trees. It borders a deep tidal channel that is fringed with salt marsh species. These areas are so small that they are unmapped. The basin swamps in the park are in good condition despite past logging activity. These systems are sensitive to changes in hydrologic patterns that could originate outside the park.

An elevated logging road built by the previous property owners passes through the core of this basin swamp/hydric hammock complex. While the road may not affect the hydrology of the basin swamp to a great extent, it does provide a pathway for invasive plants into the park. Staff has treated the area for Chinese brake fern several times and continues to monitor for additional infestations. Chinese brake fern typically prefers areas with exposed limestone and may have been brought in with lime rock fill

during road construction. The primary management actions in the basin swamp will be removal and control of invasive plants.

Depression Marsh

The depression marshes are primarily located within the mesic flatwoods in the northwest end of the park. These isolated wetlands are dominated by herbaceous vegetation. Typically, these small wetlands will carry fire during periods of low water or when emergent grassy fuels are continuous over standing water. Depression marshes that dry out during extended droughts act as ephemeral wetlands that are critical breeding sites for many invertebrate and amphibian species whose larvae cannot coexist with fish in more permanent wetlands (Moler and Franz 1987). The gopher frog (*Lithobates capito*), an imperiled species that spends its non-breeding life in nearby scrub and scrubby flatwoods, is one such species.

Invasion of the depression marshes by woody plant species is normally kept in check by prescribed fire and natural flooding. Although there is some encroachment of woody vegetation, these marshes are in fairly good condition and are expected to improve as prescribed fires are used to manage the surrounding mesic flatwoods. Prescribed fire and control of invasive plants are the primary management measures for depression marshes in the park.

Coastal Hydric Hammock (variant of Hydric Hammock)

The most extensive forested community in the park is hydric hammock. The hydric hammock is generally in good condition despite having been selectively logged in the past. Several episodes of logging, dating from before the turn of the century, have occurred, each time targeting a partially different group of species (Swindell 1949, Jennings 1951). Species diversity is relatively high, and there is a high diversity of species assemblages within the hydric hammock. Red cedar and cabbage palm are usually important canopy members, but they are most dominant in areas near salt marsh and on offshore islands within the salt marsh. These red cedar and cabbage palm forests are a coastal variant of hydric hammock. Species more characteristic of swamps and upland hardwood forests replace the red cedar and cabbage palm in the more inland portions of the hydric hammock. The presence of other species varies with elevation, land-use history and distance from the salt marsh.

The make-up of this community is highly variable because the hydric hammock within the park once graded into upland hardwood forest, swamps of various types, and mesic flatwoods. The beginnings of the transition zones between these communities lie just within the park boundaries. The many small islands within the salt marsh were likely places of slightly higher elevation within the hydric hammock, which were isolated as sea levels rose. Community boundaries and species distributions within communities are dynamic and will continue to change over time with the influence of sea level rise and storms.

Hydric hammocks play a critical role in regional hydrology (Simons et al. 1989). They serve the important function of temporarily storing water in high rainfall periods, but typically retain scattered small pockets of standing water up to 70 days per year. Hydric hammocks occur on a variety of sand to muck soils but are always low lying and situated over a limestone substratum that occasionally projects above ground as exposed outcrops or bare rock areas. Soil depth can be as little as 20 centimeters in these areas. Over the past 25 years, researchers have documented the gradual recession of the hydric hammock and a conversion of coastal hydric hammock islands to salt marsh. University of Florida researchers first established monitoring plots in the park in 1992 (Williams et al 1999; Williams 2003). Comparison of aerial photography graphically illustrates the die-off of sabal palms, oaks, and red cedars on islands within the salt marsh.

The many small, and sometimes large, rainwater depressions in the park constitute another variable component of the hydric hammock. These depressions have a longer hydroperiod and deeper water than is found in the surrounding hydric hammock. They occur because of breaks in the limestone bedrock near the surface. The freshwater pools can be ephemeral or permanent. The ponds are often brackish, probably because they are flooded by tidal surges. The vegetation characteristic of these ponds varies, often changing with time (Abbott 1998, Abbott and Judd 2000). Corkwood (*Leitneria floridana*) is common in some of the less dynamic, more permanent pools. Other species common in these pools include sawgrass and Carolina willow. The more ephemeral ponds often contain concentrations of herbaceous species that occur scattered throughout the surrounding hydric hammock. These pools are too numerous to count or map. Most of them are small and do not adequately fit any FNAI category.

Logging activities earlier in the 20th century have affected the hydric hammock community in several ways. Loggers removed the most desirable timber trees, and with them the most desirable genes. Because of the selective logging (high grading), the remaining forest is probably less genetically diverse than it once was. The genetic pool, in terms of quality of timber trees, may be inferior to what once existed in Gulf Hammock (Vince et al. 1989). Another consequence of former logging practices is that loblolly pine stands may be denser in some areas now than in the past. In some areas with dense populations of loblolly pine, southern pine beetles infested large numbers of trees in the past. Accessible infested areas were logged in 1997 and 2000 to control the spread of the beetle to adjacent lands. Because of the logging, hydrologic patterns and water quality were likely affected. Hydrologic patterns have also been altered by activities outside park boundaries, including conversion of hydric hammock to pine plantation and past construction of roads and drainage systems.

The impacts of invasive plants within the hydric hammock are restricted to a few species in specific areas. Limited areas in the northwest may be impacted by Chinese brake fern and require monitoring and additional control. Cogongrass has also been a problem in certain areas. The greatest threat is from Brazilian pepper (*Schinus terebinthifolius*), which is expanding its range north along the Gulf Coast. The Brazilian peppers are most likely to appear on the coastal hydric hammock islands which have a more open canopy and are more prone to disturbance from storm surges. Surveys conducted by FNAI staff in 2010 and again in 2021 documented scattered plants on offshore islands at the southern end of the park (FNAI 2021). FNAI also documented a new population of Brazilian pepper in management zone WB-5 at the north end of the park. Scattered plants in the northern end of the park closer to Cedar Key have been treated, but significant infestations occur on other public and private lands near Cedar Key.

Control of invasive plants within the hydric hammock is a high priority, although much of the hydric hammock is free of invasive plant species. Staff will continue to monitor hydric hammocks for the presence of invasive plants and any changes in hydric hammock community that might be related to sea level rise. Staff will pursue funding for treatment of the Brazilian pepper infestations based on the data from the 2021 survey.

Mangrove Swamp

Within the park, this community type occurs primarily south of Turtle Creek Bay. Cedar Key is near the northern limit for this system on the Gulf Coast. Mangroves are common in Cedar Key but uncommon in areas further to the east to the Waccasassa River and south to Turtle Creek. Why this occurs is unknown, but the prevailing ocean currents or salinity levels may be responsible. Black mangrove may grow in relatively dense stands or as scattered individuals in tidal marsh. Hard freezes can damage black mangrove, so its dominance in the tidal marsh can vary with the severity of recent winters. The mangrove swamp appears to be in excellent condition.

Over the past 20 years, there has been a tremendous expansion of mangroves within the salt marsh and tidal creeks south of Turtle Creek Bay. Comparison of aerial photography from 1994 to 2016 shows an order of magnitude increase in mangrove density, but not range. While there are more scattered mangroves within the northern parts of the salt marsh, the largest increase is in the southern end. The densest stands of mangrove occur on the extreme western boundary of the park, presumably in the areas of highest salinity. The mangroves have expanded along the western margins of the salt marsh and along the tidal creeks that flow through the salt marsh.

The primary threat to the mangrove swamp is Brazilian pepper, which like mangroves, is expanding its range northward. Fortunately, Brazilian pepper is limited by salinity and may not be able to germinate or survive in mangrove swamps in areas of higher salinity. The 2021 FNAI Brazilian pepper survey did not detect any Brazilian peppers in the mangrove swamps at the south end of the park.

Salt Flat (variant of Salt Marsh)

Salt marsh is the most extensive community in the park. Extensive stands of black needle rush and saltmarsh cordgrass dominate the salt marsh. Areas dominated by saltgrass and other herbs are common seaward of hydric hammock islands. Areas of bare limestone are also scattered throughout the salt marsh of the park.

As with the other estuarine natural communities, salt marshes are sensitive to runoff and pollution from adjacent uplands. According to Vince et al. (1989), the salt marsh system is linked to adjacent upland areas by a band of hydric hammock that modifies the quantity, timing and quality of freshwater entering the marsh. If the quantity, quality, or timing parameters of freshwater inputs rapidly change, this consequence can greatly modify the structure and productivity of a tidal community. Specifically, significant fluctuations of salinity outside of an extremely narrow water quality range could negatively impact this sensitive estuarine community, one that acts as a nursery for numerous invertebrate and fish species. Overall, the salt marsh community appears to be in excellent condition. In general, salt marsh communities are quite resilient and require very little active management.

Blackwater Stream

The only blackwater stream in the park is the Waccasassa River. The water quality of the river is monitored periodically. Currently, the stream appears to be in good condition. Potential threats to the river include mining and timbering that occur in the surrounding watersheds. These activities could eventually lead to degradation of the community by decreasing water quality and by altering natural hydrologic processes. Another problem is streambank erosion caused by excessive boat wakes. Additional details about the Waccasassa River are provided in the *Hydrology* section above. DRP staff will continue to work with other agencies to monitor the condition of the Waccasassa River and monitor potential land-use changes in the watershed that might impact the river.

Estuarine Composite Substrate

Estuarine composite substrate is a combination of mineral, fauna and flora-based estuarine natural communities including estuarine seagrass bed, estuarine mollusk reef, estuarine consolidated substrate, and estuarine unconsolidated substrate. Due to the difficulties of mapping these subtidal and intertidal natural communities individually, they are grouped for mapping purposes as estuarine composite substrate but are listed separately below to identify the types found within the park. Where possible, estuarine mollusk reefs have been mapped separately. These substrates are important since shellfish, particularly oysters, and seagrasses often colonize them. They also provide habitat for a variety of fish and wildlife, including marine turtles, that use the Waccasassa Bay area as feeding and nursery grounds.

Protection of the estuarine communities from outside impacts and contamination is the primary management action.

Estuarine Consolidated Substrate

Small limestone outcrops and larger limestone flats are common along the streambeds and coastal shores of the park. These outcrops are important since shellfish, particularly oysters, often colonize them. The extent of this community within the park is unknown at this time. As mentioned above, areas of estuarine consolidated substrate are not mapped individually but are included as part of the estuarine composite substrate. Protection of the estuarine communities from outside impacts and contamination is the primary management action.

Estuarine Mollusk Reef

The mollusk reef is the only faunal-based estuarine system in the park. Oyster colonies form the bulk of this community. Mollusk reefs commonly occur as shoals in tidal creeks. Their total extent is unknown, but all the mollusk reefs that are visible in recent aerial photographs have been mapped.

The estuarine mollusk reefs in this part of the Gulf Coast are dominated by the American oyster, although other species of mollusks also occur on the reefs. In general, mollusk reefs are prone to impacts from water quality degradation. The mollusk reefs within the park occur within Class II waters, but shellfish harvesting is often restricted due to water quality concerns. Protection of the estuarine communities from outside impacts and contamination is the primary management action. In the case of mollusk reefs, harvesting of oysters should be restricted to sustainable levels.

Estuarine seagrass bed

Seagrass beds occur at scattered locations within estuarine areas of the park. Many of the seagrass areas in the Big Bend region have been mapped (DEP 2014), but it is difficult to confirm the current extent of this submerged community type. As described above, seagrass bed acreage figures are included within the total for the estuarine composite substrate in the park. Large areas of sparse to dense seagrass beds occur southwest of the mouth of the Waccasassa River, both within and outside the park.

Protection of the estuarine communities from outside impacts and contamination is the primary management action. In the case of seagrass beds, impacts from prop scarring are a constant threat. Public education about the importance of seagrass beds is one option to reduce damage from naïve boaters.

Estuarine Unconsolidated Substrate

Most of the tidal creeks within the park have mud bottoms, and many have extensive supratidal mud flats that are important feeding areas for wading birds and shorebirds. Although some estuarine unconsolidated substrate may have limited amounts of sand deposition from adjacent uplands, much of this community along this low-energy coastline is dominated by mud deposits. Protection of the estuarine communities from outside impacts and contamination is the primary management action.

Developed

The only developed area in the park is the fiber factory road that runs northeast from the park boundary toward the town of Gulf Hammock. Resource management along this road right-of way will focus on removal of all priority invasive exotic plants (Florida Invasive Species Council Category I and II species).

Objective A: Maintain 135 acres within the optimum fire return interval.

- Action 1 – Update prescribed fire plan annually.
- Action 2 - Conduct prescribed fire on 45-90 acres annually.

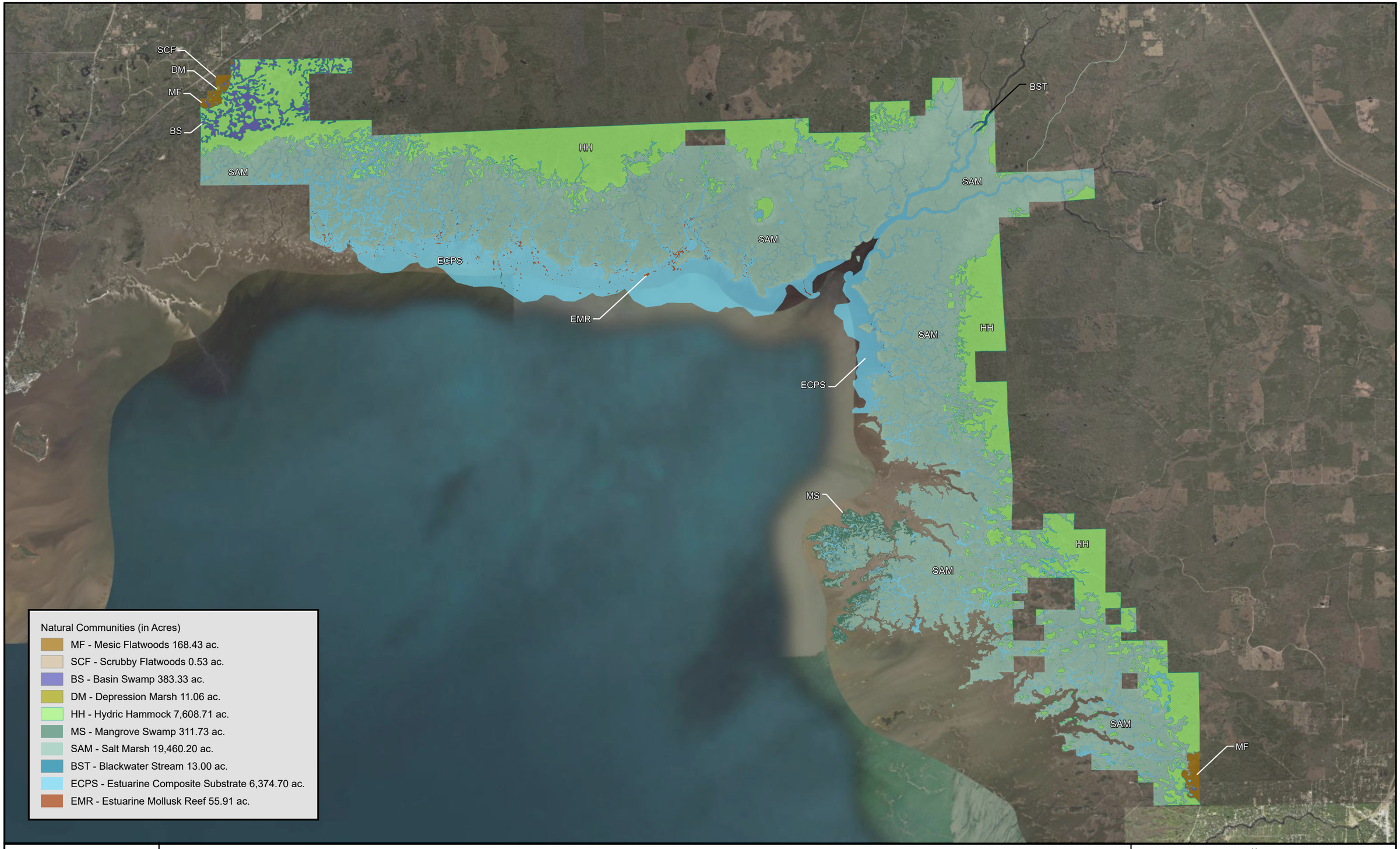
The table below contains a list of all fire-dependent natural communities found within the park, their associated acreage and optimal fire return interval, and the annual average target for acres to be burned.

Prescribed Fire Management		
Natural Community	**Acres**	**Optimal Fire Return Interval (Years)**
Mesic Flatwoods	168	2-3
Depression Marsh	11	2-10
Scrubby Flatwoods	0.5	5-15
Annual Target Acreage	55 - 90	

Prescribed fire is planned for each fire zone at the appropriate interval. The park's prescribed fire 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 objectives. Each annual fire plan is developed to support and implement the broader objectives and actions outlined in this 10-year management plan.

Mesic flatwoods is the primary fire-type community in the park. Its fire frequency is every two to three years on average (FNAI 2010). Some of the areas that require prescribed fire are located within the corporate boundaries of the city of Yankeetown, whose ordinances prohibit open burning. Coordination with town officials will be required for completion of prescribed fire objectives. Much of the mesic flatwoods in the southern end of the park was heavily impacted by the southern pine beetle outbreak, and many off-site loblolly pines were removed along with the resident slash pines. Prescribed fires will be an integral part of the restoration of the clearcut areas and will help prevent recolonization by loblolly pines. The mesic flatwoods in the northwest corner of the park will also be managed with prescribed fire to facilitate restoration. Winter or dormant season fires may be used to reduce fuel loading while minimizing stress on pines. Ultimately, all mesic flatwoods zones will be burned during the lightning season. Between 55 and 90 acres will need to be treated each year on average to maintain the recommended fire return interval for mesic flatwoods.

Occasionally, lightning fires occur under dry conditions in the hydric hammock community within the park. Most of these fires are slow creeping fires. If these fires require suppression, staff will attempt to extinguish them with hand tools or allow them to burn out to avoid damaging the hydric soils with heavy equipment. Park staff will coordinate and work with the local Florida Forest Service staff regarding the development of a plan for addressing wildfire suppression within the park boundary. A portion of the wildfire suppression plan may be an element regarding rehabilitation of fire lines and any other related impacts.



Natural Communities (in Acres)

- MF - Mesic Flatwoods 168.43 ac.
- SCF - Scrubby Flatwoods 0.53 ac.
- BS - Basin Swamp 383.33 ac.
- DM - Depression Marsh 11.06 ac.
- HH - Hydric Hammock 7,608.71 ac.
- MS - Mangrove Swamp 311.73 ac.
- SAM - Salt Marsh 19,460.20 ac.
- BST - Blackwater Stream 13.00 ac.
- ECPS - Estuarine Composite Substrate 6,374.70 ac.
- EMR - Estuarine Mollusk Reef 55.91 ac.

WACCASASSAA BAY PRESERVE STATE PARK
Natural Communities - Existing Conditions

N

0 1 2 Miles

Sources: ESRI; Florida Department of Environmental Protection

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

Maintenance of the fire-type natural communities in the park is essential for management of animal and plant species that are fire-adapted. Species like the eastern indigo snake and Florida black bear have large home ranges that may span a variety of habitats, but both rely on fire-maintained natural communities including mesic flatwoods. Fire is also a critical management tool for gopher tortoises that occur within the mesic and scrubby flatwoods. Regular burning of depression marshes maintains important breeding habitats for certain amphibian species that breed in herbaceous wetlands.

Objective C: Conduct natural community/habitat improvement activities on 40 acres of mesic flatwoods natural community.

- Action 1 - Conduct supplemental plantings of the appropriate pine species (longleaf pine and South Florida slash pine) in the mesic flatwoods.

The mesic flatwoods in Waccasassa Bay Preserve State Park need more frequent prescribed fire, followed by planting of appropriate pine species. At the north end of the park, longleaf pine is the desired species, while at the south end South Florida slash pine or a mix of the two species may be more appropriate. Mechanical treatment may be necessary to facilitate planting and survival of pines. If possible, DRP staff should determine if wet flatwoods are also present in the park.

IMPERILED SPECIES

Fourteen listed plant species occur within the park. Several of the park's rare plant species were documented during a floristic study in the late 1990s (Abbott 1998, Abbott and Judd 2000). One listed plant that is notably abundant in the park's hydric hammock is corkwood (*Leitneria floridana*). Corkwood typically occurs on the edges of low karst depressions within the hydric hammock. Several endangered plants also occur within the park's hydric hammock, including Florida pinkroot (*Spigelia loganioides*), pinewoods dainties (*Phyllanthus leibmannianus*), coralberry (*Symphoricarpos orbiculatus*) and crested coralroot (*Hexalectris spicata*).

All populations of endangered plant species in the park will be identified and mapped to the extent possible. Many of these have already been located by Abbott (1998). The GPS locations have been provided to DRP and incorporated into the DRP GIS. Additional locations were mapped by District 2 staff during past field surveys. Since the majority of these imperiled plants occur in hydric hammock, no specific management is needed to maintain their populations. Logging activities associated with any future southern pine beetle control measures should be carefully monitored to prevent important plant populations from being harmed. DRP staff will continue to work with staff from the University of Florida Herbarium and other institutions, as well as FNAI staff, to locate and monitor plant species of conservation interest.

Many of the 22 imperiled animal species that occur within the park have populations that also range outside the park; however, the large, undisturbed expanses of the park likely serve as important foraging areas for many of these species. It is probable that many of the reptiles and mammals that have smaller home ranges breed successfully within the park. By 1950, the Florida black bear (*Ursus americanus floridanus*) was nearly extirpated from the Gulf Hammock region, although Florida panthers (*Puma concolor coryi*) were reported frequently (Pearson 1951). Waccasassa Bay Preserve State Park lies within the Big Bend Bear Management Unit (BMU). This subpopulation was estimated to contain around 12-28 bears, mostly concentrated south of Waccasassa Bay. The minimum subpopulation target is 200 bears according to the Florida Black Bear Management Plan (FWC 2012). Unfortunately, the Big Bend BMU suffers from low levels of genetic diversity (Dixon et al 2007).

The Florida salt marsh vole (*Microtus pennsylvanicus dukecambelli*) has been a challenging small mammal for researchers to study, primarily due to the inaccessibility of their preferred habitat, salt marsh (Woods et al. 1982). For many years, this genetically distinct subspecies of the common meadow vole was only known from a single locality between the park and Cedar Key. Efforts by the University of Florida and the Florida Cooperative Fish and Wildlife Research Unit have documented salt marsh voles at additional sites on public land. The vole has been confirmed within the Lower Suwannee National Wildlife Refuge, Cedar Key Scrub State Reserve and Waccasassa Bay Preserve State Park (McCleery and Zweig 2014). This species is listed as endangered on both federal and state lists and is considered critically imperiled within Florida by FNAI. The novel floating camera traps used to document the Florida salt marsh voles have also detected a second rare mammal species, the Gulf salt marsh mink (*Neovison vison halilimnetes*), in the same estuarine habitats within the park (McCleery et al 2014).

Marian's marsh wren (*Cistothorus palustris marianae*) and Scott's seaside sparrow (*Ammospiza maritimus peninsulae)* are two imperiled, salt marsh dwelling birds known to occur at Waccasassa Bay Preserve State Park. The population status of these two species is still relatively unknown (Post et al. 1983; Kale 1996; Sauer et al. 2014). A recent biological review of Marian's marsh wren and Scott's seaside sparrow conducted by avian experts and FWC concluded that increased monitoring efforts were needed because of ongoing threats to salt marsh habitat along the Gulf Coast and a trend of declining marsh wren populations in the area (FWC 2011; FWC 2013a). In 2016, FWC research staff collected updated observations within the Big Bend region, including at Cedar Key Scrub State Reserve.

The only park record for scrub-jay, made in the 1970s, was in the southern part of the park. Historically, scrub-jays were known to occur near Yankeetown. The most recent sightings of scrub-jays in this area were west of U.S. Highway 19, just south of the Withlacoochee River (Tom Mathews, personal communication). It is also possible that scrub-jays may have entered the park where it shares a boundary with Cedar Key Scrub State Reserve to the north.

The gopher tortoise is known to occur in flatwoods at the south and northwest ends of the park. FWC has adopted a statewide protocol for monitoring gopher tortoises based on a line transect distance sampling method (LTDS) (Smith et al. 2009). Any assessment of the status of gopher tortoise populations in the park should consider using this standard protocol.

The eastern indigo snake is a federally listed upland species that is becoming increasingly rare throughout its range due to loss and fragmentation of its critical habitat (Enge et al. 2013). Indigo snakes have historically been more frequently observed in the Gulf Hammock region. They are known to utilize hydric hammock and tidal marsh areas within the park. Anecdotal observations, or lack of observations, indicate that the indigo snake population within the park and the Gulf Hammock region has recently declined (Godley and Moler 2013).

Several other imperiled or rare reptiles occur within the park, including the Gulf salt marsh snake (*Nerodia clarki clarki*) and ornate diamond-backed terrapin (*Malaclemys terrapin macrospilota)*. The Gulf salt marsh snake occurs within the estuarine communities of the park. This species is known to have a wide zone of intergradation with the southern form (known as the mangrove water snake) throughout Citrus County and Levy County. The ornate diamond-backed terrapin is another important and highly vulnerable species of greatest conservation need that resides within estuarine habitats of the park and the adjacent aquatic preserve (FWC 2012).

At least three species of marine turtle occur within the waters of the Gulf of Mexico and the adjacent estuaries within Waccasassa Bay Preserve State Park: Kemp's ridley turtle (*Lepidochelys kempii*), loggerhead turtle (*Caretta caretta*) and green turtle (*Chelonia mydas*). Waccasassa Bay serves as an

important developmental habitat for sub-adults of these species (Carr 1995; Younker et al. 1992). There are also historical accounts of Kemp's ridley and green turtles hibernating in mud bottoms off Cedar Key and Waccasassa Bay (Carr 1995). The estuarine resources of the Big Bend region are exceptionally diverse, with lush beds of submerged aquatic vegetation (SAV) and highly productive benthic macroinvertebrate communities that attract young marine turtles throughout the year. The constant pulses of freshwater into estuaries that characterize this region are critical to maintaining the natural hydrology and sustaining water quality and quantity in the lush SAV and benthic communities. The West Indian manatee also uses the estuarine communities in the park and the Waccasassa River.

Coordination with FWC and the U.S. Fish and Wildlife Service (USFWS) is essential for identification of threats to sea turtles and manatees and for the protection of resources vital to them. An active prescribed fire program in the mesic flatwoods natural community will improve habitat for gopher tortoises and indigo snakes.

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

Imperiled Species Inventory						
Common and Scientific Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
PLANTS						
Chapman's sedge *Carex chapmanni*			LT	G3,S3	4	Tier 1
Wood spurge *Euphorbia commutata*			LE	G5,S2		Tier 1
Angle pod *Gonolobus suberosus*			LT			Tier 1
Crested coralroot *Hexalectris spicata*			LE			Tier 1
Corkwood *Leitneria floridana*			LT	G3,S3	4	Tier 1
Cardinal flower *Lobelia cardinalis*			LT		4	Tier 1

Imperiled Species Inventory						
Common and Scientific Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
Florida mayten *Maytenus phyllanthoides*			LT			Tier 1
Erect pricklypear *Opuntia stricta*			LT			Tier 1
Pinewoods dainties *Phyllanthus liebmannianus* ssp. *platylepis*			LE	G4T2,S2		Tier 1
Yellow butterwort *Pinguicula lutea*			LT		1,4	Tier 1
Pinnate-lobed coneflower *Rudbeckia triloba* var. *pinnatiloba*			LE	G5,S2		Tier 1
Florida pinkroot *Spigelia loganioides*			LE	G2,S2	4	Tier 1
Coralberry *Symphoricarpos orbiculatus*			LE	G5,S1		Tier 1
Redmargin zephyrlily *Zephyranthes simpsonii*			LT	G2G3, S2S3	4	Tier 1
FISH						
Gulf sturgeon *Acipenser oxyrinchus desotoi*	FT	LT		G3T2T3, S2?	4	Tier 1
REPTILES						
American alligator *Alligator mississippiensis*	FT(S/A)	T(S/A)		G5,S4	4,10,13	
Loggerhead turtle *Caretta caretta*	FT	LT		G3,S3	4,13	Tier 1
Green turtle *Chelonia mydas*	FT	LT		G3,S2S3	4,13	Tier 1

Imperiled Species Inventory						
Common and Scientific Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
Eastern indigo snake *Drymarchon couperi*	FT	LT		G3,S2?	1,10,13	Tier 1
Gopher tortoise *Gopherus polyphemus*	ST			G3,S3	1,10,13	Tier 1
Common kingsnake *Lampropeltis getula*				G5,S1S2	4,10	Tier 1
Kemp's ridley turtle *Lepidochelys kempii*	FE	LE		G1,S1	4,13	Tier 1
Gulf saltmarsh snake *Nerodia clarkii clarkii*				G4T3,S2	4,10	Tier 1
BIRDS						
Scott's Seaside Sparrow *Ammospiza maritimus peninsulae*	ST			G4T3,S3	2,4,13	Tier 2
Florida Scrub Jay *Aphelocoma coerulescens*	FT	LT		G1G2, S1S2	1,6,7,13	Tier 3
Marian's Marsh Wren *Cistothorus palustris marianae*	ST			G5T3,S3	2,4,13	Tier 2
Little Blue Heron *Egretta caerulea*	ST			G5,S4	4,10,13	Tier 1
Tricolored Heron *Egretta tricolor*	ST			G5,S4	4,10,13	Tier 1
Swallow-tailed Kite *Elanoides forficatus*				G5,S2	4	Tier 1
American Oystercatcher *Haematopus palliatus*	ST			G5,S2	4,10,13	Tier 1
Wood Stork *Mycteria americana*	FT	LT		G4,S2	4,10,13	Tier 1
Black Skimmer *Rynchops niger*	ST			G5,S3	4,10,13	Tier 1
MAMMALS						

Imperiled Species Inventory						
Common and Scientific Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
Florida salt marsh vole *Microtus pennsylvanicus dukecambelli*	FE	LE		G5T1, S1	4	Tier 2
Florida panther *Puma concolor coryi*	FE	LE		G5T1,S1		Tier 1
West Indian manatee *Trichechus manatus latirostris*	FT	LT		G2G3, S2S3	4,10,13	Tier 1

Management Actions

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

Monitoring Level

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

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

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

- Action 1 - Develop monitoring protocols for five selected imperiled animal species.
- Action 2 - Implement monitoring protocols for five imperiled animal species including Florida scrub-jay, eastern indigo snake, Florida salt marsh vole, Scott's seaside sparrow and Marian's marsh wren.

Monitoring of Florida scrub-jays, in cooperation with FWC, Audubon Jay Watch, and park volunteers on the adjacent Cedar Key Scrub State Reserve, will document any scrub-jays that cross over into Waccasassa Bay Preserve State Park. Documentation of sightings of eastern indigo snakes will provide important information about the status of this species in the park. Any sightings of indigo snakes will be reported to FWC and the Florida Museum of Natural History. Monitoring of Scott's seaside sparrow and Marian's marsh wren will be conducted through cooperative survey efforts with FWC. Any additional monitoring of the salt marsh vole will be conducted by FWC and the University of Florida in cooperation with the USFWS.

Objective C: Monitor and document two selected imperiled plant species in the park (coralberry and Florida pinkroot).

- Action 1 - Develop monitoring protocols for two selected imperiled plant species including coralberry and Florida pinkroot.
- Action 2 - Implement monitoring protocols for two imperiled plant species.

A floristic study within the park documented and vouchered both coralberry and Florida pinkroot (Abbott 1998). DRP staff will develop and implement a monitoring plan to identify and document additional populations of these species within the park. The park will also continue to cooperate with FNAI and other researchers in documenting imperiled plants within the park.

INVASIVE SPECIES

Three important invasive species, cogongrass (Imperata cylindrica), Brazilian pepper and Chinese brake fern are known to occur within the park (Table below). While Brazilian pepper is known to occur in the northern and southern portions of the park, the extent of the infestation is unknown. A survey of this species is needed before thorough treatment can occur. The park is remote, access is primarily by water and there are many acres of hydric hammock that are vulnerable to invasion by Brazilian pepper. Some of the hydric hammocks occur as islands embedded within the salt marsh. DRP staff is treating Brazilian pepper in the northern portions of the park.

Chinese brake fern may have been introduced to the park on lime rock used to stabilize roads. There are numerous areas of naturally occurring exposed limestone in the hydric hammock and other areas of the park. Many of these support native ferns and may be vulnerable to colonization by Chinese brake fern. Some invasion of limestone outcrops has occurred in the hydric hammock adjacent to infested lime rock roads. Regular treatment has reduced the amount of brake fern and appears to be preventing it from invading further into the hydric hammock. Cogongrass occurs primarily in a former southern pine beetle harvest area. It was likely introduced on logging equipment. Another small patch occurs on State Road 24.

Since the last management plan was approved, 253 acres of invasive plants have been treated in the park.

The most significant invasive animal in the park is the feral hog. Hogs are plentiful in the park and cause significant damage to marshes and other seasonally wet areas. While it may not be feasible to control feral hogs within the park, they are hunted aggressively in the wildlife management areas and private hunting leases that border the park.

In 2002, the red bay ambrosia beetle (Xyloborus glabratus) was first detected in the United States in southeast Georgia. The beetle carries the fungal pathogen (*Raffaelea lauricola*) which it transmits to red bay trees (*Persea borbonia*) and other species in the Lauraceae family, causing laurel wilt disease and death. The beetle and its associated pathogen spread rapidly, and by 2005 it had appeared in Duval County. In 2010, the disease was discovered in Levy County. The beetle (and laurel wilt) has now spread throughout most of Florida and into many neighboring states. Although most of the adult red bays have been top-killed, the trees continue to re-sprout from their roots. It may be that members of the Lauraceae family will continue to survive in shrub form as the remnant tree root systems continue to resprout. At this point, much remains unknown about the long-term impacts of this disease on red bays and other Lauraceae. Staff should continue to restrict the movement of firewood into and out of the park and educate visitors about the issue.

Species Name **Scientific Name - Common Name**	**FLEPPC Category**	**Distribution**	**Zone ID**
Cinnamomum camphora - Camphor-tree	I	Single Plant or Clump	WB-1B
Imperata cylindrica - Cogon grass	I	Scattered Plants or Clumps	WB-1B, WB-1C
Pteris vittata - Chinese brake fern	II	Single Plant or Clump, Scattered Plants or Clumps, Linearly Scattered	WB-6B, WB-6A, WB-6C
Sapium sebiferum - Chinese tallow tree	I	Single Plant or Clump	WB-1B
Schinus terebinthifolius - Brazilian pepper	I	Scattered Plants or Clumps, Scattered Dense Patches	WB-1B, WB-2

Objective A: Annually treat 10 gross acres, which is equivalent to 1.5 infested acres of invasive plant species in the park.

- Action 1 - Annually develop/update invasive plant management work plan.
- Action 2 - Implement annual work plan by treating 10 gross acres, equivalent to 1.5 infested acres, in the park annually and continuing maintenance and follow-up treatments as needed.

In addition to treating Brazilian pepper and the other invasives, DRP staff should continue efforts to survey all Brazilian pepper in the park. Once this information is available, staff will seek funding for initial and maintenance treatment of all known infestations of Brazilian pepper.

Objective B: Prevent the introduction and spread of invasive plants into the park.

- Action 1 - Develop and implement preventative measures to avoid the introduction and spread of invasive plants in the park.

Invasive plants are often introduced or spread to natural areas on equipment, in fill dirt or mulch, and in ornamental plantings. The park should develop and implement preventative measures that reduce the

likelihood of introducing and spreading invasive plants in the park. This would include inspecting equipment and fill dirt source to ensure that everything entering the park is free of invasives

Objective C: Survey the entire park for invasives at least once over 10 years.

- Action 1 - Develop and implement a method of surveying the entire park for invasive plants one time over the course of 10 years.

Because the park has populations of Brazilian pepper, is remote, and has difficult access, DRP staff should seek creative mechanisms for surveying the park for Brazilian pepper. This would allow staff to target their treatment efforts and seek funding to treat specific areas.

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

- Action 1 - Evaluate current methods of controlling feral hogs in the park and implement additional methods where possible.

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

CULTURAL RESOURCES

There are 73 archaeological sites and one linear resource group in the park that have been recorded with the Florida Master Site File (FMSF). All known sites have been recorded.

The majority of the sites in the park are prehistoric and are from the Weeden Island and Woodland cultures dating to about 1000 AD. The Deptford and Safety Harbor cultures are represented on a much smaller scale. These sites include shell middens, prehistoric habitations and campsites, burial sites and procurement sites. Some sites lack pottery and thus are designated prehistoric. There is a wealth of archaeological information within the park that could greatly increase our knowledge about the evolution of aboriginal cultures along the Gulf Coast.

A few sites in the park are historic, ranging from the Territorial Development period of 1821-45 to the early 20th century. The sole linear resource in the park, the Florida Railroad (LV228), is from the Territorial Development period. A predictive model has been completed for the park (Collins et al. 2012).

There are numerous archaeological sites within the Big Bend coastal region, including Waccasassa Bay Preserve State Park, that are situated on cabbage palm hammock islands, limestone highs around artesian sources, tidal bars, and relict dunes. Because most of this region along Florida's west coastline is undergoing rapid change due to sea level rise, land subsidence, and wave/tidal action, it is expected that landscape modifications in the form of hammock and upland loss and scouring of limestone islands will cause a future loss of archaeological sites at Waccasassa Bay.

Archaeological sites at Waccasassa Bay are remote and primarily accessible by water. Most need to be reassessed during the tenure of this plan. Current condition data is not available. Because many sites are in low lying coastal areas, the primary threat is erosion and sea level rise. Looting is also a threat, but the remoteness of the area may aid in protecting the sites.

DRP staff should develop a plan to assess the sites, protect the sites from looting and address any management concerns found during assessments.

Natural erosional processes are degrading many of the known aboriginal sites, and many are being gradually inundated due to sea level rise. As discussed in previous archaeological surveys of the Gulf Hammock and Waccasassa Bay area, much of the information about aboriginal cultures will be lost as these sites erode and are destroyed (Jones and Borremans 1991, Jones 1993, Vojnovski et al 2000). Study of these sites should be encouraged. Advice from the Division of Historical Resources (DHR) will be sought on appropriate actions to protect and/or salvage information from these sites.

The park does not have any collections.

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
LV34 Lone Cedar Island	Weeden Island	Archaeological Site	NE	G	P
LV47 North Bank Mouth of Waccasassa River	Prehistoric/Unspecified	Archaeological Site	NE	NE	P
LV48 Mouth of Rocky Creek	Prehistoric/Unspecified	Archaeological Site	NE	G	P
LV49 Rocky Creek I	Prehistoric/Unspecified	Archaeological Site	NE	NE	P
LV50 Rocky Creek II	Prehistoric/Unspecified	Archaeological Site	NE	NE	P
LV52 Waccasassa I	Prehistoric/Unspecified	Archaeological Site	NE	NE	P
LV133 Salt Works at Salt Island	Civil War Era	Archaeological Site	NE	NE	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
LV228 Florida Railroad – Site of	American, 1821-present	Linear Resource	NE	NE	P
LV298 Rocky Run Island	Prehistoric/Unspecified Woodland	Archaeological Site	NE	NE	P
LV299 Rocky Run II	Prehistoric/Unspecified Woodland; Historic/ Early to Mid-20th Century	Archaeological Site	NE	NE	P
LV300 Primitive Campsite II	Prehistoric/Unspecified Weeden Island	Archaeological Site	NR	NE	P
LV301 Primitive Campsite	Prehistoric/Unspecified Weeden Island	Archaeological Site	NR	NE	P
LV302 Mud Creek	Weeden Island	Archaeological Site	NE	NE	P
LV303 Cow Creek	Unknown	Archaeological Site	NE	NE	P
LV304 WAC (W. of Stafford island)	Weeden Island, Deptford, American 1900-	Archaeological Site	NR	NE	P
LV305 Tange Shell Mound	Weeden Island	Archaeological Site	NR	NE	P
LV306 McCord Site	Woodland, Aboriginal unspecified	Archaeological Site	NE	NE	P
LV307 Leaning Oak Site	Weeden Island, Safety harbor	Archaeological Site	NR	NE	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
LV308 Gator Mound	Weeden Island	Archaeological Site	NE	NE	P
LV309 Shell Scatter	Woodland, Aboriginal unspecified	Archaeological Site	NE	NE	P
LV310 Cowpen Site	Woodland, Aboriginal unspecified	Archaeological Site	NE	NE	P
LV311 Kelly Creek I	Aboriginal unspecified	Archaeological Site	NE	NE	P
LV312 Kelly Creek II	Weeden Island, Aboriginal unspecified	Archaeological Site	NE	NE	P
LV313 Kelly Creek III	Aboriginal unspecified	Archaeological Site	NE	NE	P
LV314 Kelly Creek IV	Woodland, Aboriginal unspecified	Archaeological Site	NE	NE	P
LV315 Kelly Creek V	Unknown culture	Archaeological Site	NE	NE	P
LV316 Kelly Creek VI	Woodland, Aboriginal unspecified	Archaeological Site	NE	NE	P
LV317 Transect 5	Woodland, Aboriginal unspecified	Archaeological Site	NE	NE	P
LV318 Leaning Oak II	Woodland, Aboriginal unspecified	Archaeological Site	NE	NE	P
LV319 Square Well	Woodland, Aboriginal unspecified	Archaeological Site	NE	NE	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
LV320 Square Well Rd. II	Woodland, Aboriginal unspecified	Archaeological Site	NE	NE	P
LV322 Barn at Loop Rd. Entrance	Early 20th Century	Archaeological Site	NE	NE	P
LV323 Hearth Kelly Creek	American 1900-	Archaeological Site	NE	NE	P
LV324 Rocky Run Still	American 1900-	Archaeological Site	NE	NE	P
LV435 Gnat Island	Aboriginal unspecified	Archaeological Site	NE	NE	P
LV436 Sandfly Point	Weeden island	Archaeological Site	NE	NE	P
LV437 Little Gnat Island	Woodland	Archaeological Site	NE	NE	P
LV438 Demory Stub	Woodland	Archaeological Site	NE	NE	P
LV439 Thousand point A	Late Archaic	Archaeological Site	NE	NE	P
LV440 Thousand point B	Woodland	Archaeological Site	NE	NE	P
LV441 Thousand point C	Prehistoric	Archaeological Site	NE	NE	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
LV442 Clothesline Island	Woodland Historic unspecified	Archaeological Site	NE	NE	P
LV443 Bee Island	Woodland	Archaeological Site	NE	NE	P
LV444 Sandfly Point	Woodland	Archaeological Site	NE	NE	P
LV445 Sherd Island	Woodland	Archaeological Site	NE	NE	P
LV446 Gnat Island 2	Woodland	Archaeological Site	NE	NE	P
LV447 Snake Eyes Point	Woodland	Archaeological Site	NE	NE	P
LV448 Fawn Island	Woodland	Archaeological Site	NE	NE	P
LV450 Demory Tip	Woodland	Archaeological Site	NE	NE	P
LV452 Plentiful Island	Weeden Island	Archaeological Site	NE	NE	P
LV454 Lowes Bay 1	Woodland	Archaeological Site	NE	NE	P
LV455 Lowes Bay 2	Weeden Island	Archaeological Site	NE	NE	P
LV456 Lowes Bay 4	Prehistoric with pottery	Archaeological Site	NE	NE	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
LV457 Sandfly Point B	Prehistoric with pottery	Archaeological Site	NE	NE	P
LV458 Confusion Point	Prehistoric with pottery	Archaeological Site	NE	NE	P
LV460 Hospitality Island	Prehistoric with pottery	Archaeological Site	NE	NE	P
LV461 Blue Ball Island	Prehistoric with pottery	Archaeological Site	NE	NE	P
LV463 Shotgun Island	Prehistoric with pottery	Archaeological Site	NE	NE	P
LV466 House Site	Prehistoric with pottery	Archaeological Site	NE	NE	P
LV467 Opus P Site	Prehistoric lacking pottery	Archaeological Site	NE	NE	P
LV468 Crackerville	Deptford, 700 B.C.-300 B.C.	Archaeological Site	NE	NE	P
LV469 Spring Run Burial Mound	Prehistoric with pottery	Archaeological Site	NR	NE	P
LV470 Thousand Mile Creek	Prehistoric with pottery	Archaeological Site	NE	NE	P
LV471 Old Fiber Factory	Nineteenth century American, 1821-1899	Archaeological Site	NE	NE	P

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
LV472 South Point	Archaic, 8500 B.C.-1000 B.C.	Archaeological Site	NE	NE	P
LV473 South Beach	Prehistoric with pottery	Archaeological Site	NE	NE	P
LV474 Trout Creek	Prehistoric lacking pottery	Archaeological Site	NE	NE	P
LV475 Sheephead Creek	Prehistoric with pottery	Archaeological Site	NE	NE	P
LV476 Thousand Island	Other	Archaeological Site	NE	NE	P
LV529 Spring Run Hammock	Nineteenth century American, 1821-1899	Archaeological Site	NE	NE	P
LV532 Turtle Creek North	Weeden Island, A.D. 450-1000	Archaeological Site	NE	NE	P
LV540 Potlid Pinellas	Weeden Island, A.D. 450-1000	Archaeological Site	NE	NE	P
LV542 Turtle Creek Well	Nineteenth century American, 1821-1899	Archaeological Site	NE	NE	P
LV824 Tilting Oak	Prehistoric with pottery	Archaeological Site	NE	NE	P

Objective A: Assess and evaluate six of 74 recorded cultural resources in the park.

- Action 1 - Complete six assessments/evaluations of archaeological sites.

Prioritize preservation and stabilization projects.

Archaeological sites at Waccasassa Bay Preserve State Park are currently subject to greater wave action, higher tidal surges, and unknown changes due to global sea level rise. As the threat of significant disturbance from these factors along this coastline region increases, additional precautions may be needed within the preserve, including more intensive archaeological evaluation.

Over the life of this plan, DRP staff should consult with DHR and develop an approach to assessing all the cultural sites in priority order of vulnerability to looting, erosion and ease of access. Due to the remoteness of the park and its difficulty of access, the stated goal is to assess only six sites, however DRP staff will assess as many sites as possible over the life of this plan. National Register listed or eligible sites should be given the highest priority initially.

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

- Action 1 - Ensure all known sites are recorded or updated in the Florida Master Site File.
- Action 2 - Seek assistance to conduct a Phase 1 archaeological survey for high and medium priority areas identified by the predictive model (Collins et al. 2012).
- Action 3 - Collaborate with DHR to encourage research into the aboriginal people who inhabited this area of the Gulf Coast, including their culture.

Ideally, more archaeological information should be gathered from sites before they are inundated or eroded by sea level rise, which is already observable in the park. Staff should communicate with the Bureau of Natural and Cultural Resources (BNCR) and DHR to determine if resources are available to conduct additional research on archaeological sites within the park. DRP should continue to collaborate with archaeological researchers.

Objective C: Bring 1 of 74 recorded cultural resources into good condition.

- Action 1 - Design and implement a practical monitoring program for the cultural sites within the park.

Because of the remote nature of the park and its limited access, even for DRP staff, the first need is to develop a practical monitoring method for cultural sites within the park. Staff should collaborate with BNCR and DHR to develop a practical approach to monitoring the cultural sites. A discussion of any need, practicality and plan for cyclical maintenance should be included in the monitoring plan. For this property, monitoring is probably much more important than maintenance.

LAND USE COMPONENT

VISITATION

Waccasassa Bay Preserve State Park is an unspoiled wilderness spanning a 20-mile stretch of Florida's Big Bend section of its Gulf Coast. Located in Levy County, Waccasassa Bay Preserve State Park is one of the largest parks in Florida. The purpose of Waccasassa Bay Preserve State Park is to protect its many natural communities and imperiled species while offering recreational opportunities to the public.

Expanses of salt marsh and wading birds greet the visitor. Visitors come to the park to appreciate the rustic wilderness of Waccasassa Bay Preserve State Park on Florida's Gulf Coast. The isolated nature of the park means that most of the land is only accessible by paddlers and those using watercraft. The park's rustic natural beauty is remote and pristine.

The large stretches of salt marsh dotted with tree islands and mudflats allow visitors to experience privacy and virtual seclusion. Several recreational activities including paddling and fishingare opportunties for visitors.

Visitors can access three primitive campsites, which are only accessible via paddle craft. Primitive camping is the only activity hosted by the park, although paddlers and anglers often frequent the Waccasassa Bay. Similarly, park staff offer guided paddle tours in the winding rivers, extensive mudflats, and the main bay. Recreational activities at Waccasassa Bay are centered around the pristine wilderness landscape on Florida's Gulf Coast. The Big Bend Saltwater Paddling Trail and the Florida Circumnavigational Saltwater Paddling Trail, a 1,515-mile route along Florida's coast, meanders through the park. The park's campsites are listed as overnight camping locations for part of Segment 6 on the Florida Circumnavigational Saltwater Paddling Trail network. The wilderness appeal of Waccasassa Bay Preserve State Park and its unspoiled character are enjoyed by visitors and nature seekers alike.

Trends

From 2009 to 2019, Waccasassa Bay Preserve State Park recorded significant seasonal trends in visitation. Late winter, early spring and summer are the most popular times for visitation. Months with the highest visitation were February, April, and July. Late spring and early winter had the lowest visitation, particularly the months of May and December.

EXISTING FACILITIES AND INFRASTRUCTURE

Infrastructure in the park is minimal due to its remote position on the Gulf Coast and unit classification as a preserve. There are currently no structures present within park boundaries. Three primitive campsites are found in the park, including Kelly Creek, Hall Creek, and Turtle Creek sites.

A wilderness preserve is an area with minimal human impact. It should be predominantly natural, not containing significant structures. A wilderness preserve is an area within a state park that retains its primeval character and is managed in a way to interpret and sustain this character. Typically, a wilderness preserve appears to be shaped and delineated by nature. The isolated nature of a wilderness preserve can offer the solitude and remoteness essential to the wilderness experience. The area may possess environmental, archaeological, or other unique features that are scenic, educational, or historic. Resource management facilities are limited to those essential for operation and for specified public uses.

Much of Waccasassa Bay Preserve State Park currently meets these criteria and is under consideration for designation as a wilderness preserve. More information is discussed in the Detailed Conceptual Land Use Plan.

Paddling Campsites

Three primitive campsites are available. The campsites can be accessed by boat or watercraft. Campsites include centrally located Kelly Creek, the western Hall Creek, and Turtle Creek to the southeast. There have historically been four campsites, however the fourth site called "Double Barrel," also known as "Waccasassa River" has been removed from use due to rising waters. There are no significant structures located in the park. Campsites are accessible only by water. There are firepits at the campsites with no other facilities offered. Three camping locations are available on a first-come, first-served basis. Campers should come prepared for primitive camping only.

Support Area

Maintenance at the park is conducted through the support area located on the south side of State Road 24 at adjacent Cedar Key Scrub State Reserve. The park units are co-managed but retain their distinct identities. The support area houses sheds, an office, storage structures, a maintenance shop and residences. These offerings provide maintenance and upkeep for both parks.

A roughly 0.8-mile maintenance road, known as the "Jungle Trail," extends from the support area at Cedar Key Scrub State Reserve into the northwest interior of Waccasassa Bay Preserve State Park. The Jungle Trail represents the remnant of a logging road used during logging operations prior to acquisition by DRP. Portions of the trail are slightly elevated above the surrounding low-lying environment such as the mesic flatwoods and hydric hammock natural community types.

Facilities Inventory

Camping Areas	
Primitive campsites	3

CONCEPTUAL LAND USE PLAN

Detailed Conceptual Land Use Plan Objectives

Two use areas at Waccasassa Bay Preserve State Park are listed below for improvements recommended for implementation within the 10-year planning cycle. Specific plan details are available in the next section.

Jungle Trail

Objective: Enhance access for visitors.

Action Items:

- *Develop new trailhead.*
- *Extend the Jungle Trail via boardwalk to provide vantage of the salt marsh.*
- *Create and implement an interpretive plan for the Jungle Trail and boardwalk.*

A modest trailhead area should be established on the south side of State Road 24, approximately 0.45 miles east of the current administrative support area. Basic trailhead elements are recommended, including stabilized parking and interpretive/wayfinding signage, ideally situated under a small shelter. The trail will consist of an out-and-back, single-track trail into the interior of Waccasassa Bay Preserve State Park. Given the constrained uplands and need to minimize habitat bisection, trail loops and spurs are not recommended. This linear trail will provide a unique hiking experience into some of the most remote swaths of wildland in Florida. The trail should arc well north and east of the administrative support complex and join an existing management road, the remnant of the Florida Railroad, that runs east of the complex. As the path approaches the support area, its route should be diverted to buffer the visitor experience from glimpses of maintenance infrastructure and equipment. The trail would then link with the existing Jungle Trail. There is potential to extend the Jungle Trail deeper into the interior of Waccasassa Bay Preserve State Park. This proposed extension would consist of an elevated boardwalk and be constructed from timber, composite decking, or similar materials. The boardwalk sections may be modeled after the 2,500-foot Big Cypress Bend Boardwalk at Fakahatchee Strand Preserve State Park. The boardwalk extension would be routed largely through hydric hammock and terminate at the salt marsh. Design emphasis should be on discreteness of footprint and scenery immersion. The ending point at the salt marsh would provide vistas of this important natural community and nearly unobstructed views into Waccasassa Bay and the Gulf of Mexico. The precise location, alignment, length, and route of this extension must be cautious to minimize habitat disturbance and hydrological interruptions. Close coordination among DRP program areas is essential.

Development of a trailhead, where vehicles will park, should not occur on the sensitive and intact scrub habitat. Instead, any such trailhead development should occur on areas with mesic flatwoods where footprints of prior disturbance may be utilized. Similarly, the soils of mesic flatwoods can be more easily stabilized with lime rock when compared with soils of other nearby natural community types. This will permit proper stabilized surface for the purposes of a trailhead.

This objective requires comprehensive interpretive planning to determine the most effective way to connect visitors to the meaningful and relevant themes on this trail and boardwalk. The type, design, quantity, and placement of interpretive elements to deepen understanding will be specified during this additional planning process. The following are concepts that may be considered.

The Jungle Trail and its potential extension would provide several interpretive opportunities. For example, the five natural communities that are observed along the trail could be interpreted to illustrate

the significance of several natural community types, such as hydric hammock. Furthermore, cultural and historic elements such as the Florida Railroad or Cedar Key Rail Line could be formally interpreted. This objective requires comprehensive interpretive planning to determine the most effective way to connect visitors to the meaningful and relevant themes on this trail and boardwalk. The type, design, quantity and placement of interpretive elements to deepen understanding will be specified during this additional planning process. The following are concepts that may be considered. Interpretive information may include the function of the railroad and its role in the settling of Florida. The Florida Railroad was completed in 1861 and was one of the first railroads in the state, connecting the city of Cedar Key to Fernandina on the Atlantic coast.

Finally, several viewing opportunities would be afforded to visitors using the trail. The possible completion of the boardwalk extension of the Jungle Trail would result in a nearly unobstructed viewshed over the Gulf of Mexico, providing visitors with a suitable "destination trail."

Wilderness Preserve Designation
Objective: Designate appropriate portions of the park as a wilderness preserve.

The area proposed for wilderness preserve designation includes approximately 32,807 acres at Waccasassa Bay Preserve State Park. This includes areas along the Gulf of Mexico, Waccasassa Bay and several interior rivers, and natural communities such as basin swamp, hydric hammock, salt marsh, and estuarine flats. It is recommended that a large portion of Waccasassa Bay Preserve State Park be identified and managed under this status in formal acknowledgement and to maximize protection of its high quality and biodiverse natural communities, specifically that of its expansive salt marsh and outstanding hydric hammock natural communities. In accord with the concept of a wilderness preserve, much of Waccasassa Bay Preserve State Park exhibits minimal signs of human alteration. These settings provide recreational enjoyment opportunities for visitors accessing the unit by paddling or small motorized watercraft when exploring the numerous channels, creeks, and rivers in the park. The mesic flatwoods natural community should be excluded from this designation due to disturbances such as southern pine beetle infestations. Additionally, zones around the Jungle Trail and the proposed boardwalk extension should be excluded from the wilderness preserve designation, as these infrastructural developments are incompatible with the designation.

OPTIMUM BOUNDARY

The majority of the lands surrounding Waccasassa Bay Preserve State Park are undeveloped or conservation lands. The southern border of the park abuts Yankeetown, while the eastern border is adjacent to the Florida Forever Gulf Hammock Parcel. The NATC Conservation Easement is located along the northern border and Cedar Key Scrub State Reserve is situated along the northwestern perimeter. Forestry operations are prioritized in areas around the park. Residential development is virtually nonexistent.

A narrow band of lands totaling 400 acres extends along State Road 24 between Waccasassa Bay Preserve State Park and Cedar Key Scrub State Reserve. Because Waccasassa Bay Preserve State Park and other conservation lands limit development, lands suited for development are exceptionally sparse. The limited availability of plots appropriate for development results in competing interests regarding these valued parcels. These few remaining undeveloped lands are included in the optimum boundary for both Waccasassa Bay Preserve State Park and Cedar Key Scrub State Reserve. A development company

acquired much of these sought-after upland areas and drew plans for an already platted subdivision adjacent to Cedar Key Scrub State Reserve. Single family lots were obtained with planned development despite efforts by the state to stop it. Even scattered development outside of the park can impact the natural conditions and management operations within.

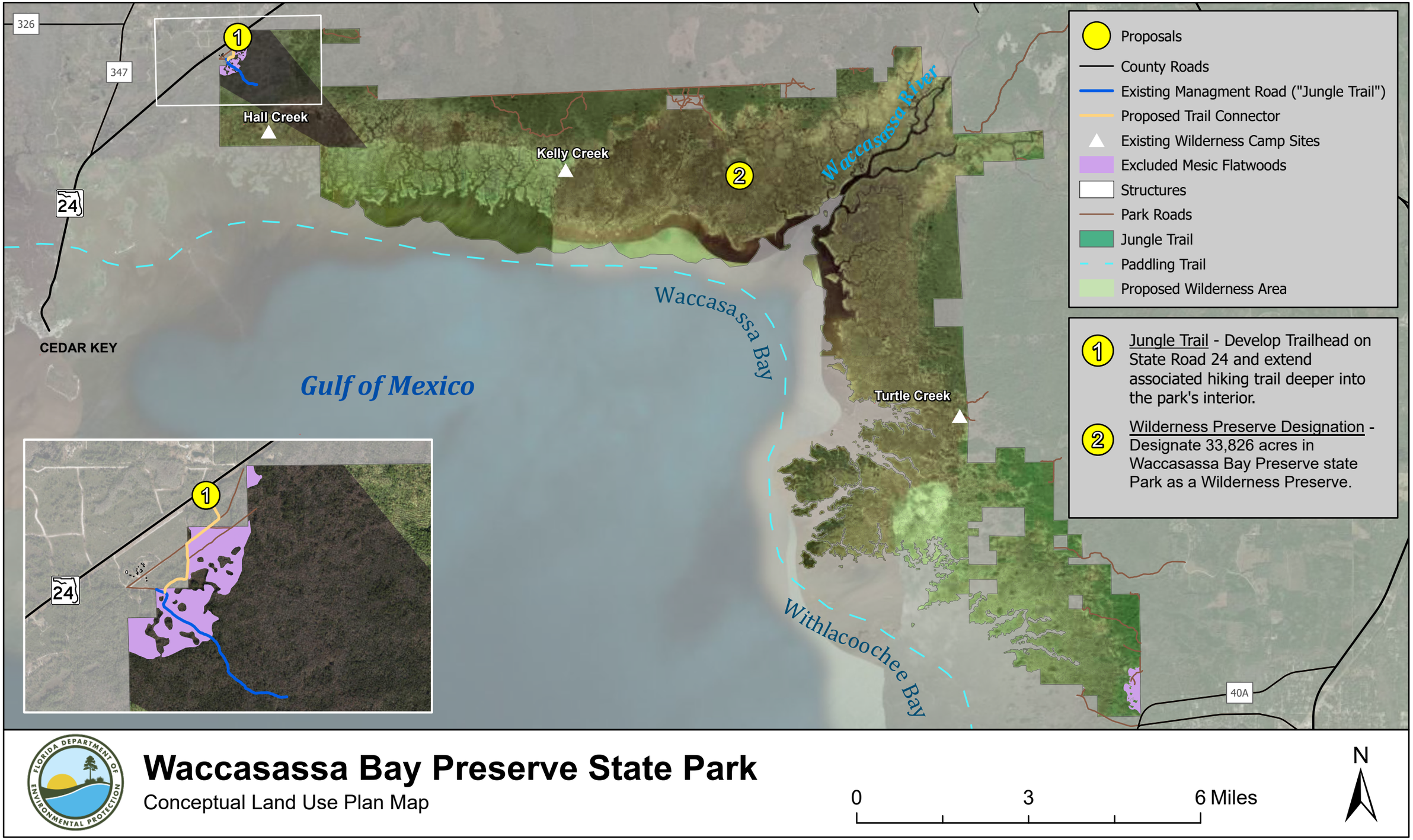
Therefore, many of the optimum boundary parcels planned for development were purchased by the Florida Gulf Coast Mitigation Bank. Credits will be sold, and the properties can be expected to be transferred into public management and ownership. The lands within the Florida Gulf Coast Mitigation Bank feature a road connected with State Road 24 and a boat ramp, which may facilitate ease of access into Waccasassa Bay Preserve State Park upon possible acquisition.

Located to the east of Waccasassa Bay Preserve State Park is the Florida Forever Gulf Hammock parcel. The land does not overlap with the ARC-approved optimum boundary but is immediately adjacent to its eastern perimeter. It encompasses 25,611 acres, which drains into the adjacent aquatic preserve, composed of a largely forested ecosystem. This area also is a refuge for rare or imperiled plant and animal life such as red-cockaded woodpecker, gopher tortoise and pinkroot.

Several inholding properties located within the optimum boundary are prominent for ecologically significant natural environments. Inholding properties possess areas which include scrub, hydric hammock and scrubby flatwoods, which characterize some of the last remnants of the hydric hammock ecosystem. Plant and animal diversity attracts research interest for the profusion of imperiled species and isolated wildlife populations. Access to these private parcels impacts park property, particularly wetlands. Obtaining these properties would prevent further damage.

Acquisition of the additions and inholdings properties would enhance the outlook that one day a continuous band of public land would extend north from Yankeetown through the Big Bend region on the Gulf Coast. The acquisitions would protect the Florida salt marsh vole by preserving some of the few remaining areas of salt marsh habitat. Likewise, protection would be provided for cultural resources such as sites listed in the FMSF, which includes three archaeological sites. Many areas require protection within and beyond the parameters of the park. Protecting these parcels can adequately preserve cultural and natural resources, and obtaining inholding properties should protect these areas from further degradation. Finally, the long-term preservation of the communities within the park depends on preservation and conservation efforts both within and outside of the boundaries of the park.

No existing Florida Forever projects overlap with the optimum boundary for this unit.



Waccasassa Bay Preserve State Park

Conceptual Land Use Plan Map

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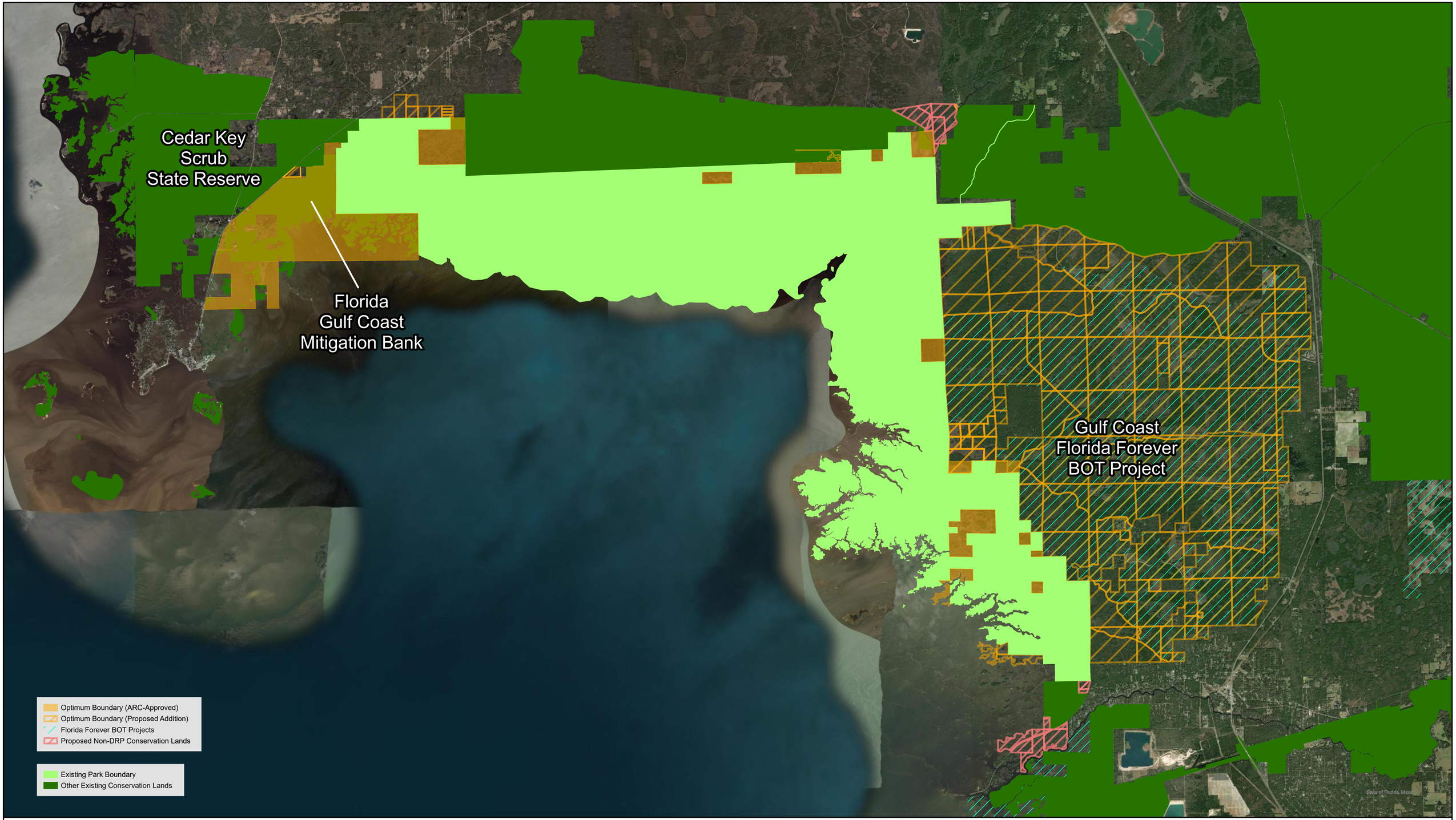

Waccasassa Bay Preserve State Park

Optimum Boundary Map

0 3.5 7 Miles

N