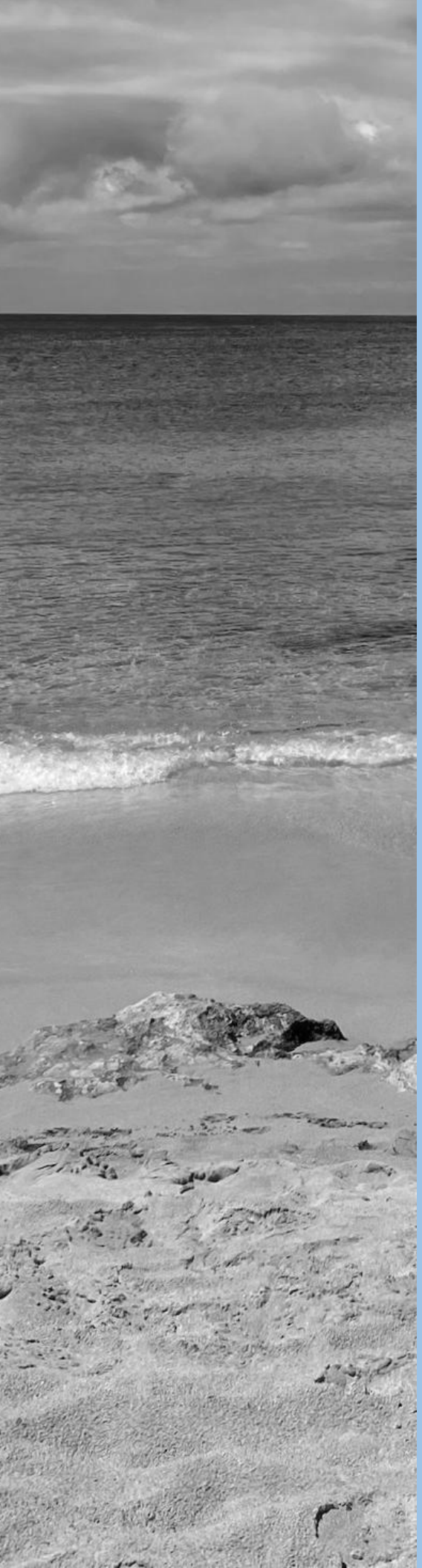

CAYO COSTA STATE PARK
Park Chapter

CHARLOTTE HARBOR REGION

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Cayo Costa State Park

Park Chapter

Planning Region: Charlotte Harbor

County: Lee

Lease/Management Agreement Number: 3426

Overview: Preserving pristine elements of southwest Florida's barrier island chain, Cayo Costa State Park protects critical habitats for sea turtles and shorebirds while providing a uniquely remote location for coastal resource-based recreation.

Total Acreage: 2,675.35

Natural Communities	Acres
Beach Dune	167.73
Coastal Berm	80.09
Coastal Grassland	463.30
Coastal Interdunal Swale	41.67
Coastal Strand	438.57
Depression Marsh	28.59
Maritime Hammock	573.17
Mesic Flatwoods	62.73
Mangrove Swamp	701.02
Marine Unconsolidated Substrate	86.59
Shell Mound	9.56

Altered Land Cover	Acres
Developed	16.92
Ditch/Canal	1.44
Invasive Exotic Monoculture	7.62

Acquisition: Cayo Costa State Park was initially acquired on September 7, 1976, through the Environmentally Endangered Lands Bond Proceeds.

Resource Management Component

Hydrology

- Continue to cooperate with other state and federal agencies and independent researchers in hydrological studies and monitoring programs.
- Assess long-term sustainability of fresh groundwater for park use.
- Assess changes in freshwater lens salinity levels.
- Continue to cooperate with independent researchers evaluating changes in the island geomorphology following storm events.
- Continue to monitor sedimentation levels at service dock area and Jug Creek and seek funding for dredge activities to maintain access.
- Assess removal of the spoil berm at Jug Creek to restore historic tidal flow.

Natural Communities

- Develop and update burn plan annually.
- Manage areas for wildfire/fuel suppression.
- Conduct prescribed fire on 20 acres annually.
- Conduct natural community/habitat improvement activities on 44 acres of mesic flatwoods to prepare zones for the safe application of prescribed fire.

Imperiled Species

- Update imperiled species list.
- Continue to implement existing monitoring protocols for marine turtle species and piping plover, red knot, Wilson's plover, snowy plover, least tern, black skimmer, and American oystercatcher.
- Monitor impacts on shorebird and sea turtle nesting by terrestrial nuisance species in the park.
- Provide visitor interpretation and outreach for shorebirds, seabirds, and wading birds.
- Review and revise protocols as necessary to remain consistent with FWC and USFWS standards.
- Resurvey/replicate LTDS protocols to estimate the gopher tortoise population.
- Continue to implement existing monitoring protocols.
- Periodically review existing protocols.

Invasive and Nuisance Species

- Identify the major vectors and pathways for invasive plants at the park and reduce incoming propagules where possible.
- Regularly update surveys to reflect accurate infestation levels of each management zone.
- Develop an early detection rapid response protocol for new infestations.
- Develop a species-specific action plan for each management zone with a prioritization framework.
- Evaluate and update plan on an annual basis and adapt to changing conditions.
- Survey all maintenance areas yearly for new infestations.
- Treat areas where invasive plant spread is imminent (e.g., after prescribed fire, mechanical, or other disturbance).
- Document treatments and update surveys in NRTS.
- Survey and treat after prescribed fire for rapid spread of invasive species.
- Treat medium infestations with staff and volunteers where available.
- Reduce high infestations with additional labor sources (e.g., contract funding, strike teams) and plan for passive or active restoration.
- Document treatments and update surveys in NRTS.
- Manage invasive or nuisance animals.
- Coordinate with USDA, FWC, and staff to develop monitoring and control plans for invasive black spiny-tailed iguanas and other invasive/nuisance species.

Cultural Resources

- Complete 13 assessments/evaluation of archaeological sites.
- Prioritize preservation and stabilization projects.
- Ensure all known sites are recorded or updated in the Florida Master Site File.
- Continue to survey the park and document all historic and archaeological resources encountered with the Florida Master Site File.
- Design and implement regular monitoring programs for 15 cultural sites.

Land Use Component

Conceptual Land Use

Pelican Bay Boat Basin

- Evaluate expansion of dock and slips.
- Develop and implement an interpretive sign plan.
- Reconstruct the camp store/concessions building.
- Evaluate scope of on-island visitor support services.

Campground

- Redevelop the semi-primitive tent campground.

Interpretation

- Develop and implement an interpretive trail plan.

Park Protection

- Survey and mark the corners of park boundaries that interface with private properties.
- Maintain demarcation/corner posts.
- Prevent the use of unauthorized trails and promote their natural recovery.
- Address private encroachments onto the park.

Support Facilities and Infrastructure

Pelican Bay Maintenance Area

- Reconstruct a three-bay maintenance building.
- Reconstruct one pole barn.
- Create visual barrier between staff support area and visitor arrival/departure area.

Well Site

- Evaluate and reconfigure parkwide potable water system.
- Conduct a historic structure assessment of the defunct water tower and determine management direction.
- Improve storage space for resource management supplies and light management equipment.

Staff Residences

- Reconstruct the third residence that was destroyed by Hurricane Ian.
- Evaluate alternative residence sites at landbase of Don Pedro Island State Park.

Jug Creek and Pelican Bay Canal Maintenance

- Coordinate with USACE to explore long-term permitting options to provide cyclical maintenance dredging needs.

Optimum Boundary

- Inholdings within the vicinity of Lee County platted rights-of-way between Pelican Bay and Sellers Canal
- County abandonment and conveyance of all rights-of-way that are unnecessary for private access
- Bayside parcel at the southern tip of Cayo Costa
- East-west oriented inholding just south of the ephemeral inlet to Murdoch Lagoon.
- Faulkner Mound
- North Captiva Island inholdings
- Management authority of adjacent sovereign submerged lands extending 100 ft seaward of mean high water

Charlotte Harbor

Gulf of America

Pine Island Sound

PINE ISLAND SOUND AQUATIC PRESERVE

PINE ISLAND SOUND AQUATIC PRESERVE

PINE ISLAND NATIONAL WILDLIFE REFUGE

PINE ISLAND NATIONAL WILDLIFE REFUGE

PINE ISLAND NATIONAL WILDLIFE REFUGE

PINE ISLAND NATIONAL WILDLIFE REFUGE

CAYO COSTA

PINE ISLAND

NORTH CAPTIVA ISLAND

CAPTIVA ISLAND

PART ISLAND

USEPPA ISLAND

MAIN ST

Cottages

Docks

STRINGFELLOW RD

BOKEELIA

BOCILLA PRESERVE (Lee Co.)

Back Bay

Tom Bay

Jug Creek

Little Bokeelia Bay

CALUSA LAND TRUST & NATURE PRES. OF PINE I.

CHARLOTTE HARBOR PRESERVE STATE PARK

CARVER PRESERVE (Lee Co.)

Cabins

Campground

Support Area

Main Dock

Entrance Station

Staff Residences

AREA SUBJECT TO CHANGE

BEACH

COASTAL STRAND

COASTAL GRASSLAND

MESIC FLATWOODS

MARITIME HAMMOCK

DEPRESSION MARSHES

MANGROVES

SHELL MOUND

COASTAL BERM

Pelican Pass

Pelican Bay

Murdock Pt.

Murdock Lagoon

COASTAL INTERDUNAL SWALES

Primo Bay

PUNTA BLANCA ISLAND

MONDONGO ROCKS

MONDONGO ISLAND

PATRICIO ISLAND

CAMP KEY

BROKEN ISLANDS

BIRD KEY

MIDDLE KEY

Platt Pt.

CABBAGE KEY

Murdock Bayou

SHELL MOUND

COASTAL BERM

MANGROVES

COASTAL STRAND

COASTAL INTERDUNAL SWALE

MARITIME HAMMOCK

BEACH

THE NARROWS

Pejuan Pt.

COASTAL BERM

MANGROVES

Pejuan Cove

COASTAL STRAND

Captiva Pass

BLACK KEY

COVE KEY

WOOD KEY

LITTLE WOOD KEY

CAT KEY

RAT KEY

BENEDICT KEY

BIG BIRD ROOKERY

CAPTIVA SHOAL

Safety Harbor

NORTH CAPTIVA ISLAND

COASTAL GRASSLAND

MARITIME HAMMOCK

MANGROVES

Foster Pt.

COASTAL BERM

COASTAL INTERDUNAL SWALE

Foster Bay

MANGROVES

COASTAL STRAND

COASTAL STRAND

SOUTH BANKS

MANGROVES

Redfish Pass

PINE ISLAND SOUND AQUATIC PRESERVE

Park Boundary
Adjacent Conservation Lands
Structures
Park Road Stabilized
Park Road Unstabilized
Hiking Trails
Hiking/Biking Trails
Aquatic Preserve
Campsites

SURROUNDING LAND COVER
Beach Dune
Coastal Grassland
Coastal Scrub
Coastal Strand
Mangrove Swamp
Maritime Hammock
Salt Marsh
Sand Beach (Dry)
Tidal Flat

N W E S

CAYO COSTA STATE PARK

LEE COUNTY, FLORIDA

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INTRODUCTION

LOCATION AND ACQUISITION HISTORY

Cayo Costa State Park is located in Lee County, occupying portions of four islands: Cayo Costa, Punta Blanca, North Captiva and Bokeelia Island. Primary public access occurs on Cayo Costa Island via boat by way of either Boca Grande from the north or Pine Island from the west. The Charlotte Harbor Region map depicts the park's general location as well as other significant surrounding land and water resources.

Cayo Costa State Park was initially acquired on September 7, 1976, through the Environmentally Endangered Lands Bond Proceeds. Subsequent additions to the park have been achieved through Preservation 2000 and Florida Forever program funding. Currently, the park comprises 2,675.35 acres. The Board of Trustees of the Internal Improvement Trust Fund (Trustees) hold fee simple title to the park and on June 21, 1984, the Trustees leased a portion of Cayo Costa State Park to three state agencies: the Department of Environmental Protection's (DEP) Division of Recreation and Parks (DRP), the Florida Fish and Wildlife Conservation Commission (FWC) and the Department of State's Division of Historical Resources (DHR) under Management Agreement #745-9005, which later changed to Lease No. 3569. On February 25, 1986, the Trustees leased the remaining part of the park to DRP under Lease No. 3426. This lease is for a period of 50 years and will expire on February 24, 2036. On October 23, 2000, the Trustees canceled Lease 3569 and amended the associated lands to Lease No. 3426.

Cayo Costa 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 DEP.

SECONDARY AND INCOMPATIBLE USES

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

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

In accordance with section 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 multiple-use management activities would not be appropriate as a means of generating revenues for land management. Instead, entrance fees, concessions and similar measures will be employed on a case-by-case basis as a means of supplementing park management funding. 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 Cayo Costa State Park is to preserve examples of the southwest Florida barrier island chain, lend protection to the Charlotte Harbor Estuary and provide coastal resource-based recreation opportunities.

Park Significance

- Accessible only by boat or kayak, this former fishing ground of the Calusa Indians features 9 miles of undeveloped shoreline for swimming, paddling, snorkeling, shelling, fishing and wildlife appreciation.

- The park protects well-preserved portions of barrier islands that sustain coastal wildlife, including important nesting habitats for sea turtles and shorebirds.

- In 1848, the U.S. military utilized the northern end of Cayo Costa and the southern end of nearby Gasparilla Island as a military reservation. By the early 20th century, Cayo Costa was the site of a military quarantine station and marine hospital, three pilots' houses, post office, dock and at least two fishing villages.

Central Park Theme

A historic and ecological gateway into vibrant southwest Florida, Cayo Costa State Park is one of Florida's few remaining undeveloped barrier islands, supporting pristine habitats for native flora and fauna to thrive.

Internal Classification

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

OTHER DESIGNATIONS

The unit is not within an Area of Critical State Concern as defined in section 380.05, F.S. and it is not under study for such designation. The park is a component of the Florida Greenways and Trails System, administered by the DRP's Office of Greenways and Trails.

All waters within the park have been designated as Outstanding Florida Waters, pursuant to Chapter 62-302, Florida Administrative Code (F.A.C.). Surface waters in this park are also classified as Class III waters (suitable for fish consumption and recreation) by DEP. The park is adjacent to the Pine Island Sound and

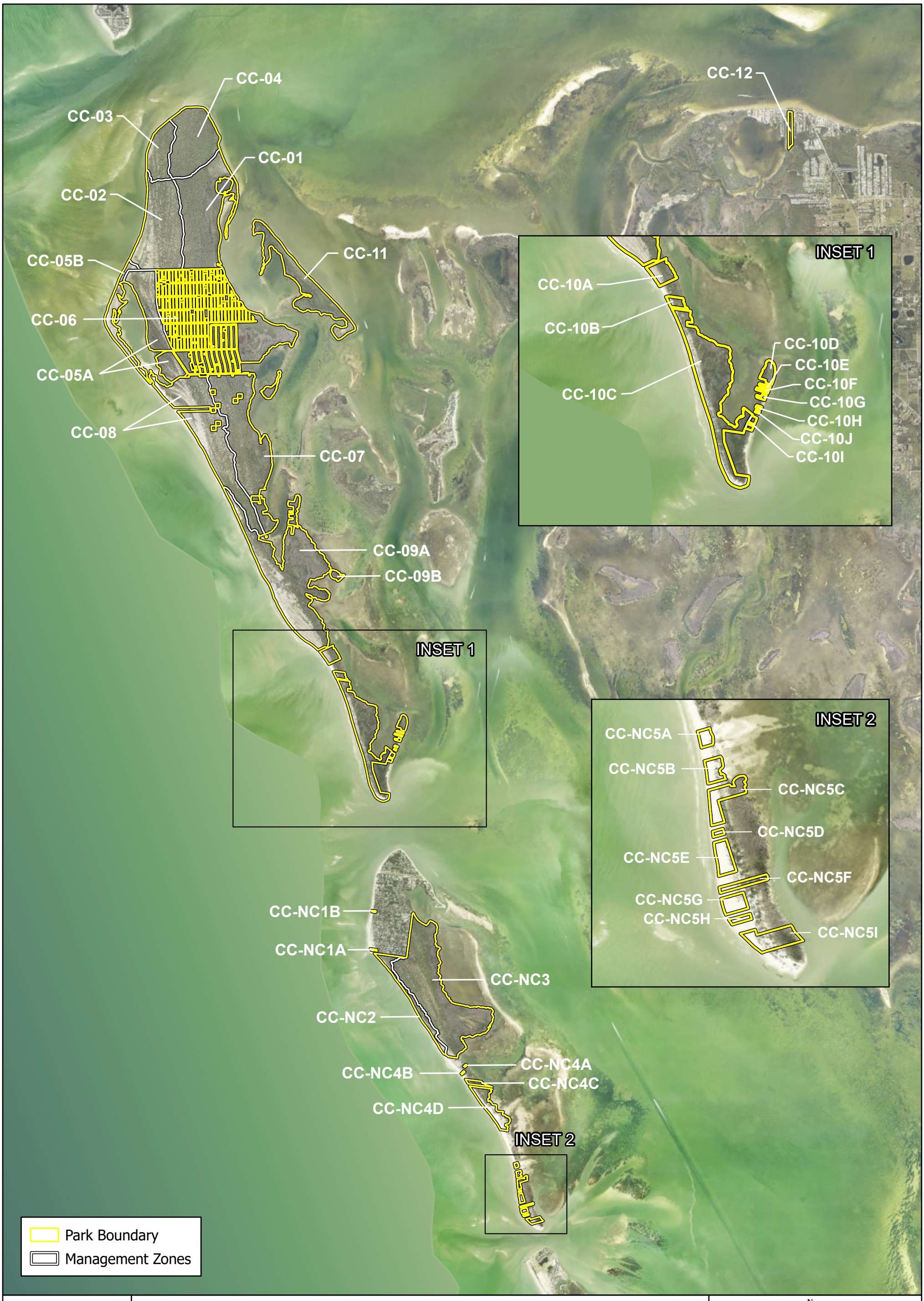
Gasparilla Sound-Charlotte Harbor aquatic preserves as designated under the Florida Aquatic Preserve Act of 1975 (section 258.35, F.S.).

PARK ACCOMPLISHMENTS

- Partnered with the U.S. Department of Agriculture (USDA) to successfully eradicate all feral hogs from the island.
- Shorebird nesting is monitored monthly throughout the nesting season in accordance with DRP and FWC protocols resulting in high nesting/fledging success.
- New wayfinding and interpretive signage was developed and installed.
- New campground restroom was built with funding from a Lee County Tourism Development Council grant. Its endurance through several hurricanes is a testament to design and construction aspects focused on resilience.

RESOURCE MANAGEMENT COMPONENT

Cayo Costa State Park Management Zones		
Management Zone	**Acreage**	**Managed with Prescribed Fire**
CC-01	239.13	Yes
CC-02	194.71	No
CC-03	69.9	No
CC-04	148.61	No
CC-05A	125.39	No
CC-05B	43.56	No
CC-06	387.45	No
CC-07	257.51	No
CC-08	233.06	No
CC-09A	313.66	No
CC-09B	5.07	No
CC-10A	11.51	No
CC-10B	4.2	No
CC-10C	101.05	No
CC-10D	5.73	No
CC-10E	0.69	No
CC-10F	0.75	No
CC-10G	0.82	No
CC-10H	0.34	No
CC-10I	1.93	No
CC-10J	0.26	No
CC-11	125.83	No
CC-12	7.79	No
CC-NC1A	0.28	No
CC-NC1B	0.32	No
CC-NC2	64.82	No
CC-NC3	283.95	No
CC-NC4A	0.24	No
CC-NC4B	0.32	No
CC-NC4C	4.04	No
CC-NC4D	28.02	No
CC-NC5A	0.96	No
CC-NC5B	1.55	No
CC-NC5C	2.74	No
CC-NC5D	0.14	No
CC-NC5E	1.03	No
CC-NC5F	0.94	No
CC-NC5G	0.86	No



CAYO COSTA STATE PARK
Management Zones

N

Miles

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Cayo Costa State Park Management Zones		
Management Zone	**Acreage**	**Managed with Prescribed Fire**
CC-NC5H	0.29	No
CC-NC5I	3.76	No

TOPOGRAPHY

The islands of Cayo Costa, North Captiva and Punta Blanca are in the Peace River District, specifically the Peninsular Coastal Lowlands Province. These islands are part of a barrier island chain which includes Gasparilla Island to the north and Captiva and Sanibel to the south. Collectively, these land masses form a buffer that protects the Charlotte Harbor estuarine system, isolating it from some effects of storm-generated waves in the Gulf of America. Pine Island, where Jug Creek is located, also falls within this district and is located east of this barrier island chain. Cayo Costa, North Captiva and Punta Blanca rest on a foundation of limestone. The upper layer of this limestone originates from a Pleistocene series of sedimentary deposits called the Anastasia formation, mainly composed of coquinoidal limestone, sand and clay.

Cayo Costa

Naturally occurring fluctuations in elevation on Cayo Costa vary from mean sea level (msl) to 10 feet above msl. One pre-Columbian mound, Old Ware Mound, represents the highest elevation on the island at about 16 feet above msl.

Topographic relief on the island was created by wind and waves depositing sediment in ridges along the seaward face of the island. These ridges, which extend parallel along the west side of the island, are tallest and most pronounced directly adjacent to the Gulf. As the ridges are replaced and weathered over time, they become shorter and leveled. This creates a gently undulating ridge-swale topography found only on the west side of the island. On the east side of the island, fluctuations in topography were created by either sedimentation from the bay or over wash events that occurred during major storms. Changes in shoreline topography on these barrier islands occur sporadically and are exacerbated by strong storms, long open fetches and consistent boat wakes.

North Captiva

Topography at North Captiva Island is very similar to Cayo Costa. The same forces that shaped Cayo Costa also shaped North Captiva. Smaller and narrower than Cayo Costa, most of the park portion of North Captiva is less than 6 feet above msl, with the maximum elevation reaching only 10 feet above msl. The northern extent of the island on the Gulf side closely matches the undulating ridges found on Cayo Costa. The Gulf side of the narrower south end of the island is known as Redfish Shores. This area experiences frequent erosion and has sections where mangroves are exposed to the high wave energies of the Gulf. In 2004, Hurricane Charley breached the middle of the island creating “Charley’s Pass,” separating the south from the north end of the island for five years until sand reaccreted. In 2022, Hurricane Ian nearly breached the island approximately 0.5 miles south of “Charley’s Pass” with sand reaccreting weeks after the storm. South of Redfish Shores is Redfish Pass, which formed during a hurricane in 1921 and continually separates North Captiva from Captiva Island.

Punta Blanca

The topography of Punta Blanca, a small island east of Cayo Costa, is mostly low-level ridges reaching 3 feet above msl. An area on the southern spit of the island reaches 8 feet above msl and was historically used as a family house site as early as 1935. The island was originally formed as a part of Cayo Costa as recently as 1868. Since this time, the inlet known as Pelican Pass that separates Punta Blanca and Cayo Costa has widened, separating the two islands from one other by the waters of Pelican Bay.

Jug Creek

The Jug Creek parcel is located on the north end of Pine Island, with a generally flat and low-lying topography, reaching only 3 feet above msl. This thin strip of property has been dredged to 6 feet below msl in the past for boat access to Pelican Sound. Dredging has resulted in a slightly raised spoil pile extending parallel to the west side of the canal, supporting a variety of hardwood trees, mangroves and ferns, in addition to multiple invasive plant species.

SOILS

The soils found on Cayo Costa consist of undifferentiated sand with a varying mixture of shell fragments. Some areas also contain marl and peat properties, especially on the east side of the islands. The 1984 Soil Survey of Lee County, Florida (Henderson 1984) describes seven soil types within Cayo Costa and associated parcels (see the Southwest District Soils Descriptions appendix). The main sandy soils include Canaveral fine sand, beaches and Captiva fine sand. All these soil types are found on the western side and central areas of Cayo Costa and North Captiva.

On the eastern shore of Cayo Costa, North Captiva and throughout Punta Blanca, Wulfert muck and Kesson fine sand are the dominant soil types. These soil types are poor-draining and frequently yield mangrove swamps. The surface of the soil is a dark organic muck with underlying sand and shell.

Jug Creek and the southern tip of Punta Blanca show evidence of massive soil disruption in the form of earth movement. This disturbed soil is likely from nearby dredging projects and early attempts to raise the existing topography for coastal development. Since this soil movement, native vegetation has returned, though sparse, within these areas due to the loss of the native seed bank and high compaction.

HYDROLOGY

Cayo Costa and North Captiva both sustain a shallow lens of freshwater. Drawing freshwater from a shallow lens directly adjacent to open ocean will eventually lead to salinization of all shallow wells. Prior to 2022, the park extracted an average of 828 gallons of water per day, with a maximum extraction of 1,880 gallons per single day. Effects of groundwater withdrawal on surface water quality are not known.

Due to a shallow water table and the lack of sheet flow over the island, the drainage of surface water is slow. Precipitation is readily absorbed into the sandy soils, but once the sediment is saturated, surface water accumulates. Slow underground seepage mixed with high humidity and a slow evaporation rate leaves standing surface water throughout the park. Park trails and campground areas will accumulate water after heavy rainfall events. There are ten areas on Cayo Costa and two areas on North Captiva that perennially hold water. The occurrence of inland water bodies is attributed to historical coastline locations, which were driven by sea levels and the occurrence of large storm events.

Four water features located on Cayo Costa are designated as Class II Waters by DEP and generally maintain salinities that are indistinguishable from the average salinity of Pine Island Sound. These

Soils

- 2 - Canaveral fine sand, 0 to 2 percent slopes
- 4 - Canaveral fine sand-urban land complex, 0 to 2 percent slopes
- 5 - Captiva fine sand, frequently ponded, 0 to 1 percent slopes
- 22 - Beaches
- 23 - Wulfert muck, tidal, 0 to 1 percent slopes
- 24 - Kesson fine sand, tidal, 0 to 1 percent slopes
- 25 - St. augustine, organic substratum-urban land complex, 0 to 2 percent slopes
- 48 - St. augustine sand, 0 to 2 percent slopes
- 99 - Water
- 140 - Wulfert muck, tidal-urban land complex, 0 to 1 percent slopes

CAYO COSTA STATE PARK
Soils

N

Mile

0 0.5 1

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include Old Place Hole (management zone CC-01), Manatee Hole (management zone CC-06), Primo Point tidal pool complex (management zone CC-06) and Murdock Lagoon (management zone CC-08). They are connected to Pine Island Sound managed by Charlotte Harbor Aquatic Preserves through tidal inlets.

Two water bodies known as the Egret Ponds (management zone CC-01) exchange water with Pine Island Sound through subterranean tidal seepage, which maintains the two ponds at consistent depths and salinities, regardless of seasonal rainfall variations. Lack of surface water exchange with the sound, designates management remains to DRP. Both Egret Ponds are designated as Florida Class III Waters.

One body of water categorized as a lagoon near the beach access area on the Gulf side at the widest portion of Cayo Costa is included within the optimum boundary for resource management and protection purposes. Formed within the past 40 years as a result of sand accretion patterns, this approximately 102-acre lagoon is surrounded (except for one private outparcel on the southeastern shore) by uplands and dry shoreline managed by the park. The one-mile-long and 0.25 mile-wide lagoon maintains an average 10-foot depth, frequently utilized by imperiled shorebird and wading species foraging within the tidally exposed mudflats.

Another water body, known as the Pejuan Tidal Pool, found on the southernmost point of Cayo Costa (management zone CC-10C), is salty due to seawater inundation occurring during extreme high tides or large storm events. This large pool of water has an elevated salinity from the surrounding seawater (up to 50 parts per thousand) due to its lack of regular tidal flushing. The water exhibits extremely low visibility and a murky brown color due to tannins and suspended particulates.

One body of water remains as a relic of historic geology, known as the inland mangrove pond (management zone CC-06). During the geologic formation of Cayo Costa over the past 3,000 years, spits of land became interconnected as sea levels decreased. These spits of land became linked through sediment movement and sea subsidence. Where saltwater became trapped, a large volume of salt was deposited as the water evaporated. Now, without connection to the surrounding bay or Gulf, the salinity remains around 20 parts per thousand, allowing mangroves to persist over competing freshwater species. This inland pocket of mangroves will continue to persist until the salinity balance is countered by rainwater accrual.

Fresh bodies of water are also found at Cayo Costa, including Alligator Marsh (management zone CC-06), Sellar's Marsh (management zone CC-07) and Hogs Pond (management zone CC-05A). Alligator Marsh is the most extensive, covering approximately 33 acres during the summer months. Water levels of all three are closely correlated to rainfall on the island. During the driest months of the year, all are reduced to either a surface film of water, or a soggy substrate. Herwitz (1977) observed that these freshwater bodies are simply low-lying zones of saturation in contact with the unconfined aquifer. These fresh bodies of water are also designated as Class III waters by DEP.

North Captiva contains two bodies of water located on the surface of the island; a tidal pool located in management zone CC-NC3 and a remnant dune swale in management zone CC-NC2. Both water bodies are saline and become inundated with saltwater during large storm events. The tidal pools in management zone CC-NC3 are designated as Class II Waters by DEP and generally maintain salinities that remain near 35 parts per thousand. A body of freshwater is located on North Captiva but not within the park boundary.

Jug Creek has significantly altered hydrology due to the dredging of the canal. As the canal was created, a spoil berm was deposited along the west side of the canal disrupting water flow though the mangrove swamp. Extreme high tides and storm events allow saltwater to flow over the berm and into

the lower mangrove swamp area. As the water subsides, saltwater is trapped along with a large volume of detritus that is carried in with the water. Management measures should include partial or complete removal of the berm to restore mangrove tidal flow.

Coastal Erosion/Sedimentation

As barrier islands, constant shifts in shoreline locations and overall morphology are expected. There are no unique erosion problems except those associated with the dynamics of a sandy coastline. The size and location of Johnson Shoals located just off the coast of the widest section of Cayo Costa drives the accretion and erosion on the island. With increased shoaling, the southern section of the island is starved of sediment. This widens the north section of the island and diminishes the southern section. Over the past 25 years, sand accretion has expanded the beach adjacent to the campground by almost 300 feet, forming a wide, well-established dune system with multiple imperiled plant species. Other areas of the park have also experienced accretion due to the natural coastal process of longshore sediment transport. Longshore sediment transportation along the east side of the island has resulted in the formation of a southward extending spit into Pelican Bay that is heavily used by local recreational boaters.

Accretion has become problematic within the canal at Jug Creek and the service boat dock area at Cayo Costa with boat access and fuel transportation to the island occasionally impaired at both locations. In 2007 and 2016, both locations were dredged to 5 feet below msl to improve park staff access and normal park operations. These areas were again dredged in late 2025 to restore pre-Hurricane Ian conditions. These access canals will require additional maintenance dredging as sediment accretes in the future to maintain normal park operations.

Evidence of shifting shorelines is most prominent on the island of North Captiva where the shoreline at the north end of the park has shifted anywhere from 250 feet up to >1,500 feet eastward over the past 30 years. Sediment transport in the southerly direction during this timeframe has resulted in accretion along the southern half of the island, adding more than 300 feet of beach and dune systems in previous locations that were previously a little more than 150 feet wide. This increase of sand along the southern sections of the island still did not prevent three different hurricanes, Hurricane Charley in 2004, Hurricane Ian in 2022 and Hurricane Milton in 2024 from washing over the island at narrow points, forming a channel that divided it into two or three sections. Accretion eventually reconnected the island into a contiguous stretch of beach in 2008, and again within several weeks following Hurricane Ian.

Hurricanes Helene and Milton in 2024 resulted in a significant loss of vegetation along the beach and erosion across the island with increased sedimentation in mangrove swamps along the south end where similar impacts had occurred two years prior during Hurricane Ian in 2022. In some locations on the south end of the island, the storm surge washed completely across the island removing or toppling vegetation and shifting sand towards the bay side.

Currently, no beach nourishment or other erosion mitigation projects are proposed for Cayo Costa or associated parcels. If extensive erosion occurs, the park should reposition trails and access points as needed to maintain normal park operations. Beach nourishment is preferable over any type of engineered stabilization (e.g., seawall, jetties, breakwaters, etc.) but should only be considered in situations where park operations are fully hindered.

Monitoring and Assessment

Objective: Assess the park's hydrological restoration needs.

Actions:

- Continue to cooperate with other state and federal agencies and independent researchers in hydrological research and monitoring programs.
- Assess long-term sustainability of fresh groundwater for park use.
- Assess changes in freshwater lens salinity levels.
- Continue to cooperate with independent researchers evaluating changes in the island geomorphology following storm events.
- Continue to monitor sedimentation levels at service dock area and Jug Creek and seek funding for dredging activities to maintain access.
- Assess removal of the spoil berm at Jug Creek to restore historic tidal flow.

Routine surface water testing and ground water level monitoring for water quality are not necessary at Cayo Costa State Park due to the remoteness of the island. Bodies of water on Cayo Costa and North Captiva are essentially unaffected by human activities. With no impact on surface water and no impervious roads or parking areas on Cayo Costa, North Captiva, or Punta Blanca, effort should be directed to the sustainability of visitor and staff consumption of the fresh groundwater supply. Currently, the park pumps water from the freshwater lens, treats it for potability and supplies it to the maintenance building, residences, restrooms and camping area. More predictive data on the longevity of this water supply is needed. As saltwater intrusion occurs, deeper wells or other potable water treatment methods may be recommended.

DRP will rely upon agencies such as South Florida Water Management District, U.S. Geological Survey, Lee County and DEP to keep it apprised of any declines in surface water quality or any additional suspected contamination of groundwater on the island. DRP will continue to closely cooperate with state and federal agencies and independent researchers engaged in hydrological research and monitoring programs within the state park, and it will encourage and facilitate research in those areas. DRP staff will continue to monitor accretion levels at the service dock area and Jug Creek and seek funding as necessary for dredging activities to maintain normal park operations at both locations. DRP staff will seek funding for an assessment of the berm removal impacts on sedimentation and tidal flow restoration. If determined that berm removal will not increase net sedimentation in Jug Creek, DRP staff will seek funding for berm removal to restore historic tidal flow.

NATURAL COMMUNITIES

Cayo Costa State Park contains 13 distinct natural communities and two altered landcover types (see Natural Communities Map). A list of known plants and animals occurring in the park is contained in the Southwest District Species Matrix appendix.

Beach Dune

Beach dunes at Cayo Costa and North Captiva are wind or wave deposited ridges of unconsolidated sediments along high energy shorelines. Sections on both islands have exceptionally wide beach dune habitat with linear dune ridges flanked by coastal interdunal swales that hold water after large storm events.

Vegetation consists of herbaceous dune forming species such as sea oats (*Uniola paniculata*) and railroad vine (*Ipomea pes-caprae* spp. *brasiliensis*). Other species include coastal sea rocket (*Cakile lanceolata*), seacoast marshelder (*Iva imbricata*), seashore paspalum (*Paspalum vaginatum*) and bitter

panicgrass (*Panicum amarum*). Shrubs such as the state threatened inkberry (*Scaevola plumieri*) are common throughout. This community at Cayo Costa is mainly comprised of wind-deposited foredune and wave-deposited upper beach, with dunes reaching a maximum height of 8 feet above msl. This ephemeral community is constantly shifting due to accretion and erosion of the local sediment budget. Vegetation in the beach dune is halophytic and can withstand recurrent changes associated with occasional burial and exposure; however, plants are vulnerable to human disturbance. Once pioneer vegetation stabilizes a beach dune community, succession to more enduring communities may occur, particularly in areas with long-term shoreline accretion.

The beach dune on Cayo Costa is located mostly along the west coast of the island, creating an almost continuous line inland from the sandy beach along the Gulf's edge. Along the south end of the island, much of the beach dune is discontinuous due to the strong storm surge from Hurricane Ian in 2022 with many sections of beach currently fronting mangrove swamp. There is also a disconnected section of beach dune on the east side of the island facing Pine Island Sound divided by small patches of mangrove swamp. On North Captiva, beach dune is found along the west coast of the island facing the Gulf in linear strips and patches between sandy beach and coastal strand communities. Coastal erosion has fragmented this community by directly exposing areas of coastal strand to the high wave energies of the Gulf. It is expected that more areas of beach dune communities will develop as vegetation from coastal strand declines from salt and wave exposure.

Prior to the recent hurricanes, the beach dune community type found at Cayo Costa and North Captiva closely matched the Florida Natural Areas Inventory (FNAI) description and qualified as an exemplary site in the FNAI Guide to the Natural Communities of Florida (2010). Imperiled plant species common in the beach dune community include west coast dune sunflower (*Helianthus debilis* subsp. *vestitus*) and state threatened inkberry. Each of these plants are commonly found within the beach dune community on both Cayo Costa and North Captiva. Some of the animals that utilize the beach dune community at Cayo Costa and North Captiva include Eastern coachwhips (*Coluber flagellum flagellum*), nesting shorebirds and sea turtles, including the federally threatened loggerhead (*Caretta caretta*) and federally threatened green (*Chelonia mydas*) sea turtles, which deposit eggs within the beach dune community each year between May and October.

Areas of beach dune community at Cayo Costa and North Captiva are in good condition. Low occurrence of invasive non-native plants matched with limited beach driving helps maintain this community in its natural state. Unfortunately, storm surge from Hurricane Milton in 2024 severely damaged the beach dune community with much of the frontal dune vegetation buried in three to 4 feet of sand that shifted landward with the storm surge. In several areas along the island, the beach dune community appears to have been erased entirely with coastal strand now fronting the sandy beach. The beach dune community is recovering at the park with much of the dune covered with emergent pioneer dune vegetation. Over time, the natural coastal erosion processes will continue to alter the beach dune, resulting in acreage fluctuations. New beach dunes will form as the communities shift landward with changing sea levels and increased erosion patterns.

Management of beach dune at Cayo Costa and North Captiva focuses on imperiled species protection and monitoring, invasive animal and predator control, invasive plant survey and treatment efforts and protection from human disturbances. Areas of beach dune where birds have nested historically are pre-posted ahead of nesting season with boundary markers adjusted as needed to account for changes in historic usage and shoreline configuration. Sea turtle nests are also posted for protection and monitored in accordance with FWC protocol throughout the breeding season. Park and district staff monitor predation levels at the park and coordinate predator control efforts with USDA for the

MAH
DM
CD
CS
MF
DV
BD
CB
CIS
CG
SHM
MS
MUS

Natural Communities (in Acres)

- BD - Beach Dune 121.94
- CB - Coastal Berm 35.66
- CD - Canal/Ditch 1.02
- CG - Coastal Grassland 314.75
- CIS - Coastal Interdunal Swale 43.93
- CS - Coastal Strand 533.7
- DM - Depression Marsh 26.98
- DV - Developed 12.16
- MAH - Maritime Hammock 553.75
- MF - Mesic Flatwoods 61.93
- MS - Mangrove Swamp 779.73
- MUS - Marine Unconsolidated Substrate 177.69
- SHM - Shell Mound 3.68

CAYO COSTA STATE PARK
Natural Communities - Existing Conditions

N

0 0.5 1 Mile

protection of sea turtles and shorebirds. Interpretive signs are generally effective in advising visitors of the need to stay off the beach dunes. A past effort to remove Australian pine (*Casuarina equisetifolia*) was successful in eliminating it from the beach dune community at Cayo Costa; however, large stands of Australian pine on beachfront private outparcels at North Captiva make extermination efforts on state park property nearly impossible. As saplings are observed, park staff should make every effort to hand pull the trees while small to avoid another future large removal event. This includes plants such as beach naupaka (*Scaevola taccada*), which can outcompete its native relative, the state threatened inkberry. Cogongrass (*Imperata cylindrica*) can quickly become a monoculture and outcompete native dune vegetation. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early.

Any changes to the trail system on newly proposed walkways that would intersect the beach dune community should be constructed as switchback paths to avoid sand from blowing out past the foredunes. Perpendicular walkways can indirectly result in damage to plants on the back sides of dunes due to direct salt spray or sand burials.

Coastal Berm

Coastal berm is found in patches at both Cayo Costa and North Captiva along the seaward and landward edges of the mangroves on low energy shorelines. At Punta Blanca, coastal berm can be found along the full length of the eastern side of the island. Coastal berm is defined by its substrate of course, calcareous, storm-deposited sediment forming long narrow ridges that parallel the shore. Tree species are similar to coastal strand and include cabbage palm (*Sabal palmetto*), gumbo limbo (*Bursera simaruba*), seagrape (*Coccoloba uvifera*) and buttonwood (*Conocarpus erectus*) with lower shrubs such as gray nicker (*Guilandina bonduc*), white inidgoberry (*Randia aculeata*) and buttonsage (*Lantana involucrata*) and forbs such as shoreline seapurslane (*Sesuvium portulacastrum*), saltgrass (*Distichlis spicata*) and bushy seaside oxeye (*Borrichia frutescens*). Rare plant species found within the coastal berm community on Cayo Costa include the state threatened joewood (*Jacquinia keyensis*). Locations where wind and waves have deposited coastal berms show evidence of historical storms and seem to exist along the east side of the island and in 45-degree north-facing strips along the southern half of the island. This is due to the creation and constant movement and shifting that occurs along barrier islands. Coastal berm on North Captiva is distributed in patches within the mangrove swamp along the east side of the island. These berm areas have a slightly higher elevation compared to the surrounding mangrove swamp, which allows for diverse vegetation types other than mangroves.

The areas of coastal berm on Cayo Costa and associated islands are in good condition. Feral hogs (*Sus scrofa*) were previously known to root within the coastal berm at Cayo Costa, causing soil disturbance, but have since been eradicated from the island. Some invasive non-native plants including beach naupaka, Australian pine, Brazilian pepper (*Schinus terebinthifolia*), Washington fan palm (*Washingtonia robusta*) and Senegal date palm (*Phoenix reclinata*) have invaded this natural community. With continued removal of these plants, the condition of the coastal berm will improve. Surrounding land use on Pine Island consists of landscaping/ornamental plant and fruit tree production. Proximity of these invasive seed sources to the park makes continued occurrence of the plants on the islands probable.

Management of coastal berm at Cayo Costa and North Captiva largely focuses on rare plant surveys, and invasive plant surveys and treatment efforts. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early.

Coastal Grassland

Coastal grassland on Cayo Costa and North Captiva is predominantly an herbaceous community,

occupying the flatter and drier portions of the transition zone between the primary beach dunes and the coastal strand communities. Portions of the community are imbedded with remnant coastal interdunal swales that still hold water after storm events. The coastal grassland communities are located behind the primary dune in the over wash plain parallel to the beach and longitudinally over half the length of the island. This community is bisected by park trails/roads that pass through the grassland and two staff residences. Typical plant species include sea oats and saltgrass on more recently deposited sediments on the landward side of dunes transitioning into bushy bluestem species varieties (*Andropogon glomeratus*), broomsedge bluestem species varieties (*Andropogon virginicus*), saltmeadow cordgrass (*Spartina patens*) and Leavenworth's tickseed (*Coreopsis leavenworthii*). The coastal grassland community found on these islands is identified as an exemplary site in the FNAI Guide to the Natural Communities of Florida (2010).

The coastal grassland community at Cayo Costa and North Captiva includes a mixture of species such as sea oats, bluestem grasses, saltgrass and saltmeadow cordgrass that transition into open areas further inland where a unique species known as hairy gramma grass (*Bouteloua hirsuta*) typically found in Texas and on the western high plains (Küchler 1964) persists as a dominate ground cover. Areas of coastal strand are interspersed among the grasslands, containing cabbage palms, coco plum (*Chrysobalanus icaco*), snowberry (*Chiococca alba*), saw palmetto (*Serenoa repens*), state threatened joewood and state endangered Sanibel shrub-verbena (*Lantana depressa* var. *sanibelensis*). This mosaic of grassland and coastal strand also contains open bare patches of sand frequently inhabited by gopher tortoises (*Gopherus polyphemus*) and coachwhip snakes. Rare animal species found in this community include the federally protected Eastern indigo snake (*Drymarchon couperi*).

Currently, the coastal grassland is in excellent condition at Cayo Costa, and some portions are gradually succeeding to coastal strand and maritime hammock. Periodic disturbances to the coastal grassland communities at Cayo Costa and North Captiva include large storm events. As storms pass through, they remove large vegetation and deposit saline water, negatively impacting normal coastal strand and hammock species. This allows the salt-tolerant grasses to bounce back and dominate the landscape, rebuilding the coastal grassland community.

On North Captiva, much of the previously mapped grassland areas at the northeast end of the park have now succeeded to coastal strand. Despite decrease in acreage of grassland patches that still exist within the park boundary, the remaining coastal grassland is in excellent condition with minimal invasive non-native plant coverage.

Management of coastal grassland at Cayo Costa and North Captiva largely focuses on invasive plant survey and treatment efforts. DRP staff will continue periodic surveys for invasive plant infestations to catch new infestations early. If new roads or developments are proposed for either Cayo Costa or North Captiva, the coastal grassland should be avoided to maintain the FNAI exemplary site status.

Coastal Interdunal Swale

Coastal interdunal swales occur on both Cayo Costa and North Captiva running generally north to south in the low areas between dune ridges directly behind the frontal beach dune community and older dune ridges within coastal strand and coastal grassland communities. The dominant plant species are quite variable and a function of local hydrology, saltwater occurrence and the age of the swale. On Cayo Costa, the interdunal swales occur as moist grasslands with shallow wet areas including a diverse mixture of herbs such as saltgrass, umbrella sedge (*Fuirena scirpoidea*), *Cyperus sp*., seashore paspalum, bluestem grasses and cordgrass (*Spartina sp*.). Shrubby vegetation generally becomes established within swales over time. Periodic inundation with saltwater during extreme high tides and storm events often

resets succession and causes woody vegetation to die back after which they are recolonized with salt-tolerant species like saltgrass. Older coastal interdunal swales along the middle and east sides of the island have long since succeeded to coastal grassland, coastal strand, maritime hammock and linear depression marshes as accretion continues to build the west side of the island.

The coastal interdunal swale community type found on Cayo Costa and North Captiva closely matches the FNAI description and is identified as an exemplary site in the FNAI Guide to the Natural Communities of Florida (2010). Coastal interdunal swale communities at Cayo Costa and North Captiva are in excellent condition with minimal invasive non-native plant coverage.

Management of coastal interdunal swales at Cayo Costa and North Captiva largely focuses on invasive plant survey and treatment efforts. DRP staff will continue periodic surveys for invasive plant infestations to catch new infestations early.

Coastal Strand

Coastal strand communities at Cayo Costa and North Captiva typically form a transition zone between beach dune and coastal grassland communities and older maritime hammock or mangrove swamp communities. Within the coastal strand are pockets and small strips of grassland understory, creating a fluctuating mosaic of strand and grassland throughout the islands. On the widest portions of Cayo Costa and North Captiva, coastal strand has developed as a linear feature atop old dune ridges within larger strips of coastal grassland on the west side of the island. It transitions into a wider, more contiguous community containing smaller patches of interspersed coastal grassland on the east side of the island along the maritime hammock. Narrower sections of Cayo Costa and North Captiva typically have a linear band of coastal strand between the frontal dune (if present) and mangrove swamp on the east side of the islands.

Coastal strand dunes will contain deep, well-drained sands that are generally quite stable but become susceptible to severe damage if the vegetation is significantly disturbed. Coastal strand is a shrub-dominated community usually maintained by wind-driven salt spray. Along the southwest coast of Florida in areas protected from salt spray, coastal strand may undergo succession to maritime hammock. Periodic fire may also be a factor in maintaining this community and preventing its succession to maritime hammock. Tropical coastal strand species prevalent on Cayo Costa and North Captiva include seagrape, myrsine (*Myrsine cubana*), buttonsage, beach creeper (*Ernodea littoralis*), yellow necklace pod (*Sophora tomentosa* var. *truncata*), coco plum, white indigoberry, snowberry and numerous others. Smooth domed canopies will develop as the taller vegetation is pruned by the windblown salt spray that kills the outer buds. The coastal strand community type found on Cayo Costa and North Captiva closely matches the FNAI description and is identified as an exemplary site in the FNAI Guide to the Natural Communities of Florida (2010).

Multiple imperiled plant and animal species utilize the coastal strand on Cayo Costa and North Captiva. As recently as 2004, a federally endangered prickly apple-cactus (*Harrisia aboriginum*) was documented within the coastal strand on Cayo Costa. Following tropical storms and hurricanes later that same year, the cacti has not been documented on Cayo Costa or North Captiva; however, all coastal strand and maritime hammock communities on Cayo Costa and North Captiva are considered potential habitat for this endangered cactus. Federally threatened Eastern indigo snakes are also known to utilize the coastal strand habitat on Cayo Costa and North Captiva. High numbers of active gopher tortoise burrows can be found within this community, along with large populations of the state threatened joewood, state threatened shell mound pricklypear (*Opuntia stricta*) and state endangered Sanibel shrub-verbena.

On Cayo Costa, the coastal strand is currently in good condition. Imperiled plants and animals thrive in the coastal strand, and the invasive plant coverage is minimal. On North Captiva, the coastal strand is in fair condition; however, invasive plant treatment efforts have not taken place on the island in many years due to the lack of infrastructure and access to the park. Brazilian pepper has taken over much of the coastal strand at North Captiva. Tropical storms over the years have resulted in a considerable amount of blowdown within the coastal strand community at both Cayo Costa and North Captiva.

Coastal strand is not considered a fire dependent community although it does receive prescribed fire for a variety of reasons including proximity to fire dependent communities, such as at Cayo Costa. According to FNAI, the natural fire frequency of coastal strand is unresolved (FNAI 2010). The coastal strand community varies in dominant species from temperate areas in north to central Florida, which contain dense saw palmetto (*Seronoa repens*) patches, to tropical areas such as Cayo Costa and North Captiva dominated by sea grape. A fire return interval of four to 15 years has been estimated by DRP; however, variability outside this range may occur based on site specific conditions and management goals. While the reduction of dangerous wildfire fuel is vital and may require occasional prescribed fire, the ecological value of prescribed burning of coastal strand at North Captiva and Cayo Costa is not supported. For Cayo Costa, coastal strand will not be identified as a pyric community with a set fire return interval unless other evidence is presented that justifies the need for ecological burning.

Management of coastal strand at Cayo Costa and North Captiva largely focuses on rare plant surveys, and invasive plant surveys and treatment efforts. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early. Prescribed burns with the intent of reducing fuels should be considered in coastal strand on both Cayo Costa and North Captiva when fuel levels are deemed high.

<u>Maritime Hammock</u>

Maritime hammock is the most extensive community on Cayo Costa, covering most of the east side of the island bordered by mangrove swamp along the shoreline. Maritime hammock on North Captiva is patchy on the west side of the island, and in a continuous strip on the east side adjacent to the mangrove swamp. On Cayo Costa and North Captiva, canopy species typically consist of live oak (*Quercus virginiana*), seagrape, gumbo limbo, Jamaican dogwood (*Piscidia piscipula)*, Catclaw blackbead (*Pithecellobium unguis-cati*), strangler fig (*Ficus aurea*) and cabbage palm. The understory species may consist of saw palmetto, wax myrtle, myrsine, wild coffee (*Psychotria nervosa*), snowberry, coralbean (*Erythrina herbacea*) and marlberry (*Ardisia escallonioides*). Buildup of organic material contributes to moisture retention in the understory, which can contain lots of ferns and aerial bromeliads. A nearly complete canopy cover of cabbage palms and live oak reduces the range of temperature fluctuations during the day and night in this community.

The maritime hammock throughout Cayo Costa closely matches the FNAI description and is identified as an exemplary site in the FNAI Guide to the Natural Communities of Florida (2010). Maritime hammock on Cayo Costa and North Captiva is also considered habitat for several rare plant species, including the state endangered West Indian cock's-comb (*Celosia nitida*) and the federally endangered prickly apple-cactus.

The condition of maritime hammock at Cayo Costa is excellent. Extensive rooting from feral hogs had previously disrupted large sections of hammock, especially adjacent to park trails. Feral hogs are no longer present on the island and areas where rooting had previously occurred are gradually healing with vegetation regrowth. Invasive non-native plants are minimally present in this community, namely Brazilian pepper, carrotwood (*Cupaniopsis anacardioides*) and bowstring hemp (*Dracaena*

hyacinthoides). Focused efforts in invasive non-native plant treatment have taken place, including a full-island treatment of all Florida Invasive Species Council (FISC) Category I and II invasive plant species in 2019, the work of two AmeriCorps workers in 2014, and the continued assistance from other park volunteers whose primary responsibilities include the chemical treatment of bowstring hemp and Brazilian pepper regrowth within the maritime hammock.

The maritime hammock on Cayo Costa has been subject to occasional fire, either through intentional prescribed fires, by accidental visitor or resident ignitions, or naturally by lightning strike. FNAI describes maritime hammock as a non-pyric community type that rarely experiences fire (FNAI 2010). Apart from management zone CC-01, which contains mesic flatwoods surrounded by areas of maritime hammock, the maritime hammock for this plan will be managed as non-pyric with no prescribed fires for ecological reasons. Areas that are ignited naturally or by human interaction should be extinguished as quickly as possible to prevent the fire from spreading to other areas and to avoid the destruction of private property.

Management of maritime hammock at Cayo Costa and North Captiva largely focuses on rare plant surveys, and invasive plant surveys and treatment efforts. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early.

Mesic Flatwoods

The mesic flatwoods community at Cayo Costa is in discontinuous patches along the interior half of the island. It is characterized by an open canopy of tall slash pines (*Pinus elliottii*), cabbage palms and a dense, ground layer of low shrubs, grasses and forbs such as bluestem grasses (*Andropogon sp*.). Saw palmetto is present but not overly dominant and the flatwoods have minimal snowberry, indigoberry, coral bean and myrsine understory when compared to those typically found in the hammock. The flatwoods occur locally within the maritime hammock, typically near a site of historical human disturbance, giving the appearance that the community is more related to human activity than to the island's physiography or successional pattern. The formation of these flatwoods correlates to the passage of major hurricanes, with these large storms opening attractive areas for human development within the hammock. In contrast to the rolling topography of the coastal strand situated on old dune swales to the east, the mesic flatwoods are relatively flat.

Multiple imperiled plant and animal species utilize the mesic flatwoods on Cayo Costa including gopher tortoises, which are common throughout. Federally threatened Eastern indigo snakes are also found in the mesic flatwoods along with state threatened shell mound prickly pear and state listed bromeliads. Bald eagles (*Haliaeetus leucocephalus*) commonly build nests in slash pine trees in the larger mesic flatwoods community on the north end of the island as well as the discontinuous patches in the south.

Mesic flatwoods in the park are in fair condition. Invasive plants are minimally present in this community, namely Brazilian pepper; however, the absence of prescribed fire has deteriorated the condition of the flatwoods, which are overgrown and overloaded with fuel. In addition, the overall pine health deteriorated substantially post-Hurricane Ian in 2022 with many large pine trees losing their crowns or toppling in the high winds, and other dying post storm due to the saltwater inundation. Only a portion of the mesic flatwoods on Cayo Costa are currently managed with prescribed fire as several patches of flatwoods are surrounded by non-pyric community types and others are located near outparcels containing private homes. The portion of mesic flatwoods on Cayo Costa managed with fire located in management zone CC-01 has not received fire since 2010 due to limitations involving barging equipment and crew to the island for fire prep. In other locations throughout the island, managing the smaller areas of this pyric community embedded in an otherwise non-pyric area limits the feasibility

of applying prescribed fire, and the lack of regular fire degrades the quality of this community. Lightning strike fires occur, but with less frequency than on the mainland. The optimal fire return interval for this community is two to four years.

Management of mesic flatwoods at Cayo Costa largely focuses on invasive plant survey and treatment efforts and prescribed fire. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early. On the mainland, mesic flatwoods are a pyric community that burns frequently. The largest pockets of flatwoods north of the main road will continue to be ecologically maintained with prescribed fire (approximately 49 acres); however, it should also be monitored for pine mortality and groundcover response. Burn preparation should include mechanical treatment to reduce the fuel load ahead of any prescribed burn efforts.

Shell Mound

Shell mound communities on Cayo Costa and North Captiva are areas of elevated topography composed entirely of shells (clams, oysters, whelks) previously discarded by generations of Native Americans. The shell mounds on Cayo Costa support diverse tropical hardwood vegetation including white stopper (*Eugenia axillaris*), false mastic (*Sideroxylon foetidissimum*), Florida swamp privet (*Forestiera segregata*), strangler fig and gumbo limbo, along with herbaceous species including sea purslane (*Sesuvium portulascum*) and saltwort (*Batis maritima*) and Guinea hen weed (*Petiveria alliacea*). Papaya (*Carica papaya*) is also known to occur on and near prominent mounds on Cayo Costa and is prevalent on Old Ware mound. Imperiled plant species found among the shell mound communities at Cayo Costa include the state threatened shell mound pricklypear, state threatened triangle cactus (*Acanthocereus tetragonus*), state endangered West Indian cock's-comb (*Celosia nitida*) and federally endangered prickly apple-cactus. The shell mounds are typically surrounded by mangroves, indicating that sea levels were much lower at the time these mounds were created.

The shell mounds on Cayo Costa are in fair condition. The shell mound communities on North Captiva are not entirely contained within park boundaries. The height of several of the mounds at Cayo Costa made them targets for early private residential construction. One large mound on Cayo Costa, Faulkner Mound, has a private home on the highest point of the mound within an outparcel through the middle of the mound. This makes natural community management very difficult due to the matrix of park and non-park property. Due to the construction of homes, walkways and fencing on portions of the mound that are privately owned, some mounds on Cayo Costa are physically altered. Looting of the shell mounds for artifacts has occurred in the past, causing disturbances to both the mound and associated vegetation.

Management of shell mounds at Cayo Costa and North Captiva largely focuses on rare plant surveys, invasive plant surveys and treatment efforts, and protection from looting. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early. Invasive plant treatment efforts should avoid subsurface disturbances. In addition, staff will visit the shell mounds as frequently as possible to deter visitors from physically disturbing these sites.

Depression Marsh

Depression marshes at Cayo Costa include both linear features formed from the saline remnant of interdunal swales along old dune ridges and a large almost 20-acre feature in the center of the island. Dominant vegetation in the depression marshes at Cayo Costa includes Jamaica swamp sawgrass (*Cladium jamaicense*), giant leather fern (*Acrostichum danaeifolium*), sand cordgrass (*Spartina bakerii*) and coastalplain willow (*Salix caroliniana*).

Currently, the depression marshes on Cayo Costa are in good condition. Invasive plant species such as Brazilian pepper and bowstring hemp are present in and around the marsh boundaries. Also, hog damage in and around the depression marshes is slowly recovering post-eradication.

Management of depression marshes at Cayo Costa largely focuses on invasive plant surveys and treatment efforts. Depression marshes at Cayo Costa will continue to be maintained as non-pyric, being surrounded by other non-pyric communities, such as maritime hammock and mangrove swamp, with some located near outparcels that contain private homes. DRP staff will continue periodic surveys for invasive plant infestations to catch new infestations early.

Mangrove Swamp

Mangrove swamp communities at Cayo Costa, North Captiva, Punta Blanca and Jug Creek are either fringes or dense forests located along relatively flat, low wave energy, marine and estuarine shorelines. Dominant overstory includes red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), white mangrove (*Laguncularia racemosa*) and buttonwood (*Conocarpus erectus*) in mixed stands or in differentiated, monospecific zones based on degrees of tidal influence, salinity levels and type of substrate. Soil types found in mangrove swamps at Cayo Costa and associated islands are typically anaerobic and saturated with brackish water at all times, becoming inundated at high tide. Red mangroves dominate the deepest water, followed by black mangroves in the intermediate zone, and white mangroves and buttonwood trees in the highest, least tidally influenced zone. Mangroves at Cayo Costa and associated islands usually occur with little to no understory in the lower tidal zones; however, in upper tidal reaches, may have a shrub groundcover including seaside oxeye, gray nicker, coinvine (*Dalbergia ecastaphyllum*) and herbaceous species such as saltwort, perennial glasswort (*Sarcocornia perennis*) and giant leather fern (*Acrostichum danaeifolium*). Mangrove swamps provide important habitat for birds, juvenile fish and crustaceans, and play an important role in the cycling of nutrients and breakdown of detritus.

The mangrove swamp communities found at Cayo Costa, North Captiva, Punta Blanca and Jug Creek are in fair condition. Occasional invasive non-native plants can be found interspersed in the upper tidal reaches within the mangrove swamp, but no areas are monocultures of invasive species. Brazilian pepper, Portia tree (*Thespesia populnea*) and beach naupaka are the typical invasive plant species found in this natural community. Much of the mangrove swamp at Cayo Costa and associated islands was severely damaged during Hurricane Ian with most trees defoliated and many toppled by high winds. Mangrove dieback and recovery post Hurricane Irma in 2017 was found to be influenced by increased storm surge and sedimentation (Lagomasino et al., 2021) and overall resilience class, species composition and canopy height (Xiong et al., 2022). The wind and storm surge at Cayo Costa and associated islands from Hurricane Ian in 2022 drastically shifted sand into the mangrove swamp community along the south end of the island. The mangrove swamps at all islands had not recovered from the increased sedimentation and lack of tidal flow from Ian when Hurricanes Helene and Milton made landfall along the west coast of Florida in 2024. Prior to Hurricanes Helene and Milton, there was some evidence of regrowth in the understory despite a large portion of the mangrove swamp on all associated islands containing skeletonized dead mangroves in the upper canopy. Storm surge and wind from Hurricanes Helene and Milton, especially Hurricane Milton which made landfall just 45 miles north in Sarasota County, resulted in additional sedimentation throughout the swamp and loss of vegetation in several areas along the south end of the island where water rushed across to the bay.

At Jug Creek, the mangrove swamp tidal flow has been disrupted by a spoil berm placed along the west side of the canal when the canal was created. This spoil berm now contains a host of native and invasive plant species that the park monitors and treats. The spoil berm also increases sedimentation

into the canal due to erosion from wave action along the shoreline.

Management of mangrove swamps at Cayo Costa largely focuses on invasive plant surveys and treatment efforts, preventing boaters from tying lines to the mangroves and illegal trimming of mangroves on state park property. Illegal trimming of mangroves on state park property has previously been documented and brought to the attention of FWC law enforcement agents. Trimming has occurred in specific locations along the east side of the island where park visitors attempted to create access to cultural sites and the beach side of the park. Quarterly surveys by boat should be conducted along the east side of the islands to monitor mangrove health on state park property. DRP staff will continue periodic surveys for invasive plant infestations to catch new infestations early.

Estuarine Unconsolidated Substrate

Estuarine unconsolidated substrate at Cayo Costa and North Captiva encompasses unvegetated, mineral-based estuarine communities that typically fall in subtidal and intertidal locations along the east side of the islands. In most areas, the estuarine unconsolidated substrate encompasses mud flats, tidal creeks and shallow canals within the larger mangrove swamp communities at both islands. These areas provide habitat for fiddler crabs, marsh crabs and other crustaceans and mollusks. At low tides, the exposed tidal mud flats provide a feeding ground for wading bird species. Management of these areas largely focuses on protection from outside impacts.

Marine Unconsolidated Substrate

Marine unconsolidated substrate at Cayo Costa and North Captiva consists of expansive unvegetated areas of sand beaches and subtidal lagoon locations, typically along the western shoreline at both locations. At Cayo Costa, the marine unconsolidated substrate surrounds the north and south ends of the island with narrow shorelines extending down the east side facing Charlotte Harbor and southeast side along Captiva Pass on an old island spit known as Pejuan point.

The marine unconsolidated substrate at Cayo Costa and North Captiva is in excellent condition. Natural beach erosion and accretion occur constantly within this community. The acreage and shape of the substrate changes daily based on the speed and location of the longshore current. On the west side of the islands, this community consists mainly of open sandy beaches seaward of the beach dune. Along the east side of the islands, this community includes sandy shorelines flanking the mangroves exposed at low tides. At the widest point of the island along the west side, an inland unnamed saltwater lagoon occasionally overflows its banks creating a channel through the marine unconsolidated substrate to the Gulf. Significant erosion and storm events result in the natural opening of this lagoon to the Gulf, which again eventually closes due to natural sediment drift and sand accretion over time. Beach raking does not occur on these islands; therefore, the beach wrack community is kept natural enhancing the nutrient cycle and the food web.

The sandy beaches on Cayo Costa and North Captiva provide important nesting habitat for imperiled sea turtles, primarily the loggerhead and green sea turtles, and imperiled avian species. In 2014, the marine unconsolidated substrate community along the west side of the island and sandy beaches along the north and south passes received a designation as critical habitat for the northwest Atlantic Ocean distinct population segment of the loggerhead sea turtle (Federal Register 2014). During the 2020 nesting season, Cayo Costa received its first documented leatherback (*Dermochelys coriacea*) on the south end of the island. The marine unconsolidated substrate community provides important habitat for various avian species, several of which nest on the higher portions of the beach. Most of these species use the beaches at resting and feeding areas, and many do not tolerate disturbance. Federally protected red knots (*Calidris canutus rufa*) and piping plovers (*Charadrius melodus*) are frequent visitors

in the winter months. Portions of this sandy beach community at Cayo Costa and Noth Captiva received a critical habitat designation by the U.S. Fish and Wildlife Service (USFWS) for piping plovers in 2009 (Federal Register 2009).

All-terrain vehicles and utility vehicles are used on the beaches for sea turtle nesting surveys, with driving limited to those lower beach areas near or below the high-tide line not utilized by shorebirds and sea turtles in accordance with FWC best management practices. In this community, wrack and seaweed is typically left in place to provide foraging opportunities for shorebirds and additional nutrients to the sandy soil. Situations where hand removal or hand raking of wrack might be necessary include large fish kill events typically associated with harmful algal blooms.

Management of marine unconsolidated substrate at Cayo Costa and North Captiva largely focuses on minimizing habitat disturbances and imperiled species monitoring efforts. Beach renourishment and structures are not necessary on the island as erosion and accretion fluctuate naturally along the beach. Beach raking should not be conducted on Cayo Costa or North Captiva to preserve the wrack line and minimize impacts to nesting shorebirds and sea turtles. Natural resource protection should be balanced with recreational use by posting marine turtle nests in accordance with FWC permits and guidelines, increasing signage prohibiting pets on the beach and posting temporary shorebird nesting and protection areas. Driving on this natural community should be limited to necessary management activities and in accordance with FWC best management practices to avoid conflicts with beach nesting species.

Marine Consolidated Substrate

Marine consolidated substrate at Cayo Costa consists of expansive, relatively open areas of solidified limerock with sparsely inhabited sessile plant and animal species within the subtidal, intertidal and supratidal zones. This hardbottom community was first observed by district staff in 2014 at the south end of the island less than 100 yards offshore in linear bands that stretch parallel to the shore for more than 800 yards. The hard bottom was documented as hosting a variety of sessile marine invertebrates. Smaller areas directly along the shoreline have been uncovered and exposed regularly with normal fluctuations in longshore sand transport and more significantly during tropical storm events. Most recently, hard bottom along the shoreline became exposed following Hurricane Milton in 2024 as the storm surge shifted the sandy beach eastward into the mangroves.

Altered Land Cover Types

Developed

Developed areas within the park consist of natural communities that have been replaced or nearly replaced by structures of permanently cleared areas. Developed areas at Cayo Costa and Jug Creek include the campground, restroom facilities, ranger station, maintenance building, three staff residences, water treatment tank and parking area.

Management of developed areas largely focuses on invasive plant surveys and treatment efforts. DRP staff will continue periodic surveys for rare plants and invasive plant infestations to catch new infestations early. Other management measures include ensuring vegetation around developed areas follow wildland urban interface protocols for structure protection during prescribed fire management in adjacent natural areas. The developed areas within the park will be managed to minimize the effect of the developed areas on adjacent natural areas. Proposed landscaping within developed areas of the park should include only native plant materials sourced by ecoregion to preserve local genetic integrity, except where sufficient research suggests other strategies are appropriate for a given species. Native

plants that have been documented within the county but have not been historically documented in the park should be avoided entirely. Additionally, special care should be taken with native plant species that are known to hybridize between ecoregions. For example, the east coast dune sunflower (*Helianthus debilis* subsp. *debilis*) readily hybridizes with the west coast variety (*Helianthus debilis* subsp. *vestitus*), with the latter variety being the only subspecies appropriate to plant in parks along the west coast of Florida. Proposed planting or landscaping efforts must be approved by DRP district staff prior to installation.

Canal

The canal area at Jug Creek will be managed to minimize the effect of the canal on adjacent natural areas. The depth will be maintained at 5 feet to allow for the passage of the crew boat to maintain normal park operations. Encroachment by red mangrove and white mangrove into the crew dock area should be prevented through annual trimming. Over the years, the canal has been filling in and becoming too shallow for the park boats to enter. In 2016, the canal was dredged to maintain boat access for park staff, but sediment substantially reaccreted only one year later. Without canal access, the island parks will not be able to transport staff, fuel and other operational resources to the islands.

Prescribed Fire

Objective: Within 10 years, have 49 acres maintained within the optimum fire return interval.

Actions:

- Develop and update burn plan annually.
- Manage areas for wildfire/fuel suppression.
- Conduct prescribed fire on 20 acres annually.

The prescribed fire management table below lists all fire-dependent natural communities found within the park, associated acreages, optimal fire return intervals and the annual average target for acres to be burned.

Prescribed Fire Management		
Natural Community	**Acres**	**Optimal Fire Return Interval (Years)**
Mesic Flatwoods	44	2–4
Depression Marsh	5	2–4
Annual Target Acreage Range	12–25	

Fire at Cayo Costa State Park has been a source of discussion for many years. Under current landcover conditions, 90 acres of pyric natural communities (mesic flatwoods and depression marsh) are mapped on the island of Cayo Costa, all of which are intermixed with non-pyric communities including maritime hammock and mangrove swamp. Historically, within the park, only one management zone (CC-01) has been treated with prescribed fire. This zone contains 44 acres of mesic flatwoods and 4 acres of depression marsh. Most of the natural community within this zone consists of maritime hammock (approximately 100 acres). The depression marshes and flatwoods are not adjacent to each other, and much of the maritime hammock is being burned during these prescriptions. The other 37 acres of pyric natural communities on Cayo Costa are not managed with prescribed fire. These areas include patches of mesic flatwoods and a large depression marsh (approximately 20 acres) in management zone CC-06 that are surrounded by maritime hammock and mangrove swamp in the southern section of the island. Many of the patches of pyric natural communities are adjacent to privately owned outparcels.

Since its founding as a state park, Cayo Costa has had four prescribed burns. Two burns were conducted in 1990, totaling 60 acres. One burn was conducted in 2004, totaling 84 acres. The most recent burn was conducted in 2010, totaling 56 acres. The park will continue to develop and update a burn plan annually to return the mesic flatwoods natural community to maintenance conditions.

As an island park, there are many logistical constraints and challenges with getting equipment to the island for mechanical treatment and obtaining personnel to conduct the burns on site. The park will continue to pursue opportunities for both equipment and personnel for fire preparation, mechanical treatment and prescribed burns to meet annual plan goals and restore the mesic flatwoods on the island.

While hurricanes and tropical storms are the main causes of ecological disturbance on Cayo Costa and North Captiva, lightning strikes and wildfires do occasionally occur. Wildfires have occurred at the park as recently as 2008 and 2015. To minimize the occurrence of dangerous wildfires, prescribed fires can be conducted to reduce vegetation fuel levels. In the event of large fuel accumulation, prescribed fire should be utilized. DRP will be cognizant of fuel loads found on Cayo Costa and apply prescribed fire as needed to reduce the risk of catastrophic wildfires.

Improvement

Objective: Conduct natural community/habitat improvement activities on 44 acres of mesic flatwoods to prepare zones for the safe application of prescribed fire.

Action:

- Conduct mechanical treatment to reduce fuel loads.

Cayo Costa has not seen prescribed fire since 2010, which has created a dense understory of live woody fuels and duff accumulation in the mesic flatwoods. Prescribed fire alone can no longer be expected to restore natural balance of fuel loading without the need for a significant reduction in fuels to prevent catastrophic conditions. A substantial number of pine trees in the flatwoods have died as a result of wind and salt inundation from Hurricane Ian. These trees will need to be felled throughout the zone to reduce fire intensity in the upper canopy. In addition, all major soil disturbance should be avoided. Priority would be to mow the zone edges up to 100 feet along the north, south and west sides, as the east side of the zone abuts mangrove swamp community. Maintaining such conditions of fuel reduction activities between infrequent prescribed fires is essential to continue the net oxidation of duff and improve the quality and effectiveness of subsequent burns.

IMPERILED SPECIES

Cayo Costa and associated islands have a rich diversity of plant and animal life, including a variety of imperiled species that utilize the park for breeding, nesting, resting and feeding grounds. Cayo Costa and North Captiva are vital to the existence and reproduction of many imperiled species since much of Florida's coastal habitats have been altered. Although the impetus of natural systems management as practiced by DRP is management of natural communities and not individual species, certain species are of particular concern and importance, and merit special management attention. On the islands of Cayo Costa and North Captiva, these species include marine turtles and several imperiled shorebird and seabird species.

Imperiled marine turtles frequently nest on the beaches of Cayo Costa and North Captiva. Federally threatened loggerhead sea turtles are the most common with 542 nests in 2023, 657 nests in 2024 and 623 nests in 2025 on the islands of Cayo Costa and North Captiva. The number of loggerhead nests at Cayo Costa is likely much higher as the southern 1.5 miles of beach is not fully surveyed due to access related issues. Federally threatened green sea turtles lay between four and 30 nests on Cayo Costa and North Captiva each year. Rare sea turtle species such as leatherbacks and Kemp's ridleys have also been documented at Cayo Costa and North Captiva. A leatherback nest was documented on the south end of Cayo Costa in 2020. Kemp's ridley (*Lepidochelys kempii*) sea turtles have also been observed within park boundaries and have washed ashore during stranding events.

Cayo Costa State Park participates in the Statewide Nesting Beach Survey program involving daily sea turtle nesting surveys from April 15 to October 31 with a yearly nesting summary provided to FWC Fish and Wildlife Research Institute. All marine turtle activities conducted by the state park are regulated under a Marine Turtle Permit issued by FWC. The permit allows staff to conduct nesting surveys, conduct stranding and salvage activities, relocate nests for conservation purposes, outfit nests with self-releasing screens/cages, conduct hatch success evaluations and maintain and display preserved specimens. Nests are posted and monitored daily until hatch with information about tidal inundation, erosion, or depredation recorded. Depredation by nuisance animals such as raccoons (*Procyon lotor*) and coyotes (*Canis latrans*) has previously been a significant issue for nesting sea turtles on these islands. Protective screening of nests involves placing a 4x4-foot self-releasing screens over the nests deter depredation in accordance with the Marine Turtle Conservation Handbook (2016). Screens are secured in place with four tent stakes and buried two to three inches below sand surface. Additional nuisance animal removal activities have previously been contracted for the protection of incubating sea turtle nests when depredation levels are high. Nests are excavated three days after hatching occurs or 70 days from the date when eggs are first deposited.

No structural lighting or electricity exists in the sparse development along the Gulf facing beach at Cayo Costa. Plans for new construction or updates to existing structures should not include structural lighting since the park is closed to the public at night. If lighting is necessary, lights will need to conform to FWC Marine Turtle Lighting Guidelines designed to prevent adult and hatchling disorientations. Disorientation events attributed to artificial light sources and area sky-glow near the park are reported to FWC and Lee County.

Nesting seabirds and shorebirds are also monitored at Cayo Costa in accordance with FWC guidelines and DRP Shorebird and Seabird Management standards. This includes completing monthly shorebird focal species nesting surveys during the FWC Florida Shorebird Database windows March through August. Bird species known to nest on Cayo Costa include snowy plovers (*Charadrius nivosus*), least terns (*Sternula antillarum*), Wilson's plovers (*Charadrius wilsonia*), black skimmers (*Rynchops niger*) and American oystercatchers (*Haematopus palliatus*). Exclusion of humans and their pets from least tern and black skimmer colonies during the pre-nesting and nesting season is essential for successful nesting. Historical nesting sites are posted and roped by park staff pre-season to provide this disturbance free zone. Solitary nesters like the American oystercatcher and Wilson's plover are vulnerable to disturbance pre-nesting. Staff continue to follow the guidelines and recommendations provided in DRP's Resource Management Standard, "Shorebird and Seabird Management," for the protection and management of least terns and other imperiled shorebird, seabird and wading bird species.

Cayo Costa and North Captiva are important resting and feeding areas for migrating and wintering shorebirds. On July 10, 2001, USFWS designated portions of Cayo Costa and North Captiva as critical

habitat for piping plovers. Species currently experiencing population declines such as the federally threatened red knot (*Calidris canutus rufa*) and piping plover (*Charadrius melodus*) are monitored within the state park. All parks, including Cayo Costa and North Captiva, participate in FWC's winter shorebird survey to accurately capture how many birds are using Florida beaches for wintering and resting. All parks also participate in the International Piping Plover census coordinated by the U.S. Geological Survey every five years. The last census was conducted in 2016. When important resting and feeding areas are identified at these parks, proper signage and protection will be erected. Access to North Captiva can be logistically challenging and the park will coordinate with other agencies to coordinate access or coverage for these surveys.

In recent years, park staff have begun collecting bi-weekly non-breeding shorebird surveys in accordance with FWC protocol to assess overall usage of Cayo Costa by migratory species such as red knots and piping plovers. This data also provides the park with information on overall biodiversity and habitat usage by migratory and non-migratory birds to better inform management decisions.

Dogs brought by visitors to the park introduce significant and challenging impacts on shorebird nesting success. The south end of the park is heavily used by recreational boaters who occasionally bring their dogs with them to the island despite multiple signs posted that indicate pets are not allowed. Park staff patrol the shoreline as often as possible, educating park visitors on state park policies regarding pets. The current approach to reducing this impact to shorebird nesting depends on multiple partners including law enforcement personnel. Rule 62D-2.014(13), F.A.C., includes enforceable language on the presence of pets in restricted areas. This code is enforced by FWC law enforcement at state parks.

During the 2021 nesting season, DRP contracted FWC law enforcement to patrol the beach on the weekends for recreational boater violations, specifically park visitors with dogs on the beach. During July and August of 2021, 46 warnings were issued for violations observed by the officers, 35 of which were warnings issued for dogs on the beach. While successful, the program could not continue in subsequent seasons due to logistical challenges involving the officers' commute to the island from the FWC boat slip in St. James City.

Predation critically threatens many rare species (Hecht and Nickerson 1999), with the deleterious impacts of predation losses compounded by habitat loss (Reynolds and Tapper 1996). In Florida, nesting beaches have been substantially altered by urbanization and development, leaving few beaches isolated from development, thereby severely reducing the amount of habitat suitable for successful nesting by sea turtles and shorebirds (e.g., Rogers et al, 1995). At the same time, predators are found along many beaches where nesting could otherwise succeed. Nest predation can have severe impacts on reproductive success for sea turtles and shorebirds (Engeman et al. 2010).

Nuisance sea turtle and shorebird predators at Cayo Costa and associated islands include coyotes and racoons. Coyotes have been observed swimming from Gasparilla Island to Cayo Costa and from Cayo Costa to North Captiva. Both raccoons and coyotes can destroy multiple turtle nests in one night and have previously impacted the overall hatching success on Cayo Costa and North Captiva. To combat depredation of sea turtle eggs, nesting surveyors place an FWC-approved self-releasing metal screen over the clutch of eggs to prevent the predators from reaching the egg clutch. Unfortunately, many of the nests are depredated overnight before the surveyors arrive in the morning and have a chance to place the screen on it. With assistance from the Sea Turtle Conservancy, trapping efforts have taken place in the past on Cayo Costa for coyotes and raccoons to reduce nest depredation and boost sea turtle hatching success. In 2015, this effort also included the removal of several wild hogs by park staff and contractors, as the hogs had also begun depredating sea turtle nests. In 2017 and 2018, wild hog

eradication efforts were taking place on the island but beach-focused predator control measures targeting coyotes and raccoons were not conducted prior to turtle nesting season, resulting in a high rate of nest depredation (approximately 60% in 2017). In 2019, beach-specific predator control efforts were completed by USDA throughout the season, which resulted in a decrease in overall nest depredation (approximately 41% depredated). A multi-year predator removal strategy needs to be developed with a dedicated funding source to improve sea turtle and shorebird nesting success on Cayo Costa. Additional nuisance species removal efforts occurred in 2020 and 2021 with funding from the Sea Turtle Conservancy. Depredation levels of sea turtle nests dropped to <10% for both 2022 and 2023 nesting seasons.

Though no longer listed as imperiled, southern bald eagles are noted here because of the FWC guidelines for activities near eagle nests during the October 1 through May 15 nesting season (FWC 2008). Special precautions are taken near active bald eagle nests, including buffers, to prevent disturbance.

Eastern indigo snakes were previously being researched on both North Captiva and Cayo Costa by the Sanibel Captiva Conservation Foundation (SCCF). The research involved a population study of the genetic differences between mainland indigo snakes and the Pine Island barrier island populations. Snakes that are captured by SCCF biologists are measured and marked using a scale clip technique and PIT tag to identify individuals from the population. Despite optimal habitat in both locations, indigo snakes were not captured on Cayo Costa and have rarely been captured within the park boundaries on North Captiva (pers. comm. with Chris Lechowicz, Director SCCF). One previous management concern for these imperiled snakes on Cayo Costa was the feral hog presence throughout the island. Feral hogs are no longer of concern to indigo snake populations as they have been eradicated from the island as of 2019, and Eastern indigos snakes have been observed by park and DRP district staff since that time. These imperiled snakes are normally found in developed areas, on park trails, around resident houses and the maintenance area. Annual reports on these research findings are submitted to DRP.

Lee County is among the most important counties for Florida manatees (*Trichechus manatus latirostris*) on the west coast of Florida. Waterways along the east side of the islands within the Pine Island Sound fall within the USFWS proposed critical habitat designation for the Florida manatee. Although most of the manatee activity occurs in the southern half of Pine Island Sound, manatees frequently move north along the outskirts of North Captiva and Cayo Costa. Locations frequented by manatee include Pelican Bay, adjacent to the northeastern shore of Cayo Costa, and Safety Harbor within North Captiva. Manatees also frequent Hook's Canal, located slightly outside of the park boundary near management zone CC-06. Manatees are so frequent in both Pelican Bay and Safety Harbor that a comprehensive Manatee Protection Plan has been completed for the area. From April 1 through November 15, both waterbodies are designated slow speed zones to protect manatees from boats during the warmer months. A manatee awareness sign has been posted at the main park boat dock to inform visitors of manatees in the surrounding waters. State Park personnel are directed to contact FWC for important manatee sightings, and for any hurt, sick or imperiled individuals seen within or adjacent to park boundaries.

Both Cayo Costa and North Captiva support dense populations of gopher tortoises within the coastal strand and coastal grassland natural communities. In 2014, Cayo Costa State Park was identified as one of 35 priority Florida state conservation lands to be included in a gopher tortoise population assessment. This line transect distance sampling (LTDS) study completed in 2015 by staff from the Joseph W. Jones Ecological Research Center determined the density, age class and health of the

tortoises, providing rankings for survey sites based on population evaluation and habitat suitability (Smith 2016). The calculated density of tortoises per hectare surveyed on Cayo Costa was 2.095 with an abundance of 343 gopher tortoises for the 163.5 hectares surveyed on the island (Smith 2016). Habitat at Cayo Costa was determined to be of high quality with a likelihood of viable gopher tortoise populations (Smith 2016). The study also found that gopher tortoise population manipulation/augmentation is not necessary on Cayo Costa, but the sites require continued management to maintain the existing population and habitat quality (Smith 2016). A repeat LTDS survey completed by FNAI in 2023 reaffirmed the 2015 survey results with a calculated density of 2.1 tortoises per hectare with an abundance of 349 tortoises (FNAI 2024).

Both coastal strand and coastal grassland remain consistently open and low enough for unencumbered movement and foraging of gopher tortoises, and prescribed fire is not necessary in these communities. Prescribed burning of mesic flatwoods will continue to benefit this species. DRP will monitor for decreases in the population of gopher tortoises and consult with FWC on data trends. Relocation of gopher tortoises to Cayo Costa and associated island should not be considered due to the remote nature of the populations and the high potential for introduction of novel pathogens.

Federally endangered smalltooth sawfish (*Pristis pectinata*) have been observed within the state park boundary in waters surrounding Cayo Costa. On October 2, 2009, the National Oceanic and Atmospheric Administration's National Marine Fisheries Service designated areas surrounding Cayo Costa and North Captiva as critical habitat for the smalltooth sawfish within the Charlotte Harbor Estuary Unit. The Charlotte Harbor Estuary Unit includes tidally influenced waterways along the east side of Cayo Costa, North Captiva and Boca Grande Pass.

Imperiled plant species are managed through the upkeep of the park's natural communities. There are 14 imperiled plant species currently found on Cayo Costa and North Captiva. Additionally, the federally endangered prickly apple-cactus was historically found on Cayo Costa. The last known population on the island of Cayo Costa has not been located since Hurricane Charley in 2004. Several other imperiled plant species listed in the park's previous approved management plan (December 9, 2005) have been removed from this list as they have not been observed or vouchered in the park.

On January 22, 2016, a final rule was issued by USFWS designating critical habitat for the federally protected prickly apple-cactus (USFWS 2016). This rule identifies potential habitat for the endangered cactus, along with areas to be surveyed and potential sites for relocation. All upland natural communities at Cayo Costa and North Captiva are designated as potential critical habitat to protect the prickly apple-cactus. Staff from Marie Selby Botanical Gardens have completed multiple surveys at the park under permits issued by DRP to locate any existing populations as part of their research efforts in assessing genetic variability throughout its known range along the southwest coast. A portion of their research involves working with the federal government to identify potential reintroduction locations in areas like Cayo Costa where the species has become extirpated. Due to its size, protected status and diversity of coastal habitats (and through a USFWS 'decision matrix'), Cayo Costa has been determined to be an ideal recipient site for reintroduction of the species from nearby populations, including the highly threatened population at the adjacent Bocilla Preserve near the mouth of Jug Creek (pers. comm. with Dr. Shawn McCourt, Marie Selby Botanical Gardens). Their research also found that populations were in active decline due to invasive species such as Brazilian pepper, which altered the canopy environment (Chambers et al., 2021).

Protection of imperiled plant species means protecting suitable habitat from disturbance. For the prickly apple-cactus and many other species, this includes reducing invasive plant species coverage and thinning of canopies to reduce overshading (Chambers et al., 2021). A relatively large population of the

state threatened shell mound pricklypear occurs in the park. Recently the invasive cactus moth (*Cactoblastis cactorum*) was also found in the park. The female moth lays her eggs at the base or tip of a spine in the form of a long chain known as an egg-stick. The larvae crawl down the egg stick onto the cladode where they burrow into the pad and destructively feed on the tissue, moving to other cladodes until the food source is exhausted or the larvae exit the plant to pupate (Habeck et al., 2016). Cactus moth feeding may be detected by the pile of frass on or beneath an infested pad. The Florida Department of Agriculture and Consumer Services' (FDACS) Division of Plant Industry has submitted a petition to USDA for permission to release a biological control agent of the moth (pers. comm. with Nicole Benda, FDACS-DPI). The park will continue to monitor populations of shell mound pricklypear plants for egg sticks and signs of cactus moth destruction, removing egg sticks and infested pads as needed. Egg sticks and infested pads should be frozen or heat-killed prior to disposal.

State threatened joewood and state endangered Sanibel shrub-verbena are abundant within the coastal strand on both Cayo Costa and North Captiva. Cayo Costa is near the northernmost limit for joewood, with most of joewood in Florida existing in the Keys. Both joewood and Sanibel shrub-verbena are located within the coastal grassland and coastal strand on North Captiva and Cayo Costa, along with state-threatened shell mound pricklypear. Other species, including west coast dune sunflower and state threatened inkberry, are found parkwide within beach dune community.

Some imperiled plant species are associated specifically with the Indian shell mounds and middens found on Cayo Costa and North Captiva. Plants such as West Indian cock's-comb prefer this calcium enriched natural community. Also, due to the higher topography and location adjacent to mangrove swamps, Florida mayten (*Tricerma phyllanthoides*) can also be found around the shell middens and mounds.

Bromeliads are found throughout the mangrove swamps and maritime hammock. Major threats to these imperiled species are hydrological and salinity changes due to sea level rise. As water levels rise and strong storms become more frequent, host trees for these plants found in the maritime hammock may be damaged by saltwater. DRP will monitor the impacts of sea level rise to these imperiled plant species and coordinate with FDACS and local botanical gardens to preserve genetic material if needed.

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 the Southwest District FNAI Element Tracking Codes appendix.

Imperiled Species Inventory						
Common and Scientific Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
PLANTS						

Imperiled Species Inventory						
Common and Scientific Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
Triangle cactus *Acanthocereus tetragonus*			T		2	Tier 1
West Indian cock's-comb *Celosia nitida*			E		2	Tier 1
Coastal dune sandmat *Euphorbia cumulicola*			E	G2, S2	2	Tier 1
Prickly apple-cactus *Harrisia aboriginum*		E	E	G1, S1	2, 3	Tier 2
West coast dune sunflower *Helianthus debilis* subsp. *vestitus*				G5T2, S2	2	Tier 1
Spiked crested coralroot *Hexalectris spicata*			E		2	Tier 1
Joewood *Jacquinia keyensis*			T		2	Tier 1
Sanibel shrub-verbena *Lantana depressa* var. *sanibelensis*			E	G2T1, S1	2	Tier 1
Shell mound pricklypear *Opuntia stricta*			T		2	Tier 1
Inkberry *Scaevola plumieri*			T		2	Tier 1
Northern needleleaf *Tillandsia balbisiana*			T		2	Tier 1
Cardinal airplant; Common wildpine *Tillandsia fasciculata*			E		2	Tier 1
Twisted airplant; Banded airplant *Tillandsia flexuosa*			T	G5, S3	2	Tier 1
Giant airplant; Giant wild-pine *Tillandsia utriculata*			E		2	Tier 1
Florida mayten *Tricerma phyllanthoides*			T		2	Tier 1

Imperiled Species Inventory						
Common and Scientific Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
FISH						
Smalltooth sawfish *Pristis pectinata*	FE	E		G1G3, S1S2	13	Tier 1
REPTILES						
American alligator *Alligator mississippiensis*	FT (S/A)	SAT		G5, S4	13	Tier 1
Loggerhead sea turtle *Caretta caretta*	FT	T		G3, S3	8, 9, 10, 13	Tier 3
Green sea turtle *Chelonia mydas*	FT	T		G3, S2S3	8, 9, 10, 13	Tier 3
American crocodile *Crocodylus acutus*	FT	T		G2, S2	13	Tier 1
Leatherback sea turtle *Dermochelys coriacea*	FE	E		G2, S2	8, 9, 10, 13	Tier 3
Eastern indigo snake *Drymarchon couperi*	FT	T		G3, S3	2, 10, 13	Tier 1
Gopher tortoise *Gopherus polyphemus*	ST			G3, S3	2, 8, 10, 13	Tier 3
Kemp's ridley sea turtle *Lepidochelys kempii*	FE	E		G1, S1	8, 9, 10, 13	Tier 3
BIRDS						
Florida burrowing owl *Athene cunicularia floridana*	ST			G4T3, S3	2, 13	Tier 1
Short-Tailed hawk *Buteo brachyurus*				G4G5, S1	13	Tier 1
Red Knot *Calidris canutus rufa*	FT	T		G4T2, S2N	8, 10, 13	Tier 3
Piping plover *Charadrius melodus*	FT	T		G3, S2	8, 10, 13	Tier 3
Snowy plover *Charadrius nivosus*	ST			G3, S1	8, 9, 10, 13	Tier 3
Wilson's plover *Charadrius wilsonia*				G5, S2	8, 9, 10, 13	Tier 3
Little blue heron *Egretta caerulea*	ST			G5, S4	13	Tier 1

Imperiled Species Inventory						
Common and Scientific Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
Reddish egret *Egretta rufescens*	ST			G4, S2	13	Tier 1
Tri-colored heron *Egretta tricolor*	ST			G5, S4	13	Tier 1
Swallow-tailed kite *Elanoides forficatus*				G5, S2	13	Tier 1
Merlin *Falco columbaris*				G5, S2	13	Tier 1
Peregrine falcon *Falco peregrinus*				G4, S2	13	Tier 1
Magnificent frigatebird *Fregata magnificens*				G5, S1	13	Tier 1
Gull-billed tern *Gelochelidon nilotica*				G5, S2	13	Tier 1
American oystercatcher *Haematopus palliates*	ST			G5, S2	8, 9, 10, 13	Tier 3
Worm-eating warbler *Helmitheros vermivorum*				G5, S1	13	Tier 1
Caspian tern *Hydroprogne caspia*				G5, S2	10, 13	Tier 1
Wood stork *Mycteria americana*	FT	T		G4, S2	13	Tier 1
Painted bunting *Passerina ciris*				G5T3Q, S1S2	13	Tier 1
Roseate spoonbill *Platalea ajaja*	ST			G5, S2	13	Tier 1
American avocet *Recurvirostra americana*				G5, S2	13	Tier 1
Black skimmer *Rynchops niger*	ST			G5, S3	8, 9, 10, 13	Tier 3
American redstart *Setophaga ruticilla*				G5, S2	13	Tier 1
Least tern *Sternula antillarum*	ST			G4, S3	8, 9, 10, 11, 13	Tier 3
Sandwich tern *Thalasseus sandvicensis*				G5, S2	10, 13	Tier 1

Imperiled Species Inventory						
Common and Scientific Name	**Imperiled Species Status**				**Management Actions**	**Monitoring Level**
	FWC	**USFWS**	**FDACS**	**FNAI**		
MAMMALS						
Florida manatee *Trichechus manatus latirostris*	FT	T		G2G3T2, S2S3	10, 13	Tier 1

Management Actions:

1. Prescribed Fire
2. Invasive Plant Treatment/Removal
3. Translocation/Augmentation
4. Hydrological Maintenance/Restoration
5. Nest Boxes/Artificial Cavities
6. Hardwood Control
7. Mechanical Treatment
8. Predator Control
9. Erosion Control
10. Protection from Visitor Impacts
11. Decoys (Shorebirds)
12. Vegetation Planting
13. Outreach/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. [If referenced in table, provide discussion in narrative]

Inventory

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

Action:

- Update imperiled species list.

Update imperiled species list as necessary to add or remove species in compliance with current FWC or USFWS listing status and update any accepted nomenclature changes.

Fauna

Objective: Continue existing monitoring protocols for 12 selected imperiled animal species.

Actions:

- Continue to implement existing monitoring protocols for marine turtle species and piping plover, red knot, Wilson's plover, snowy plover, least tern, black skimmer and American oystercatcher.
- Monitor impacts on shorebird and sea turtle nesting by terrestrial nuisance species in the park.
- Provide visitor interpretation and outreach for shorebirds, seabirds and wading birds.
- Review and revise protocols as necessary to remain consistent with FWC and USFWS standards.
- Resurvey/replicate LTDS protocols to estimate the gopher tortoise population.

Imperiled species management at Cayo Costa State Park focuses primarily on shorebirds and other coastal bird species, as well as marine turtle species that nest within the parks. The parks coordinate all monitoring of imperiled species at the parks with FWC and submit monitoring data to FWC as required.

Daily marine turtle nesting surveys are completed by park staff, volunteers and contractors under a FWC Marine Turtle Permit issued to the state park and in strict accordance with the FWC Marine Turtle Conservation Handbook (FWC 2016). The park previously used a digital survey application, developed by DRP and adopted by FWC, to collect GPS data in the field and allow direct digital data entry of the marine turtle nesting data. Currently, the park uses a digital survey application created by FWC that allows direct digital entry from the field and allows FWC to directly pull the annual reports submitted. District Biologists are involved in reviewing the results of the monitoring and ensuring it is reported to FWC in accordance with Marine Turtle Permit conditions.

Shorebird surveys are conducted in accordance with DRP's Resource Management Standard, "Shorebird and Seabird Management." Surveys are conducted both during the nesting season and during the winter and migratory seasons. Data for nesting shorebirds are submitted to FWC via the online Florida Shorebird Database. The primary focus of surveys is on imperiled shorebird and seabird species that

nest on the beaches and in the dunes. An additional survey known as the Winter Shorebird Survey is completed in accordance with Florida Shorebird Alliance guidelines and identifies winter distribution of shorebirds and seabirds in Florida. Over-wintering and migratory imperiled species such as the piping plover and red knot are monitored as well through non-breeding shorebird surveys completed bi-weekly and submitted to FWC. Non-breeding shorebird surveys provide a snapshot of park usage and distribution of shorebird, seabird and wading bird species. Park staff routinely monitor shorebird flocks for banded birds, particularly piping plovers and red knots, and report that information to the USFWS and international researchers working with these migratory species.

Historic shorebird nesting areas will be posted in advance of seasonal occupation annually in accordance with FWC and DRP guidelines. Individual solitary nesting sites will be posted to provide a buffer as they are encountered on the beach to limit disturbances. The park will continue to coordinate with Audubon and FWC towards a shorebird stewardship program on site. The park will work to enhance community outreach efforts during shorebird nesting season through improved interpretive programming and regular monitoring of posted areas by park staff and volunteers.

Current protocols for nesting surveys include data collection on the presence of terrestrial predators. Staff and volunteers are trained to observe and document predator tracks near shorebird nesting

habitat, shorebird nest sites and sea turtle nest sites and false crawls. In accordance with FWC guidelines and permit conditions, self-releasing cages and screens are installed over sea turtle nests by park staff on Cayo Costa and North Captiva to discourage depredation by nuisance mammal species. Park staff coordinate with DRP district biologists, who monitor shorebird and sea turtle nest depredation activity and coordinate predator removal efforts at all southwestern beach parks. Park staff will continue to communicate with district biologists as depredations occur for timely implementation of predator removal efforts.

Dogs brought by visitors to the park introduce significant and challenging impacts on shorebird nesting success. Remoteness of the islands prevents the level of visitor activity oversight afforded at other parks. Protocols that staff and volunteers use to document the presence of nuisance species near nesting areas also include documentation of the presence of dogs. Evidence of dogs is typically observed during every sea turtle and shorebird nesting survey conducted on the islands. Signage on each of the islands clearly describes DRP's policy on pets, however, evidence of non-compliance persists. The current approach to reducing this impact to shorebird nesting depends on multiple partners including law enforcement personnel. Park staff maintains signage and educates visitors on policies when dogs are encountered in areas of the park where prohibited. Rule 62D-2.014(13), F.A.C., includes enforceable language on the presence of pets in restricted areas. This code is enforced by FWC law enforcement at state parks.

Despite current efforts, off-leash dogs continue to threaten the nesting success of several imperiled species found on the islands, including the American oystercatcher, least tern, snowy plover and Wilson's plover. Measures to increase FWC law enforcement presence are needed. These measures should include pairing DRP and FWC law enforcement staff, vessels and equipment to meet partnering agency safety requirements that may otherwise limit the number of days that law enforcement personnel are present on Cayo Costa and North Captiva islands during the nesting season. Continued monitoring will gauge the effectiveness of such enhanced partnerships.

Two surveys completed nine years apart have shown that Cayo Costa continues to support dense populations of gopher tortoises on the island. These surveys are an important tool in monitoring the overall health of the population, especially following large-scale storm events like Hurricane Ian, the eye of which passed directly over the park. Follow-up replicate LTDS surveys were completed at the park in 2025 for longitudinal records of comparison. Staff will continue to refer to the FWC Gopher Tortoise Management Plan (FWC 2012) to guide management of this imperiled species.

Eastern indigo snake population assessment research at Cayo Costa and North Captiva being conducted by SCCF is ongoing. The goal of this research is to obtain valuable baseline data on Eastern indigo snake populations on the barrier islands through measurements, tagging and genetic analysis. Sightings of Eastern indigo snakes at Cayo Costa and North Captiva are reported by park and district staff to SCCF, which will assist with locating snakes for this ongoing population study.

Flora

Objective: Continue existing protocols for one selected imperiled plant species in the park.

Actions:

- Continue to implement existing monitoring protocols.
- Periodically review existing protocols.

The federally listed prickly apple-cactus was last observed in the park in 2004 prior to Hurricane Charley. All upland natural communities at Cayo Costa and North Captiva are designated as potential critical habitat to protect the prickly apple-cactus. Subsequent surveys of the park by staff and researchers have yielded no new observations; however, the habitat at Cayo Costa has been determined to be an ideal recipient site for reintroduction of the species from nearby populations. District and park staff will continue to work with USFWS and researchers to survey the presence of cacti and identify suitable recipient site locations at the park for reintroduction. Park staff will continue to actively manage invasive plant infestations at the park for the conservation of this species.

INVASIVE SPECIES

Cayo Costa State Park contains a variety of invasive plant species throughout the associated islands. Significant invasive plant control efforts have been conducted by DRP staff, volunteers and contractors throughout Cayo Costa, North Captiva, Punta Blanca and Jug Creek. Most recently, the park received funding in 2018 from DRP to complete a full island treatment on Cayo Costa and Punta Blanca for all FISC Category I and II listed species. This project covered over 1,400 acres of uplands and was completed over a six-month period in 2019. Additional invasive plant treatment efforts in 2018, 2022 and 2023 provided through FWC Invasive Plant Management contracts have assisted with re-treatment efforts to keep invasive plant regrowth to a minimum. Species of particular concern include Brazilian pepper, Australian pine, Australian umbrella tree (*Schefflera actinophylla*), cogongrass, carrotwood, beach naupaka, white leadtree, bowstring hemp, sisal hemp (*Agave sisalana*), Washington palm (*Washingtonia robusta*), Senegal date palm (*Phoenix reclinata*) and rosary pea.

The most visible invasive tree, the Australian pine, has a long history on these islands. Over the past 20 years, park staff has made strides in eliminating most of the Australian pines found at all the island parks. In 2018, Lee County issued management authority to DRP over several parcels owned by the county, allowing more effective control of invasive plants and animals. As of 2024, nearly all adult Australian pine trees have been killed on Cayo Costa, except for isolated young trees found on outparcels and private properties outside of the park boundary. An extensive seedbank remains on both Cayo Costa and North Captiva.

Brazilian pepper is the most prevalent invasive non-native plant found on all the island parks. The displacement of native vegetation by Brazilian pepper has been extensive in the past, but mechanical treatment along with herbicide has reduced the coverage of this plant. Locating and treating Brazilian pepper is often difficult due to the inaccessibility of its infestations. With the amount of Brazilian pepper plants that have been located and treated on the island, the island most likely contains an extensive seed bank. Continued post-treatment surveys and retreatment efforts will be necessary parkwide to identify areas of resprouting Brazilian pepper.

Small areas of beach naupaka are present in the park along the beach dune system of Cayo Costa and Punta Blanca. Larger patches are present in the park on the island of North Captiva. This species was

fully treated on Cayo Costa and Punta Blanca in 2019, but new occurrences are plausible given its salt tolerant seeds that spread easily by maritime currents. These invasive non-native plants closely resemble and outcompete their native counterparts, the state-threatened inkberry. Native imperiled inkberry is easily differentiated from non-native invasive beach naupaka by the leaves (shape and texture) as well as the black-colored fruit produced in late summer and fall. To avoid confusion with native inkberry, staff typically work with biologists to positively identify non-native species.

Limited access to North Captiva, however, results in a prevalence of plant species in this remote and separate portion of the park. The district has prepared a three-year plan to ensure that the entire park, including North Captiva, is comprehensively surveyed for invasive plants to monitor for new species occurrences and regrowth post-treatments. Areas on Cayo Costa with known extensive seed banks have been selected for retreatment in the next year to ensure that regrowth is monitored and treated immediately.

Of greater concern to park and district staff is the arrival of new invasive plant species to the islands from offsite. While birds, mammals and wind can transport seeds of invasive non-native plants to the islands, humans can also act as vessels for plant dispersal. To avoid the dispersal of invasives, DRP does not allow firewood or any potted plants to be imported to the island. Waste collected from visiting boats is also not allowed in park trash receptacles, as raccoons frequently raid this trash and could potentially spread invasive plant seeds across the island. This also limits potential pests and pathogens that could be introduced to the islands from the mainland and other outside locations.

Invasive plants are accompanied on these islands by invasive animals, such as feral hogs. Until 2019, feral hogs were the most significant invasive non-native animal presence in the park. Feral hogs were reportedly originally released on Cayo Costa in the 1800s by resident fisherman, who used them as a food source. Since that time, hogs had been increasing in population, destroying native vegetation and causing physical damage to multiple historic and cultural sites located in the park. Contracted trappers have been used in the past to remove hogs from Cayo Costa, and park staff have previously been hired to focus on this effort. Even with consistent trapping, hog populations remain high. In 2015, the park was selected by DRP, USFWS and USDA to be the focus of a wild hog eradication effort scheduled for 2016–2017. This eradication effort took place over a year and included the removal of 126 feral hogs by USDA. The project and follow-up surveys to ensure eradication were completed in 2018.

Black spiny-tailed iguanas (*Ctenorsaura similis*) are the most visible invasive, non-native animal on the island of Cayo Costa, and occur frequently in beach dune and coastal strand habitat throughout the park. Black spiny-tailed iguanas are commonly found on nearby Boca Grande and have been observed with increased frequency on Cayo Costa since 2015. Black spiny-tailed iguanas have been spotted as far south as management zone CC-10 by district staff, but it is likely that they have spread throughout the island. Black spiny-tailed iguanas have not been observed on North Captiva, Punta Blanca, or at Jug Creek. In 2025, green iguanas (*Iguana iguana*) were observed at both the southern-most shoreline of Cayo Costa and mid-island adjacent to the ranger station. This species is commonly found on the nearby islands of Sanibel and Captiva, and along coastal locations in South Florida, but had not been documented on Cayo Costa previously. Consistent removal efforts are necessary to reduce green iguana levels before population levels increase and the species spreads throughout the island. Both the black spiny-tailed iguanas and green iguanas can displace gopher tortoises, and limit food sources for many native animals. DRP is currently implementing trapping efforts and coordinating with FWC on a removal strategy for black spiny-tailed iguanas and green iguanas on the island of Cayo Costa.

Nuisance imperiled species predators commonly found at Cayo Costa and North Captiva include

coyotes and racoons, which account for most of the depredation activity for shorebirds, seabirds and sea turtle nests on the islands. Historically, predator control efforts were initiated in response to periods of elevated nest depredations. In addition to funding through DRP, the Sea Turtle Conservancy had provided the park with several years of predator removal funding with a goal of increasing the number of hatchlings reaching the Gulf. Through these consistent predator control efforts, mammalian depredations of sea turtle nests at the park dropped from more than 60% of total nests in 2018 to below 10% of total nests annually.

The nine-banded armadillo (*Dasypus novemcinctus*) also occurs on Cayo Costa and North Captiva but has not yet become a nuisance sea turtle nest predator on those islands despite reports of predation from other parks. Staff should monitor the abundance of armadillos and take steps to remove them when they become a problem. Invasive animal removal reports indicate that black rats (*Rattus rattus*) also occur within the park. Black rats have been responsible for park vehicular equipment issues in the past including building nests in engine compartments and gnawing through important wires. In 2021, black rats became a nuisance in the campground area, gnawing through screens in the cabins and personal tents to gain access to food. It was necessary for DRP to contract USDA to complete a campground-wide removal effort to provide a better recreational experience for campers and park visitors. Currently, staff members remove these animals when encountered, in accordance with DRP procedural guidelines.

Invasive Plant Species			
Species Name ***Scientific Name* - Common Name**	**FISC Category**	**Distribution**	**Zone ID**
Rosary pea *Abrus precatorius*	I	Scattered Plants or Clumps	CC-01, CC-04, CC-06
Earleaf acacia *Acacia auriculiformis*	I	Scattered Plants or Clumps	CC-06
Sisal hemp *Agave sisalana*	II	Scattered Plants or Clumps	CC-02, CC-05A, CC-05B, CC-08, CC-09A
Australian pine *Casuarina equisetifolia*	I	Single Plant or Clump	CC-02, CC-03, CC-05A, CC-05B, CC-10C, CC-11 CC-NC2, CCNC3, CC-NC4C, CC-NC4D, CCNC5C, CCNC5F, CC-NC5I
Coconut palm *Cocos nucifera*	II	Single Plant or Clump	CC-07, CC-09A
Madagascar rubbervine *Cryptostegia madagascariensis*	II	Scattered dense patches	CC-01, CC-06
Carrotwood *Cupaniopsis anacardioides*	I	Scattered Plants or Clumps	CC-04, CC-11
Durban crowfoot grass *Dactyloctenium aegyptium*	II	Scattered Plants or Clumps	CC-02, CC-04,
Bowstring hemp *Dracaena hyacinthoides*	II	Scattered Plants or Clumps	CC-01, CC-04
Council tree *Ficus altissima*	II	Scattered Plants or Clumps	CC-02, CC-04

Invasive Plant Species			
Species Name ***Scientific Name* - Common Name**	**FISC Category**	**Distribution**	**Zone ID**
Indian laurel *Ficus micropcarpa*	I	Scattered Plants or Clumps	CC-01, CC-04, CC-06
Cogongrass *Imperata cylindrica*	I	Scattered Plants or Clumps	CC-01, CC-02, CC-07
White leadtree *Leucaena leucocephala*	II	Scattered Plants or Clumps	CC-01, CC-04, CC-07, CC-11, CC-12
Punk tree *Melaleuca quinquenervia*	I	Scattered Plants or Clumps	CC-01, CC-12
Rose natal grass *Melinis repens*	I	Scattered Plants or Clumps	CC-01, CC-03
Balsampear *Momordica charantia*	II	Scattered Plants or Clumps	CC-05A, CC-06
Senegal date palm *Phoenix reclinata*	II	Scattered Plants or Clumps	CC-06
Guava *Psidium guajava*	I	Scattered Plants or Clumps	CC-06
Beach naupaka *Scaevola taccada*	I	Scattered Plants or Clumps	CC-01, CC-02, CC-03, CC-04, CC-05A, CC-05B, CC-08, CC-09A, CC-10A-10J, CC-11 CC-NC2, CC-NC4C
Australian umbrella tree *Heptapleurum actinophyllum*	I	Scattered Plants or Clumps	CC-03, CC-04, CC-06, CC-07
Brazilian pepper *Schinus terebinthifolia*	I	Scattered Plants or Clumps	All management zones
Princess-of-the-night *Selenicereus undatus*	II	Scattered Plants or Clumps	CC-01, CC-02
Creeping oxeye *Sphagneticola trilobata*	II	Scattered Plants or Clumps	CC-01, CC-06, CC-NC4D
American evergreen *Syngonium podophyllum*	I	Scattered Plants or Clumps	CC-12
Australian almond *Terminalia muelleri*	II	Scattered Plants or Clumps	CC-12
Portia tree *Thespesia populnea*	I	Scattered Plants or Clumps	CC-04, CC-05A, CC-11, CC-12
Jamaican feverplant *Tribulus cistoides*	II	Scattered Plants or Clumps	CC-12
Caesarweed *Urena lobata*	I	Scattered Plants or Clumps	CC-01, CC-04
Washington fan palm *Washingtonia robusta*	II	Scattered Plant or Clump	CC-01, CC-06, CC-12

Invasive Plant Treatment

Objective: Update the long-term invasive plant management plan for the park.

Actions:

- Identify the major vectors and pathways for invasive plants at the park and reduce incoming propagules where possible.
- Regularly update surveys to reflect accurate infestation levels of each management zone.
- Develop an early detection rapid response protocol for new infestations.
- Develop a species-specific action plan for each management zone with a prioritization framework.
- Evaluate and update plan on an annual basis and adapt to changing conditions.

Objective: Monitor and maintain 811 gross acres of habitat already in maintenance condition as needed.

Actions:

- Survey all maintenance areas yearly for new infestations.
- Treat areas where invasive plant spread is imminent (e.g., after prescribed fire, mechanical or other disturbance).
- Document treatments and update surveys in the Natural Resource Tracking System (NRTS).

Objective: Reduce or maintain cover class on 1,862 acres not in maintenance.

Actions:

- Survey and treat after prescribed fire for rapid spread of invasive species.
- Treat medium infestations with staff and volunteers where available.
- Reduce high infestations with additional labor sources (e.g., contract funding, strike teams) and plan for passive or active restoration.
- Document treatments and update surveys in NRTS.

In addition to treating, conduct surveys where they are overdue to find new infestations before they increase. Staff should focus on treatment of small populations of invasives whenever they arise in addition to large-scale woody invasives. Staff, volunteers and AmeriCorps should be utilized in tackling persistent, non-woody invasives that require both a team and time, such as bowstring hemp (*Dracaena hyacinthoides*), princess-of-the-night (*Selenicereus pteranthus*) and night-blooming cactus (*Selenicereus undatus*). Priority should be on maintaining infestation at or below current infestation and singling out priority invasive species that should be eradicated, such as cogongrass. Successful removal of certain species, such as Australian pines, will save time and effort down the line and allow all parties to maintain focus on an ever-decreasing pool of invasive species. New invasive species should immediately be vouchered and eradicated. Education and outreach with private parcel owners should be pursued to prevent future infestations from private parcels and to garner additional volunteer support in removal efforts. Staff should take great care in transferring equipment from the Bokeelia parcel to the main park to prevent further spread of invasive species.

Invasive and Nuisance Animal Control

Objective: Implement control measures on four invasive/nuisance animals to protect native species and habitats.

Actions:

- Manage invasive or nuisance animals as needed.
- Coordinate with USDA, FWC and staff to develop monitoring and control plans for invasive black spiny-tailed and green iguanas.

USDA and DRP staff have directly assisted with sea turtle and shorebird predator management of coyotes and racoons on the islands of Cayo Costa and North Captiva, and management of invasive black spiny-tailed iguanas and nuisance black rats on Cayo Costa. In 2019, USDA was able to fully eradicate feral hogs from the island of Cayo Costa.

Sea turtle predator management completed by USDA has been shown to effectively reduce sea turtle nest depredation rates in subsequent seasons. Park staff will continue to coordinate with District Biologists to monitor depredation levels at the park during nesting seasons and assess when further predator control is warranted.

Historically, the management of black rats was completed in response to high infestations, or around areas vital to park operation or visitor accommodations. Management activities include mechanical methods such as trapping and removal. The use of bait should be avoided at the park to prevent secondary poisoning of predator species, such as the federally listed Eastern indigo snakes, hawks, owls and bald eagles. Management activities should be prioritized around areas of greatest need as complete eradication is unlikely due to neighboring islands, private parcels and the inaccessibility of much of the park.

FWC, USDA and DRP staff have previously assisted with black spiny-tailed iguana management on the island of Cayo Costa. District and park staff area currently pursuing options for iguana management due to the increasingly high rate of infestation. Additionally, the recent sightings of green iguanas is cause for concern on the island of Cayo Costa. Iguana management is vital, as they are known to displace gopher tortoises and have been known to forage on the flowers of the imperiled prickly apple-cactus, which would prevent pollination (Frank 2016). Cayo Costa is the largest undisturbed portion of critical habitat for the species and is currently under consideration as a potential reintroduction site by USFWS. District and park staff will continue to pursue opportunities for invasive species control of iguanas on the island.

CULTURAL RESOURCES

Prehistoric and Historic Archaeological Sites

Cayo Costa State Park contains 13 archaeological sites and two historic cemeteries recorded in the Florida Master Site File (FMSF): 13 of these recorded sites are located on Cayo Costa and two are located on North Captiva. Other sites, including a homestead site and former boat works site, have been identified on Punta Blanca but have not been recorded for FMSF.

There are seven archaeological sites containing prehistoric components found on Cayo Costa and one on North Captiva, including two large shell mounds, one shellworks and four shell middens. One of these sites, Mark Pardo Shellworks (LL01606), was listed on the National Register of Historic Places

(NRHP) in 1996. Very little is known about these sites or the prehistoric people that occupied these islands. Six of the seven sites were recorded based on surface inspection alone, with little to no additional investigation. Consequently, the dimensions, composition, cultural affiliation and date of construction and use for these sites remain largely unknown. The only exception is the Mark Pardo Shellworks, which was investigated more intensely to be placed on the NRHP. The investigation of this shellworks has led to the conclusion that this site is definitively associated with the Caloosahatchee.

Cayo Costa's aboriginal cultural resources lie within the Caloosahatchee Region, as described in the Archaeological Resources of Caloosahatchee Region Multiple Properties NRHP registration form. This region, centered on the estuarine systems of Charlotte Harbor, has supported human populations from the Paleo-Indian period (circa 11,500 B.C.E.) to the present. Most recorded aboriginal sites in the region are coastal shell middens that have been ascribed to the Caloosahatchee Culture, 500 B.C.E. to 1750 C.E. The Caloosahatchee and the historic period Calusa people are believed to have been large, sedentary coastal-dwelling populations with complex societies. These societies utilized the rich marine and estuarine resources for a diverse and abundant food source. Middens, mounds and shellworks on both North Captiva and Cayo Costa fit the site type models for the Caloosahatchee Region.

Foster Bay Midden (LL00733) is a shell midden located on North Captiva. The midden covers an elongated area that stretches over state and private property. Pottery fragment evidence indicates that this midden is associated with the Glades culture, which existed in the area from 1000 B.C.E. to 1700 C.E.

Old Ware Mound (LL00086) is a shell mound located on Cayo. The survey of the mound, which was part of the park's predictive model study completed by the Alliance for Integrated Spatial Technologies at the University of South Florida in 2013, allowed researchers to update the spatial expanse of the site in the FMSF based on elevation measurements and visual ground-truthing. This shell mound is of unknown cultural affiliation and temporal period. This site is difficult to access due to extensive vegetation and is currently not incorporated into the park's trail system.

Faulkner Mound (LL00087) is a shell mound located on Cayo Costa. This prehistoric mound is associated with Weeden Island culture 450–1000 C.E. Historically, the mound covered approximately one and a half acres, although current reports delineate the mound covering only a third of an acre.

No Name (LL1413) is a site found on Cayo Costa. The cultural affiliation and temporal period of the site is unknown. This site was recorded in association with Faulkner Mound as being a mound.

Clark #1 (LL00702) and Clark #2 (LL00703) are shell middens located on Cayo Costa. These sites were initially assessed and recorded in 1983 and are of unknown cultural affiliation and temporal period.

Clark #3 (LL00704) is a shell midden located on Cayo Costa. This prehistoric site lies underneath two historic town sites, the Padilla Settlement (LL00701) and Burroughs Ranch (LL01494). This site is commonly visited as it exists under a heavily used park trail. This trail was most likely a continuation of the paths used by the Padilla settlement.

Mark Pardo Shellworks (LL1606) is a shellworks location and a shell midden found on Cayo Costa. Currently, it is believed that this site is associated with the Caloosahatchee IIA-IV cultural phases (500–1500 C.E.). The east, west and south sides of the site are bounded by the high tide line and the north side by a residential development. The site consists of two distinct components; linear shell deposits that parallel the shoreline adjacent to a mangrove swamp, and a black dirt shell midden just inland from the shellworks. The shell deposits, which primarily contain large lightning whelk and horse conchs, range up to one and a half meters above the ground and cover approximately 30 acres. The

midden contains rich black dirt which indicates a living area, and a variety of shells including oyster, clam, conch and lightning whelk. These two components within the shellworks site may represent two different occupation periods. Current hypotheses include that the shellworks represents a protective seawall, or the remains of a shellfish harvesting/shell tool production area. A third site component may exist beneath the submerged sediment within the mangrove swamp community. This portion of the site may have been occupied when sea levels were historically lower in this area. Alternatively, submerged materials may have been deposited directly into the water by Native Americans. The Mark Pardo Shellworks site was listed on the NRHP in 1996 because of its outstanding preservation, abundance of ecofacts (natural objects not altered by humans, but which may be indicative of human occupation) and artifacts, and potential to yield information about the Paleo-environments and Caloosahatchee habitation sites on southwest Florida barrier islands.

There are seven historic sites recorded on Cayo Costa and one on North Captiva. These include two cemeteries, a homestead, school, remnants of two fishing villages and a U.S. military and maritime related site.

Several different historic cultural groups inhabited Charlotte Harbor and its coastal islands. Many of these cultures overlapped in time, attracted to the islands by ancestral ties, rich natural resources, deep water passages, isolation and proximity to Cuba and the Caribbean. When the Spanish arrived in Charlotte Harbor in the 16th century, the area was occupied by the native Calusa people. With Spanish efforts focused on north Florida, Charlotte Harbor was used as a convenient rendezvous and trading point. By the mid-18th century, Spaniards began to establish fishing ranchos on the coastal islands, and by the 1830s European Americans did as well. In 1848, the U.S. military utilized the northern end of Cayo Costa and the southern end of nearby Gasparilla Island as a military reservation. By the early 20th century, Cayo Costa hosted a quarantine station/marine hospital, three pilots' houses, a post office, dock and at least two fishing villages. Following modern developments such as new industries, improved transportation, school redistricting and state acquisition, much of Cayo Costa is now a state park.

Pioneer Cemetery (LL00699) is a historic cemetery on Cayo Costa. This site was created in the early 20th century by the residents of the fishing ranchos on the island. Harbor pilot Captain Peter Nelson, who died in 1919, is buried here. He moved to Lee County in 1887 from Denmark when the shipping industry in the area was flourishing due to cattle and phosphate exports. This site includes shell-bordered graves surrounded by a wooden fence with rock tombstones.

Quarantine Station (LL00700A) is a historic military site located on Cayo Costa. This site, created in the early 20th century, is the former location of a U.S. military quarantine station and three ship pilothouses. The quarantine station was relocated to Cayo Costa from Gasparilla Island in 1904 and was in operation on the island until 1925. The site consists of masonry building material scattered over approximately two acres. A submerged brick concentration located by DHR archaeologist in 1992 may be remnants of the middle of the three pilothouses. This site is located directly on the shoreline and receives consistent wave action.

Padilla Settlement (LL00701) is a 19th and 20th century historic American settlement (1821–present). This site is the former location of a Spanish fishing village that was founded by Tariva "Pappy" Padilla before the Civil War. The Padilla family and other Spanish fishermen lived in wood plank and palmetto thatch houses on the northern end of the island. The U.S. military classified them as squatters and required them to relocate to the middle of the island.

Foster Bay Homestead (LL00734) is a historic house site dating from 1821–present, found on North Captiva. This site consists of the structural remains of an early 20th century house and dock. Items such as window frames, glass and a piston water pump were recorded at this site.

Padilla Cemetery (LL01493) is a late 19th century – early 20th century cemetery. This cemetery is associated with the Padilla settlement (LL00701) and contains the graves of Tariva "Pappy" Padilla, his wife and at least one child who were buried in the 1930s. An estimated 30 Cuban fishermen, who died during a 1910 hurricane, may be buried at this site. There are two distinct ledges covered with limestone rock and maritime hammock vegetation. Coquina rocks were used as headstones within the cemetery, which covers approximately 17.5 meters squared. As of 2005, 95% of this cemetery was reported to be eroded into Pelican Bay.

Burroughs Ranch (LL01494) is a historic town site from the mid-19th century on Cayo Costa. This site is the former location of a fishing homesite established in 1859. Maps from the mid-19th century depict two medium-sized buildings and four smaller buildings within the homesite.

A portion of the Cayo Costa School (LL02647) site is within park boundaries on Cayo Costa. The school was used from 1911 to approximately 1923 when a new school was constructed on Punta Blanca. The site was recorded in 2015 and consists of building and foundation remains and a water well.

In 2013, the Alliance for Integrated Spatial Technologies at the University of South Florida were contracted as part of a DRP districts 4 and 5 project to perform predictive modeling of cultural resource potential in state parks. During this project, aerial LiDAR data was used to refine maps showing the complex surface elevations of the park (Collins 2014). Fieldwork was also conducted to survey with sub-meter instrumentation and GPS camera equipment to ground truth previously recorded sites, and potential new sites. The analysis of LiDAR and ground truthing assisted in correcting the boundaries for two previously recorded sites, Old Ware Mound and Faulkner Mound.

The archaeological sensitivity model created from this research found that of the 2,392 acres within Cayo Costa State Park, 1,672 acres (70% of the park) is considered highly sensitive for cultural resources. The other 30% is considered to have a low sensitivity for cultural resources. With the corrected locations for Old Ware Mound and Faulkner Mound, 93% of the recorded sites fall within the high sensitivity area. The researchers predict that the missing 7% are mapped incorrectly in the FMSF, and that ideally 100% of all identified and not identified sites will fall within the areas marked as having high cultural sensitivity; however, this hypothesis has not been tested or validated

Of the 13 archaeological sites and two historical cemeteries identified in this management plan for Cayo Costa, seven are in good condition, five are in fair condition, two are in poor condition and one has not been evaluated. The main factors threatening all the sites on Cayo Costa and associated islands include coastal erosion, damage from invasive species (plant and animal), ground disturbance from visitors and private development.

A common theme of disturbance on these islands is coastal erosion. All sites located next to either the Gulf of America or Pelican Sound suffer from erosion. These sites are impacted by tidal action, rising sea levels, storm surge and consistent boat wakes. This loss of coastal sediment is undercutting prehistoric shell middens and mounds, stripping stabilizing soil off site surfaces and exposing artifacts and human remains. Preventing site loss due to erosion is difficult, and sometimes impossible. The addition of hard stabilization materials would only exacerbate erosion around the structure. With increasing sea levels predicted, many of the coastal sites will be submerged.

Three sites experiencing extensive shoreline erosion are the Quarantine Station and the Padilla

Cemetery. The locations of these sites directly adjacent to the water make them vulnerable to wind and waves. Almost all the remnants of the Quarantine Station have been lost due to wave energy breaking away deteriorated wood and concrete. The Padilla cemetery has almost certainly been entirely lost to shoreline retreat. Rocks used as headstones for the cemetery were previously found scattered around the shoreline near the grave sites.

Faulkner Mound experienced significant erosion from Hurricane Ian in 2022 and Hurricane Milton in 2024 with most of the vegetation along the shoreline toppling and tall escarpments forming where the waves carved into the side of the mound. During Hurricane Milton, dead coastal strand and mangroves to the south of the mound that had been buried during Hurricane Ian was washed out entirely creating direct access from the bay side of the park to the Gulf. Subsequent site inspections were completed with the lead archaeologist from DRP's Bureau of Natural and Cultural Resources and staff from Florida Professional Archaeologist Network to document the state of the mound following Hurricane Ian, and with the park biologist and Florida Professional Archaeologist Network staff following Hurricane Milton. Additional shoreline protection in the form of vegetation plantings in the future will assist with wave attenuation and decreasing shoreline erosion at this site.

Invasive animals and plants may also deteriorate prehistoric and historic sites within Cayo Costa. Wild hogs have previously rooted up massive areas foraging for the roots and young shoots of plants, which disturb the soils associated with the shell mounds and middens, as well as the stratification of artifacts found at all cultural sites. Destruction of artifacts and ecofacts has also been widely documented by hogs during their search for food. The recent eradication of wild hogs from the island will help prevent further degradation of archaeological sites on Cayo Costa. Invasive plants, such as Brazilian pepper and bowstring hemp, have also diminished the quality of many cultural sites at the park. The full-island invasive plant treatment effort completed in 2019 included these cultural sites throughout the island, with vegetation treated in place to avoid disturbance of the subsurface. The Clark #3 shell midden is an area with constant bowstring hemp invasive plant coverage. Some ground disturbance has occurred onsite through manual removal of these plants by park staff and volunteers in previous treatment efforts. Contractors also hand-pulled vegetation and treated the area with herbicide; however, months later sprouts of bowstring hemp have been observed throughout the area.

Excessive foot and vehicle traffic, disturbances associated with development, vandalism and past looting are also sources of cultural site disturbance at Cayo Costa and North Captiva. Designated trails have been established since its induction as a state park. Some existing trails were likely used by early settlers of the island, which predictably intersect many of the prehistoric and historical sites.

Disruption from foot traffic and vehicle traffic is kept to a minimum and only DRP staff are authorized to use motorized vehicles within the park. Additional roads created by private residents within the boundary of the state park have resulted in impacts to cultural sites, including the Mark Pardo Shellworks.

Disturbance associated with development can be seen at all sites adjacent to private property on the islands. Faulkner Mound is a shell midden site in fair condition due to alterations made by home construction. Also, Foster Bay Midden is in fair condition due to trenching that occurred for underground utilities. All the sites sharing property with private landowners will be damaged to some degree by the activities on the private property.

The last significant disturbance at Cayo Costa and associated islands involved vandalism and looting. In the past, looting was a recurrent issue for all sites within Charlotte Harbor. Stories of pirates and renegades inspired searches for buried treasure and sunken gold coins. Many sites were pitted in

unsuccessful search efforts. Looting and vandalism are now uncommon as the rumors of treasure were discredited. Past damage at many of the cultural sites has been covered from slumping, weathering and vegetation growth. If future looting is observed at any of the sites, staff from DHR's Public Lands Archaeology program are available to conduct archaeological damage assessments.

Management measures for the different types of cultural resources at Cayo Costa are relatively similar. The historic sites, along with the shell middens and mounds (earthworks), should be preserved and protected as much as possible. The goal of cultural site management at Cayo Costa is continuous sustainable vegetative cover that requires minimum maintenance or manipulation. Park staff should maintain sites so that there is no clear evidence of disturbance—environmental or human—that would result in erosion or loss of terrain features. The three fundamentals to preservation include:

- Establish and/or perpetuate continuous vegetative cover to stabilize and protect the soil from weather and human contact that may cause erosion.
- Eliminate recreational or maintenance-related interventions that may disrupt the vegetative cover or forest floor.
- Minimize destructive natural disturbances, such as tree windthrow, burrowing animals and invasive non-native plant growth.

Vegetation currently covering all sites adequately shields them, rendering a thick duff layer and deflecting rainfall and wind. This vegetative cover, which frequently consists of shell mound, coastal strand or maritime hammock species, conceals sites from common view. Obscurity protects these sites from most visitor impacts.

Many of the cultural resources on the northern section of Cayo Costa are found adjacent to established trails used by visitors and park staff. No new trails should be established around existing cultural sites, and extensive surveys should be completed if new trails are proposed elsewhere on the islands. Additionally, invasive plants, specifically bowstring hemp and Brazilian pepper, must be treated.

Large trees are found on some historic sites and shell mounds within the park. If these trees become larger than 12 inches in diameter at breast height, DRP staff should evaluate removal as large trees can topple during hurricanes, unearthing sediment and artifacts that become entangled in the roots. In addition, any ground disturbances, including land clearing on the uplands and sub-surface activities occurring seaward of the mean high-water line, out to the 400-foot sovereign submerged lands boundary, is subject to DHR consultation and review.

Other cultural sites, including the Pioneer Cemetery, are maintained for interpretive value. The Pioneer Cemetery site is kept free from vegetation and is surrounded by a wooden fence. Shell bordered grave sites and headstones are maintained by park staff and volunteers to maintain an up kept appearance. This site should be maintained in its current stable condition. If any changes are planned or observed within or near the site, DHR should be contacted.

Sites such as the Padilla Cemetery, Quarantine Station and Captiva Pass are so eroded that minimal preservation action is feasible. Previously, vegetation was planted around the Padilla Cemetery to stabilize the area. Without changing direction and intensity of wave energy in that area, plantings will not be effective at sediment stabilization. With seagrass prominent in all coastal waters surrounding Cayo Costa and North Captiva, stabilization or restoration measures are not feasible offshore. DHR should be contacted if substantial artifacts are unearthed at these sites by shoreline erosion.

DRP staff should be vigilant of vandalism and looting at all cultural sites on Cayo Costa and North

Captiva. Monthly inspections of cultural sites in locations highly accessible to visitors should maintain active management presence to deter looters. If looting or vandalism is witnessed, staff must inform FWC or local law enforcement and contact DHR for further guidance. All cultural sites will be monitored annually in accordance with DHR guidelines.

Historic Structures

Jug Creek previously contained nine historic structures within the state park boundary, known as Shady Nooks. Shady Nooks (LL00979, LL01852, LL01853, LL01854, LL01855, LL01856, LL01857, LL01858, LL01859) were all considered vernacular type structures built circa 1940 (one structure built between 1910 – 1930) at Jug Creek. This type of structure is derived from vernacular housing types of the upland south, which were built with log frames. Many of these buildings featured wrap-around porches that are covered by flared continuations of the main roofs. Entry points were slightly offset, and the kitchens extended from the rears of the buildings. Each structure was used in association with rental cottages.

All the Shady Nook structures were important examples of Florida vernacular architecture and contribute significantly to the character of Bokeelia and Pine Island. The Shady Nook Cottages are considered contributing structures in the Bokeelia Historic District, designated by Lee County on February 5, 1990. Unfortunately, significant flood damage sustained during the storm surge associated with Hurricane Ian in 2022 necessitated removal of the structures.

The historic water tower (BL 127027) was erected in 1965 prior to park acquisition by landowners for storing pumped groundwater. This tower retained pumped groundwater and distributed it to all other facilities. With new technology, this tower is no longer needed. Unused and offering minimal to no historical value, the tower is considered a risk to nearby equipment. The tank was destroyed by Hurricane Ian when it was lifted off the structure by strong winds and dropped into the woods more than 100 feet away. It was necessary to remove the tank entirely from the island.

Collections

The park maintains collections of biological representations of animals that can be found within the park. All park collections are held on Cayo Costa proper within the climate- controlled ranger station. This includes loggerhead sea turtle carapace, skull and bones as authorized under a FWC Marine Turtle Permit; gopher tortoise, box turtle and cooter turtle shells; and manatee, dolphin, wild hog, alligator and pelican bones. All sea turtle, manatee, dolphin, pelican and alligator collections were found washed ashore on the Gulf beach of Cayo Costa. All other items were found within the state park while surveying and treating invasive plants. No collections are from live animal dispatches. All specimens were collected by authorized staff under salvage permits issued to DRP by FWC and USFWS.

The only item within the collections at Cayo Costa not representative of the biological components of the park is a women's belt made from sea turtle leather. This belt, which is representative of what a fisherman would have worn while working on the island in the early 1900s, is on loan from FWC.

All specimens found in the collections at Cayo Costa are in good condition. All specimens within the collections at Cayo Costa are used to interpret the natural resources found on the islands. Preserved imperiled species specimens are used in multiple ranger-guided walks and tours to interpret how natural communities are vital for the continued existence of sea turtles, manatees and birds. There are currently no threats to the collection, or to the building in which they are housed.

Currently the ranger station in which the collections are kept is in good condition with air conditioning and routine pest control. Even in the event of electrical failure, all collections would remain in good

condition. All items are contained inside secure glass cases for viewing and the building is locked when not occupied by staff.

A scope of collections statement should be completed for the park, as well as a collection management assessment. All collections are cataloged in Past Perfect and 10% of the collections should be inventoried annually. All items within the collections should maintain their labels with appropriate item numbers.

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
LL00086 Old Ware Mound	Prehistoric	Archaeological Site	NE	F	P
LL00087 Faulkner Mound	Historic; Prehistoric; Weeden Island, 450–1000 C.E.	Archaeological Site	NE	F	P
LL00699 Pioneer Cemetery	19th century American, 1821–1899; 20th century American, 1900–present	Historic Cemetery	NE	G	P
LL00700A Quarantine Station	20th century American, 1900–present	Archaeological Site	NE	P	P
LL00701 Padilla Settlement	19th century American, 1821–1899; 20th century American, 1900–present	Archaeological Site	NE	G	P
LL00702 Clark 1	Prehistoric	Archaeological Site	NE	G	P
LL00703 Clark 2	Prehistoric	Archaeological Site	NE	G	P
LL00704 Clark 3	Prehistoric	Archaeological Site	NE	G	P
LL00733 Foster Bay Midden	Glades, 1000 B.C.E.–1700 C.E.	Archaeological Site	NE	F	P
LL00734 Foster Bay Homestead	19th century American, 1821–1899; 20th century American, 1900–present	Archaeological Site	NE	F	P
LL00979 Shady Nook	c1940	Historic Structure	NE	D	

Cultural Sites Listed in the Florida Master Site File					
Site Name and FMSF #	**Culture/Period**	**Description**	**Significance**	**Condition**	**Treatment**
LL01413 NN	Unknown	Archaeological Site	NE	NE	P
LL01493 Padilla Cemetery	19th century, American, 1821–1899	Historic Cemetery	NE	P	P
LL01494 Burroughs Ranch	19th century American, 1821–1899	Archaeological Site	NE	G	P
LL01606 Mark Pardo Shellworks	Other	Archaeological Site	NRL	G	P
LL01852 Shady Nook	C1940	Historic Structure	NE	D	
LL01853 Shady Nook	C1940	Historic Structure	NE	D	
LL01854 Shady Nook	C1940	Historic Structure	NE	D	
LL01855 Shady Nook	C1940	Historic Structure	NE	D	
LL01856 Shady Nook	C1940	Historic Structure	NE	D	
LL01857 Shady Nook	C1940	Historic Structure	NE	D	
LL01858 Shady Nook	C1940	Historic Structure	NE	D	
LL01859 Shady Nook	C1940	Historic Structure	NE	D	
LL2647 Cayo Costa School	C1940	Archaeological Site	NE	F	P

Significance:
NRL - National Register Listed
NRE - National Register Eligible
LS - Locally Significant
NE - Not Evaluated
NS - Not Significant

Conditions:
G - Good
F - Fair
P – Poor

Recommended Treatment:
RS - Restoration
RH - Rehabilitation
ST - Stabilization
P - Preservation
R – Removal

Condition Assessment

Objective: Monitor and assess 13 of 24 recorded cultural resources.

Actions:

- Complete 13 assessments/evaluation of archaeological sites.
- Prioritize preservation and stabilization projects.

Park staff will monitor 13 cultural sites annually, recording site visits and updating site files with the FMSF short form. Monitoring will focus on shell mounds and middens to ensure that looting and other resource impacts are not occurring on site.

Several archaeological sites at the park are currently subject to greater wave action, higher tidal surges and unknown changes due to sea level rise. As the threat of significant disturbance from these factors along this coastline region increases, additional precautions may be needed at the park, 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. National Register listed of eligible sites should be given the highest priority initially.

Documentation of Recorded Sites

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

Actions:

- Ensure all known sites are recorded or updated in the FMSF.
- Continue to survey the park and document all historic and archaeological resources encountered with the FMSF.
- Follow DHR's Matrix and required Compliance and Review consultations when ground disturbing activities are planned.

Park staff will continue to complete surveys of the park to identify and document all historic and archaeological resources encountered through submitting new or updated FMSF forms to DHR.

According to the predictive model completed in 2014, 69.9% of Cayo Costa State Park has a high probability of archaeological sites (Collins 2014). DRP's matrix should be followed for any area where ground disturbing activities are planned. DHR compliance and review consultations will be triggered by the level of disturbance identified in the DHR Matrix for ground disturbing activities.

Preservation Measures

Objective: Bring one of 15 cultural sites into good condition.

Action:

- Design and implement regular monitoring programs for 15 cultural sites.

Most of the sites on Cayo Costa are in good condition or else impacted by erosion caused by storms and tides. For the latter sites, document the changes and artifacts, if any, that are eroded.

SPECIAL MANAGEMENT CONSIDERATIONS

Seagrass Beds

Along the islands of Cayo Costa, Punta Blanca and North Captiva, the seagrass bed community is extensive, flanking nearly the entire length of the east side of both islands. These seagrass beds are part of the Pine Island Sound Aquatic Preserve managed and monitored by DEP staff. Even though the seagrass bed community is technically outside of state park boundaries, these areas are no less important to the state park and its natural and imperiled resources. Seagrass is a photosynthesizing plant requiring sunlight to reach through the water column and has rhizomes anchoring it into the sediment. These expansive stands of vascular plants occur in subtidal or coastal waters where wave energy is moderate. Seagrass is a critical habitat and nursery area providing food and shelter for many commercial and recreational fisheries, including threatened and endangered species. Imperiled species that frequent seagrass beds for foraging include sea turtles, manatees and smalltooth sawfish. Seagrass provides many environmental benefits including sediment stabilization, increasing water clarity by trapping particulates, absorbing nutrients and carbon dioxide and producing oxygen. Statewide, FWC values seagrass at $20,000 per acre, and a local study in Pine Island Sound found it was worth $93,829 per acre (Beever 2012). Species found in the Pine Island Sound seagrass beds include turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*) and shoal grass (*Halodule wrightii*).

The seagrass beds on the east side of the islands are relatively healthy despite several large areas of propeller scarring. Aerial imagery captured bi-annually by the Southwest Florida Water Management District and South Florida Water Management District is used to determine the geographic extent of seagrass beds and assess changes over time. These coverage maps show signs of some seagrass bed loss from 2014 to 2021, on the east sides of Cayo Costa and Punta Blanca. The southeast side of North Captiva shows additional loss of seagrass near the shallow water and shoals that can deter some recreational boaters, but there are also areas of prop scarring found here. Another location with seagrass bed loss is mapped within Pelican Bay on the north end of Cayo Costa, where a sand spit continues to accrete in a southerly direction. Boat propeller scarring and groundings continue to be one of the main contributors of seagrass loss and damage in Pine Island Sound, which has the highest acreage of scarring within the local aquatic preserves.

Park staff will continue to operate all park vessels within designated channels and at speeds consistent with posted markers or observed conditions. The park will display educational signage and provide educational materials to recreational boaters that visit the main park entrance. District and park staff will continue to coordinate with the Charlotte Harbor Aquatic Preserves staff on any proposed activities at the park that might have an impact within the adjacent Sound.

Arthropod Control Plan

In 1995, a Lee County Mosquito Control District/DEP agreement that allowed a three-year experimental use of Abate, with monitoring by Mote Marine Laboratory, after which Abate use would continue unless “substantial adverse impacts to non-targets” were shown by Mote. The experiment concluded with a finding of no significant impacts, and the use of Abate was authorized in a formal amendment to the arthropod management plan (AMP) in 1999.

Even though the 1987 AMP only allowed Bti, the 1999 Amendment to that AMP stated that “the use of methoprene, Bti, and monomolecular films…remains unchanged. All other chemicals used on designated

lands will be reported." Because of the heightened concern with the toxicity of Abate, the 1995 agreement defined the low marsh "recurring breeding areas" as those which needed regular treatment and high marsh "non-recurring areas" as those which only needed occasional treatment. The types of habitats were mapped, ground-truthed and adopted by mutual consent. The 1999 amendment did not institute these designations but rather identified "treatment areas" and "non-treatment areas." The amendment required an annual meeting between Lee County Mosquito Control District and DEP staff, prior to the treatment season, to review maps and decide which acreages should be classified in the two categories for that year.

Mosquito control plans (i.e., Arthropod Control Plans) are typically proposed by county mosquito control districts when they desire to treat on public lands that are protected by section 388.4111, F.S. (Collier County Mosquito Control District 2012; FDACS 2012). The current plan for Cayo Costa State Park was finalized in 2010 and is available in the Southwest District Arthropod Control Plan appendix. In 2017, DEP approved limited aerial adulticiding in state parks within Lee County, with specific restrictions, excluding Cayo Costa State Park. Additionally, the use of Spinosad was authorized in designated areas, with its use subject to reevaluation every five years.

Mosquito control plans temporarily may be set aside under declared threats to public or animal health, or during a declared state of emergency.

See the Florida State Park System – Statewide Philosophy and Framework for additional information.

LAND USE COMPONENT

VISITATION

Accessible only by boat or paddlecraft, this former offshore realm of the Calusa features 9 miles of undeveloped shoreline for swimming, paddling, snorkeling, shelling and fishing, while interpreting representative natural and cultural resources of the local barrier islands. The park contains areas of exceptional natural beauty, including coastal grasslands and miles of white sandy beaches critical to nesting sea turtles and shorebirds. Other portions of the island support closed-canopy maritime hammocks and mangrove forests that are important habitats for neotropical birds and other coastal wildlife. The majority of visitation is day use; however, the park's semi-primitive campground provides for tent camping just landward of the Gulf.

Trends

Visitation at Cayo Costa is centered on the beaches. Annually, the park receives approximately 99,000 visitors, many arriving via personal boat and beaching along the southern portion of the island and along the Gulf beach when sea surface conditions are conducive. Activities such as snorkeling, surf fishing and paddling trend towards warmer months, while boating and exploring the island's trails remain popular year-round. Historically, the campground and rustic cabins saw consistent use. However, in 2022 Hurricane Ian damaged the rustic cabins beyond repair and caused significant damage to the semi-primitive campground. Re-establishing camping is a priority and is addressed in this plan.

Economic Impact

Annual visitation at Cayo Costa State Park averages approximately 90,000. Lower recorded attendance in recent years is attributed to repetitive hurricane impacts. The park recorded 2,497 visitors in FY 2023-24. By DRP estimates, visitors in FY 2023-24 contributed $2,077,716 in direct economic impact, the equivalent of adding 29 jobs to the local economy (DEP 2024).

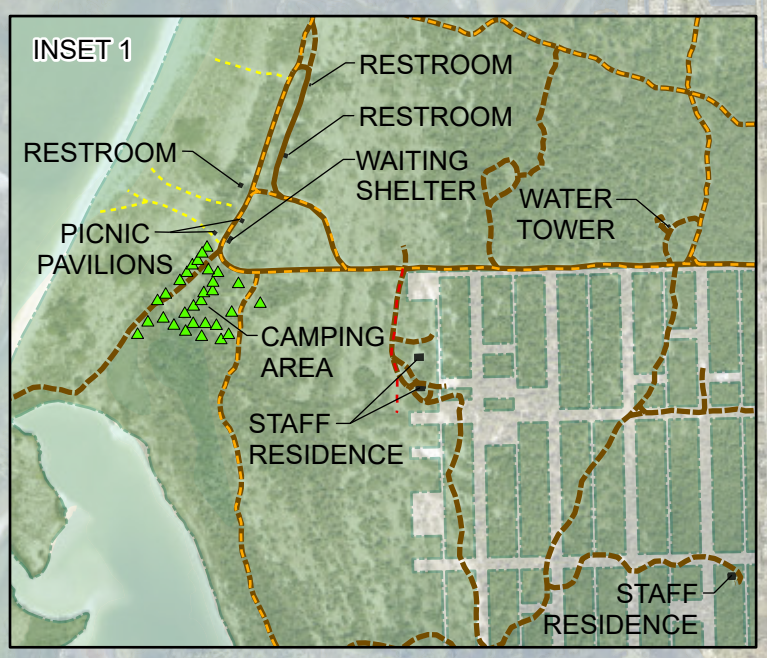
EXISTING FACILITIES AND INFRASTRUCTURE

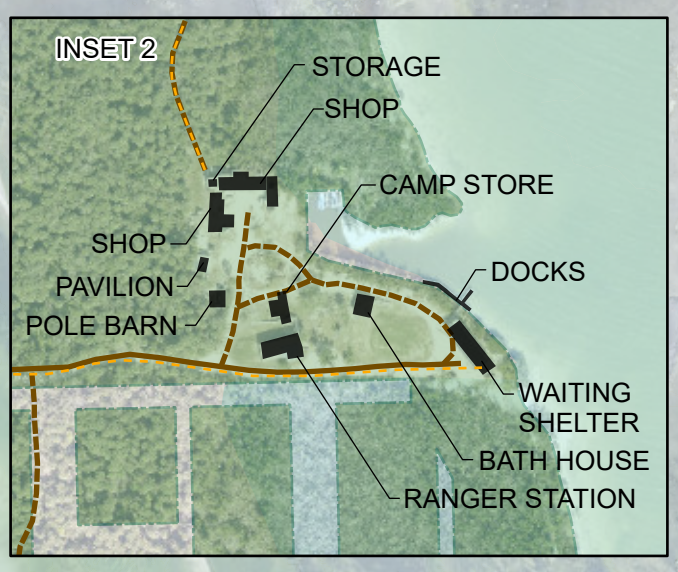
The primary public access point onto Cayo Costa Island is the Pelican Bay Boat Basin. This area contains public and service boat docks, restroom and administrative office space. The park maintenance area is located adjacent to the boat basin and includes two pole barns, a generator shed and a storage shed. A large diesel generator is located within the maintenance compound and provides electrical power to park facilities and staff residences. A tram originates from this access area, and transports visitors approximately 1 mile to the western side fronting the Gulf. Prior to Hurricane Ian, Gulf side facilities included 12 rustic cabins, three restroom facilities, two picnic shelters, an amphitheater and a tent camping area with 30 sites.

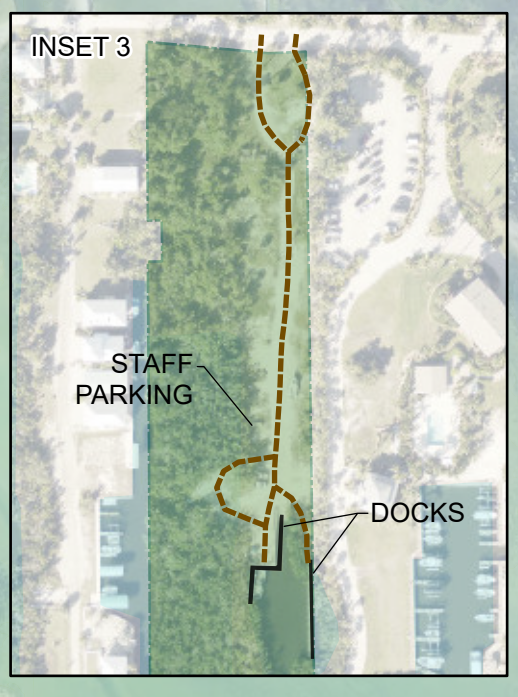
Cayo Costa contains about 5 miles of trails for hiking and biking. Interpretive facilities include a series of interpretive panels at the Pelican Bay and Gulf side use areas that serve to orient visitors and provide information about the natural history of Gulf barrier islands and their natural and cultural resources. Fees are collected at two honor box stations located on the bay and Gulf sides of the island. Water is provided by a well and wastewater is processed via septic systems. Three staff residences are located in the interior of Cayo Costa Island.

North Captiva and Punta Blanca islands contain no facilities or recreational infrastructure.

CEMETERY TRAIL
SCRUB TRAIL
PINELANDS TRAIL
GULF BEACH TRAIL
CABINS & CAMPING AREA
MURDOCK POINT
INSET 1
QUARANTINE TRAIL
MAIN DOCK & RANGER STATION
INSET 2
PELICAN PASS
PUNTA BLANCA ISLAND
PELICAN BAY
PRIMO BAY
PRIMO ISLAND
BIRD KEY
MIDDLE KEY
MONDONGO ISLAND
USEPPA ISLAND
CABBAGE KEY
PLATT POINT
MURDOCK BAYOU
CAYO COSTA ISLAND
THE NARROWS
PEJUAN COVE
PEJUAN POINT
GULF OF AMERICA
CAPTIVA PASS
JUG CREEK SHOAL
JUG CREEK COTTAGES & CREW BOAT LAUNCH
INSET 3
BOKEELIA ISLAND
BACK BAY
PART ISLAND
ORANGE PASS
COON KEY
BLACK KEY
PINE ISLAND SOUND AQUATIC PRESERVE
CAPTIVA SHOAL
SAFETY HARBOR
FOSTER POINT
FOSTER BAY
NORTH CAPTIVA ISLAND
SOUTH BANKS
REDFISH PASS
PINE ISLAND NATIONAL WILDLIFE REFUGE







- Park Boundary
- Park Road Stabilized
- Park Road Unstabilized
- Hiking Trail
- Hiking/Biking Trail
- Walkways
- Structures
- Camping Sites

CAYO COSTA STATE PARK
Existing Facilities

N

0 0.5 1 Mile

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

Prior to Hurricane Ian, several structures were located on the park's small base of operations on Pine Island and included six rental cabins and an office/laundry/storage building. A boat ramp and dock, for park staff and other official use, is located here as well. Access to the Pine Island operational base is from Pine Island Road via Matlacha. This location is the park's only base of operations with roadway connection to the mainland and is important for operational support as the point of embarkment for staff and supplies to Cayo Costa Island.

Facilities Inventory

Pelican Bay Boat Basin	
Restroom	1
Ranger Station	1
Generator Building	1
Pole Barn	2
Arrival Dock – Damaged by hurricane; under repair	1
Service Dock	1
Maintenance Building – Destroyed by hurricane; to be reconstructed	1*
Office	1
Pavilion – Destroyed by hurricane; to be reconstructed	1*
Waiting Shelter	1
Camp Store/Concessionaire – Destroyed by hurricane; to be reconstructed	1
Well Site	
Well Pump	1
Water Tower	1
Volunteer Storage	1
Gulf side Use Area	
Tent Camping – Damaged by hurricane; to be redeveloped	30*
Elevated Restroom	1
Small on-grade restroom	1
Picnic pavilion	2
Residences – One residence destroyed by hurricane; to be reconstructed	2*
Hiking Trail	7 miles
Pine Island	
Boat Dock and Ramp	1
Unimproved Parking Sites	20

CONCEPTUAL LAND USE PLAN

Pelican Bay Boat Basin

Objective: Provide appropriate access.

Actions:

- Evaluate expansion of dock and slips.
- Develop and implement an interpretive sign plan.

Access to the park is entirely by watercraft. All overnight guests arrive at Pelican Bay, as well as day use visitors who arrive via the park concessionaire shuttle boat service. Those visitors that arrive at Pelican

Bay via personal boat must utilize the dock and available boat slips. In the interest of minimizing unauthorized and often damaging landings and moorings in the Pelican Bay vicinity, there is a need to expand the number of available slips at the park dock. Designs to expand the dock to include up to 10 additional slips should be explored and implemented if determined feasible. Limiting factors include seagrass protection in the waters of the dock site.

Determine the most effective way to connect visitors to the park's significance and relevant themes at both the Pelican Bay and Camping Area trail hubs, including the possibility of trail labels. The type, design, quantity and placement of interpretive elements to deepen understanding and improve orientation will be specified during this planning process. Appropriateness in this dynamic coastal area will be considered.

Objective: Redevelop visitor reception and concessions.

Actions:

- Reconstruct the camp store/concessions building.
- Evaluate scope of on-island visitor support services.

Prior to Hurricane Ian, visitor support services on Cayo Costa included shuttle service to and from the island, cross island shuttle between Pelican Bay and the Gulf, camper check in and equipment rentals. Concepts to restore these services will include consideration of a concessionaire operation that aligns with the overall management needs of the park while supporting allocation of DRP staff to address essential resource management, interpretation and maintenance activities. Visitor services should once again focus on beach activities such as paddling, snorkeling, fishing and small boat sailing, as well as the administration of the semi-primitive campground. A scope of services will be evaluated, including shuttle service to and from the island, tram service between the Pelican Bay Boat Basin and the Gulf beach, camping registration and equipment rentals. An operations plan, based on the scope of services, would need to be consistent with the design of the new camp store/concession building to be reconstructed immediately north of the existing ranger station.

Campground

Objective: Reestablish overnight camping.

Action:

- Redevelop the semi-primitive tent campground.

Prior to Hurricane Ian, the park provided a semi-primitive campground for registered campers consisting of 30 tent sites. A vicinity bathhouse serves campers as well as day use beach users. Campers either bring freshwater or can access potable water from the bathhouse. The campground should be redeveloped along with a secondary smaller restroom with showers that once served cabin guests. Opportunity exists to reconfigure the arrangement of campsites to maximize an immersive natural-area experience. As a semi-primitive campground, no utilities (neither water nor electricity) are supplied to the individual campsites. The only infrastructural amenity of the campground is the restroom/bathhouse building where potable water, outdoor showers and restrooms are available. Redesign should ensure convenient access to the restroom buildings but allow for wider spacing of sites, generous swaths of natural habitat between sites, staggering such that campsites do not directly face one another, and narrower meandering pathways. As campers do not arrive by vehicle, paths are unpaved and utilities are not provided, the rigid and tightly sequenced sites of the existing layout can be re-evaluated for an

1. Pelican Bay Dock and Canal - Implement interpretive sign plan. Evaluate expansion of dock and slips. Evaluate cyclical canal maintenance.

2. Pelican Bay Visitor Reception - Reconstruct camp store/concession building.

3. Maintenance Area - Reconstruct three-bay shop and pole barn.

4. Campground - Redevelop semi-primitive tent campground.

5. Staff Residence - Full reconstruction of staff residence destroyed by hurricanes.

6. Staff Residences - Construct up to three off-island residences.

7. Well Site - Evaluate and reconfigure parkwide potable water system. Conduct a historic structure assessment of water tower and determine management direction.

CAYO COSTA STATE PARK
Conceptual Land Use Plan

N

0 500 1,000 US Feet

8 Pine Island Land Base - Provision fill in the vicinity of any residences constructed here.

9 Jug Creek - Evaluate cyclical canal maintenance.

CAYO COSTA STATE PARK - PINE ISLAND
Conceptual Land Use Plan

N

0 125 250 US Feet

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enhanced aesthetic experience. The number of spaces may increase or decrease modestly according to management considerations and spatial limitations within the general footprint of the campground.

Interpretation

Objective: Provide interpretation of natural and cultural resources.

Action:

- Develop and implement an interpretive trail plan.

A comprehensive park-wide interpretive and wayfinding plan is necessary to provide an introductory overview of the park to visitors upon their arrival. Cayo Costa and North Captiva islands should be described as a contextual part of the southwest Florida barrier islands chain. Themes to be explored include the general natural history and ecological role of southwest Florida barrier islands and the imperiled species they support, as well as the human story of those who once inhabited these places. Major natural areas and targeted points of cultural interest should be highlighted, such as seagrass beds, mangrove forests, beach dunes and the publicly accessible cultural sites of past human presence.

Park Protection

Objective: Establish clear and accurate delineation of park boundaries.

Actions:

- Survey and mark the corners of park boundaries that interface with private properties.
- Maintain demarcation/corner posts.
- Prevent the use of unauthorized trails and promote their natural recovery.
- Address private encroachments onto the park.

Management of park lands in proximity to privately owned outparcels has been challenging. Uncertainty over property boundaries has led to encroachments and the creation of unauthorized access trails/roads by some private property owners. Corner posts along park and private property boundaries should be periodically inspected and maintained. Wherever necessary, boundary surveys should be conducted/updated to accurately demarcate property lines. Any trails or roads that are determined to have been established on park lands without proper authorization, should be evaluated based on guidance provided in the Optimum Boundary section of this park chapter. Any such roads/trails deemed non-essential for access of private property should be blocked and allowed to revegetate (see Optimum Boundary section for detailed discussion).

Support Facilities and Infrastructure

Pelican Bay Maintenance Area

Objective: Redevelop essential maintenance facilities.

Actions:

- Reconstruct a three-bay maintenance building.
- Reconstruct one pole barn.
- Create visual barrier between staff support area and visitor arrival/departure area.

Hurricane Ian caused significant damage or destruction to elements of the maintenance area at Pelican Bay. Both the maintenance building and a pole barn were among the structures that were destroyed and must be replaced. These support facilities are essential to park maintenance and responsible stewardship of park equipment, particularly in the maritime environment. The new three-bay maintenance building and the new pole barn will be re-built in their former locations near the Pelican Bay Boat Basin to facilitate fuel, equipment and supplies arriving to the island.

Although necessary, having the arrival location for visitors and the maintenance area in such proximity can present an undesirable overlap. As an interim measure to mitigate this overlap, privacy fencing can be considered. However, the more sustainable, aesthetically pleasing, desirable, long-term solution is to establish native vegetation such as sea grapes that can block the view of the maintenance compound and provide a visually appealing back drop to arriving visitors.

Well Site

Objective: Improve protection of the well facility and other park equipment.

Actions:

- Evaluate and reconfigure parkwide potable water system.
- Conduct a historic structure assessment of the defunct water tower and determine management direction.
- Improve storage space for resource management supplies and light management equipment.

Water salinity and elevated iron content necessitate configuration of a new potable water system. The existing well site is approximately 2,000 feet west (inland) of the Pelican Bay access area, on the north side of the gulf access road. Situated in the interior of the island, the well is optimally located to draw fresh water from the center of the freshwater lens and centrally located to supply the facilities of Pelican Bay, the campground and the residences. Accordingly, the well site is situated strategically interior to serve multiple sites that require water via the shortest feasible distances of waterline. Additional studies may be indicated to locate the optimal point of ground entry to reach a sustainable source of potable water.

The former well house structure that previously shielded the well was destroyed in recent hurricanes leaving the well exposed to the CC air, sun and rain. Plausibly in conjunction with configuration of a new well, new housing must be constructed around the pump to safeguard this essential infrastructure.

The historic water tower at the well site is no longer in use, and its condition has deteriorated with age in the harsh island climate, accelerated by the impacts of recent storm events. In its current state, the structure poses a potential safety risk. It is necessary that a historic structure assessment be performed to determine precise course of action – either structural repair or a DHR-coordinated sequence of documentation and removal.

Volunteers assist the park in many ways including imperiled species monitoring, posting and roping of sensitive wildlife habitat, maintenance of facilities and implementation of visitor management measures. Supplies and equipment utilized for these tasks are often stored or staged at the well site area. Current storage consists of a single small shed. This building could be renovated (interior) to improve the efficiency of space. As a forward operating location for survey and monitoring efforts, light rolling stock such as all-terrain vehicles and utility vehicles are temporarily staged here, necessitating shelter. Either exterior renovation of the building or the addition of a small pole barn could provide necessary dry storage.

Staff Residences

Objective: Provide residences for essential staff positions.

Cayo Costa

Actions:

- Reconstruct one residence post Hurricane Ian.

Prior to Hurricane Ian there were three staff residences on Cayo Costa Island – two located seaward of the maritime hammock and one located deep within the protective hammock. The storm destroyed one of the seaward residences and severely damaged the second, while the hammock residence suffered only minor exterior damage. Design and construction measures that improve the structures' resiliency to future storm events should be considered and implemented.

With the knowledge that future hurricanes and regionally encompassing changes to the vulnerable barrier islands of southwest Florida are inevitable, contingency planning should begin considering relocation of all or some number of Cayo Costa staff residences to more protected (off-island) locations. Establishing staff residences at off-island locations where commuting via boat is still feasible as a resiliency concept that should be explored. Coastal locations that offer more protection from the immediate impacts of tropical cyclones are discussed below and in the Don Pedro Island State Park Chapter of the Southwest District Management Plan.

Don Pedro Island or Pine Island Base of Operations

Actions:

- Design and construct up to three residences off the island (long term).
- Mitigate flooding by raising grade of proposed support area on Pine Island land base.

As part of the barrier island chain along the southwest Florida coast, Cayo Costa State Park is exposed to the immediate impacts of tropical cyclones, lending to the vulnerability and high replacement cost of structures including essential residences. This plan, therefore, sanctions the construction of up to three single-family staff residences, or a comparable multi-family structure, at either Don Pedro Island State Park or the Pine Island Base of Operations. This relocation concept should be considered in the greater context and balance of other facility relocation/retreat needs throughout the Charlotte Harbor Region. Specifically, an inland tract of Don Pedro Island State Park, a commonly administered unit within reasonable boating distance of Cayo Costa, should be evaluated as a potential residence hub for essential park staff. Currently, this parcel is managed by Charlotte Harbor Preserve State Park staff and is included in Don Pedro Island State Park's Optimum Boundary. This parcel is proposed to be reassigned to Don Pedro Island State Park's lease.

The Pine Island land base is frequently flooded due to its low elevation and proximity to surrounding waterways. If additional residences are constructed on the island, fill should be placed within the active operational areas and over the footprints of potential structures to prevent flooding of the residences.

Jug Creek and Pelican Bay Canal Maintenance

Objective: Maintain navigable water access.

Action:

- Coordinate with the U.S. Army Corps of Engineers (USACE)to explore long-term permitting options to provide cyclical maintenance dredging needs.

Maintaining navigable water depths at Pelican Bay and Jug Creek is essential for park operations. Periodic maintenance dredging at Jug Creek is of particular importance as this base of operations is where all fuel and supplies depart for the island. These canals "silt in" gradually over time or can fill with sediment quite quickly as a result of storm surge events. Navigable depths have historically been maintained via individually permitted dredging projects. A more enduring maintenance dredging permit should be explored with the Fort Myers Permitting Section of the USACE Jacksonville District to provide for dredging needs at Cayo Costa as well as other regional parks to avoid delays that could impede essential park operations.

VISITOR USE MANAGEMENT

Sensitive Area Management

Objective: Prevent unauthorized access to sensitive areas.

Actions:

- Protect sensitive estuarine natural communities.
- Protect sensitive wildlife areas through posting and roping, routine patrolling, monitoring and visitor interface.

As a barrier island park with many miles of shoreline, a significant challenge is regulating and mitigating the unintended impacts of visitor access. Access points are numerous and visitors often range freely across broad areas of the park. Beaching or attempted beaching by recreational boaters along the park undeveloped bayside of the park causes impact to mangroves that serve as an ecologically vital peripheral component of the aquatic preserve. Boats with active motors entering the shallows near the park bayside can also result in damage to seagrass beds. More active coordination and collaboration with the adjacent aquatic preserve managers should be pursued to improve seagrass protection. Establishing and enforcing combustion motor exclusion zones where seagrass beds occur in the shallow waters adjacent to the park would reduce impacts to these and other sensitive estuarine natural communities in the nearshore environment.

While beaching along the Gulf side of the island during relatively calm marine conditions is generally accepted, certain segments of Gulf beach may require temporary exclusion due to the seasonal nesting activities of imperiled shorebirds. Park staff will follow FWC shorebird monitoring and habitat management guidelines including the posting and roping of documented nesting sites. Likewise, FWC Statewide Nesting Beach Survey procedures for locating, marking and monitoring sea turtle nests will be followed. Sea turtle and shorebird nesting success requires consistent visitor interface and interpretation throughout the combined nesting season (March through October).

Extensive shoreline inspection has not revealed a location with a suitable water depth and access corridor across the barrier island to the destination Gulf beach to justify the proposal of an additional bayside dock-facilitated landing site for commercial or private boats. The far southern portion of Cayo

Existing Park Boundary

Optimum Boundary (ARC-Approved)

CAYO COSTA STATE PARK - NORTH CAPTIVA
Optimum Boundary

N

0 1,000 2,000 Feet

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Existing Park Boundary
Optimum Boudnary (ARC-Approved)

CAYO COSTA STATE PARK
Optimum Boundary

N
0 800 1,600 Feet

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Existing Park Boundary

Optimum Boundary (ARC-Approved)

CAYO COSTA STATE PARK - SOUTH TRACT
Optimum Boundary

N

0 750 1,500 Feet

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Costa is particularly poorly suited for the establishment of a fixed landing site. This portion of the island is dynamic in nature and has experienced significant erosion in recent years, influenced in part by increased shoaling just offshore of the widest part of the island. See "Coastal Erosion/Sedimentation" in the Hydrology section of the Resource Management Component.

OPTIMUM BOUNDARY

The optimum boundary for Cayo Costa State Park includes all remaining unimproved private and county lands on Cayo Costa and remaining unimproved private parcels on the central and southern portions of North Captiva Island that are contiguous with existing park boundary. Benefits of these acquisitions would include resource protection and enhanced access for management. On Cayo Costa proper, acquisition of numerous inholdings would close management gaps between portions of the park, providing greater range of shoreline and interior trail access for resource management protection, resource-based recreation and interpretive opportunities. As remaining unimproved parcels are acquired, segments of platted road rights of way through the northern portion of Cayo Costa, which are no longer needed for private inholding access, may be transferred to park management.

The inland lagoon located along the Gulf side at the widest portion of Cayo Costa is included within the optimum boundary for resource management and protection purposes. The formation of the lagoon occurred within the past 40 years as a result of sand accretion patterns. Except for one private outparcel on the southeast shore, the lagoon waters are surrounded by uplands and dry shoreline managed by the park. The 1-mile-long and 0.25-mile-wide lagoon covers approximately 102 acres and maintains an average depth of 10 feet. Imperiled shorebird and wading species frequently use tidally exposed mudflats and beach shoreline along the lagoon for foraging and resting perennially. The lagoon shoreline is also significant for loggerhead and green sea turtle nesting.

Management of the sovereign submerged lands located 25 feet seaward of the mean high waterline, along the Gulf shorelines of both Cayo Costa and North Captiva, is proposed for resource protection. Extending this proposed management authority up to 300 feet seaward along the stretch of Gulf Beach (roughly on latitude with Pejuan Point) is warranted to protect marine consolidated substrate (limestone outcroppings). DRP also proposes that management authority be extended 25 feet seaward of the mean high waterline along all segments of the park bayside shoreline. Such management authority proposals for adjacent sovereign submerged lands should be presented to DEP's Division of State Lands via a lease amendment request, coordinated through DRP's Office of Park Planning.

Toward the south end of the island, near an area known as "the narrows," is an inholding containing the majority of a significant recorded cultural site called Faulkner Mound. While this precontact shell mound has been impacted by site construction and clearing of vegetation, the overall mound feature retains its general shape, profile and archaeological content. In effort to preserve this prominent cultural resource, the Faulkner Mound inholding should be considered a viable acquisition parcel, despite existing development.

Park and Private Lands Access

The following section is for general consideration only. Implementation of solutions to the identified issues may differ from the recommendations given below as further surveying, legal consultation and stakeholder engagement may be required.

The purpose is to describe the arrangement of the platted subdivision located on Cayo Costa and the relationship of this plat to Cayo Costa State Park; and to offer recommendations for updating the platted right-of-way and amending potential encroachments across park boundary. The corresponding Access Management Map depicts these recommendations.

Existing Right-of-Way

The north-central interior of Cayo Costa contains the plat of a dense subdivision, *La Costa Isles*, originally planned circa 1912, prior to establishment of the park. Right-of-way, for owner access to the individual parcels, is included in the plat. Ownership/jurisdiction over the right-of-way extending between parcels is held by Lee County. This grid, which defines the parcel boundaries within the plat, contains alternating wide and narrow right-of-way segments.

Other Access

In addition to the grid of Lee County rights-of-way, other roads exist for both park and private parcel access. The park roads (brown line) serve management purposes and provide opportunity for public recreational access through the park. The other roads that do not conform to the right-of-way grid (red line) are cleared for private parcel access and, in some cases, encroach on park land. Some of these roads entail significant meanders.

Park gates (green points) exist at junctions where ingress and egress controls are needed for park management and resource protection.

Distribution of Parcel Ownership

As indicated in the map, many of the parcels within the plat have been acquired for management under DRP as part of Cayo Costa State Park. Platted parcels that have been acquired as part of the park are depicted in green to match the broader park boundary. Remaining private parcels/inholdings are isolated (depicted in the map without shading) and park-parcels are separated from one another only by the linear right-of-way (depicted in yellow) extending north-south and east-west. In these areas where all parcels are under park management, certain segments of the right-of-way are no longer necessary for access to the remaining privately-owned parcels.

South of the platted area are seven remaining private parcels without any existing right-of-way/legal access, with the exception of the large rectangular parcel which can be accessed by water at its Gulf frontage but lacks legal access to the bay/canal.

Recommended Access

Vacating County Right-of-Way

To consolidate DRP management where park parcels are separated from one another only by the segments of county right-of-way, DRP proposes that the respective segments be vacated. If vacated, the segments would be incorporated with the adjacent park. Right-of-way segments essential for access to private parcels should be maintained. It should be noted that most of the platted right-of-way (yellow line) is not cleared and represents intact maritime hammock, thus adding to the urgency for protection.

Existing Roads to be Closed and Existing Inholding Access

Where roads for private parcel access have been cleared, potential encroachments on park land should be assessed. Preliminary field surveys conducted in 2020/2021 have identified private-interest roads traversing sensitive natural landscapes within existing park boundary. To avoid park resource impacts, DRP recommends closure of such roads contingent upon viable alternative routes that adhere to the shortest distances along the platted right-of-way. These recommended routes are depicted in black – some existing as cleared paths (solid black line) and others as uncleared/unused legal access (dashed black line). The existing cleared right-of-way, extending east-west at the southern edge of the plat, is particularly significant for providing direct access to five parcels as well as Sellers Canal (the only navigable bayside inlet for the plat) at its eastern terminus.

Access Easements Needed

For the southern private parcels (outside of the plat arrangement) utilizing existing cleared paths (solid white line) to indirectly access the existing county roads and Sellers Canal, DRP recommends retaining the existing meandering routes to minimize resource impacts and providing easements as needed for access along these same routes.

Access Easements and Clearing Potentially Needed

For private parcels not linked to any assets by either legal access or cleared paths, DRP recommends delineating straight easements for access to the arterial cleared path (proposed for easement). Recommended straight easements will provide the shortest route and yield the least impact across park land.

New Park Gates

Approximately 11 additional park gates (orange points) are recommended at junctions where unauthorized vehicular passage is frequent. Limiting ingress and egress by vehicles is intended to reduce impacts to park resources. Pedestrian ingress and egress may be permitted at such junctions where users utilize authorized park routes and abide by standard rules for park visitors.

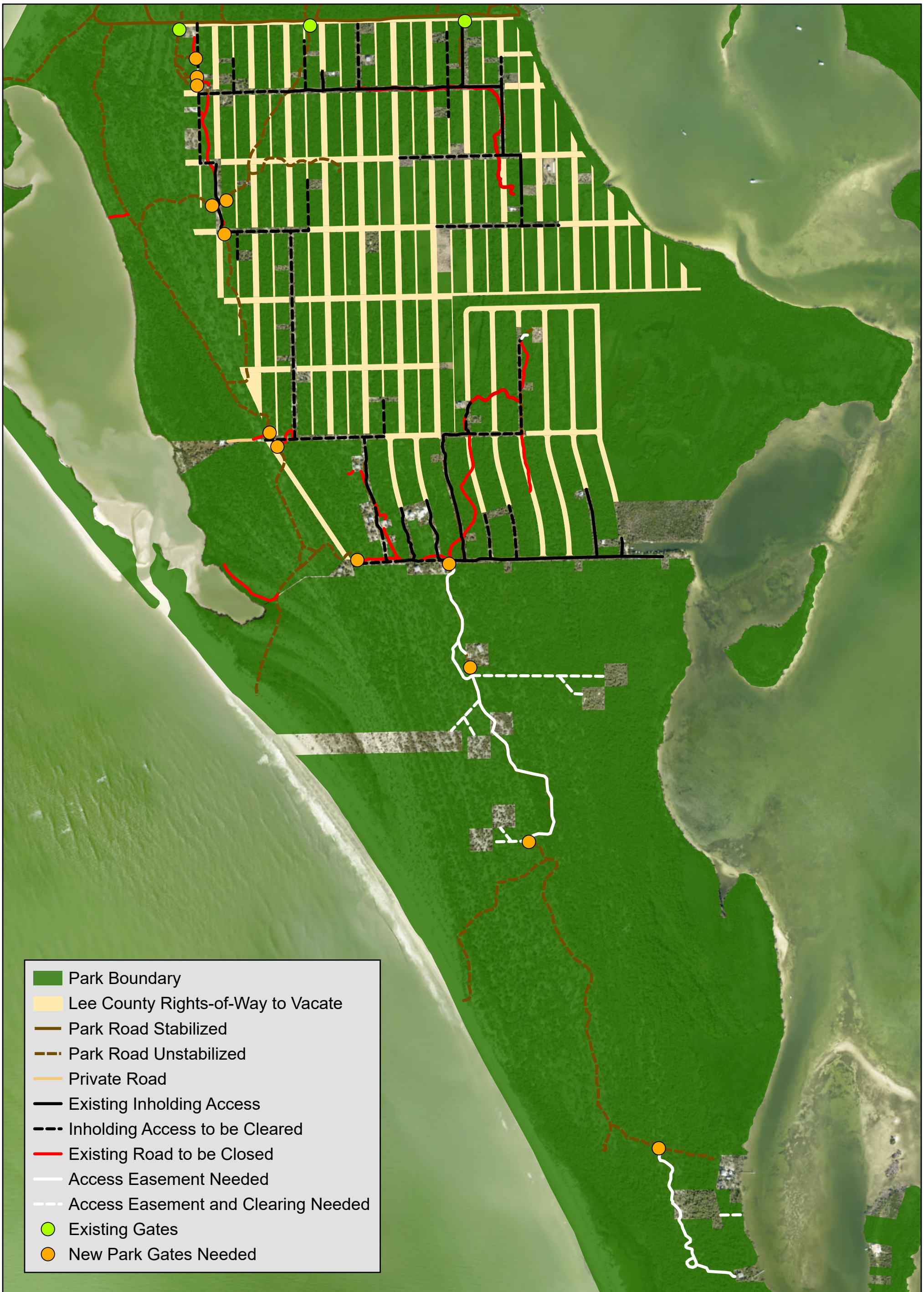
Restoration

For any existing roads or paths that are vacated or otherwise discontinued, DRP recommends allowing the natural vegetation to return. Desired future conditions and specific restoration actions may be considered as access management is confirmed with Lee County and the private parcel owners.

Summary

Access to the parcels of *La Costa Isles* is provided by county-owned right-of-way. The proposed right-of-way to vacate consists of platted legal access that does not provide private parcel access. Other existing roads to close are those that traverse park boundary for the purpose of accessing private parcels where less-impactful alternative access is viable and comparable (for the parcel owners) by utilizing the legal access granted by the original county right-of-way (i.e., segments of right-of-way that should be maintained). Outside of the platted area, any existing roads should be evaluated on a case-by-case basis for either abandonment or retention. If roads outside of the platted area are determined to be

necessary for ongoing access to private inholdings, they should be established by way of easement, as coordinated through DRP's Office of Park Planning.



CAYO COSTA STATE PARK
Access Management

N

0 500 1,000 Feet

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