CHARLOTTE HARBOR
Regional Overview

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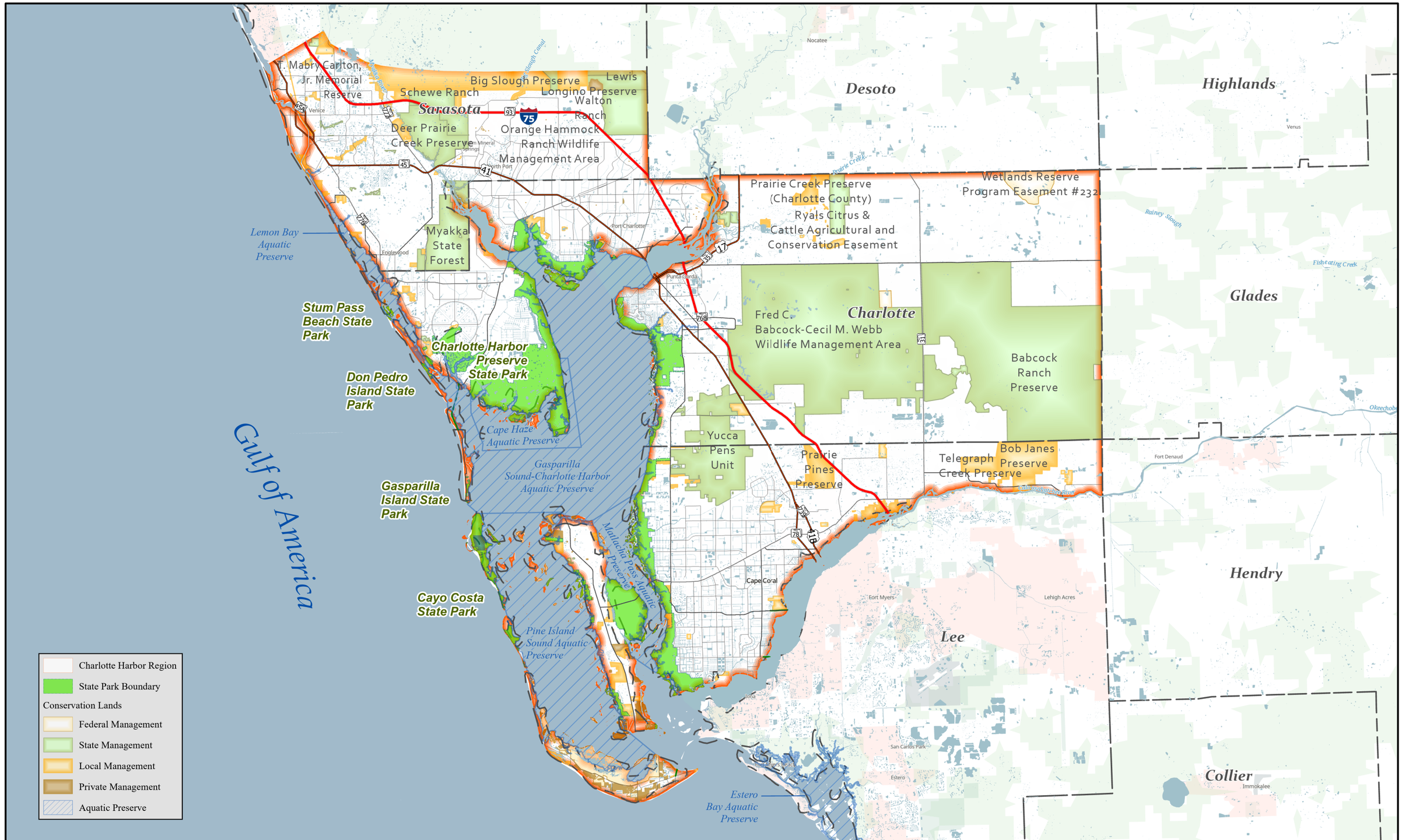

FLORIDA PARK SERVICE - SOUTHWEST DISTRICT
Charlotte Harbor Region

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CHARLOTTE HARBOR REGION

REGIONAL GEOGRAPHY

As the name implies, the dominant geographic feature of the region is Charlotte Harbor. This vast bay system includes five named aquatic preserves, together representing one of the largest protected estuaries in Florida. Both the Myakka River and Peace River empty into Charlotte Harbor at its northern end near the cities of El Jobean and Charlotte Harbor respectively and are critical to the function and health of the estuary. Several large barrier islands help protect Charlotte Harbor from some aspects of tropical cyclones. From north to south, these include Gasparilla, Cayo Costa, North Captiva, Captiva and Sanibel islands.

With over a million residents in the combined portions of Sarasota, Charlotte and Lee counties surrounding Charlotte Harbor, the Cape Haze and Cape Coral peninsulas are among the most densely populated areas of the state. The local economy is largely based on retail trade, healthcare, hospitality, food services, new construction and social assistance. With the regional population growth and urbanization projected to continue, the state parks and aquatic preserves play an increasingly important role in mitigating anthropogenic impacts to the estuary and associated barrier islands.

Charlotte Harbor Region Units:

- Gasparilla Island State Park
- Cayo Costa State Park
- Don Pedro Island State Park
- Stump Pass Beach State Park
- Charlotte Harbor Preserve State Park

REGIONAL GEOLOGY, GEOMORPHOLOGY, TOPOGRAPHY, SOILS, MINERALS

Geology

The dominant geological stratum affecting the physical features of the land surface and associated biota in the Charlotte Harbor Region is the Oligocene-Pliocene Hawthorne Group. Overlying soils are typically categorized as spodosols characterized by a horizon of organic matter with trace iron and aluminum. In most of the planning region, these soils have fluctuating surficial water tables and can range from saturated to dry depending on seasonality. Correspondingly, mesic flatwoods with a dense shrubby understory is the dominant natural community across the greater landscape. More relevant to the five units of this region are the soils comprising the various land types along the coastlines of Charlotte and Sarasota counties. Beaches and dune fields within the barrier island parks of the region are comprised almost entirely of quartz sands. These well-drained, nutrient-poor soils are colonized by hardy salt-tolerant plants such as sea oats (*Uniola paniculata*). The quartz sands beneath tidally influenced areas such as mangrove swamps and salt marshes are overlain by often deep layers of organic rich sediments. No mineral deposits of commercial value are known to exist within any of the parks of the Charlotte Harbor planning region.

The islands of the Charlotte Harbor Region are part of one of the most morphologically diverse barrier-inlet systems in the world (Davis, 1994). This system extends for about 186 miles and includes 29 barrier

islands and 30 tidal inlets. (Randazzo and Jones, 1997). Like most barrier islands, they are unstable land masses, constantly changing shape in response to the natural influences of wave energy, storms, tides, wind and rising sea levels.

North Captiva, Cayo Costa, Punta Blanca, Gasparilla and Don Pedro islands are all situated on an upper layer of limestone called the Anastasia Formation, mainly composed of coquinoidal limestone, sand and clay. These islands buffer and protect the Charlotte Harbor estuarine system from storm-generated waves in the Gulf. Farther north, the Manasota Key Peninsula, which includes Stump Pass Beach State Park, affords similar protection to the Cape Haze Peninsula.

The two adjacent islands of Cayo Costa and North Captiva are both approximately 3,100 years old (Stapor et al., 1991). Radiocarbon dating of shells from sediment cores has aged all ridges on both islands and explains the topographic origins. The sets of beach ridges on Cayo Costa and North Captiva indicate a history of alternating sediment deposition and erosion, plausibly the result of three major fluctuations in sea level: (1) sea level rise until about 2,000 years ago, (2) sea level fall between 1,700 and 1,100 years ago and (3) rise in sea level from 1,100 years ago to present day. These ridges were formed from changes in the level of surrounding waters while wave energies remained generally constant.

Elevations on Cayo Costa proper vary over a 12.5-foot range, from 2 feet below mean sea level (msl) to about 10.5 feet above msl. One pre-Columbian mound, Old Ware Mound, rises to about 16 feet above msl. Topographic relief in Cayo Costa State Park was created by sediment deposited in successive ridges onto the seaward face of the island by the action of wind and waves. The most pronounced natural topographic features in the park are found on the seaward side, where the foredunes reach heights of 5–8 feet above msl. The older inland dunes level off to a gently undulating surface because of weathering. Elevations vary between 2–6 feet. The topography on the east side of the island is independent of this ridge-swale complex, having been shaped instead by overwash fans and bayside sedimentation.

In his book, *The Natural History of Cayo Costa (1977)*, Stanley Herwitz detailed the geomorphic history of the Charlotte Harbor barrier chain. About 5,000 years ago, the rate of sea level rise, caused by the melting of late Pleistocene glaciers, began to slow. It was at this time that the flooded mouths of the Myakka and Peace rivers formed the Charlotte Harbor estuary. As the rising sea coincided with a process of alluvial sediment deposition, a prominent spit began to extend southward from Cape Haze paralleling Pine Island. At this time, the waters of the Peace and Myakka rivers flowed southward into San Carlos Bay. The spit may have been breached on occasion during this process, allowing the rivers to flow through the openings temporarily, but the volume of discharge and tidal movement were of such a low magnitude that longshore drift quickly sealed these temporary openings. It was not until Matlacha Pass began to fill with sediment and the southern portion of the spit (now known as Sanibel Island) began to recurve eastward into San Carlos Bay that discharge from the Myakka and Peace rivers were forced to utilize the more northerly tidal inlets. This gave the barrier island chain a configuration resembling the present one. Herwitz also made some interesting speculations and observations about the development history of Cayo Costa Island. For example, Cayo Costa is separated from Gasparilla Island to the north by Boca Grand Pass that, at a depth of 51 feet, is the major tidal channel serving Charlotte Harbor. However, the major pass was once located at the narrowest part of Cayo Costa, south of present day Platt Wing.

Major geomorphic changes have occurred on Cayo Costa and associated parcels in the last 150 years. 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. Recent technology shows that this prominent shoal existed throughout the entire 3,000-year history of the island (Stapor et al., 1991). With increased

shoaling, the north section of the island widens while the southern section inversely diminishes as it is starved of sediment.

The most recent chapter in this geomorphological history occurred in the 1930s when Johnson Shoals re-emerged during a hurricane to become a prominent landform. At this time, there was a single V-shaped shoal that formed a barrier behind which a foreland grew out from Cayo Costa almost connecting with the shoal. In the 1940s however, a storm fragmented the shoal into three segments, exposing the shore of the island to wave action. The foreland lost over 100 feet by 1951. From time to time, fingers of sand from the shoals approached the shore. These acted as natural groins, obstructing the southward drift of sediments. As a result, much of Cayo Costa south of Johnson Shoals was subjected to severe erosion over a period of approximately 40 years. Historic analysis of the Cayo Costa shorelines reveals that the entire sector of the island south of Murdock Lagoon was over 500 feet wider and in a less pronounced concave form prior to the most recent emergence of Johnson Shoals. Herwitz speculated that the next breaching of the island might occur at this narrow point south of Murdock Bayou, a location where several private dwellings have been built.

During the 1980s, Johnson Shoals disappeared, followed by the formation of a long, southward reaching spit from the beach just south of where the rental cabins (destroyed by Hurricane Ian in 2022) and campground are located. Over the past four decades, this spit has formed a large, semi-enclosed lagoon. If Johnson Shoals were to re-emerge, it is speculated that they will once again intercept sand drifting toward the south and reduce the spit.

One of the more interesting features of Cayo Costa's plant communities is an inland community of red mangroves. Although it originated in a saltwater lagoon-like environment, the mangrove community now fringes an inland body of fresh water. It has been isolated from its marine origins by the same processes that constantly change the shape of barrier islands. The occurrence of interior water bodies is attributed to shoreline fluctuations, which were driven by changes in sea levels and large storm events. As barrier islands, constant shifts in shoreline locations and overall morphology are expected. Punta Blanca Island formed as a part of Cayo Costa as recently as 1868. It was connected to the "hook" of land enclosing the Old Place Hole. At this time, Old Pelican Pass was just a narrow channel separating Punta Blanca from Cayo Costa.

Examining the mainland portion of the Charlotte Harbor Region, the primary role of Charlotte Harbor Preserve State Park is to protect and preserve important estuarine and upland habitats along the periphery of Charlotte Harbor and to buffer the Lemon Bay, Gasparilla Sound - Charlotte Harbor, Cape Haze, Pine Island Sound and Matlacha Pass aquatic preserves from the impacts of dense urban development. The preserve exhibits little natural topographic relief. Most of its lands are periodically submerged or inundated, and most of the acreage lies within the landward extent of jurisdictional waters of the state as defined by Florida Statutes. The few non-estuarine areas possessing natural topography are typically less than 5 feet above msl. Low elevation areas are typically barren salt flats or vegetated with mangroves, marsh or wet (hydric) pine flatwoods. Topographic alteration by humans has occurred to some extent in all management areas of the preserve beginning with pre-Columbian peoples and their predecessors who built extensive mounds. Some of the canals and ponds associated with these archaeological sites may have also been built by these aboriginal inhabitants. Pre-Columbian Indian middens (or kitchen middens) and mounds may reach heights of 15–20 feet above msl and are usually vegetated with tropical hardwood hammock or coastal hammock species. Other, more recent, anthropogenic alterations to the topography of the preserve are numerous, including fire plow scars, mosquito ditches, dams, canals, drainage ditches, spoil piles and borrow pits. All management activities

in the preserve are undertaken with due regard and consideration for protection of the cultural resources, and with the intent, where practical, to restore more recently altered natural areas to their historic natural community type.

The estuarine wetlands of Charlotte Harbor began to form approximately 5,000 years ago when a rise in sea level flooded the mouths of the Myakka and Peace rivers. The flooding caused sediment to be deposited in a series of deltaic formations, which began the in-filling of the present estuary. These recently deposited sediments form the substrate of the estuary's wetlands.

The Anastasia Formation (introduced above) is the predominant stratum lying below the preserve's unconsolidated surface material. This formation appears as a light cream to light gray sandy limestone and tan, shelly, sandy marl. Sporadic outcrops are visible on salt barrens and in estuarine creek bottoms at several locations. The Anastasia Formation was formed as an offshore deposit when southwest and southern Florida were shallow marine environments during periods of higher sea level. The formation varies from very thin to 10 feet thick and occasionally reaches 15 feet in depth. It overlies the deeper Caloosahatchee Marl and is an important component of the shallow aquifer (McCoy, 1962 from Estevez, 1984).

Much of the preserve has low, poorly drained soils, characterized by the U.S. Department of Agriculture's Natural Resource Conservation Service as poorly drained sands or mucky sands of about 36 different types (see Soils Maps). The soils range from dry Satellite Fine Sands that support scrub oaks and lichen vegetation to wet Wulfert Muck that is dominated by mangroves and rushes. The dominant soils are hydric composed of Peckish Mucky Fine Sand, Estero Muck, Wulfert Muck, Isles Muck and Kesson Fine Sand, all of which are typical of coastal estuaries. The hydric soils make up approximately 82.4% of the preserve, or 35,995 acres. The remaining 17.6% are upland soil types dominated by Smyrna Fine Sand, Myakka Fine Sand, Oldsmar Sand, Wabasso Sand limestone substratum and Immokalee sand. These soils support mesic pine flatwoods, most of the cabbage palm and oak hammocks, scrub and scrubby flatwoods communities. Most of the upland soils are distributed throughout the preserve except for Smyrna fine sand. This soil is limited to the Cape Haze Management Area and appears to be associated with those areas with longleaf pine. Detailed soil descriptions are provided in the Southwest District Soils Descriptions appendix. Previous land uses, hydrologic alterations, and fill removal/placement have affected portions of all the management areas of the preserve. In areas where large-scale disturbances have taken place, soil horizons may be intermixed and/or totally absent because of earth moving, erosion or oxidation processes. These disturbed areas frequently have altered salinities or chemical makeup, resulting in very different floral and faunal components than would typically occupy the same areas without disturbances. Any proposed activities in the preserve must consider these consequences and take appropriate management steps to prevent soil disturbance and erosion.

REGIONAL HYDROLOGY

The Charlotte Harbor Watershed encompasses three major drainage areas, including the Charlotte Harbor, Peace River and Myakka River basins. Surface hydrology is primarily via the Peace, Myakka and Caloosahatchee rivers. These rivers, in conjunction with their tributaries, deliver freshwater to the harbor where it mixes with saltwater from the Gulf, creating the vast estuary. The mixing of waters within the estuary is largely influenced by tides and the flow of these major rivers, which is dependent on seasonal rainfall patterns.

Charlotte Harbor is largely buffered from residential development by the surrounding Charlotte Harbor Preserve State Park. Local hydrology takes the form of both sheet flow and small tidally influenced drainages, referred to as salt creeks. The natural sheet flow and stream flow hydrology have been highly altered by canals that were dug to attenuate (temporarily retain) runoff from adjacent residential areas before entering the preserve and ultimately the estuary.

Hydrology specific to the region's barrier islands is influenced by local factors. Freshwater sheet flow from rain events is minimized by the deep porous sands of the beach dunes. However, standing freshwater can still accumulate at the ground surface within interdunal swales and depressions that lack estuarine connections. These wetlands range from ephemeral to semi-permanent. Where estuarine connections occur, wetlands are subject to tidal influence and assume estuarine characteristics. All barrier islands of the region are subject to the mass influx of marine and estuarine waters during storm surge events associated with tropical cyclones. Storm surge can significantly reshape the morphology and topography of the barrier islands which have lasting effects on local hydrology.

REGIONAL SEA LEVEL RISE PROJECTIONS

For the lowest lying and most coastally situated and tidally affected units of the Charlotte Harbor Region, a set of sea level rise scenario maps depicts projected changes in natural communities – the barrier island units of Stump Pass Beach, Don Pedro Island, Gasparilla Island, and Cayo Costa state parks.

Using the Sea Level Affecting Marshes Model (SLAMM), a baseline of existing natural communities, underlying soil types, digital elevation models, and slopes were evaluated in relation to potential sea level rise. From this baseline, the model projects the succession of natural communities within the selected coastal units.

This SLAMM-based projection is comparable to the intermediate scenario of the 2022 NOAA Interagency Sea Level Rise Technical Report. Rate of projected rise is non-linear, with higher rates of rise trending later. Given the complexity of variables and degree of uncertainty in longterm projections, the maps presented in this plan represent potential natural communities conditions by the year 2050 – consistent with the near-term horizon of the unit plans.

Using such projections, resource management and capital facilities can be planned with advanced awareness of changing conditions. Among various adaptations to the regional natural resource management program, natural communities succession has particular implications for optimal fire return intervals, groundcover restoration objectives, and installation of culverts and low water crossings. For cultural resource management, adaptive objectives may include stabilization of vulnerable archaeological sites or historic structures and prioritization of research on cultural sites most sensitive to tidal erosion. For construction of capital facilities, projecting natural communities succession will increasingly guide site selection and inform architectural elements.

REGIONAL RESOURCE-BASED RECREATIONAL THEMES

The Charlotte Harbor Region units preserve some of the last remaining sites of public access to Gulf and estuarine resources for coastal recreation in southwest Florida. The beaches and clearwater estuarine shorelines of Stump Pass Beach, Don Pedro Island and Cayo Costa state parks offer miles of secluded adventure including fishing, paddling, swimming, snorkeling and beachcombing, all while interpreting barrier island environments that balance habitat preservation and resource-based recreation. Gasparilla Island State Park offers similar Gulf beach access while preserving and interpreting significant cultural elements integral to the history of the Cape Haze Peninsula and Boca Grande Pass.

Charlotte Harbor Preserve State Park is more than an estuarine buffer. The preserve provides opportunities to access and appreciate one of the largest estuaries in Florida. It is as much a sanctuary for those seeking refuge from urban life as it is for the myriad of fish, wading birds, marine mammals and other wildlife that depend on its vast coastal habitats. The preserve is also an ideal wildlife watching site along the Great Florida Birding and Wildlife Trail, providing the opportunity to observe great horned owl (*Bubo virginianus*) and red-shouldered hawk (*Buteo lineatus*).

The Florida Gulf Coast Trail provides direct access to the Punta Gorda Management Area of Charlotte Harbor Preserve State Park from the north and eventually the south once the trail segment is developed. The Charlotte County segment of the Florida Gulf Coast Trail is currently developed and provides access to the Charlotte Harbor Environmental Center as well as the Old Datsun Trailhead, though a designated pedestrian crosswalk is likely needed for visitors to safely cross Burnt Store Road. This management area provides nearly 6 miles of hiking trails traversing uplands and freshwater marsh.

The Florida Circumnavigational Saltwater Paddling Trail (CT) spans 1,515 miles along the Gulf and Atlantic coasts of Florida from Big Lagoon State Park near Pensacola to Fort Clinch State Park of Fernandina Beach (see map on last page). Four scenic state parks are featured in the Charlotte Harbor segment of the CT, including Cayo Costa, Don Pedro Island, Gasparilla Island and Stump Pass Beach. Don Pedro Island State Park provides a paddlecraft launch and landing for visitors to access the paddling trail. Farther south, Cayo Costa State Park, which is accessible only by water, provides ample shoreline and interior hiking opportunities. Within this region, paddlers are drawn to the historic Port Boca Grande lighthouse on the southern end of Gasparilla Island and opportunities for combing the extensive stretches of undeveloped beach along each of the four barrier island parks that are abundant with wildlife.

REGIONAL INTERPRETIVE THEMES

Interpretive themes of the Charlotte Harbor Region are premised on coastal preservation and improving understanding of the complex and often rapid natural processes that shape and influence the barrier islands and delicate ecosystem of the broader Charlotte Harbor estuary. While they may appear static to the infrequent visitor, these landscapes are subject to the continual maritime forces of wind, tides, wave action, longshore sand transport and periodic tropical cyclones that yield erosion, accretion or major morphological shifts of the barrier islands. The interpretive objective is to convey an understanding of these upland coastal conservation areas as dynamic habitats and vital buffers for the surrounding waters. Listed below are the central park themes for each of the units of the region, highlighting the most significant natural or cultural features:

Gasparilla Island State Park

Bordering one of the deepest naturally occurring passes in Florida, the topographic, bathymetric and ecological features of Gasparilla Island State Park create ideal habitat for sport fish, an environment that inspired the growth of the historic Boca Grande community and local folklore.

Cayo Costa State Park

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

Don Pedro Island State Park

Just one in a chain of barrier islands, Don Pedro Island State Park displays shimmering grasslands and rolling beach dunes situated amidst one of the most productive estuaries of Florida.

Stump Pass Beach State Park

Littered with seashells and shark teeth, the sandy shores of Stump Pass Beach State Park provide an escape for both humans seeking the outdoors and wildlife such as sea turtles and shorebirds that nest along the beaches.

Charlotte Harbor Preserve State Park

Surrounding one of the most productive estuaries in all of Florida, Charlotte Harbor Preserve State Park acts as a natural buffer for five aquatic preserves by slowing and filtering water before it enters the harbor and offering refuge to native wildlife.

developed dry land
estuarine beach
estuarine open water
inland fresh marsh
inland open water
mangrove
ocean beach
open ocean
rocky intertidal
salt marsh
tidal flat
undeveloped dry land

CHARLOTTE HARBOR REGION BARRIER ISLAND PARKS
Projected Natural Communities Succession
Secondary to Sea Level Rise by 2050

N

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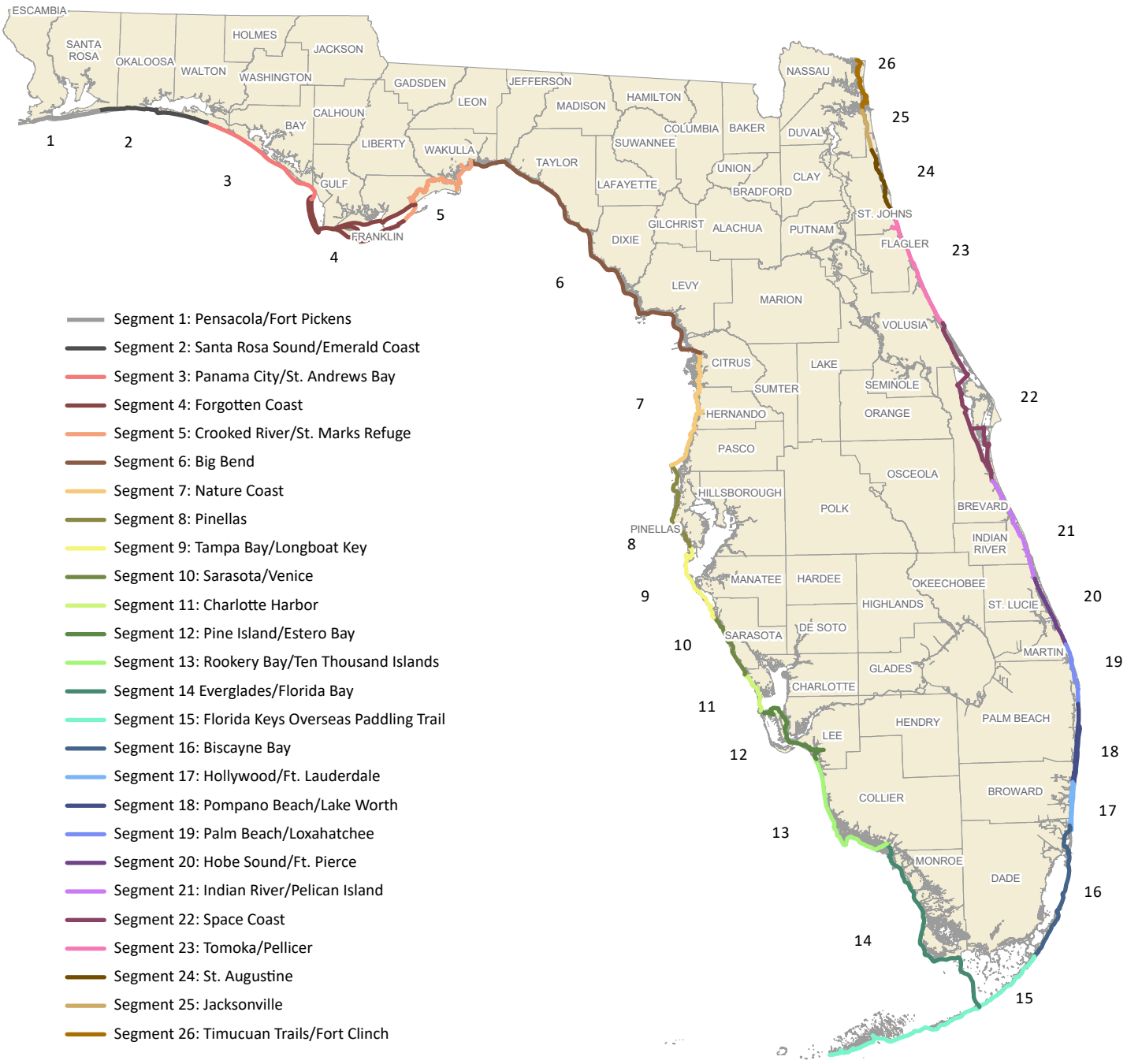
Florida Circumnavigational Saltwater Paddling Trail



- Segment 1: Pensacola/Fort Pickens
- Segment 2: Santa Rosa Sound/Emerald Coast
- Segment 3: Panama City/St. Andrews Bay
- Segment 4: Forgotten Coast
- Segment 5: Crooked River/St. Marks Refuge
- Segment 6: Big Bend
- Segment 7: Nature Coast
- Segment 8: Pinellas
- Segment 9: Tampa Bay/Longboat Key
- Segment 10: Sarasota/Venice
- Segment 11: Charlotte Harbor
- Segment 12: Pine Island/Estero Bay
- Segment 13: Rookery Bay/Ten Thousand Islands
- Segment 14 Everglades/Florida Bay
- Segment 15: Florida Keys Overseas Paddling Trail
- Segment 16: Biscayne Bay
- Segment 17: Hollywood/Ft. Lauderdale
- Segment 18: Pompano Beach/Lake Worth
- Segment 19: Palm Beach/Loxahatchee
- Segment 20: Hobe Sound/Ft. Pierce
- Segment 21: Indian River/Pelican Island
- Segment 22: Space Coast
- Segment 23: Tomoka/Pellicer
- Segment 24: St. Augustine
- Segment 25: Jacksonville
- Segment 26: Timucuan Trails/Fort Clinch

- Drinking Water
- Camping
- Kayak Launch
- Shower Facility
- Restroom
- Restaurant
- Grocery Store
- Point of Interest
- Hotel/Motel

N W E S

Disclaimer: This guide is intended as an aid to navigation only. A Global Positioning System (GPS) unit is required and persons are encouraged to supplement these maps with NOAA charts or other maps.
Updated: 11/2022