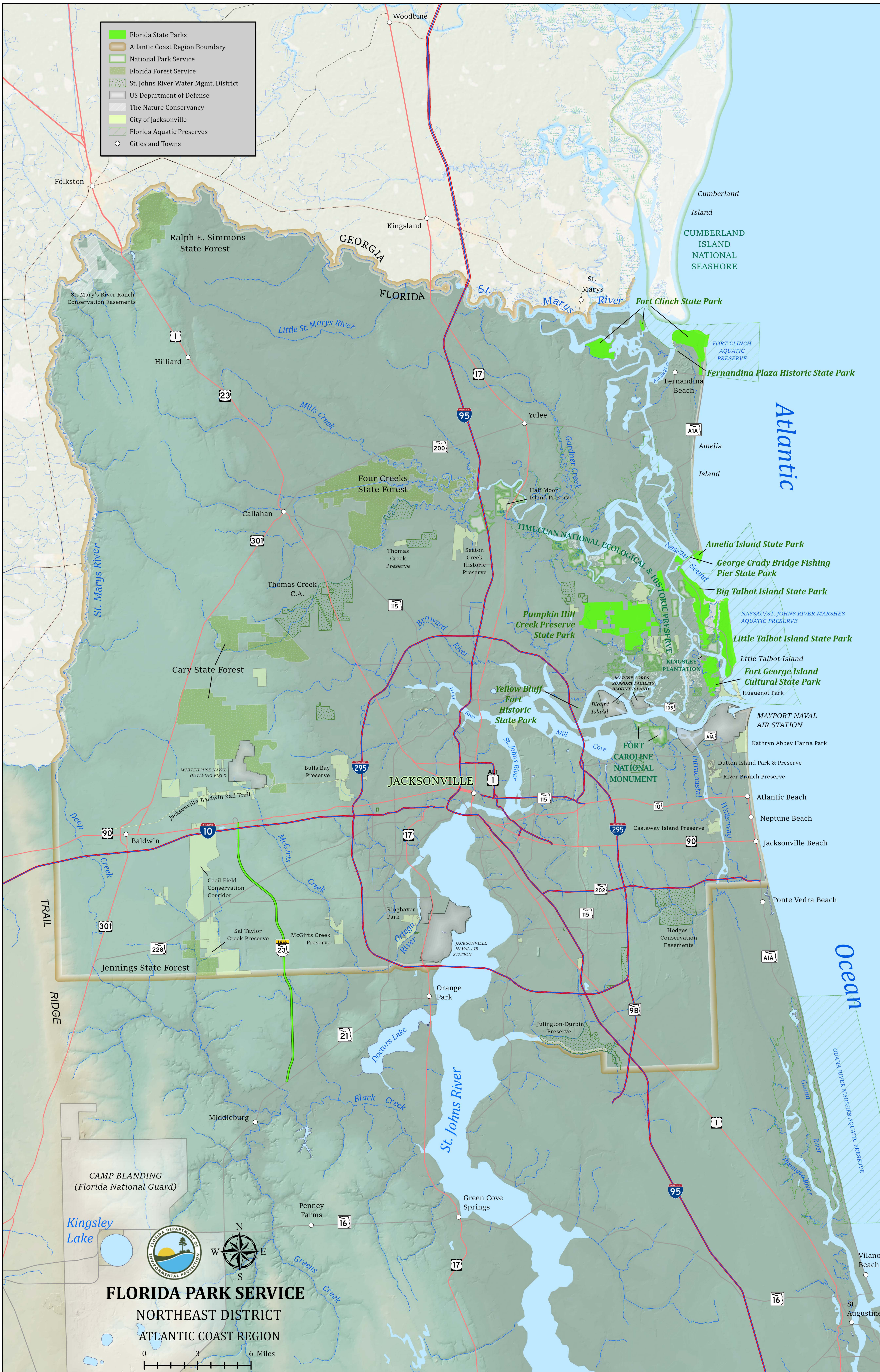
ATLANTIC COAST
Regional Introduction



Florida State Parks
Atlantic Coast Region Boundary
National Park Service
Florida Forest Service
St. Johns River Water Mgmt. District
US Department of Defense
The Nature Conservancy
City of Jacksonville
Florida Aquatic Preserves
Cities and Towns
Woodbine
Folkston
Kingsland
GEORGIA
FLORIDA
Cumberland
Island
CUMBERLAND
ISLAND
NATIONAL
SEASHORE
Ralph E. Simmons
State Forest
St. Mary's River Ranch
Conservation Easements
St.
Marys
St. Marys River
Fort Clinch State Park
FORT CLINCH
AQUATIC
PRESERVE
Fernandina Plaza Historic State Park
Fernandina
Beach
Amelia River
Little St. Marys River
Hilliard
Mills Creek
Yulee
Gardner Creek
Atlantic
Amelia
Island
Four Creeks
State Forest
Half Moon
Island Preserve
Callahan
Thomas
Creek
Preserve
Seaton
Creek
Historic
Preserve
TIMUCUAN NATIONAL ECOLOGICAL & HISTORIC PRESERVE
Nassau Sound
Amelia Island State Park
George Crady Bridge Fishing
Pier State Park
Big Talbot Island State Park
St. Marys River
Thomas Creek
C.A.
Pumpkin Hill
Creek Preserve
State Park
NASSAU/ST. JOHNS RIVER MARSHES
AQUATIC PRESERVE
Broward River
Little Talbot Island State Park
Cary State Forest
KINGSLEY
PLANTATION
Little Talbot Island
Fort George Island
Cultural State Park
Huguenot Park
MARINE CORPS
SUPPORT FACILITY
BLOUNT ISLAND
Yellow Bluff
Fort
Historic
State Park
Trout River
Blount
Island
MAYPORT NAVAL
AIR STATION
Mill Cove
FORT
CAROLINE
NATIONAL
MONUMENT
Kathryn Abbey Hanna Park
St. Johns River
Intracoastal Waterway
Dutton Island Park & Preserve
River Branch Preserve
WHITEHOUSE NAVAL
OUTLYING FIELD
Bulls Bay
Preserve
JACKSONVILLE
Jacksonville-Baldwin Rail Trail
Atlantic Beach
Neptune Beach
Deep Creek
Baldwin
McGirts Creek
Castaway Island Preserve
Jacksonville Beach
TRAIL
RIDGE
Cecil Field
Conservation
Corridor
Ponte Vedra Beach
Ringhaver
Park
Hodges
Conservation
Easements
Ortega River
Sal Taylor
Creek Preserve
McGirts Creek
Preserve
JACKSONVILLE
NAVAL AIR
STATION
Jennings State Forest
Orange
Park
Ocean
Julington-Durbin
Preserve
Doctors Lake
GUANA RIVER MARSHES AQUATIC PRESERVE
Guana River
Tolomato River
Black Creek
Middleburg
St. Johns River
CAMP BLANDING
(Florida National Guard)
Kingsley
Lake
Penney
Farms
Green Cove
Springs
FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION
N
W
E
S
Greens Creek
Vilano
Beach
St.
Augustine
FLORIDA PARK SERVICE
NORTHEAST DISTRICT
ATLANTIC COAST REGION
0
3
6 Miles

ATLANTIC COAST REGION

REGIONAL GEOGRAPHY

The Atlantic Coast Region of District 2 encompasses Duval and Nassau counties. This is the western-most point along the mainland eastern seaboard of North America, a geographic characteristic influencing local tides and large-scale weather events that impact the natural landscapes, flora and fauna of the region's state parks.

Atlantic Coast Region State Parks:

- Amelia Island State Park
- Big Talbot Island State Park
- Fernandina Plaza Historic State Park
- Fort Clinch State Park
- Fort George Island Cultural State Park
- George Crady Bridge Fishing Pier State Park
- Little Talbot Island State Park
- Pumpkin Hill Creek Preserve State Park
- Yellow Bluff Fort Historic State Park

These Division of Recreation and Parks (DRP) units protect and preserve exceptional examples of natural domain along the barrier islands, salt marshes and coastal woodlands of northeast Florida. While these units are all identified as state parks, they are internally classified as either state park, state recreation area, state preserve, or state special feature site based on the inherent content and scale of their natural and cultural resources. These agency classifications determine how the individual units are managed in terms of program area focus.

REGIONAL GEOMORPHOLOGY TOPOGRAPHY AND SOILS

Geomorphology

The Atlantic planning region falls entirely within the Barrier Islands Sequence District, a geomorphological region which encompasses much of northeast Florida's coastline and extends north into Georgia and South Carolina. This region's soils are comprised of relatively recent undifferentiated sediments with landscapes predominantly shaped by coastal and riverine processes.

The subject parks are located specifically within a sub-unit of the district known as the Sea Islands Province – a more refined geomorphological area defined by barrier islands that were formed when coastal lands were severed from the mainland due to sea level rise following the last glacial period. Coastal ridges formed during similar periods of past sea level rise and are interspersed with broad, shallow tidal marshes. Ancient beach ridges and dunes are responsible for the rolling topography found in maritime hammock and, to a lesser extent, more recent beach dune. Barrier island soils and salt marsh sediments are geologically young, having largely accumulated since the last glacial period, circa 11,700 years ago. This is around the same time that sea level rise began to isolate low-lying lands from the mainland. Elevations within the Sea Islands Province range from sea level to slightly above 60 feet, and karst features are absent.

Amelia Island and the Talbot Islands consist of a late Pleistocene core and more recent Holocene beach ridge sand deposits attributed to two major fluctuations in sea level (Henry 1971). The precise ages associated with the formation of the Talbot Islands are still being defined, however, the more landward Big Talbot Island appears to be older, with a rich cultural history and diverse soil profile including uniquely exposed carbon-rich humate sands that can be observed at the "bluffs" (Henry 1971, Rachlie 1993, Olsen 1999, Ashley et al. 2007, Bryan et al. 2008).

Amelia Island and the Talbot Islands are composed of several geologic deposits. From youngest to oldest, these include the Holocene and Pleistocene sediments, the Hawthorn Group and the Ocala Group. Pleistocene and recent deposits of soil, muck, sand, shell, and clay extend from the surface to depths of approximately 150 feet. Successive alternation of sea levels occurred during the late Pleistocene (dating from approximately 50,000 years ago) as glaciers were alternately freezing and melting. During this period, the islands were apparently exposed to weathering and erosion. Distinct soil profiles developed in response to these erosional processes. The numerous spodic layers in the bluffs of Big Talbot Island reveal the many alternating changes in water table levels over this period of geologic time. More recent Holocene sediments on all three barrier islands date from approximately 12,000 years ago and are primarily composed of unsorted sands with silt and shell layers. The younger portions of Amelia Island and Little Talbot Island consist largely of these modern Holocene sediments (White 1970).

The unique juxtaposition of natural communities in Amelia Island and the Talbot Islands emphasizes natural island migration and the process of shoreline "retreat" in this area (Godfrey 1976). The high primary dunes on Amelia Island are gradually migrating southward into the deep trough that lies immediately seaward of the Talbot Islands (Browder and Hobensack 2003). The distinct temporal origins of the island are revealed here as the white sands of the more recently deposited beaches and dunes merge with the older deposits found in the coastal interdunal swales and oak hammock uplands. On Big Talbot Island, the tall oak hammock which now occupies the bluffs above the beach would normally occur in more protected leeward areas. Such shoreline retreat is a natural event involving erosion of shorefront facies caused by sea level rise and erosional processes that have resulted in drastic exposure of spodosol deposits on the beach. The "bluffs" at Big Talbot Island and the eroding dunes on Amelia Island and Little Talbot Island are examples of the geologic processes of erosion and accretion that are critical in the formation of sea islands.

The geology and physical geography of the Sea Islands Province influence the coastal uplands, pine flatwoods and estuarine wetlands that characterize the Atlantic Coast planning region parks. Some of the specific natural communities comprising these broad landcover classifications include beach dune, coastal strand, maritime hammock, mesic flatwoods, and salt marsh. These and other natural communities found within the Atlantic Coast planning region parks support important ecological processes and provide important habitats for imperiled species such as shorebirds, wading birds, terrapins, sea turtles and gopher tortoises.

Topography

The barrier islands of the Atlantic Coast planning region of District 2 are situated at the southern extent of a large section of Atlantic coast known as the Sea Islands Coastal Region, which contains as many as 23 barrier islands separated from the mainland and surrounded by water during high tides (Hayes 1994, Foyle et al. 2004). The full extent of this barrier chain extends for 112 miles from Bulls Island, South Carolina, in the north, to Fort George Island, Florida, in the south. (Mathews et al. 1980).

Amelia Island is Florida's northernmost barrier island, extending approximately 13.5 miles long and 3 miles wide. Its total land area is over 15,000 acres, with 230 acres of its southern tip comprising Amelia Island State Park. In comparison, Big and Little Talbot (including Long Island) are two separate and smaller barrier islands with each extending approximately 5 miles long and 1 mile wide. Big Talbot Island is 1,900 acres and Little Talbot Island is 2,250 acres. Both islands are almost entirely under public ownership.

One unique feature of this southeastern United States barrier island chain is its extremely broad expanse of lowland salt marshes and meandering tidal creeks lying landward of the old beach ridges that formed during the Pleistocene epoch, roughly 10,000 to 2,000,000 years ago (Alber et al. 2005). In Florida, geologists describe this distinct physiographic region as the Atlantic Coastal Ridge and part of the St. Marys Meander Plain (Puri and Vernon 1959; White 1970). The origins of the beach sediments that comprise these coastal islands are from both continental shelf deposits and Piedmont-draining river systems (Giles and Pilky 1965). These "sea islands" gradually formed by rising ocean levels, barrier island submergence and continued deposition of younger unconsolidated sediments (Godfrey 1976). Sea islands characteristically are separated from each other by river entrances or sounds (Raichle et al. 1997).

As with most coastal barrier islands, Amelia Island and the Talbot Islands consist of parallel dune ridges with a distinct variety of vegetation types and natural communities such as maritime hammocks, coastal grasslands and interdunal swales. Coastal interdunal swales are important ephemeral freshwater wetlands that have formed in the lowest elevation areas between dune ridges (Florida Natural Areas Inventory (FNAI) 2010; Johnson and Muller 1993). These dune features comprise the natural topographic relief of the islands.

Typical of all barrier islands, natural coastal accretion and erosion processes play a significant role in shaping the topography of Amelia Island and the Talbot Islands (Browder and Hobensack 2003, Howard, and Olsen 2004). Topographic elevations of the primary dune ridges within Amelia Island State Park range from 21 feet in height along the Nassau Sound shoreline to 32 feet along the older stabilized ridges adjacent to the Atlantic shoreline. The highest dune elevation on Big Talbot Island is 24 feet at "the bluffs" and at "Half Moon Bluff" on the northern part of the island, while the dune ridges at the north end of Little Talbot Island can reach 43 feet in height. Long Island is a smaller (2 miles long and 0.25-mile-wide), isolated island between Big and Little Talbot islands with a maximum elevation of 31 feet at its north end.

The natural topography of the Atlantic planning region barrier island dunes has been dramatically altered over the past several decades by multiple anthropogenic factors including highway/bridge construction, ditching/draining of freshwater wetlands (including mosquito control activities), and navigation channel and jetty construction. A discussion of barrier Island alterations associated with maintenance of the navigation channel and jetty construction factors are discussed below under “Soils.”

In the late 1940s, large portions of Amelia Island and the Talbot Islands were acquired by the Florida Department of Transportation (FDOT) to construct the northern extension of Florida’s State Road A1A (A1A). During A1A construction, the island landscapes were bisected. The piling of spoil from ditch and road construction and the leveling of dunes to fill low areas altered natural elevations in numerous locations throughout all three barrier islands. Bridges and associated hardened abutments constructed to cross over two major river entrances (Nassau and Fort George) and two tidal creeks (Simpson and Myrtle) also contributed to alterations of the estuary’s daily tidal fluctuation. Significant maintenance needs are continually being addressed at several A1A sections, including its crossing at Nassau River Sound and the Fort George River Inlet. In the early 2000s, DRP received $100,000 in FDOT wetland mitigation funds through the auspices of the Northeast (Regulatory) District of the Florida Department Environmental Protection (DEP) in Jacksonville. The funds were intended as mitigation for wetland impacts associated with the Fort George Inlet bridge replacement. Recognizing that construction of ditches, roads and impoundments had significantly altered the natural hydrology on the Talbot Islands and Fort George Island, DRP received funding for a hydrologic restoration feasibility study to address known topographic alterations and impacts. The study identified several areas where these alterations appeared to most influence the natural hydrology of the parks and options for restoration (WilsonMiller 2005).

In addition to A1A construction, mosquito ditches and stormwater impoundments were installed between 1959 and 1962. The ditching has disrupted natural sheetflow and drainage within freshwater wetlands on the islands. Between 1959 and 1962, Amelia Island Mosquito Control District (AIMCD) altered the topography at Amelia Island State Park by constructing a series of ditches among the dune ridges and freshwater interdunal swale wetlands in hope of eliminating nuisance mosquito breeding sites. This topic is discussed in greater detail in the Amelia Island State Park chapter of the DRP Northeast District management plan.

Soils

A total of 30 soil types occur within the Atlantic Coast planning region state parks. While some of the soil types are common to several state parks, they may be named and numerically coded differently by their respective county soil surveys. See Appendix for a complete listing and detailed descriptions of the soils identified in each park. Sandy, well-drained soils occur along the beaches and beach dunes of the planning region's barrier island parks, while poorly drained, mucky, organic, lowland soils occur in the estuarine marshes.

Spodosols account for the majority of soils at Big Talbot Island State Park and Pumpkin Hill Creek Preserve State Park. This soil family is the most common in the state, identified by a hardpan or red spodic layer. The hardpan is composed of organic matter, iron and, sometimes, aluminum. Layers of the spodic hardpan are visible in long horizontal stripes in the eroded bluffs at Big Talbot Island.

Although Spodosols are very common in Florida, the particular sub-order of the soil series Cornelia found on Big Talbot Island is a Spodosol with a thick hard pan and is one of the rarer soils in the United States. These particular soils commonly occur in areas dominated by scrub oaks and characteristically have a very thick accumulation of organic carbon in the spodic layer. The "black rocks" on the east shoreline of Big Talbot Island are undoubtedly remnants of spodic horizons from an earlier age and are of unique geologic importance. Mount Cornelia, consisting of dome-shaped knolls on Fort George Island, is also composed of the Cornelia soil series. Most of these soil types formed in the late Pleistocene or Holocene.

On Little Talbot Island, the upland soils are excessively drained sands with no diagnostic horizons. The dark red, spodic layer found in the Cornelia soil series of Fort George and Big Talbot islands does not occur on Little Talbot Island. The geologically older north end of Little Talbot Island has soils of brown fine sand that contain bands of heavy minerals, mostly rutile and ilmenite. Shell and rock fragments are common.

Soil erosion within Amelia Island and the Talbot Islands is associated with either erosion of the coastal margins of the islands or destabilization of older dune ridges within the interiors of the islands. Erosional forces acting on the inlets and coastlines of the islands are difficult to mitigate.

Nor'easters and tropical cyclones are natural events that have long shaped accretion and erosion patterns of the entire barrier chain system in the southeastern United States. More recently, efforts to stabilize and improve two major river entrances (St. Marys Inlet and St. Johns Inlet) have had significant impacts. The jetties at the St. Marys and St Johns river inlets disrupt the natural littoral drift and associated sediment transport and alter the accretion/erosion rates (Byrnes and Hiland 1995). Inlet armoring in this region has facilitated the need for the U.S. Army Corps of Engineers (USACE) to provide routine maintenance to a vast set of unintended coastal accretion and erosion issues (USACE 1984, 1999).

Ongoing beach erosion exists along much of the Atlantic shoreline at Amelia and the Talbot islands. This erosion has threatened private and public upland development, and the St. Marys Inlet and adjacent beaches have long been designated as one of Florida's most "critically eroded" coastal regions (DEP 2012a). The southernmost 20,000 feet of Amelia Island, which includes the state park, has experienced significant erosion associated with "up drift" jetty construction to the north. From 1857-1924, the island's southern tip receded approximately 2,200 feet. (Raichle et al. 1997).

Until 1985, Nassau Sound to the north of Big Talbot Island was one of the last two unaltered natural inlets on the eastern coast of Florida (Raichle 1993, Browder and Hobensack 2003). In 1985 naturally deposited sand was dredged from the junction of the Amelia and Nassau rivers and trucked to the middle shoreline of Amelia Island in an attempt to correct beach erosion problems. This beach nourishment project placed tons of sand in littoral drift resulting in substantial changes in the shoals offshore of Big Talbot Island, the northward migration of Nassau Sound and the southward migration of Bird Islands. Eventually the southern Bird Island became fused with Little Talbot Island as predicted by Raichle (1993).

In 1994, 2.6 million cubic yards of beach-quality sand was placed along the southern 18,000 feet of Amelia Island. This project extended the mean high-water line as much as 350 feet seaward of the pre-project location. In response to significant erosional stresses at the southern end of the nourishment area, a temporary, terminal groin field was constructed in 1995 to limit losses of the recently deposited sand to Nassau Sound. This groin field directly impacted the northern portion of the park where two of the groins were located. Subsequent beach nourishment along the southern portion of Amelia Island was conducted in 1997 with sand deposited past the groin field well into the park. The temporary groin field eventually failed, and, in 2004, a permanent terminal groin structure and offshore breakwaters were constructed in its place (Dial Cordy and Associates Incorporated 2003, Olsen and Bodge 2007). This project appears to have successfully stabilized the southern tip of Amelia Island. Native beach vegetation has taken root creating additional stabilization, and the return of nesting shorebirds are positive signs of dune recovery.

Big and Little Talbot islands are also subject to dramatic sediment accretion/erosion challenges. Between 1871 and 1934, the shoreline of Little Talbot Island expanded 3 miles southward and 2,200 feet seaward. This accretion was the result of the construction of the jetty at the mouth of the St. Johns River that slowed the flow of sand southward along the coast. This long period of dramatic accretion ended in 1938, when the north jetty was made effectively impermeable to the passage of sand. Since that time, sand has been piling up at Wards Bank (Huguenot Park), resulting in the gradual northward migration of the mouth of the Fort George River, which has carved away over 4,000 feet of the southern tip of Little Talbot Island. This erosion has impacted park amenities, including the loss of a fishing pier, parking areas and restroom septic facilities.

The erosion of Little Talbot Island's southern shoreline has also complicated matters for FDOT to maintain a stabilized State Road A1A roadway. Since A1A is immediately adjacent to the island's southern tip, multiple road protection projects have been implemented along the span of highway beginning at the seaward side of the Fort George Inlet. In 2004, FDOT installed a new revetment in conjunction with the Fort George Inlet Bridge replacement project. The scouring effect of the reflected current along the southern shore of Little Talbot Island and the impact of shoreline armoring both combine to exacerbate the shoreline erosion here. Additionally, the uninterrupted sediment load of the Fort George River continues a net deposition of sand and silt within the Fort George Inlet.

Conversely, the sand spit on the northeastern tip of Little Talbot Island has been accreting, creating a large area of sand flats and intertidal salt marsh. Between 1974 and 1990, the northern end of Little Talbot Island expanded 1,000 feet to the north (Raichle 1993, Olsen 1999). Much of the sand accretion may have been partially due to erosion along the mile of shoreline just south of the spit on Little Talbot Island, which has been steadily receding during the same period (Raichle 1993). However, more recent sand accumulation at the north portion of the island is from a southward migration of the Bird Island Shoals (Browder and Hobensack 2003). The formation and movement of Bird Islands are intertwined with a complex shoal development in the Nassau Sound (Creed and Olsen 1999, Browder and Hobensack 2003). Most recently, the northwestern tip of Little Talbot Island has been eroding, producing truncated dune ridges in this area, lowering dune elevations and impacting adjacent maritime hammock.

Erosion on Big Talbot Island appears to be influenced by both natural and anthropogenic factors. The scouring of the high escarpment at the "bluffs" is partially due to the natural process of island migration (Raichle 1993). Over many years, the northeast shoreline of Big Talbot Island has significantly eroded from east to west. Public access to this area has been modified as the bluff sluffs into the Nassau Sound. Temporary stabilization measures (i.e., fabric mats or sandbags) have been implemented to slow erosion. The pattern of ebb shoal breaching and shifting tidal channels in the Nassau Sound appears to have a direct link to erosion rates at the "bluffs" (Creed and Olsen 1999, Browder and Hobensack 2003).

Coastal dynamics in Florida is monitored and updated by the DEP Office of Resiliency and Coastal Protection in the Critically Eroded Beaches report. This document, which is updated annually, provides a listing of Florida's beaches that are designated critically eroded.

The status of Inlets is tracked by the DEP, Inlets and Ports Program, Annual Inlet Repot. The Annual Inlet Report includes the inlet management plan's (IMP) adoption year, IMP updated year, annual bypass numbers by year, bypass objective, annualized volume, cumulative volume, cumulative objective, surplus/deficit volume, and the percentage of the bypass objective met. The Annual Inlet Report highlights the surplus and/or deficit of material that is being bypassed on an annual basis to each side of an inlet that is actively managed. The report includes a bar graph for each inlet that has bypass numbers to be shown.

REGIONAL HYDROLOGY

Sea Level Rise

Sea level rise increases the severity and impacts of spring tides, king tides, and storm surge events along Florida's entire Atlantic coast. The Atlantic Coast Region of the Northeast District is particularly vulnerable to these tidal events, as the area naturally experiences the greatest tidal range in the state. Seasonal and annual high tides, heightened by sea level rise, submerge salt marsh vegetation, accelerate natural erosion along sea islands, and have potential to impact low-lying park infrastructure. Successional planning introduced at the highest-level section of the Northeast District Plan (Statewide Philosophy and Framework) should be considered for this region.

Atlantic Coast Region Rivers

The Sea Islands Province is crossed by three tidal-influenced freshwater rivers: the St. Marys, Nassau, and St. Johns. Origins of these rivers, their associated natural communities, and significance to the parks in the Atlantic Coast Region are discussed below.

St. Marys River

The northeastern portion of District 2 is in the St Marys River watershed. The St Marys River originates from the Okefenokee Swamp and follows a circuitous route south, then north, then east through a break in the Trail Ridge, reaching the Atlantic Ocean at Fort Clinch State Park in Fernandina Beach at the northern tip of Amelia Island. Along its entire route of approximately 125 miles, it defines the border between Florida and Georgia. The St. Marys River has generally good water quality. The upper reaches are typically rural and lined with swamps, while lower reaches are tidally influenced and lined with salt marsh. The river encompasses nearly 1,000 square miles of drainage area in Florida alone (Georgia/Florida total is 1,585 square miles). Tidal influences on the St. Marys River can go as far as 64 miles upstream (DEP 2007).

Nassau River

The Nassau River flows approximately 65 miles, draining a basin of approximately 430 square miles in Nassau and Duval counties. The river's watershed encompasses 464 square miles and is contained entirely within Florida (Adamus et al. 1997, Ayres Associates 1999). This river is one of the only significant drainage basins on Florida's east coast that has not been subjected to channelization, stabilization or been structurally dammed (Andersen et al., 2005).

Three main freshwater tributaries, Thomas Creek, Boggy Creek, and Alligator Creek, drain the western upland portion of the Nassau watershed. Other tributaries and estuarine tidal waterways, including the Amelia River, Fort George River, and Pumpkin Hill Creek, drain the easternmost area of the basin, which is mostly low-lying coastal plain and salt marsh. The junction between freshwater and tidal bore in this river occurs nearly 20 miles upstream from the Nassau Sound (Ayres Associates 1999).

At least half of the Nassau River basin experiences daily tidal influences (Ayres Associates 1999). Amelia, Big Talbot, and Little Talbot islands state parks are all located within the Nassau River basin, except for the Rollins Bird and Plant Sanctuary on Fort George Island, which drains to the St. Johns River.

The Amelia River is a north-south intracoastal waterway of nearly 15 linear miles that extends along the west side of Amelia Island, connecting the St. Marys entrance to the north and the Nassau River to the south. Numerous small tidal creeks punctuate the salt marsh estuary of this river, including one just north of Amelia Island State Park called Walker Creek.

The Nassau River basin has been referred to as one of the last remaining large-acreage undeveloped coastal areas of northeast Florida. However, significant portions of the basin, especially north of the river's main tributary, are rapidly developing, compounding the growing water quality and quantity issues that already threaten the region. Other than an unnamed branch in the upper reaches of the Nassau River which is impaired for fecal bacteria, Total Maximum Daily Loads (TMDLs) for pollutants allowed to enter the river have not been set.

St. Johns River

The St. Johns River basin is a large (9,168 square miles) north-flowing watershed that originates in St. Lucie County, Florida. The Lower St. Johns River has a 2,750-square mile drainage area from the confluence of the St. Johns and Ocklawaha rivers to the Atlantic Ocean. The last 21 miles of the Lower St. Johns has limited freshwater inputs and is subject to daily tidal influences (Magley and Joyner 2008).

The portion of the river that passes through the Atlantic Coast planning region is near the river's mouth. Of the nine parks in the planning region, only Yellow Bluff Fort and portions of Pumpkin Hill Creek and Fort George Island occur within the St. Johns River watershed.

Water Quantity

Nassau and Duval counties in northeast Florida and Camden County in southeast Georgia fall within a groundwater sub-area covering over 1,000 square miles (Peck et al. 2005). Regional flow of groundwater is from west to east, following subsurface water contours that define the potentiometric surface (Brown 1984). Although the Upper Floridan aquifer in northeast Florida can extend up to 50 miles offshore as a thin lens of varying depth (Levy 1966; Barlow 2003), there is a long history of groundwater depletion in this region that dates to about 1880 (Peck et al. 2005). Dramatic human population increases, large groundwater withdrawals and unprecedented droughts in the southeastern U.S. have all contributed to a significant decline in the Floridan aquifer in northeast Florida (St. Johns River Water Management District (SJRWMD) 2017a).

Since groundwater pumping rates first began to be recorded, water scientists have monitored subsurface "cones of depression" that develop at the aquifer's potentiometric surface (SJRWMD 2015). These numeric depressions in the potentiometric surface indicate that significant discharge is taking place in those locations, including anthropogenic groundwater withdrawals (Knowles 2001). Major cones of depression have appeared over the past 20 years in four locations along the Florida/Georgia coast, including Jacksonville and Fernandina Beach in Florida and St. Marys and Brunswick in Georgia (Fairchild and Bentley 1977; Brown 1984; Kinnaman and Dixon 2011). Although the paper mill industry has been a primary contributor to significant groundwater decline in this region since the 1940s (Peck et al. 2005), withdrawal for public supply increasingly rivals industrial use.

The increased consumptive use of groundwater along the northeast coast and the resulting decline in groundwater levels has caused an acceleration of saltwater intrusion into the Floridan aquifer (McGrail et al. 1998). Saltwater intrusion can occur both naturally, during droughts when the freshwater lens shrinks, and anthropogenically, during periods of heavy groundwater withdrawal (Spechler 1994, 2001; Barlow 2003). The two most recent severe droughts on record in Florida (1998-2002 and 2010-12), resulted in saltwater intrusion on a statewide scale, and groundwater pumping exacerbated this process (Marella and Berndt 2005; Copeland et al. 2011).

Regional groundwater withdrawals, specifically at major pumping centers like Jacksonville and Fernandina Beach, have historically resulted in significant impacts, cones of depression and saltwater intrusions into freshwater aquifers (Brown 1984; Peck et al., 2005; SJRWMD and Suwannee River Water Management District (SRWMD) 2015; SJRWMD 2017). Surficial wells located at Amelia Island State Park (SJRWMD well N-0306) and Fort George Island Cultural State Park (SJRWMD well D-0614 and D-1383 (upper Floridan)), historic test wells at Little Talbot Island State Park, and all wells to the north at Fort Clinch State Park (SJRWMD well N-

0302, N-0303, N-0304, and N-0314) equally demonstrate that the coastal freshwater aquifers are high in chlorides that have resulted from salt intrusion (Anderson et al., 2005; SJRWMD 2023).

As of 2012, groundwater withdrawals in northeast Florida appeared to have stabilized, and the cone of depression was much reduced. Aquifer deficits, however, were still nearly 70 feet below historic levels (Barlow 2003; Marella and Berndt 2005; Williams et al. 2011). Given the projected water supply needs for the area, water managers predict that groundwater levels throughout north Florida will continue to decline (Sepulveda 2002; SJRWMD 2017a). As of 2019, the majority surface water bodies in northeast Florida lie within a WRCA (DEP 2019). Designation of the WRCA signifies projected declines in water bodies flows and levels, increased risk of adverse changes to wetland ecological function, and degraded water quality over the next 20 years (SJRWMD 2017a).

Water Quality

Water scientists have sampled groundwater levels and quality in coastal areas of northeast Florida since at least the 1930s (Frazee and McClaugherty, 1979; Brown 1984; Spechler 2001; Peck et al. 2005). Within a 10-mile radius of the Amelia/Talbot parks, over 400 wells are currently set up to monitor groundwater quality in the region (DEP 2019). Water scientists also monitor surface water conditions at hundreds of locations throughout this region. To keep track of the status and ecological health of individual surface water bodies in Florida, water managers have given each a unique identification number called water body ID (WBID). Much of the hydrological information that has been collected, stored, and managed by state water management agencies concerning all water bodies can now be accessed through a variety of web-based filters (SJRWMD 2019; DEP 2019a, DEP 2019b, U.S. Geological Survey (USGS) 2019).

Among the various types of groundwater wells being monitored are private and public water supply wells, Florida Geological Survey wells, confined and unconfined aquifer wells, Class V (non-ASR) wells, and status network monitoring wells. Some of these wells are associated with saltwater intrusion monitoring, while others are used to document changes associated with potentially contaminated sites. At least 34 of these wells (i.e., Very intensive Study Area (VISA) and Superfund sites) are in the greater Jacksonville area to monitor known groundwater contamination sites.

Little data exists for surface water quality within the boundaries of the Amelia/Talbot parks, primarily due to the lack of large freshwater resources on these barrier islands. However, nearly a hundred surface water quality stations are monitored in the estuarine waters immediately adjacent to these three parks, with thousands in place throughout the greater Jacksonville region (DEP 2019 map direct). A large variety of surface water quality information has been and continues to be collected at these stations (DEP 2019a; DEP 2019b).

Water quality monitoring in northeast Florida was initiated in response to a burgeoning urban and industrial development that continues to have significant non-point source pollution effects on Jacksonville’s regional water resources (Anderson et al. 2005). Beginning in the 1980s, the state of Florida began to recognize how serious the surface water quality problems of this region had become and began to implement meaningful regulations to protect sensitive coastal resources (DEP 1986).

All waters within the Atlantic Coast planning region state parks are designated Outstanding Florida Waters (OFW) (Florida Administrative Code, Rule 62-302-700), and are classified as Class II waters (Chapter 62-302.400, Florida Statutes). Additionally, Nassau River-St. Johns River Marshes Aquatic Preserve and the Timucuan Historic and Ecological Preserve are also both OFW. The intent of this designation is to preserve, with no degradation, the strongest level of water quality protection for an individual water body. The intent of Class II waters is reserved for water bodies that are suitable for propagation and harvesting of shellfish.

In 1984, DEP designated several Class II water bodies within the Nassau River and Lower St. Johns River basins as “prohibited from harvesting” because of chronically high levels of fecal coliform bacteria and known point/non-point sources of industrial pollution, including heavy metals (DEP 1986). In 1994, the Florida Department of Agriculture and Consumer Services (FDACS), the agency that regulates this activity, initiated a special shellfish harvest prohibition rule in all Class II water bodies in Duval and Nassau counties due to continued problems with fecal coliform bacteria pollution. This prohibited harvest rule for northeast Florida became effective in 1996 and is still in effect (Anderson et al. 2005, FDACS 2019). Nonetheless, local and state officials often debate the desire to reopen these waters to shellfish harvesting.

Water quality in some tidal creek/estuarine systems adjacent to the Talbot Islands State Parks, Fort George Island Cultural State Park, Amelia Island State Park, and Pumpkin Hill Creek Preserve State Park has been impacted by effluent discharge from multiple industrial sources such as paper/pulp mills, power plants, chemical plants, and manufacturing plants. There is also significant input from non-point sources of pollution such as stormwater runoff and faulty septic systems (Magley and Joyner 2008). Development of private lands throughout the greater Jacksonville area, including areas close to the Talbot/Amelia/Pumpkin Hill Creek state parks, continues to rapidly increase. Urban development near these parks also contributes to elevated nutrients and bacteria loading into surface and groundwater, increasing contaminants to hundreds of water bodies in the Lower St. Johns and Nassau river basins that have already been declared impaired (DEP 2019a).

In 1996, DEP initiated a formal statewide program for monitoring surface and groundwater quality (Maddox et al. 1992; DEP 2009). Water quality monitoring within each basin is sampled on a rotating basis depending on which DEP group number that it was originally assigned; The Lower St. Johns River is in Group 2, and the Nassau River is Group 4. This Integrated Water Resource Monitoring Program (IWRMP) provides a comprehensive watershed approach based on natural hydrologic units (Livingston 2003) and is designed to provide a framework for implementing Total Maximum Daily Load (TMDL) requirements that attempt to restore and protect water bodies that have been declared impaired (Clark and DeBusk 2008).

According to DEP’s basin status report for this region, numerous water bodies within the Lower St. Johns and Nassau River basins are considered impaired because of high levels of at least one of the following parameters: fecal coliform, total bacteria, total nitrogen, total phosphorus, nutrients, lead, metals, iron, and mercury (DEP 2004, 2007). Based on Florida’s Impaired Waters Rule (IWR), the U.S. Environmental Protection Agency (EPA) has verified that these water bodies fail to meet applicable state water quality standards (Chapter 62-303 F.A.C.), triggering mandatory requirements that Florida must accomplish to achieve compliance with EPA regulations. This regulatory compliance process began with the Florida DEP assigning TMDLs for identified pollutants in the Lower St. Johns River main stem and its tributaries (DEP 2019a). A statewide mercury TMDL has also been developed by DEP. Prior to these measures, a Basin Management Action Plan (BMAP) was adopted for the Lower St. Johns main stem regarding total nitrogen, total phosphorus, and fecal coliform impairment parameters (DEP 2008; DEP 2017).

In the Upper Nassau River basin, water managers have identified at least four impaired water bodies with TMDL exceedances for fecal coliform, bacteria, dissolved oxygen and total nitrogen and phosphorus. These water bodies are in the headwaters of the Nassau River that feeds productive estuary wetlands (i.e., Timucuan Ecological and Historic Preserve) adjacent to and including portions of Pumpkin Hill Creek Preserve State Park, the Talbot Islands State Parks, Amelia Island State Park, and Fort George Island Cultural State Park. Despite regulatory efforts, water quality monitoring indicates that the Nassau River estuaries are gradually becoming more eutrophic, which can lead to harmful algal blooms, hypoxia (low oxygen conditions) and, eventually, ecosystem collapse.

REGIONAL IMPERILED SPECIES PROTECTION PARTNERSHIPS

Many of the Atlantic Coast Region parks provide some of the last remaining nesting habitats for shorebirds, including imperiled species such as Wilson’s plover (*Charadrius wilsonia*), least tern (*Sterna antillarum*), and black skimmer (*Rynchops niger).* DRP staff coordinate closely with lead FWC shorebird conservation biologists to follow accepted methods and approaches to shorebird management. This includes seasonally roping and posting of established nesting areas and other protection measures such as routine patrolling, monitoring of nesting activity, and predator management to improve reproductive success.

Similarly, the Atlantic Coast Region barrier island parks provide undeveloped dark beaches critical to the nesting success of marine turtles. Ft. Clinch State Park, Amelia Island State Park, and Little Talbot Island State Park are Index Nesting Beaches that play a key role in measuring trends in the number of nests statewide. Trained DRP staff and volunteers, coordinate closely with FWC to conduct daily nesting surveys from March through October at all of the region's barrier island parks with Atlantic beaches.

REGIONAL RESOURCE-BASED RECREATIONAL OPPORTUNITIES

Sea island parks such as Big Talbot Island, Little Talbot Island, Amelia Island and Fort Clinch provide ample opportunities for saltwater recreation such as fishing and other beach activities. Nature appreciation and wildlife viewing are also popular. Amelia Island State Park allows visitors to experience one of northeast Florida's remaining undeveloped beaches.

Connected via the Timucuan multiuse trail, these barrier island parks are popular among cyclists. The trail weaves through portions of Big and Little Talbot Island State Parks, surrounding trail riders in the twisting oaks of the maritime hammock with views across the coastal strand. The parks are also connected by the Florida Circumnavigational Saltwater Paddling Trail, a recreational water link providing long-range and day paddlers alike access to the Atlantic Coast planning region's vast array of salt marsh creeks and intracoastal waterways.

The planning region's rich cultural history is showcased through opportunities for learning at the Ribault Club at Fort George, Fort Clinch, Grand Site, and the Civil War earthworks at Yellow Bluff.

Trail enthusiasts including hikers, bikers, and equestrians enjoy the miles of nature trails and resource management roads open to the public at Pumpkin Hill Creek Preserve State Park. Others enjoy paddling and fishing on Pumpkin Hill Creek. Along with adjacent federal and city parks, the park contributes to the protection of over 7,000 contiguous acres of natural area, supporting healthy ecosystems essential for biodiversity and water quality.

REGIONAL INTERPRETIVE THEMES

The planning region's interpretive themes are linked by the dynamic natural processes that shape the barrier islands along the southeastern Atlantic coast and the imperative to protect these critical coastal habitats and species. The cultural events, sites, and people whose stories are interpreted here have coastal connections from the beaches to the salt marshes to the tidal creeks and riverine systems. Listed below is the **Central Park Theme (CPT**) for each park, highlighting its most significant natural or cultural features:

Amelia Island State Park

Nesting shorebirds and coastal wildlife find refuge on the beaches and sparkling shoreline of Amelia Island State Park.

Big Talbot Island State Park

Salt-washed skeletons of giant trees line the black rock beaches of Big Talbot Island State Park, a stunning sea island shaped by ancient peoples and extreme natural forces.

Fernandina Plaza Historic State Park

Overlooking the Amelia River, Fernandina Plaza Historic State Park is a tiny park that leaves a big impression, overflowing with stories of Florida's dynamic and often tumultuous past.

Fort Clinch State Park

Watching over the Cumberland Sound coastline, Fort Clinch comes to life with the voices of soldiers who lived here, sharing their stories of dedication, hardship, and daily preparation as they defended our nation.

Fort George Island Cultural State Park

The once exclusive 1920s Ribault Club of Fort George Island Cultural State Park provides a backdrop for telling 6,000 years of history amid sprawling oak trees and salt marsh.

George Crady Bridge Fishing Pier State Park

A landmark for local anglers, George Crady Bridge Fishing Pier State Park offers breathtaking views across Nassau Sound while casting a line.

Pumpkin Hill Creek Preserve State Park

The expansive coastal flatwoods of Pumpkin Hill Creek Preserve State Park purify surrounding waters before they flow to the St. Johns and Nassau Rivers.

Yellow Bluff Fort Historic State Park

Strategically positioned to protect the St. Johns River during the Civil War, the earthen fortifications at Yellow Bluff were occupied by both sides of the conflict, including some of the first African American regiments.