Cape Fear State Park

Prospectus (Preliminary)

Part II–The Park

[Draft–October 22, 2014]

Abstract

This is a plan to create a new State park in Brunswick County, North Carolina, on land owned by the North Carolina State Ports Authority on the Cape Fear River near Southport.

- The proposed Cape Fear State Park would be an active facility, designed to provide recreational, educational, and entertainment opportunities as well as preserving some of the last remaining significant natural features of the lower Cape Fear.

- The park would be located on one of the last undeveloped sites on the western shore of the lower Cape Fear River, and would provide a stunning vista of the river and far shore from a high bluff, a rare feature of the river shoreline.

- Park components would include a bird and wildlife rehabilitation center, arboretum and botanic gardens, extensive trails (the most attractive being accessible to wheelchairs and bicycles), campgrounds with separate RV facilities, a science and education center, amphitheater, and dock for water tours of the Bald Head Island State Natural Area.

- The park site has a geologic history dating to the Last InterGlacial Period, one of the last examples of coastal fringe evergreen forest with 300-year old live oaks, extensive brackish marsh, and cleared areas suitable for reforesting with longleaf pine.

- The site has twelve themes regarded by the NCDENR Division of Parks and Recreation as highly significant with little or only moderate representation in the park system.

- The park could be the western gateway for a “Cape Fear Maritime Heritage Area” comprising the State reservations in the lower Cape Fear on both sides of the river. That would be more than the sum of its parts in fulfilment of conservation objectives, efficiency of administration, and attractiveness as a destination park.
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Appendix A The State Ports Authority and the 600-acre Property
This map, oriented with north at the top, presents a concept for a new State park in Brunswick County, on the last remaining site on the lower Cape Fear River.

The proposed Cape Fear State Park would be an active facility, designed to provide recreational, educational, and entertainment opportunities as well as preserving some of the last remaining significant natural features of the lower Cape Fear.
The typical state park, in North Carolina and elsewhere, emulates the large national parks, being established primarily to preserve relatively unspoiled wilderness areas. Selection of sites usually is based on the need to complete an inventory of the State’s natural features, its natural communities, unique habitats, scenic vistas, and the like. Completing the collection, so to speak. Visitor facilities and recreational facilities typically are focused on presenting these natural features.

At the other end of the spectrum are our large urban parks, setting aside large areas to relieve population density and provide, whether by preservation or creation, outdoor features of beauty and function to enhance our lives.

Then there are the State’s zoo and the three aquariums, providing the most active response to human needs, mixing education with entertainment. In terms of popularity and visitor counts, these are the most successful of North Carolina’s State Parks System’s facilities.

This park would respond to all of these conservation and recreational needs and add a few more elements. Conservation objectives would be met by preserving and displaying

- a unique, high-level view of a serene part of the Cape Fear River from a geologically significant relict sand dune,
- one of the last examples of coastal fringe evergreen forest with a wonderful stand of 200-300 year old live oak trees,
- freshwater creeks and ponds, and freshwater and brackish marshes, all extraordinarily biologically productive, and home to many, perhaps most of Brunswick County’s diverse plant and animal life, particularly avian life.

Conservation objectives would further be advanced by establishing a home for the Sea Biscuit Wildlife Shelter, a rehabilitation facility for birds and wildlife injured by encounters with civilization.

Recreational objectives would be met by providing walking and bicycle trails and observation platforms, picnic and camping areas, open areas for unstructured play, and water tours of the inaccessible parts of the State preserves on the other side of the river.

This park would, however, add a unique functional element, education and research, by including

- a coastal science and education center, providing interactive exhibits, classrooms, and laboratories devoted to coastal issues, such as water quality protection, watershed management, and marine and terrestrial habitat preservation, and a sustainable energy demonstration facility, showing bird-friendly windmills and other energy production and conservation techniques,
• visitor facilities at the Sea Biscuit Wildlife Shelter’s bird and mammal rehabilitation center along with facilities for training of veterinary students in care of wild species,

• display enclosures for those birds and animals that cannot be released because of injuries that prevent survival in the wild,

• an open-air aviary for the shore birds and other species that thrive along the river, accomplished by supplementing the natural habitat with hospitable plantings and structures, such as long-leaf pine for the endangered red-cockaded woodpecker, open fields for bald eagles’ browsing, and nesting platforms for osprey, by eliminating invasive species that encroach on wetlands, and then by providing viewing platforms and bird blinds for visitors to see and enjoy the birds in their own environment,

• a botanic garden and arboretum, displaying and cultivating examples of the State’s plant life, with emphasis on those varieties adapted to Brunswick County’s soils and climate, particularly the carnivorous plants that grow nowhere else,

• demonstration plots for sustainable farming and gardening practices, and ponds and tanks to develop and display methods of aquaculture.

An additional element to serve community needs, made possible by the availability of high ground that can be developed without damage to the natural features the park would protect, would be an entertainment area, providing facilities for open-air concerts, fairs, shows, and other events. This area would have

• an amphitheater, a grassy hillside constructed by excavating a pond,

• a large grassy field for fairs and shows, and

• support facilities: rest rooms, ticket booths, and parking.

The proposed location of these and other facilities is shown on the map at the beginning of this section and in the frontispiece. Here are some details on individual park components:

**Bird and Animal Rehabilitation Center (Sea Biscuit Wildlife Shelter)** (north side, center). The birds of the coastal areas, especially the larger birds and shore birds, are frequently injured by human encounters. Although there is a facility to treat injured animals at the State zoo in Asheboro, the State does not operate a facility for care and rehabilitation of injured birds. The Aquarium at Fort Fisher does take in some creatures that cannot be released to the wild. There are many such facilities throughout the State, but all are private, and all are small. The facility for the Cape Fear region, the Sea Biscuit Wildlife Shelter, is in a private home on Oak Island.

The bird and animal rehabilitation center would be funded and operated by a non-profit organization and become the new, permanent home for the Sea Biscuit Wildlife Shelter.
Facilities would also be included for treatment of injured land mammals; the only such facility in the area is operated by a family in their own home in New Hanover County.

The facility would have a large clinic for treatment and initial convalescence of the injured birds and animals. The unique feature of this facility would be visitor and educational facilities. Such facilities are rarely available in such shelters—even the rehabilitation center at the Asheboro zoo cannot accommodate visitors.

Faculty of the veterinary school at NC State University have indicated an interest in supporting the facility and using it for training of veterinary students.

Those birds and animals unable to return to the wild would be provided homes in viewing areas—those would be the only captives. Enclosures would be placed in wooded areas along the walking trails, and equipped with suitable signs.

Botanic Park and Arboretum (southwest corner). This would have the primary facilities—greenhouse and representative specimens with exhibits—concentrated in one area. But the entire park would be part of the botanic garden and arboretum, with specimen plantings throughout and explanatory signs.

The State park system does not have a botanic garden or arboretum. The North Carolina Botanic Garden at Chapel Hill is part of the University of North Carolina. There are other smaller botanical gardens, but all are privately funded. The nearest is in Fayetteville, but that is only 79 acres. The North Carolina State Aquarium maintains some botanic exhibits as a complement to its primary mission, but that is on the other side of the river.

There are arboreta in the State, some private and some established as part of county government facilities, but all are small except the North Carolina Arboretum near Asheville. That is privately funded, and focuses on the trees of the mountains.

The botanic park at the Cape Fear would not be intended to showcase ornamentals, as does Airlie Gardens in Wilmington. The collection would be devoted to North...
Carolina’s native trees and plants, focusing on unique varieties, such as live oak and the various carnivorous plants endemic to the region. The Venus fly-trap and others that grow nowhere else would be featured.

Many of the necessary varieties are on the site; others would have to be planted and actively cultivated. The varied terrain, which includes high ground and brackish and freshwater marshland, would provide suitable environments for every species of interest. It is this variety of terrain and wildlife habitat that would set this park apart from other botanic gardens.

**Hiking trails and bicycle and wheelchair roadways.** As in every State park, hiking trails of various lengths and difficulty would be provided throughout. This plan recognizes, however, that (a) the vehicle roads in our State parks are often used for cycling using ordinary street bicycles, avoiding the hazards of cycling on city streets and country roads, and (b) handicap access is a paramount consideration in any public project.

Accordingly, in addition to the usual hiking trails and vehicle roads, this park would have a third category, paved trails for bicycles and wheelchairs as well as hikers. The unique feature of this park would be such a bikeway along the top of the bluff and through the liveoak forest along the eastern edge of the high ground of the park, overlooking the brackish marsh and the Cape Fear River. Several points of access would be provided with parking, so this bikeway/walkway can be enjoyed by those with limited mobility.

This bikeway/walkway on the bluff would be approximately a mile long, with a bridge over the tidal creek. Bird blinds would provide views of the avian life in the marsh below. This would be matched by a walking trail at the base of the bluff, at the level of the salt marsh, close to the special natural community that exists near sea level. The southern anchor for both the bluff walk and the lower trail would be the dock for tour boats. (Lower right corner).

The fresh water ponds and marshes, some near the eastern edge and some in the park’s interior, would also be accessible for both hikers and riders. Bridges and bird blinds would be provided at strategic spots.

**Bird Sanctuary.** The entire park would also function as a bird sanctuary and open air aviary. There are State reserves designated as bird sanctuaries, such as those at Battery Island, Lea-Hutaff Island, Pine Island, and Wainright Island, managed by Audubon North Carolina. Those are passive reserves, specific for shore birds. There are not any State-sponsored aviaries or active bird sanctuaries suitable for tourist visits.

This facility has two advantages as a bird sanctuary: *First*, the site has a rich variety of bird habitat—woodlands, open fields, salt marsh, fresh-water marsh, and ponds. Shore birds, waterfowl, and upland inhabiting varieties can find homes or visit for foraging. *Second*, the site...
is proximate to the bird sanctuary at Battery Island, an important heronry and the annual nesting
ground for 12 to 15 percent of the State’s population of white ibis, the State natural areas across
the Cape Fear River, the spoil islands in the river that have become important habitat of wading
birds, and many designated natural heritage areas in the immediate vicinity.

The botanic park and the bird sanctuary would be the same. The same trails and paths
would permit viewing the birds and their habitat.

**Reforestation.** The entire park site would be reforested with
native species, leaving only space for the visitor facilities. The
longleaf pine (*pinus palustris*), North Carolina’s State Tree,
would be reintroduced. This is a rare opportunity. Once
prolific in the area and throughout the Southeast, longleaf pine
has been sacrificed for lumber and replaced by loblolly pine.
By 1930 longleaf pine forests had been reduced to 3-5% of
their presettlement extent. Longleaf pine forests require
regular burning to thin out ground vegetation, resulting in an
open environment preferred by many species, including the
endangered red-cockaded woodpecker.

In its 2009 Conservation Plan, the Cape Fear Arch
Conservation Collaboration observed: “The structure of
longleaf ecosystems is a beauty to behold. Tall brown pillars
with a soft herbaceous or short shrub understory, allows one to
see far into the distance and to walk through the forest relatively unencumbered.” Yet there are
few longleaf pine forests accessible to the public.

**Camping (north central, west central areas).** The only State-provided camping facilities in the
Cape Fear region are at Carolina Beach State Park, across the Cape Fear River and accessible
only by ferry or by bridge about 20 miles upriver at Wilmington. Those facilities are designed
for tent camping, and do not have hook-ups for recreational vehicles. Although RV’s are
accommodated, space is limited and the use of generators must be prohibited after ten p.m.
Thus summertime occupancy of an RV there can be a trying experience.

The State Park at Lake Waccamaw, in Columbus County, has only two sites for group
primitive camping, and no improved campsites.

Visitors to the southeastern Brunswick County area arriving in RVs can find
accommodations only in a few dreary trailer parks and the WalMart parking lot, which they
would share with the trucks that WalMart accommodates. Tent campers have nowhere to go.

Well-equipped and well-situated campgrounds in the State park would make the park’s
facilities available to many more visitors and would support tourism in the Southport-Oak Island
area as well. The park site has an old grove of very large pecan trees (north central area),
which would provide a welcoming canopy for campers using tents. This plan includes room for about 100 sites for tent and pop-up trailer camping with toilet and shower facilities in that pecan grove. The area being reforested (west central area) would be planned and equipped for RVs in a low-density arrangement. Both sites would be proximate to the Visitor’s Center, where the campground office would be located.

Open space with outdoor exhibits; available for expansion (northeastern area). This large area would be reforested to some extent but, for the most part, kept open. Fields would be planted with grass and trimmed to provide large areas for unstructured play.

This area and other unstructured areas present opportunities for many useful programs not now having space available, such as demonstration farming plots for sustainable farming in Brunswick County’s difficult soil and tanks and ponds for aquaculture development and demonstration. There would be ample space for art exhibits and outdoor experiments supporting the coastal science and education center located in the central eastern area, such as small-scale bird-friendly windmills and other sustainable energy devices.

Visitor’s Center (central area). The Visitor’s Center and park office would be centrally located and convenient to both campgrounds. The usual “welcome” facilities would be included with some exhibits, and the park offices. Classrooms and laboratories ordinarily included in North Carolina State Parks visitors’ centers would not be necessary—those would be included in the Coastal Education Center, connected by pedestrian/wheelchair bridge to the east.

Coastal Education Center (central eastern area). The Coastal Science and Education Center would be located near the shore, among the most biologically interesting features of the park. Immediately to the west, and visible from the bridge to the Visitor’s Center, are several small depression ponds, freshwater ponds home to both common and usual species. To the south runs a freshwater creek, emptying into a tidal creek and extensive tidal marsh. This
transition area from fresh to salt water is an unusual zone, biologically prolific, and scientifically interesting because of the effects of climate change with sea level rise and more intense storms. Then to the east is one of the last surviving examples of coastal fringe evergreen forest, a natural community unique to this area that is succumbing to coastal development.

The Coastal Education Center would be housed in a building large enough to support a broad range of activities, experiments, and exhibits, ranging from study of mysteries of coastal dynamics and beach erosion, the unique flora and fauna of the Cape Fear region, to demonstration of low-impact development techniques to energy conservation and sustainable energy generation technology of particular interest to the coastal area. Of interest here would be bird-friendly windmill designs, to overcome the most objectionable aspect of wind energy. Outdoor exhibits and experiments can be located in alcoves of the star-shaped building and in the adjoining expansion area to the north.

Amphitheater and Events Center (southeastern area). Outdoor entertainment is an essential component of life in a region with a soft climate, yet the only large outdoor theater and concert facility in Brunswick County is in the gated community of St. James, available only to residents. Although the site of the proposed Cape Fear State Park is not naturally hilly, an amphitheater can be created by excavating for a pond and using the spoil to create a suitable hill, with a grassy slope facing a stage with a wooded setting near the shore of the pond.

The pond would become a feature in itself, a restful vista, a habitat for aquatic birds and other creatures, and a place for model boats. No park would be complete without such a pond. Inasmuch as Brunswick County does not have any outside swimming pools open to the general public, this pond could also be configured as swimming lake, like that at Cliffs of the Neuse.

Adjoining the amphitheater (and sharing support facilities such as rest rooms, ticket booths, storage buildings, and parking) would be a large, grassy area suitable for open-air events such as fairs, horse, dog, and car shows, impromptu sports, and unstructured play. Brunswick County does not have a fair grounds or other similar facility. A separate entrance to the park would be provided for the amphitheater and events center, to facilitate collection of admission fees for special events.
**Tavern in the Trees (southeast area).** A complementary facility for this entertainment complex, suggested by the stunning views available from the high bluff overlooking the Cape Fear River, would be the *Tavern in the Trees*, situated among the live oaks, loblolly pines, and laurel oaks of the coastal fringe evergreen forest atop that bluff. This should be an informal, buffet-style restaurant of adequate quality to be a destination in itself, yet also suitable for the family spending the day in the park.

This would be connected by walkway to the amphitheater/events center complex, would be astride the primary walking trail along the bluff, and would share parking with the water tour dock in the southeast corner.

**Live Oak on the bluff**

**Hungry Mother State Park, Virginia**

**Water tours (southeast corner 19).** Directly across the Cape Fear River from the park site lies a large area of low-lying islands and marshes comprising the Fort Fisher State Recreation Area–Zeke’s Island–Bald Head Island State Natural Area complex.

Some of the beach areas can be reached overland by four-wheel drive vehicle from the Fort Fisher Recreation Area headquarters on the east side of the river, then on foot along the beach. This is an adventure—there are not any facilities along the way. The islands, of course, are accessible only from water in a very shallow-draft boat. The barrier in the river, built by the Corps of Engineers in the nineteenth century to close the inlet to the river from the ocean just below Fort Fisher, discourages visiting the islands from upriver launch sites.
The proposed park would include a dock extending across the marshland, which would be the origination point for shallow-draft boat tours of the unique and relatively inaccessible islands and marshes of the Bald Head Island State Natural Area.

This aerial photo shows the Bald Head Island State Natural Area. The beach on the right extends from Fort Fisher at upper right to Bald Head Island at lower right. (Bald Head Island is no longer an island–a large inlet at Fort Fisher filled in after the Corps of Engineers built a rock wall blocking the flow in the 1870’s, and storms and natural events caused the other small inlets to fill, finally closing the last gap in 1999.)

The natural area extends to the west (not shown in photo), taking in Battery Island, an important heron rookery visited by 12 to 15 percent of North Carolina’s population of white ibis each Spring.

Support Center (south central area). State parks require facilities for storage of maintenance equipment supplies and housing for the superintendent and resident rangers. These would be located just inside the entrance, out-of-sight from the visitor areas of the park but nevertheless close to the visitors’ center.
Location

This map of the lower Cape Fear region shows the proposed park site on the west bank of the Cape Fear River, at the eastern edge of Brunswick County.

The City of Southport is approximately two miles south of the site. The City of Wilmington is approximately 30 miles by road to the north, on the other side of the river.

Brunswick County is bisected by US 17, a north-south coastal route connecting the coastal regions and vacation spots in the Carolinas. I40 connects the region with central North Carolina and I95, and US 74/76, a major east-west route, is being upgraded to Interstate status. The Intracoastal Waterway traverses this part of the Cape Fear River.

Brunswick County has a permanent population of over a hundred thousand, and is the fourth fastest growing of North Carolina’s 100 counties. The growth is entirely due to in-migration, comprising both retirees and young families. The seasonal population is 2.6 times the permanent population.
**Surrounding Uses.** This aerial photo shows the site of the proposed park (yellow) relative to neighboring uses.

Although first glance may raise concerns—a very large ammunition depot and a nuclear plant—these installations have extensive buffer areas that are undisturbed wildlife habitat. Indeed, a park is one of few uses fully compatible with these neighbors.

The area outlined in red is the Military Ocean Terminal at Sunny Point, a marine terminal used almost entirely for ammunition shipments. The terminal property itself is about 8600 acres, with facilities well-disbursed and the remaining areas retained in the natural state. The red shaded area is a buffer zone, another 7400 acres, also maintained in the natural state with only daytime activities permitted.

The buffer zone extends east across the Cape Fear River. Part of Carolina Beach State Park is within the buffer zone.

The Sunny Point property includes three designated Natural Heritage Areas, which are actively maintained by a staff biologist. This includes periodic burning to support the long-leaf pine forests, a preferred habitat of the red-cockaded woodpecker, the area’s favorite endangered species. There are 26 rare species of plants and animals on the site.

Duke Energy’s Brunswick Nuclear Plant is concentrated in 130 acres of the 1200-acre property outlined in green. The surrounding buffer area is left in the natural state, with security precautions to prevent entry, thus leaving the wildlife and the natural features unmolested. Parks and nuclear plants are often neighbors because of the connected natural areas. Calvert Cliffs State Park in Maryland and Illinois Beach State Park, for example, adjoin such plants.
The Park Site

Topography and Site Characteristics

This excerpt from the US Geodetic Survey map shows the contours of the property in 2005. (The property currently owned by the State Ports Authority now includes the missing triangular segment at the northeast corner.)

Beginning on the western side, the site comprises unremarkable (albeit relatively unmolested) hardwood and pine forest and fields at an elevation of 20-25 feet above mean sea level. As one moves east, a richer variety of terrain appears, with mashes, ponds, and watercourses. Then the level plateau ends abruptly with a steep slope down to sea level. The property extends over a salt marsh to the edge of a shallow tributary of the Cape Fear River.
This excerpt from the nautical chart for the Cape Fear River shows the nature of the river at this point—very shallow, with many low-lying islands. Depths are shown in feet. The navigation channel (white) is rather narrow.

Snows Marsh, the group of islands at upper right, is owned by Duke Energy and is inaccessible, and consequently unmolested. That and the small islands are important bird habitat.
This map of the site and its surroundings from the US Fish and Wildlife Service National Wetland Inventory shows substantial areas of freshwater forested/shrub wetlands (dark green), and then a very substantial area of estuarine and marine wetlands on the eastern side. Precise measurements of the wetland areas are not available; the Brunswick County tax assessor shows almost 170 acres of wetlands and marsh on the property.

The estuarine marsh at the eastern side is part of the larger Walden Creek estuary to the immediate north, designated by the North Carolina Department of Environment and Natural Resources as a “Primary Nursery Area.” Such brackish marshes are regarded as among the most biologically productive habitats in nature.

The dark green areas are tidal fresh-water marsh, higher in plant diversity than brackish marsh, and home for rare plants and animals. Among the ponds on the site are four that have been identified as among few remaining “coastal plain ponds” by the North Carolina Natural Heritage Program.
Geology

The site of the proposed park lies in the geologic region known as the “Cape Fear Arch,” a region distinguished by unusual geology and the greatest biological diversity along the Atlantic Coast north of Florida. The Cape Fear Arch is located between Cape Lookout in North Carolina and Cape Romain in South Carolina, and extends inland beyond Fayetteville to the Sandhills Region of the Carolinas.

The Cape Fear Arch is a little higher in elevation than areas near the coast to the north and south, and has been above sea level for a longer period of time. It has stood as a peninsula at certain times when the rest of the coastal plain was submerged, and had been a refuge for coastal plain plants and animals during the last Ice Age.

Dr. Paul J. Hearty of the Department of Environmental Studies of the University of North Carolina Wilmington, upon inspection of the park site, observed that the upper areas at elevation about 25 feet above sea level constitute a constructional terrace most likely of marine origin formed during the Last Interglacial Period, about 125,000 years ago, when sea level was ten to 25 feet higher than at present. Dr. Hearty, describing this upper terrace:

After the formation of this terrace during a marine highstand, sea level and thus base level fell, initiating erosion and development of a dendritic drainage pattern at the uppermost headwaters of a fluvial system that cut deeply into the pre-existing terrace topography. The main trunk of the river system was graded to a glacial-age shoreline that was 200-400 ft below present sea level, far out on the continental shelf. Sea level was lowered during past glaciations due to the accumulation of huge ice sheets in the Northern Hemisphere. Most of the stream valleys on the property are only relics of this ancient drainage system, and today only support wetlands, and small springs with ephemeral flow during heavy rains. … With the melting of the ice sheets and rise of sea level to the modern level in our present Holocene interglacial, most of the ancient drainage system was backfilled with sediments which are the underpinning of modern wetlands and salt marshes.

Dr. Hearty observed that the ponds on the site are nearly all positioned in the ancient stream valleys and are likely the result of groundwater and springs supplying water to local depressions in those valleys. He suggests that the ponds are supported by an aquiclude or impermeable layer composed of clay.
Turning to the steep escarpment sloping down to the brackish marsh at the eastern side of the site:

At some time in the not so distant past, (then uncontrolled) meanders of the Cape Fear River impinged on the western margin of the valley in the area of the property, creating a steep cut bank about 30-50° slope falling to the salt marsh. Meanders later shifted away from this position, resulting in deposition of fine-grained sediments along the shoreline. In several locations along the escarpment, ancient soils and sediments associated with the 25-foot marine terrace are exposed. The majority of the scarp, however, are mantled with slumping colluvial sediments.

Dr. Hearty explored the face of the escarpment without discovering any marine fossils, but observed that there is a good possibility that marine and estuarine fossils are present in the terrace deposits, and would be discovered in the future.

This type of terrain, a high terrace with a steep bank falling to sea level, is unique in the lower Cape Fear, appearing only at this and a few other locations and here extending south about three-quarters of a mile to Price’s Creek.

Dr. Hearty enjoying his work.

Soil sample from face of steep slope.
Soils

This map from the Brunswick County GIS system shows soil types on the site:

- **BaB**–Baymead fine sand
- **BO**–Bohicket silty clay loam
- **Fo**–Foreston loamy fine sand
- **La**–Lafitte muck
- **Ly**–Lynchburg fine sandy loam
- **On**–Onslow fine sandy loam
- **Ra**–Rains fine sandy loam
- **W**–Water

**Baymead fine sand**, which covers most of eastern part of the site uplands, is a dark gray fine sand three inches thick. The subsurface layer, 20 inches thick, is light gray fine sand in the upper part and very pale brown fine sand in the lower part. Below that is a subsoil layer of fine sandy loam about 40 inches deep.

The soil is naturally very acid, but those areas used for agriculture may have been limed or otherwise amended. Surface runoff is slow. Permeability is moderately rapid, and the available water capacity is low. Test borings in 2006 over much of the site produced groundwater at depths of seven to twelve feet below the surface.

Baymead fine sand supports woodland throughout Brunswick County. Major canopy trees are longleaf and loblolly pine, red and white oak, and hickory. Lawns and ornamental shrubs are difficult to establish and maintain in this soil. It is poorly suited to athletic fields.
Bohicket silty clay loam covers the tidal flats at the eastern side of the site. Elevations are zero to three feet above sea level, and the area is dissected by narrow areas of water. Even the higher portions are often flooded.

Typically the surface layer is dark gray silty clay loam 15 inches thick, with an underlying layer of dark gray silty clay to a depth of 70 inches. Permeability is very slow. The soil ranges from neutral to moderately alkaline. It supports vegetation adapted to tidal marsh: smooth cordgrass and black needlerush. This area supports a wide variety of wildlife: land animals at the fringes, many kinds of birds, particularly those varieties feeding on marine life, and during high tides, marine life itself, crabs, shrimp, and fish.

Foreston loamy fine sand, in two north-south strips in the center of the site, is a well-drained dark gray loamy fine sand about four inches thick, with a subsurface layer of yellowish brown loamy fine sand about eight inches thick. Below that lies about 66 inches of yellowish and light gray fine sandy loam.

Surface runoff is slow. Permeability is moderately rapid. The soil is naturally strongly acid, but this may have been amended with lime. Most of the areas with this soil in Brunswick County are woodland, but some have been cut for farming.

Lafitte muck is a poorly-drained soil in the tidal flood plains at the eastern ends of the watercourses draining into the salt marsh adjoining the Cape Fear River. The muck layers, typically 55 inches thick, are dark brown, black, and dark gray.

Surface runoff is very slow. The soil has moderate rapid permeability, and shrinks when it dries. It is neutral to moderately alkaline.

This soil supports wetland plants and wildlife. Bald cypress and water tupelo grow near the edges.

Lynchburg fine sandy loam, appearing in the western part of the site, has a surface layer of fine sandy loam about nine inches thick, over a 55-inch layer of subsoil of light yellowish brown fine sandy loam with gray sandy loam in the lower part. This soil is also very acid, unless it has been amended for agriculture.

This soil has moderate permeability, surface runoff is slow, and the available water capacity is moderate. Most of this type of soil in Brunswick County is, or was, in woodland, with vegetation adapted to wetness. Canopy trees are loblolly pine, sweetgum, blackgum, southern red oak, white oak, yellow-poplar, sycamore, southern red cedar, red maple, willow oak, and water oak. Such poorly-drained areas are regarded as important habitat for deer, raccoons, fox, rabbit, bobcat, opossum, birds, and other wildlife.

Onslow fine sandy loam, also found in the western part of the site, is very similar, and supports the same types of water-tolerant vegetation and wildlife. The surface layer is only
three inches thick, with a subsurface layer of about 20 inches. An 80-inch depth of sandy clay loam lies below.

Surface runoff is slow. Permeability is moderate, and the available water capacity is moderate. The soil ranges from extremely acid to strongly acid unless it has been limed, which is likely on this site because of its use for farming.

*Rains fine sandy loam*, covering most of the western part of the proposed park site, is a poorly-drained soil with surface runoff, permeability, water capacity, and acidity similar to the other sandy loams. The surface and subsurface layers are very dark gray, with light gray sandy clay loam below. This soil support the same types of woodland vegetation and wildlife as the other sandy loams.

**Groundwater and Substrate**

Test borings on the site in 2006-2008 produced groundwater at depths of 7 to 12 feet. The seasonal water table is much higher, at or near the surface in some cases. To facilitate agriculture, the site has drainage ditches leading to the natural watercourses. An earlier test well has reached the Castle Hayne aquifer at a depth of 43 feet. At this point, that aquifer does not have a confining layer.

Both the surficial aquifer and the underlying Castle Hayne aquifer are used for domestic consumption and irrigation throughout the area. Municipal and industrial wells (including some of the wells used by the Brunswick County Public Utilities) draw from the Castle Hayne aquifer. That aquifer extends from New Jersey to Georgia; it derives its name from the outcrop at the ground surface at Castle Hayne, just to the northwest above the City of Wilmington.

Underneath the loose, sandy soil the borings encountered 10 to 25 feet of thick silty clayey soil, soft to medium stiff in consistency. Below that lies a very dense sandy soil layer to depths of 55 to 75 feet. Limestone was encountered in some of the borings at the maximum depths.

The loose, sandy soil would require pile foundations for large, heavy structures, although those are not contemplated for the park. Smaller structures should be designed for large (5 to 15 inches) and non-uniform settlements, including seismic-induced settlements.

**Environmental Contamination Analysis**

In 2005, URS corporation conducted an environmental inspection of the site at the request of the State Ports Authority, in connection with its pending purchase of the site. The summary of results appears on the following page:
The limited Phase II Investigation was completed on the Site to evaluate the property for evidence of impacts associated with past agricultural and land application activities. The following conclusions are provided based on the findings of the investigation:

- The property historically has been used for agricultural purposes and portions of the Site were used by Pfizer and ADM for land application of citric acid plant by-products to enhance agricultural conditions on the Site. These activities included land application of nitrogen-rich mycelium and of "black mud". Reportedly, land application activities were conducted under non-discharge permits issued by NCDENR and ceased in 1992.

- The Site is underlain by silty sands. Non-native materials or fill was not observed in the borings. The groundwater table lies within a few feet of the ground surface. Groundwater flow is predominantly to the east with some radial flow to the north and west due to the presence of the Cape Fear River and a river channel that border the property.

- The investigation included installation and sampling of soil borings and groundwater monitoring wells. Evidence of contamination or of land application residuals such as staining or odors was not observed.

- Phase II Investigation soil and groundwater samples were analyzed for parameters associated with past Site uses including pesticides, herbicides, metals and nitrates. Soil sample analytical results were compared with NCDENR Inactive Hazardous Sites Branch Remediation Goals For Soil (with the exception of barium, which has no cleanup goal specified under these criteria and for which results were compared with NCDENR Groundwater Section Soil to Groundwater Leaching criteria). Groundwater sample data were compared with NCDENR Groundwater Quality Standards. With the exception of 3 groundwater samples in which nitrates were reported at concentrations slightly above the Groundwater Quality Standards, no analytes were identified at concentrations exceeding the referenced criteria. While the nitrate detected in groundwater samples may be associated with agricultural activities, it is noted that nitrate was not detected in the soil samples.

- A drive-by well survey of the surrounding area identified several potential water supply wells within a 2,500- foot area surrounding the Site. The public data well search identified three wells within a 1-mile radius of the site. No onsite groundwater supply wells were identified.
Climate

The Cape Fear enjoys a mild, marine-influenced climate, the warmest area of the State of North Carolina. In spring and summer winds are generally from the southeast and are usually balmy breezes. In late fall and winter, winds are consistently stronger and mostly northeasterly to northerly. Occasionally winds reach gale force, and the area has suffered severe hurricanes. Annual rainfall is about 60 inches.

Temperature records show that the islands and beach areas are a few degrees warmer than the inland areas throughout the year. Bald Head Island, at the tip of the Cape, rarely suffers freezing weather.

The coastal area is the northern extremity of USDA plant zone 8b, which extends north from northern Florida and takes in Savannah and Charleston. The average annual extreme minimum temperatures are 15°F to 20°F.

The Cape Fear is the northern limit of the range of many tropical species, such as the American alligator and the cabbage palmetto. The photograph at left is an alligator immersed in algae.
The charts below show the normal temperatures and precipitation at the Cape Fear.

### Temperature Normals (Degree Fahrenheit)

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<tbody>
<tr>
<td>MAX</td>
<td>66.4</td>
<td>58.3</td>
<td>54.5</td>
<td>71.4</td>
<td>78.1</td>
<td>84.3</td>
<td>88</td>
<td>87.4</td>
<td>83.5</td>
<td>75.7</td>
<td>68.4</td>
<td>69.5</td>
<td>73</td>
</tr>
<tr>
<td>MIN</td>
<td>33.5</td>
<td>36.1</td>
<td>41.6</td>
<td>48.7</td>
<td>57</td>
<td>65.4</td>
<td>70.1</td>
<td>68.5</td>
<td>62.9</td>
<td>50.9</td>
<td>43.3</td>
<td>35.8</td>
<td>51.1</td>
</tr>
<tr>
<td>MEAN</td>
<td>45</td>
<td>48.7</td>
<td>53.1</td>
<td>60.1</td>
<td>67.6</td>
<td>74.9</td>
<td>79.1</td>
<td>78</td>
<td>73.2</td>
<td>63.3</td>
<td>55.9</td>
<td>47.7</td>
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### Degree Day Normals (Total)

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<tbody>
<tr>
<td>HDD</td>
<td>527</td>
<td>513</td>
<td>376</td>
<td>172</td>
<td>42</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>136</td>
<td>300</td>
<td>548</td>
<td>2719</td>
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<tr>
<td>CDD</td>
<td>0</td>
<td>0</td>
<td>4</td>
<td>24</td>
<td>121</td>
<td>296</td>
<td>435</td>
<td>401</td>
<td>252</td>
<td>83</td>
<td>24</td>
<td>8</td>
<td>1650</td>
</tr>
</tbody>
</table>

Avg. last Spring Frost: March 19  
Avg. first Fall Frost: November 12  
Growing Season: 238  
HDD = Heating Degree Days  
CDD = Cooling Degree Days

### Precipitation Normals (Total in Inches)

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<tr>
<td>TOTAL</td>
<td>5.28</td>
<td>4.18</td>
<td>4.47</td>
<td>3.08</td>
<td>4.18</td>
<td>5.04</td>
<td>6.60</td>
<td>7.86</td>
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<td>3.87</td>
<td>3.45</td>
<td>4.19</td>
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### Ocean Beach Temperature Normals (Degree Fahrenheit)

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<tr>
<td>TEMP</td>
<td>48</td>
<td>50</td>
<td>55</td>
<td>64</td>
<td>73</td>
<td>79</td>
<td>92</td>
<td>83</td>
<td>80</td>
<td>70</td>
<td>81</td>
<td>53</td>
<td>60.5</td>
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Natural Communities and Features

This map from the US Fish and Wildlife Service National Wetlands Inventory shows the wetlands and other natural features of the proposed park.

This is the key to the labels. Explanations are on the following pages.

BM    Brackish Marsh
CFEF  Coastal Fringe Evergreen Forest
FFSW  Freshwater Forested Shrub Wetlands
FM    Freshwater Marsh
FP    Freshwater Pond
PG    Pecan Grove
PHF   Pine/Hardwood Forest
Natural communities and wetlands are variously, but not consistently, described and defined by the North Carolina Department of Environment and Natural Resources Natural Heritage Program, the NCDENR Division of Coastal Management, and the US Fish and Wildlife Service National Wetlands Inventory. These descriptions draw from those, but are based on observations by Jesse Corey, Inventory Biologist for the NCDENR Division of Parks and Recreation, and Thomas Hancock, Assistant Professor of Ecology/Conservation Biology of Methodist University, made at the site in December 2013 and January 2014.

**Brackish Marsh.** The Brunswick County tax assessor’s records list 167 acres of the proposed park site as marsh. Of this approximately 100 acres of the eastern part, along the tributary of the Cape Fear River, are brackish marsh, subject to occasional or regular flooding by tides. In two areas, this marsh extends into the watercourses draining the uplands. The tidal waters are partly diluted by fresh water from both the river and this drainage. The area, with an elevation of near zero, includes some ponds and watercourses.

Mr. Corey observed: “This community supports black-tipped needle rush (*Juncus roemerianus*), smooth cordgrass (*Spartina alterniflora*), sea lavender (*Limonium carolinianum*), and glasswort (*Salicornia* spp.). In slightly elevated areas where tidal influence was not as severe, narrowleaf cattail (*Typha angustifolia*) and the invasive common reed (*Phragmites australis*) could be found.”

In exploring the marsh areas at the mouths of the watercourses in December, Mr. Corey and Dr. Hancock observed these animals: mummichog (*Fundulus heteroclitus*), ribbed mussel (*Geukensia demissa*), marsh periwinkle (*Littorina irrorata*), and magnolia threetooth (*Triodopsis hopetonensis*). However, the fringes of these marshes typically are part of the habitat of a variety of land animals, such as raccoons, white-tailed deer, river otter, and marsh rabbit. Game trails are evident along the edges of the marshlands. Birds using these marsh areas are clapper rail, sora rail, gallinule, cattle egret, American egret, blue heron, black duck, lesser scaup, hooded merganser, and eastern brown pelican. During high tides the marshlands are used by crab, shrimp, and many kinds of fish, such as croaker, flounder, minnows, mullet, and menhaden. Shrimp species include white (*Litopenaeus setiferus*), brown (*Farfanttepenaeus azterecus*), and pink (*F. Duorarum,*). Reptiles such as American alligators and young sea turtles also use such areas.¹

¹ U.S. Department of Agriculture, *Soil Survey of Brunswick County, North Carolina.*
The US Fish and Wildlife Service names these groups of birds as supported by the wetlands along the Cape Fear River: “(1) waders, (2) shallow-probing and surface searching shorebirds such as sandpipers, plovers, knots and oystercatchers, (3) deep-probing shorebirds, such as godwits, willets, and curlews, (4) serial searching birds such as terns, gulls, skimmers, pelicans and kingfishers, (5) floating and diving birds such as ducks, grebes, loons, cormorants and swans, and birds-of-prey such as osprey, hawks, eagles and owls.” The waders include great white egrets, great blue herons, snowy egrets, and white ibis, all spectacular birds.

Brackish marsh viewed from foot of bluff

Coastal Fringe Evergreen Forest. The high bluff overlooking the marsh, extending about 5000 feet north to south, supports one of the last examples of Coastal Fringe Evergreen Forest. Even in 1995, this natural community was regarded as “rare” and “one of the most imperiled community types in the state.” Mr Corey describes it thus:

The canopy is dominated by mature loblolly pine (*Pinus taeda*) (likely in the 60-70 year age class), with several large, older live oaks (*Quercus virginiana*), water oaks (*Quercus nigra*), and hickories (*Carya* sp.) interspersed. The live oaks are of notable age, likely 200-300 years old, and were likely kept intact when the land was originally cleared. Coastal red-cedar (*Juniperus virginiana var. silicicola*), yaupon (*Ilex vomitoria*) and American holly (*Ilex opaca var. opaca*) comprise the midstory, with a sparse, fire-suppressed understory dotted with widespread woodland species such as lax river-oats (*Chasmanthium laxum*) and elephant’s foot (*Elephantopus* sp.).

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1 Richard J. LeBlond, *Inventory of the Natural Areas and Rare Species of Brunswick County, North Carolina* (1995).
The loblolly pine and live oaks are old, enormous specimens. Dr. Hancock measured the circumference of several pines at greater than 5.3 feet, and several live oaks at greater than 12 feet.

The forest along the river bluff occupies about 30 acres. However, there are remnants of a larger forest in other parts of the proposed park site, particularly some especially elegant live oak trees.

**Freshwater Forested Shrub Wetlands.** The proposed park site includes the wetland sources of several creeks draining to the west and north, a larger such watercourse in the northeastern section draining to the coastal marsh, and a 60-acre complex of freshwater marsh, ponds, and creeks originating in the center of the site and draining to the east. These wetland areas are surrounded by forests populated with stands of loblolly pine and loblolly slash pine (*Pinus elliottii*), with American holly (*Ilex opaca*) and swamp bay (*Persa palustris*), some quite large (3.5 feet in circumference). Some of these woodlands represent vestiges of a larger Coastal Fringe Evergreen Forest in the form of very large live oaks. These wetland forests are often bordered by non-native, invasive species, including Japanese honeysuckle, Chinese privet (*Ligustrum sinensis*), and Chinaberry (*Melia azedarach*).

**Freshwater Marsh.** The US Fish & Wildlife Service Wetland Inventory identifies three other freshwater marshes on the park site, two in the watercourse in the northeast section of the site and another, larger area in the southeast. The photo at right shows the marsh at the head of the watercourse in the northeast section.
The marsh in the southeast corner is the largest, about nine acres. Dr. Hancock reports:

Several large individuals of swamp bay (greater than 3.8 feet in circumference at breast height) dot the landscape along with American holly and numerous understory plants. This freshwater marsh grades into a brackish marsh at the edge of the Cape Fear River. Along the gradient, red cedar, big cordgrass (*Spartina cynosuroides*), bald cypress (*Taxodium distichum*) and black needle rush (*Juncus roemerianus*) can be found. Several hummocks approximately ten by fifteen feet and three feet in elevation above the surrounding land mark the transition to brackish marsh.

**Freshwater marsh in southeast section**

**Freshwater Pond**

Six freshwater ponds, with an aggregate area of about twelve acres, have been noted on the site. Four of those (two in the watercourse in the northeast section and two at the northern head of the forested shrub wetlands in the central part of the site) are positioned in ancient stream valleys. Dr. Hearty, the geologist, opines that these most likely the result of ground water or springs that supply water to depressions in the valley floors. He believes that these ponds are
supported below by an aquaclude or impermeable layer and are not the result of dolines, sinkholes, or collapsed limestone.

The other two freshwater ponds are located within the Coastal Fringe Evergreen Forest in the central part of the bluff overlooking the marshland on the east side of the site. These are not positioned in stream valleys, and appear to have an origin other than that of the other four ponds.

Dr. Hancock notes: “Several bird species including great blue heron (Ardea Herodias), sharp-shinned hawk (Accipiter striatus), wild turkey (Meleagris gallopavo), Carolina wren (Thryothorus ludovicianus) and bald eagle (Haliaeetus leucocephalus) were observed on the December 17 site visit. Several river cooter individuals (Pseudemys concinna) were also observed.”

American alligators (Alligator mississippiensis) have been reported in ponds on the site.
**Pecan Grove.** In the north-central part of the site lies a 30-acre grove of very old and large pecan trees (*Carya illinoensis*). Although not naturally occurring, this grove represents the agricultural history of the site in a stunning way. These trees provide a high canopy with abundant space beneath, suggesting a location for a campground and space for large enclosures for birds and animals treated at the Sea Biscuit Wildlife Shelter but not able to survive in the wild.

**Pine/Hardwood Forest.** In the northwest corner of the park site there is a mature forest of about 50 acres, comprising loblolly pine (with several large individuals measuring greater than seven feet in circumference at breast height), water oak (*Quercus nigra*), tulip poplar (*Liriodendron tulipifera*), red cedar (*Juniperus virginiana*), American holly (*Ilex opaca*), yaupon (*Ilex vomitoria*) and swamp bay (*Persea palustris*).

This forest abuts the similar forest on the buffer area for the nuclear plant on the west, providing a large habitat for such woodland creatures as deer, raccoons, fox, rabbit, bobcat, opossum, and an immense variety of birds.

Much of the original forest on the site had been cleared for cultivation, and kept clear for farming over the years. The soils and condition of these open spaces suggest reforestation with longleaf pine, keeping the understory clear with burning. North Carolina’s extensive longleaf pine forests have long ago been cut for lumber and naval stores. Areas where they once flourished have been replanted with faster-growing loblolly pines, usually evenly spaced in straight rows in plantations. The open fields on this site present a rare opportunity for restoration of longleaf pine and the unique wildlife habitat such a forest provides. The endangered red-cockaded woodpecker requires longleaf pine forests for nesting.
**Maritime Wetland Forest.** The areas surrounding the freshwater marshes and brackish marsh, both along watercourses and at the base of the bluff over looking the river, support rare maritime wetland forests, with saturated soils and some exposure to salt spray. Species include American holly, yaupon, swamp bay, and bald cypress.

**Cape Fear River.** The lower part of the Cape Fear River on which the proposed park would be located is designated the *Lower Cape Fear River Aquatic Habitat* in the inventory of natural areas prepared for the North Carolina Natural Heritage Program. This area provides critical habitat for four Federally Endangered or Threatened animals: manatee (*Trichechus manatus*), American alligator (*Alligator mississippiensis*), shortnose sturgeon (*Acipenser brevirostrum*), and Atlantic sturgeon (*Acipenser oxyrinchus*). The manatee and sturgeon are Federally Endangered, and the American alligator is Federally and State Threatened.

Four estuarine fish species that are significantly rare in North Carolina occur in the lower Cape Fear River: spinycheek sleeper (*Eleotris pisonis*), marked goby (*Gobionellus stigmaticus*), freckled blenny (*Hypsoblennius ionthas*), and opossum pipefish (*Microphis brachyurus*).

In the section of the river at the park site and a few miles north and south are the *Lower Cape Fear River Bird Nesting Islands*, a natural area of State significance. These islands, some naturally occurring and some created from dredging spoil, represent one of the most important colonial water bird nesting areas in North Carolina. They support breeding populations of five rare bird species: snowy egret (*Egretta thula*), tricolored heron (*E. tricolor*), brown pelican (*Pelecanus occidentalis*), black skimmer (*Rynchops niger*), and gull-billed tern (*Sterna nilotica*). The gull-billed tern is State Threatened, and the black skimmer is significantly rare in North Carolina. The snowy egret, tricolored heron, and brown pelican are State Special Concern species. The breeding population for the brown pelican at this site is the largest in the state.

The aquatic communities in in the Cape Fear Estuary were first described in a comprehensive report by Carolina Power & Light in the 1970's. This is an except from an environmental report for license renewal in 2005:

The estuary includes 22,000 acres of salt marshes and 18,000 acres of tidal flats and small tidal streams. The Cape Fear estuary is a partially mixed estuary, meaning its water shows a gradual increase in salinity and density with depth (CP&L 1980, pg. 4-3). It has a net seaward displacement in its surface waters and a net landward displacement in its deeper waters, which has implications with respect to the transport of plankton and other organisms in and out of the estuary.

The average daily freshwater flow into the Cape Fear estuary is around 10,000 cubic feet per second, but there is considerable variability. The distribution and quantity of rainfall in the watershed are the main determinants of annual and seasonal variation (CP&L 1980, pg. 4-5).
Flows in the Cape Fear River are highest in late winter and lowest in late-summer and fall. During periods of average freshwater inflow (after the ebb tide) surface salinities range from 8 parts per thousand (Sunny Point) to 24 parts per thousand (Bald Head), while bottom salinities range from 15 parts per thousand (Sunny Point) to 29 parts per thousand (Bald Head) (CP&L 1980, pg. 4-20).

Tidal height (amplitude) decreases as the tidal pulse moves up-river. The average tidal amplitude in the lower river, (near its mouth) is approximately four feet (CP&L 1980, pg. 4-5). Tidal currents in the estuary average 3.4 feet per second, thus the movement of water in the channel during a six-hour ebb or flood tide is approximately 14 miles. This tidal excursion is large compared to the length of the estuary, and as a result water and associated organisms can be moved through the system in a few days.

The portion of the estuary seaward of Sunny Point, in which BSEP is located (essentially the first tidal reach), is characterized by complex water circulation patterns, vigorous tidal action, turbulence, fluctuating salinity levels, and high exchange ratios with the ocean. In many respects, this reach of the estuary acts as an extension of the nearby coastal zone. The distribution and abundance of aquatic organisms in the lower Cape Fear estuary are determined largely by these highly variable physical and chemical factors.

The major categories of aquatic biota found in the Cape Fear estuary are phytoplankton (microscopic plants), zooplankton (microscopic animals), planktonic or semiplanktonic larvae and postlarvae of fish and shellfish (growth stages between the egg and juvenile stage), and nekton (juvenile and adult fish and shellfish). Planktonic organisms are waterborne and are found in both the estuary and the adjacent ocean. The nekton consists of a mixture of (a) sea-spawned species, (b) a few anadromous species, and (c) resident (estuary-spawned) species.

Most of the important Cape Fear nektonic organisms are the sea-spawned type. These organisms are spawned in great numbers over large areas offshore (frequently many miles offshore) for an extended period (3-6 months in most cases). Currents carry the resulting larvae and postlarvae into the nursery grounds of various estuaries, including those of the Cape Fear estuary. Nursery areas in the Cape Fear estuary include the marshes, shallow fringe areas, and tidal creeks (and, in the case of some species, the open waters of the river). All of these early life stage organisms are subject to high natural mortality rates that decrease over time; that is, at each life stage the survivors to that point have a better chance of survival than do younger life stages (e.g., juvenile natural mortality is less than larval natural mortality).
In the Cape Fear estuary, there are two periods of larval abundance each year associated with the spawning of nearshore marine and estuarine species. A summer peak is associated with the presence mostly of anchovies and gobies. Seatrout also spawn during this period, and large numbers of pink and white shrimp are recruited to the estuary. A second peak of seasonal abundance usually occurs in winter and early spring, coincident with the spawning of spot, menhaden, striped mullet, croaker, brown shrimp, and flounders. Maximum abundance of these taxa within the estuary is usually observed in March and early April.

Species spawned in the ocean face the task of reaching the mouth of the estuary and then migrating to primary nursery zones. During the oceanic phase of migration, the swimming ability of the larvae is limited and transport inshore occurs primarily through wind action and current patterns. Natural mortality is believed to be very high during this period, and consequently survivors of the inshore migration reaching the Cape Fear estuary and other estuaries constitute only a small fraction of the eggs spawned in the ocean. It is noteworthy that the Cape Fear estuary is an open system, with regard to the origin of recruits. That is, many individuals arriving at the mouth of the estuary probably do not originate from spawning Cape Fear populations. The migratory phase for these young organisms continues inside the estuary until suitable nursery habitat is found.¹

The deepening and widening of the shipping channel in a project authorized in 1998 but not yet complete has increased the tidal amplitude in the Cape Fear River estuary and may have an effect on the aquatic communities reported above, as well as the vegetation in intertidal areas. The last available report (2010) indicated the effects of increased salinity are generally adverse.

¹ From the 2005 Progress Energy Environmental Report:
The two Brunswick Steam Electric Plant Cape Fear Studies Interpretive Reports (CP&L 1980; CP&L 1985) are perhaps the most comprehensive and useful sources of information on the distribution and abundance of important aquatic species at all life stages (larvae, juveniles and adults) in the Cape Fear estuary. These reports, supplemented by CP&L and Progress Energy annual biological monitoring reports prepared since 1981, provide a detailed record of population trends of numerically dominant and commercially and recreationally important species (e.g., spot, croaker, Atlantic menhaden, bay anchovy, Southern flounder, striped mullet, gobies, three shrimp species, and blue crab) at all life stages over an almost 30 year period.
Adjoining areas. Adjoining the park site on the west and north is the property of the Brunswick Nuclear Plant. The property comprises approximately 1200 acres, of which about 130 acres are occupied by the plant and its supporting facilities. The remaining 1070 acres are maintained in the natural state as a buffer area.

A predecessor company of Duke Energy, Carolina Power & Light, developed much of the knowledge base of the natural communities for this part of the lower Cape Fear in connection with the licensing process in 1974. This is an excerpt from the environmental report prepared for the license renewal application in 2005:

Most upland portions of the BSEP (Brunswick Steam Electric Plant) site consist of planted loblolly pine (Pinus taeda) forest. Other habitats at the site include pine-hardwood forests, longleaf pine-wiregrass communities, pine savannas, pocosins, dune-strand communities, and salt marshes. The following discussion on the habitats and representative species is taken from the Final Environmental Statement for the Brunswick Plant (AEC 1974).

Pine-hardwood forests at BSEP are mixtures of loblolly pine with hardwoods such as sweet gum (Liquidambar styraciflua), blackgum (Nyssa sylvatica), hickory (Carya spp.) and oak (Quercus spp.). Forests dominated by longleaf pine (Pinus palustris), turkey oak (Quercus laevis), and wiregrass (Aristida stricta) occur in well drained areas such as along ancient dunes. A few remnants of pine savannas occur in periodically flooded areas. Pine savannas are characterized by an open canopy of longleaf pine or pond pine (Pinus serotina) with a dense ground cover of herbs and shrubs. Pocosins are wetland depressions characterized by thickets of various evergreen shrubs and small trees such as red bay (Persea borbonia) and sweet bay (Magnolia virginiana).

Salt marshes at the BSEP site are composed primarily of cordgrass (Spartina alterniflora), with needlerush (Juncus romerianus) dominant in some areas. The marshes provide habitat for many aquatic organisms (see Section 2.2) that are preyed upon by a variety of wildlife species.

The habitats support a variety of wildlife species typical in the southeastern Coastal Plain. Pine-hardwood, pine-wiregrass, pine savannah, maritime forests, and pocosin communities support many species of birds, including hawks, woodpeckers, warblers, sparrows, and others. Animals in these habitats include white-tailed deer, opossums, raccoons, squirrels, skunks, bobcats, snakes, toads, frogs and lizards. Salt-marshes support three species of commercially valuable shrimp (white [Litopenaeus setiferus], brown [Farfantepenaeus aztecus], and pink [F. duorarum]), blue crab, spot, croaker, flounder, and numerous other fish species. They also provide
habitat for American alligators, raccoons, otters, and many species of wading birds.

To the north of the Duke Energy property lies the Military Ocean Terminal at Sunny Point, a marine terminal for ammunition shipments. The property is about 8649 acres; most is maintained as a buffer zone and kept in its natural state. The property is surrounded by an additional buffer area of about 7400 acres of holdings and easements. This zone extends across the Cape Fear River; part of the Carolina Beach State Park is within that zone.

A portion of Sunny Point is a Registered Natural Heritage Area, which includes high quality natural communities, including the rare Wet Pine Flatwoods Leiophyllum Variant, and the uncommon Small Depression Pond community types. The Wet Pine Flatwoods Leiophyllum Variant is globally restricted to southeastern North Carolina. Other natural communities within the site include the Pine Savanna and Wet Pine Flatwoods Wet Spodosol variants, and the Coastal Fringe Sandhill.

Small Depression Pond natural communities are restricted to a few scattered regions along the Atlantic Coastal Plain; the Sunny Point site contains one of the largest concentrations of such ponds in North Carolina. Small Depression Pond communities occur in limesink depressions within the sandy uplands. These depressions are believed to have been created by subterranean collapse of limestone deposits, resulting in the slumping of overlying sand deposits. Ponds form where these depressions intersect groundwater. When water levels drop during the growing season, the exposed pond margins support a diverse herb layer with several rare plant species. Characteristic species include spadeleaf (\textit{Centella erecta}), pinebarren rush (\textit{Juncus abortivus}), southern bogbutton, witch grasses (\textit{Dichanthelium spp.}), and beaksedges (\textit{Rhynchospora spp.}).

The proposed park site includes several ponds which may have been created by the same mechanism, because limestone is known to underlie much of the sandy soil of the area. Regardless of how created, those ponds are fed by groundwater, and would rise and fall with the seasons, creating the same environment as the designated natural communities at Sunny Point.

The natural communities at Sunny Point support 26 species of rare plants and animals, including four animals that are Federally designated. Twenty-two rare plant species have been found at the site, most of which are associated with the limesink ponds. The facility has an active conservation program, which includes periodic burning of the longleaf pine forests to maintain the habitat of the red-cockaded woodpecker, an Endangered species.

South of the proposed park site lies a similar site which has been partially built out for a citric acid plant in 1970. The natural communities on the remaining area would be similar to those of the proposed park site and surrounding areas. The southeast corner of this property is the location of the Price’s Creek lighthouse, completed in 1851 and lit for the last time in 1863.
Just south of that property is the Southport Ferry Landing Forest, a 250-acre site designated a Natural Heritage Area of State significance. This excerpt from the 1995 *Inventory of the Natural Areas and Rare Species of Brunswick County, North Carolina*, describes the site:

**SIGNIFICANT FEATURES:**
1. This site contains a good example of the rare Coastal Fringe Evergreen Forest natural community. Good quality Coastal Fringe Sandhill and Brackish Marsh natural communities also occur at the site.

2. The American alligator (*Alligator mississippiensis*), a Federal and State Threatened reptile, has been documented from Price Creek at this site.

**GENERAL DESCRIPTION:** Southport Ferry Landing Forest occurs on a dry sandy terrace dissected by deep ravines, and bordered along the north side by Price Creek marshes. The high terrace supports the Coastal Fringe Sandhill natural community, and low ridges and ravine slopes support the Coastal Fringe Evergreen Forest community. A swamp community with pocosin elements occupies the ravine bottoms, and the Brackish Marsh community occurs along Price Creek.

Coastal Fringe Sandhill occurs on the highest, driest soils at the site. The open canopy is dominated by longleaf pine (*Pinus palustris*), while turkey oak (*Quercus laevis*) and sand live oak (*Q. geminata*) form a moderately dense subcanopy. Prominent shrubs include dwarf huckleberry (*Gaylussacia dumosa*), wax-myrtle (*Myrica cerifera var. cerifera*), and yaupon (*Ilex vomitoria*). The ground layer has been suppressed by lack of fire and consequent litter buildup. Oak-toes lichen (*Cladina evansii*) is common.

Coastal Fringe Evergreen Forest occurs on moist to mesic sandy soils of low ridges and ravine slopes. Prominent in the canopy are large, scattered loblolly pine (*Pinus taeda*), with mixed age classes of sand laurel oak (*Quercus hemisphaerica*), live oak (*Q. virginiana*), and water oak (*Q. nigra*). American holly (*Ilex opaca*), yaupon (*I. vomitoria*), swamp red bay (*Persea palustris*), and sparkleberry (*Vaccinium arboreum*) are prominent in the understory.

Swamp forest occurs in the mucky soil floodplains of the ravines. Sweetgum (*Liquidambar styraciflua*) and red maple (*Acer rubrum*) are dominant in the canopy, and
loblolly bay (Gordonia lasianthus) is common in the
understory. The moderately-to-very dense shrub layer is
dominated by fetterbush (Lyonia lucida), gallberry
(Ilex coriacea), inkberry (I. glabra), and cane
(Arundinaria tecta). This community appears
transitional between pocosin and hardwood swamp
communities. Brackish Marsh occurs in the mucky soils
of tidal floodplains bordering Price Creek along the
northern boundary of the site. Black needlerush (Juncus
roemerianus) is the dominant species, grading upstream
to narrowleaf cattail (Typha angustifolia) dominance.

**MANAGEMENT/PROTECTION RECOMMENDATIONS:** The sandhill
areas appear to have experienced a long period of fire
suppression, resulting in a buildup of litter. This has
resulted in suppression of the herb layer, and an
increase in the ground surface fuel load. Introduction
of fire may prove difficult and risky, but is necessary
for survival and restoration of the community. The
Coastal Fringe Evergreen Forest community is naturally
limited in extent, occurring sporadically from
Brunswick to Carteret counties. It is rapidly
disappearing to coastal development, and may be one of
the most endangered community types in the state
(emphasis added).

The similarity of the Ferry Landing Forest to the proposed park site is remarkable (or
perhaps not, given its location just south of the proposed park site).

Despite its significance as a Natural Heritage Area and the rarity of the Coastal Fringe
Evergreen Forest on the site, this site is doomed. The Southport Ferry Landing Forest is within
the zoning jurisdiction of the City of Southport. Part of the site is zoned “BD,” Business
District, and the remainder “MF,” Multifamily. This is to accommodate a Planned Unit
Development, a combination of high-density housing and business. There is money to be made.

The fate of this ecologically important site makes preservation of the 600-acre proposed
park site all the more important.
Species Lists

There follows the list of species observed at the site of the proposed park by Jesse Corey, Inventory Biologist of the NCDENR Division of Parks and Recreation, on December 17, 2013. The order is by scientific name.

<table>
<thead>
<tr>
<th>Common Name</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Birds</strong></td>
<td></td>
</tr>
<tr>
<td>Sharp-shinned Hawk</td>
<td>Accipiter striatus</td>
</tr>
<tr>
<td>American Pipit</td>
<td>Anthus rubescens</td>
</tr>
<tr>
<td>Great Blue Heron</td>
<td>Ardea herodias</td>
</tr>
<tr>
<td>Cedar Waxwing</td>
<td>Bombycilla cedrorum</td>
</tr>
<tr>
<td>Red-tailed Hawk</td>
<td>Buteo jamaicense</td>
</tr>
<tr>
<td>Red-shouldered Hawk</td>
<td>Buteo lineatus</td>
</tr>
<tr>
<td>Northern Cardinal</td>
<td>Cardnalis cardinalis</td>
</tr>
<tr>
<td>Turkey Vulture</td>
<td>Cathartes aura</td>
</tr>
<tr>
<td>Killdeer</td>
<td>Charadrius vociferus</td>
</tr>
<tr>
<td>Rock Pigeon</td>
<td>Columba livia</td>
</tr>
<tr>
<td>American Crow</td>
<td>Corvus brachyrhynchos</td>
</tr>
<tr>
<td>Blue Jay</td>
<td>Cyanocitta cristata</td>
</tr>
<tr>
<td>Bald Eagle</td>
<td>Haliaeetus leucocephalus</td>
</tr>
<tr>
<td>Wild Turkey</td>
<td>Meleagris gallopavo</td>
</tr>
<tr>
<td>Song Sparrow</td>
<td>Melospiza melodia</td>
</tr>
<tr>
<td>House Sparrow</td>
<td>Passer domesticus</td>
</tr>
<tr>
<td>Savannah Sparrow</td>
<td>Passerculus sandwichensis</td>
</tr>
<tr>
<td>Downy Woodpecker</td>
<td>Picoides pubescens</td>
</tr>
<tr>
<td>Eastern Towhee</td>
<td>Pipilo erythrophthalmus</td>
</tr>
<tr>
<td>Carolina Chickadee</td>
<td>Poecile carolinensis</td>
</tr>
<tr>
<td>Common Grackle</td>
<td>Quiscalus quiscula</td>
</tr>
<tr>
<td>Eastern Phoebe</td>
<td>Sayornis phoebe</td>
</tr>
<tr>
<td>Yellow-rumped Warbler</td>
<td>Setophaga coronata</td>
</tr>
<tr>
<td>Eastern Bluebird</td>
<td>Sialia sialis</td>
</tr>
<tr>
<td>Yellow-bellied Sapsucker</td>
<td>Sphyrapicus varius</td>
</tr>
<tr>
<td>Carolina Wren</td>
<td>Thryothorus ludovicianus</td>
</tr>
<tr>
<td>Mourning Dove</td>
<td>Zenaida macroura</td>
</tr>
<tr>
<td><strong>Fish</strong></td>
<td></td>
</tr>
<tr>
<td>Mummichog</td>
<td>Fundulus heteroclitus</td>
</tr>
</tbody>
</table>

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### Insects

<table>
<thead>
<tr>
<th>Insect Type</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gulf Fritillary</td>
<td>Agraulis vanillae</td>
</tr>
<tr>
<td>Cattail Toothpick Grasshopper</td>
<td>Leptysma marginicollis</td>
</tr>
<tr>
<td>American Bird Grasshopper</td>
<td>Schistocerca americana</td>
</tr>
<tr>
<td>Red Imported Fire Ant</td>
<td>Solenopsis invicta</td>
</tr>
</tbody>
</table>

### Mammals

<table>
<thead>
<tr>
<th>Mammal</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Red Bat</td>
<td>Lasiurus borealis</td>
</tr>
<tr>
<td>White-tailed Deer</td>
<td>Odocoileus virginianus</td>
</tr>
<tr>
<td>Common Raccoon</td>
<td>Procyon lotor</td>
</tr>
<tr>
<td>Marsh Rabbit</td>
<td>Sylvilagus palustris</td>
</tr>
</tbody>
</table>

### Mollusks

<table>
<thead>
<tr>
<th>Mollusk</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ribbed Mussel</td>
<td>Geukensia demissa</td>
</tr>
<tr>
<td>Marsh Periwinkle</td>
<td>Littorina irrorata</td>
</tr>
<tr>
<td>Magnolia Threetooth</td>
<td>Triodopsis hopetonensis</td>
</tr>
</tbody>
</table>

### Reptiles

<table>
<thead>
<tr>
<th>Reptile</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green Anole</td>
<td>Anolis carolinensis</td>
</tr>
<tr>
<td>River Cooter</td>
<td>Pseudemys concinna &quot;floridana&quot;</td>
</tr>
</tbody>
</table>

### Vascular Plants

<table>
<thead>
<tr>
<th>Plant Type</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Maple</td>
<td>Acer rubrum</td>
</tr>
<tr>
<td>Field Garlic</td>
<td>Allium vineale</td>
</tr>
<tr>
<td>Broomsedge</td>
<td>Andropogon virginicus</td>
</tr>
<tr>
<td>River Cane</td>
<td>Arundinaria tecta</td>
</tr>
<tr>
<td>Sea-myrtle</td>
<td>Baccharis halimifolia</td>
</tr>
<tr>
<td>American Beautyberry</td>
<td>Callicarpa americana</td>
</tr>
<tr>
<td>Hickory</td>
<td>Carya sp.</td>
</tr>
<tr>
<td>Slender Spikegrass</td>
<td>Chasmanthium laxum</td>
</tr>
<tr>
<td>Elephant’s-foot</td>
<td>Elephantopus sp.</td>
</tr>
<tr>
<td>Dog-fennel</td>
<td>Eupatorium sp.</td>
</tr>
<tr>
<td>Yellow Jessamine</td>
<td>Gelsemium sempervirens</td>
</tr>
<tr>
<td>Pennywort</td>
<td>Hydrocotyle sp.</td>
</tr>
<tr>
<td>American Holly</td>
<td>Ilex opaca var. opaca</td>
</tr>
<tr>
<td>Yaupon Holly</td>
<td>Ilex vomitoria</td>
</tr>
<tr>
<td>Black-tipped Needle Rush</td>
<td>Juncus roemerianus</td>
</tr>
<tr>
<td>Coastal Red Cedar</td>
<td>Juniperus virginiana var. silicicola</td>
</tr>
<tr>
<td>Eastern Red Cedar</td>
<td>Juniperus virginiana var. virginiana</td>
</tr>
</tbody>
</table>
Chinese Privet Ligustrum sinense
Sweetgum Liquidambar styraciflua
Coastal Plain Tulip-tree Liriodendron tulipifera var. 1
Japanese Honeysuckle Lonicera japonica
Bull Bay Magnolia grandiflora
Sweetbay Magnolia virginiana
Chinaberry Melia azedarach
Wax Myrtle Morella cerifera
Swamp Bay Persea palustris
Common Reed Phragmites australis
Pokeberry Phytolacca americana
Slash Pine Pinus elliottii
Loblolly Pine Pinus taeda
Christmas Fern Polystichum acrostichoides
Chickasaw Plum Prunus angustifolia
Black Cherry Prunus serotina
White Oak Quercus alba
Southern Red Oak Quercus falcata
Water Oak Quercus nigra
Live Oak Quercus virginiana
Millet Beaksedge Rhynchospora miliacea
Blackberry Rubus sp.
Black Willow Salix nigra
Dune Greenbrier Smilax auriculata
Catbrier Smilax bona-nox
Smooth Cordgrass Spartina alterniflora
Sweetleaf Symplocos tinctoria
Bald-cypress Taxodium distichum
Narrowleaf Cattail Typha angustifolia
Sparkleberry Vaccinium arboreum
Netted Chain Fern Woodwardia areolata

Note: This list is not exhaustive, representing observations of one person on a single day in December.
On January 5, 2014, a group participating in the Audubon Society’s Christmas bird count observed these birds:

<table>
<thead>
<tr>
<th>Species</th>
<th>Number</th>
<th>Species</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Pipit</td>
<td>100</td>
<td>Northern Mockingbird*</td>
<td>2</td>
</tr>
<tr>
<td>American Robin*</td>
<td>250</td>
<td>Northern Cardinal</td>
<td>6</td>
</tr>
<tr>
<td>American Crow</td>
<td>6</td>
<td>Northern Flicker*</td>
<td>3</td>
</tr>
<tr>
<td>Belted Kingfisher*</td>
<td>1</td>
<td>Peregrine Falcon*</td>
<td>1</td>
</tr>
<tr>
<td>Blue Jay</td>
<td>4</td>
<td>Pileated Woodpecker*</td>
<td>2</td>
</tr>
<tr>
<td>Blue-winged Teal*</td>
<td>1</td>
<td>Red-bellied Woodpecker*</td>
<td>4</td>
</tr>
<tr>
<td>Brown Thrasher*</td>
<td>6</td>
<td>Red-shouldered Hawk</td>
<td>1</td>
</tr>
<tr>
<td>Carolina Wren</td>
<td>20</td>
<td>Red-tailed Hawk</td>
<td>1</td>
</tr>
<tr>
<td>Cedar Waxwing</td>
<td>80</td>
<td>Red-winged Blackbird*</td>
<td>40</td>
</tr>
<tr>
<td>Chipping Sparrow*</td>
<td>20</td>
<td>Rock Pigeon</td>
<td>12</td>
</tr>
<tr>
<td>Clapper Rail*</td>
<td>8</td>
<td>Ruby-crowned Kinglet*</td>
<td>8</td>
</tr>
<tr>
<td>Common Grackle</td>
<td>12</td>
<td>Rusty Blackbird*</td>
<td>2</td>
</tr>
<tr>
<td>Downy Woodpecker</td>
<td>2</td>
<td>Savannah Sparrow</td>
<td>6</td>
</tr>
<tr>
<td>Eastern Phoebe</td>
<td>1</td>
<td>Song Sparrow</td>
<td>40</td>
</tr>
<tr>
<td>Eastern Towhee</td>
<td>15</td>
<td>Swamp Sparrow*</td>
<td>10</td>
</tr>
<tr>
<td>Gray Catbird*</td>
<td>12</td>
<td>Turkey Vulture</td>
<td>3</td>
</tr>
<tr>
<td>Great Blue Heron</td>
<td>1</td>
<td>Virginia Rail*</td>
<td>1</td>
</tr>
<tr>
<td>Hermit Thrush*</td>
<td>2</td>
<td>White-throated Sparrow*</td>
<td>40</td>
</tr>
<tr>
<td>House Wren*</td>
<td>1</td>
<td>Wilson’s Snipe*</td>
<td>1</td>
</tr>
<tr>
<td>Kildeer</td>
<td>10</td>
<td>Yellow-rumped Warbler</td>
<td>221</td>
</tr>
</tbody>
</table>

* Species in addition to those observed on the visit in December and listed above.

Note: This count was made through the courtesy of the North Carolina State Ports Authority, which had not previously permitted access to the property.

The combined results of the December visit and the January count show 48 species of birds wintering in the area. Many other species, particularly shore birds such as brown pelican, various varieties of heron, and white ibis, would be present in warmer months.
**Rare and Endangered Species**

The table below shows species identified by the North Carolina Department of Environment and Natural Resources Natural Heritage Program as rare species occurring in the lower Cape Fear region as of 2012.

<table>
<thead>
<tr>
<th>SCIENTIFIC NAME</th>
<th>COMMON NAME</th>
<th>STATE</th>
<th>FEDERAL STATE RANK</th>
<th>HABITAT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amphibian</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rana capito</td>
<td>Carolina Gopher Frog</td>
<td>T</td>
<td>FSC S1</td>
<td>breeds in temporary fish-free pools; forages in sandy woods, especially pine-oak sandhills</td>
</tr>
<tr>
<td><strong>Birds</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charadrius melodus</td>
<td>Piping Plover</td>
<td>T</td>
<td>T S1,S1N</td>
<td>ocean beaches and island-end flats [breeding evidence only]</td>
</tr>
<tr>
<td>Charadrius wilsonia</td>
<td>Wilson's Plover</td>
<td>SC</td>
<td>S2B</td>
<td>beaches, island-end flats, estuarine islands [breeding evidence only]</td>
</tr>
<tr>
<td>Egretta caerulea</td>
<td>Little Blue Heron</td>
<td>SC</td>
<td>S3B,S3N</td>
<td>forests or thickets on maritime islands [breeding sites only]</td>
</tr>
<tr>
<td>Egretta thula</td>
<td>Snowy Egret</td>
<td>SC</td>
<td>S2S3B,S3N</td>
<td>forests or thickets on maritime islands [breeding sites only]</td>
</tr>
<tr>
<td>Egretta tricolor</td>
<td>Tricolored Heron</td>
<td>SC</td>
<td>S3B,S3N</td>
<td>forests or thickets on maritime islands [breeding sites only]</td>
</tr>
<tr>
<td>Gelochelidon nilotica</td>
<td>Gull-billed Tern</td>
<td>T</td>
<td>S1S2B</td>
<td>sand flats on maritime islands [breeding sites only]</td>
</tr>
<tr>
<td>Haematopus pallas</td>
<td>American Oystercatcher</td>
<td>SC</td>
<td>S2S3B,S3N</td>
<td>estuaries, oyster beds, mudflats [breeding evidence only]</td>
</tr>
<tr>
<td>Ixobrychus exilis</td>
<td>Least Bittern</td>
<td>SC</td>
<td>S2S3B</td>
<td>fresh or brackish marshes [breeding season only]</td>
</tr>
<tr>
<td>Passerina ciris ciris</td>
<td>Eastern Painted Bunting</td>
<td>SC</td>
<td>FSC S3B</td>
<td>maritime shrub thickets and forest edges [breeding season only]</td>
</tr>
<tr>
<td>Picoides borealis</td>
<td>Red-cockaded Woodpecker</td>
<td>E</td>
<td>E S2</td>
<td>mature open pine forests, mainly in longleaf pine [breeding evidence only]</td>
</tr>
<tr>
<td>Plegadis falcinellus</td>
<td>Glossy Ibis</td>
<td>SC</td>
<td>S1S2B</td>
<td>forests or thickets on maritime islands [breeding sites only]</td>
</tr>
<tr>
<td>Sterculia antillarum</td>
<td>Least Tern</td>
<td>SC</td>
<td>S3B</td>
<td>beaches, sand flats, open dunes [breeding sites only]</td>
</tr>
<tr>
<td><strong>Freshwater Fish</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acipenser brevirostrum</td>
<td>Shortnose Sturgeon</td>
<td>E</td>
<td>E S1</td>
<td>brackish water of large rivers and estuaries; spawns in freshwater areas</td>
</tr>
<tr>
<td>Acipenser oxyrinchus</td>
<td>Atlantic Sturgeon</td>
<td>SC</td>
<td>E S3</td>
<td>coastal waters, estuaries, large rivers</td>
</tr>
<tr>
<td>Heterandria formosa</td>
<td>Least Killifish</td>
<td>SC</td>
<td>S2</td>
<td>streams and lakes</td>
</tr>
<tr>
<td>Freshwater or Terrestrial Gastropod</td>
<td>Triodopsis soelneri</td>
<td>Cape Fear Threetooth</td>
<td>T</td>
<td>FSC</td>
</tr>
<tr>
<td>Mammals</td>
<td>Corynorhinus rafinesquii macrotis</td>
<td>Rafinesque’s Big-eared Bat - Coastal Plain subspecies</td>
<td>SC</td>
<td>FSC</td>
</tr>
<tr>
<td></td>
<td>Myotis septentrionalis</td>
<td>Northern Myotis</td>
<td>SR</td>
<td>PE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichechus manatus</td>
<td>West Indian Manatee</td>
<td>E</td>
<td>E</td>
<td>S1M</td>
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<tr>
<td>Moss</td>
<td>Campylopus caroliniae</td>
<td>Savanna Campylopus</td>
<td>SR-T</td>
<td>FSC</td>
</tr>
<tr>
<td>Reptiles</td>
<td>Alligator mississippiensis</td>
<td>American Alligator</td>
<td>T</td>
<td>T(S/A)</td>
</tr>
<tr>
<td></td>
<td>Caretta caretta</td>
<td>Loggerhead Seaturtle</td>
<td>T</td>
<td>T</td>
</tr>
<tr>
<td></td>
<td>Chelonia mydas</td>
<td>Green Seaturtle</td>
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<td>T</td>
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<tr>
<td></td>
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<td></td>
<td>Malaclemys terrapin</td>
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<td>SC</td>
<td>FSC, in part</td>
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<tr>
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<td>FSC</td>
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<tr>
<td></td>
<td>melanoleucus</td>
<td>Sistrurus miliarius</td>
<td>Pigmy Rattlesnake</td>
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<tr>
<td>Vascular Plants</td>
<td>Seabeanh Amaranth</td>
<td>T</td>
<td>T</td>
<td>S2</td>
</tr>
<tr>
<td>-----------------------------------------------------</td>
<td>-------------------</td>
<td>----</td>
<td>----</td>
<td>-----</td>
</tr>
<tr>
<td>Amaranthus pumilus</td>
<td>Savanna Indigo-bush</td>
<td>T</td>
<td>FSC</td>
<td>S3</td>
</tr>
<tr>
<td>Amorpha confusa</td>
<td>Big Three-awn Grass</td>
<td>T</td>
<td>S2</td>
<td></td>
</tr>
<tr>
<td>Aristida condensata</td>
<td>Savanna Milkweed</td>
<td>SC-V</td>
<td>S3</td>
<td></td>
</tr>
<tr>
<td>Asclepias pedicellata</td>
<td>Silvering</td>
<td>SC-H</td>
<td>S1</td>
<td></td>
</tr>
<tr>
<td>Baccharis glomeruliflora</td>
<td>Ware's Hair Sedge</td>
<td>SC-H</td>
<td>SH</td>
<td></td>
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<tr>
<td>Bulbostylis warei</td>
<td>Georgia Sunrose</td>
<td>E</td>
<td>S1</td>
<td></td>
</tr>
<tr>
<td>Crocanthemum georganianum</td>
<td>Florida Scrub</td>
<td>E</td>
<td>S1</td>
<td></td>
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<tr>
<td>Crocanthemum nashii</td>
<td>Toothed Flatsedge</td>
<td>SC-H</td>
<td>SH</td>
<td></td>
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<tr>
<td>Cyperus dentatus</td>
<td>Blue Witch Grass</td>
<td>E</td>
<td>S1S2</td>
<td></td>
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<tr>
<td>Dichanthelium caerulescens</td>
<td>Venus Flytrap</td>
<td>SC-V</td>
<td>FSC</td>
<td>S2</td>
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<tr>
<td>Drosera filiformis</td>
<td>Threadleaf Sundew</td>
<td>SC-V</td>
<td>S2</td>
<td></td>
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<tr>
<td>Elymus virginicus var. halophilus</td>
<td>Terrell Grass</td>
<td>SC-V</td>
<td>S1</td>
<td></td>
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<tr>
<td>Erythrina herbacea</td>
<td>Coralbean</td>
<td>E</td>
<td>S2</td>
<td></td>
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<tr>
<td>Eupatorium leptophyllum</td>
<td>Limesink Dog-fennel</td>
<td>E</td>
<td>S2</td>
<td></td>
</tr>
<tr>
<td>Galactia mollis</td>
<td>Soft Milk-pea</td>
<td>T</td>
<td>S2</td>
<td></td>
</tr>
<tr>
<td>Ipomoea imperati</td>
<td>Beach Morning-glory</td>
<td>T</td>
<td>S1</td>
<td></td>
</tr>
<tr>
<td>Lachnocaunon minus var. congesta</td>
<td>Brown Bogbutton</td>
<td>T</td>
<td>S2</td>
<td></td>
</tr>
<tr>
<td>Lechea torreyi var. congesta</td>
<td>Torrey's Pinweed</td>
<td>E</td>
<td>S1</td>
<td></td>
</tr>
<tr>
<td>Litsea aestivalis</td>
<td>Pondspice</td>
<td>SC-V</td>
<td>FSC</td>
<td>S2S3</td>
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<tr>
<td>Ludwigia lanceolata</td>
<td>Lanceleaf Seedbox</td>
<td>E</td>
<td>S1</td>
<td></td>
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<tr>
<td>Ludwigia ravenii</td>
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<td>FSC</td>
<td>S1</td>
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<td>Scientific Name</td>
<td>Common Name</td>
<td>Status</td>
<td>State Conservation Status</td>
<td>Important Habitat</td>
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<tr>
<td>-----------------</td>
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<tr>
<td>Ludwigia suffruticosa</td>
<td>Shrubby Seedbox</td>
<td>T</td>
<td>S2</td>
<td>limesink ponds, clay-based Carolina bays</td>
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<tr>
<td>Lysimachia asperulifolia</td>
<td>Rough-leaf Loosestrife</td>
<td>E</td>
<td>E</td>
<td>pocosin/savanna ecotones, pocosins</td>
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<tr>
<td>Myriophyllum laxum</td>
<td>Loose Water-milfoil</td>
<td>E</td>
<td>FSC</td>
<td>limesink ponds, waters of natural lakes</td>
</tr>
<tr>
<td>Parietaria praetermissa</td>
<td>Large-seed Pellitory</td>
<td>SC-V</td>
<td>S1</td>
<td>shell middens, disturbed sites, maritime forests</td>
</tr>
<tr>
<td>Polygonum glaucum</td>
<td>Seabeach Knotweed</td>
<td>E</td>
<td>S1</td>
<td>ocean and sound beaches</td>
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<tr>
<td>Rhexia aristosa</td>
<td>Awned Meadow-beauty</td>
<td>SC-V</td>
<td>FSC</td>
<td>clay-based Carolina bays and limesink ponds</td>
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<tr>
<td>Rhynchospora odorata</td>
<td>Fragrant Beaksedge</td>
<td>SC-V</td>
<td>S1</td>
<td>maritime wet grasslands</td>
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<tr>
<td>Rhynchospora pleiantha</td>
<td>Coastal Beaksedge</td>
<td>T</td>
<td>FSC</td>
<td>limesink ponds</td>
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<tr>
<td>Sabal palmetto</td>
<td>Cabbage Palm</td>
<td>T</td>
<td>S1</td>
<td>maritime forests on the southeastern coast</td>
</tr>
<tr>
<td>Sideroxylon tenax</td>
<td>Tough Bumelia</td>
<td>T</td>
<td>FSC</td>
<td>maritime forests and scrub</td>
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<tr>
<td>Sporobolus virginicus</td>
<td>Saltmarsh Dropseed</td>
<td>T</td>
<td>S1</td>
<td>brackish marshes</td>
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<tr>
<td>Trichostema sp. 1</td>
<td>Dune Bluecurls</td>
<td>SR-L</td>
<td>FSC</td>
<td>dunes, openings in maritime forest and scrub</td>
</tr>
<tr>
<td>Utricularia cornuta</td>
<td>Horned Bladderwort</td>
<td>T</td>
<td>S1S2</td>
<td>bogs, limesink ponds</td>
</tr>
</tbody>
</table>

**Status designations, State and Federal**

E: Endangered; in danger of extinction  
FSC: Federal species of concern; species at risk  
SC: Special concern  
SC-H: Special concern-historical; all known populations are either historical or extirpated  
SC-V: Special concern-vulnerable: likely to become threatened  
SR: Significantly rare  
SR:L: Significantly rare–limited; range limited to North Carolina and adjacent states; fate depends on conservation here.  
T: Threatened; likely to become endangered

**State conservation status ranking**

S1: Critically imperiled; extremely rare; especially vulnerable to extirpation in the State  
S2: Imperiled; rare; very vulnerable to extirpation in the State  
S3: Vulnerable to extinction in the State due to rarity or restricted range  
SH: Occurred in the State historically, with the expectation of rediscovery
Because of the migratory nature of animals, particularly birds, and the extension of the ranges of some rare species as they are protected, there may be other rare animal species on the proposed park site from time to time. For example, on the December 2013 visit, Mr. Corey observed a bald eagle (haliaeetus leucocephalus), a State Threated species which is also subject to Federal protective legislation. Those birds are often found in mature forests near large bodies of water and open fields.

On the January 2014 bird count, a peregrine falcon (Falco peregrinus), a State Endangered species, was observed. These birds nest in other areas but forage in Winter at coastal ponds and mudflats.

The State Natural Heritage Program rare animal list for Brunswick County shows the bald eagle and peregrine falcon, as well as these other birds which may visit the proposed park site for foraging or to expand their range if the site is dedicated to park use:

Henslow’s Sparrow, Ammodramus henslowii, State and Federal Special Concern, State ranked Critically Imperiled. Found in clearcut pocosins and other damp weedy fields (breeding season).

Wood Stork, Mycteria americana, State and Federal Endangered, State ranked Critically Imperiled. Found in swamps, fresh or brackish ponds.

Bachman’s Sparrow, Peucaea aestivalis, State and Federal Special Concern. Found during breeding season in open longleaf pine forests, old fields.

Black Skimmer, Rynchops niger, State Special Concern. Found in sand flats on maritime islands (breeding sites only).

Black-throated Green Warbler (Coastal Plain population), Setophaga virens waynei, State Significantly Rare, Federal Special Concern. Found during breeding season in nonriverine wetland forests, especially where white cedar or cypress are mixed with hardwoods.

American Oystercatcher Haematopus palliatus, State Special Concern. Nests on Battery Island, just downriver.

The photograph at right, showing wood storks (State and Federal Endangered), glossy ibis (State Special Concern), and American alligator (State and Federal Threatened) was taken in Brunswick County.

The author has observed eastern painted bunting, red-cockaded woodpecker, little blue heron, snowy egret, and glossy ibis in the Southport area.
Criteria for New State Parks

The NCDENR Division of Parks and Recreation has criteria to evaluate potential new park units, and a scoring system to remove unsuitable sites from consideration and rank the qualifying sites.

**Step 1: Preliminary Screening**

The initial screening involves four minimum criteria. Sites that do not meet these basic requirements are removed from consideration. The criteria are presented below, with comments about the suitability of the Ports Authority site:

**Criterion 1: Statewide significance of resource themes represented.**

The 2012 Update of the Systemwide Plan for North Carolina State Parks includes evaluation of the archaeological, geologic, scenic, and biological resources in the State parks system and identifies themes inadequately protected by the system.

*Archeology.* The proposed park site has not had an archeological survey. The limited available history suggests the site has only been used as a farm, and may have been the location of native American encampments in pre-Colonial times. However, no ruins or mounds are apparent.

*Geology.* The site has greater geologic interest. The committee of experts examining geologic themes identified *Relict Coastal Features* as a theme having high significance and no representation in the parks system. Such features are defined as “Geomorphic features created by coastal processes before the Holocene, at higher stands of sea level than at present. They include Coastal Plain scarps and terraces, relict beach ridges, and dune systems.” The site of the proposed park has such features. In a brief survey, Dr. Paul Hearty, a sedimentary geologist in the UNCW Department of Environmental Studies, observed that the upper elevations of the park site, about 24-27 feet above sea level, are a constructional terrace most likely of marine origin, formed during the Last Interglacial Period, about 125,000 years ago, when sea level was between 10 and 25 feet higher than at present. (The Holocene period began about 12,700 year ago).

He further observed that the stream valleys on the site were created when the sea level was lowered by glaciation, and were the headwaters of a river system extending out to the continental shelf. As for the steep escarpment at the eastern side of the site overlooking the Cape Fear River, Dr. Hearty opined that in the more recent past, the meanders of the river cut that steep bank, with a slope of 20-30 degrees, and later shifted away. Ancient soils and sediments are exposed at certain places along the escarpment.

The 2012 Update of the Systemwide Plan identifies *fossils* as a theme of “high” significance in the Tidewater region with representation of “none.” Dr. Hearty did not find
fossils in his brief reconnaissance of the face of the escarpment, but suggests that because the soils and sediments are attributable to the Last Interglacial Period, there is a good possibility of discovery of marine fossils from that period.

**Scenic resources.** The 2012 Update of the Systemwide Plan identifies “Scenic Vistas” of all types as having “High” significance and only “Moderate” representation in the State parks system. Vistas of rivers and estuaries have “High” significance and only “Little” representation. The proposed park site, with its unusual 20-25 foot high bluff providing a unique and excellent view of the Cape Fear River estuary and its low-lying, biologically significant marshes and islands, would fill this need in a way that no other available site could.

The 2012 update also identifies views of marshes and islands as having “High” significance but only “Moderate” representation. The proposed park site has views of both freshwater and brackish marshes in the interior, and a panoramic view of extensive brackish marshland and islands from the high bluff facing eastward.

The park site makes possible two unique scenic opportunities. A dock for shallow-draft tour boats would provide the opportunity for tours of the low-lying islands and waterways of the Bald Head Island State Natural Area across the river. The high bluff facing eastward lends itself to creation of a scenic roadway specifically for wheelchairs, ordinary street bicycles, and pedestrians. This would be a mile-long scenic highway accessible to the handicapped, with extraordinary views of the river and marshland, running through one of the last Coastal Fringe Evergreen Forests with its very old live oak trees. Scenic highways have “High” significance in the State park system, but no representation at all in the Tidewater and Coastal Plain regions. Such a wheelchair roadway would be unique, a point of pride.

**Biological themes.** A primary function of the State parks system is preservation of important examples of North Carolina’s diverse ecology in the face of population growth and development, both to protect those examples against loss and to provide recreational opportunities for an expanding population. The 2012 update of the Park’s plan identifies 32
biological themes, of which nine are rated as having very high expansion needs and 19 more are rated as having high expansion needs. These are represented at the proposed park site:

*Maritime Upland Forests.* The Coastal Fringe Evergreen Forest at the top of the bluff on the proposed park site is one of the few maritime forests located on the mainland and an increasingly rare example of its type.

*Dry Longleaf Pine Communities.* The longleaf pine forests that once covered the Coastal Plains of North Carolina have been reduced to a fraction of their original range and often replaced by the faster growing loblolly pine. The proposed park site does not now have longleaf pine, but it does have large open areas with suitable soils and conditions that can be reforested and then maintained by burning.

*Blackwater and Brownwater Coastal Plain Floodplains.* The Cape Fear River, which flows past the proposed park site, originates as a brownwater river in Piedmont, but then takes on characteristics of a blackwater river in its meanders through the Coastal Plain and is fed by two blackwater tributaries. Thus it has characteristics of both types. The river does carry sediment which is deposited at the Cape Fear River estuary and mouth creating bars, sloughs, and low-lying islands. The proposed park site is highly elevated and is not in the flood plain, but the high bluff provides panoramic views and a dock could provide water tours of the complex island mass across the river.

*Riverine Aquatic Community.* The Cape Fear differs from most other major estuaries in North Carolina in that it is open to the sea and has a significant tidal effect. Most of the other large estuaries in the State are blocked from the sea by barrier islands, have more restricted flow, and are less affected by tides. The proposed park site itself has several creeks, some flowing westward, some combining into two creeks flowing into the Cape Fear River. These are subject to tidal flow, creating *Freshwater Tidal Wetlands,* which are essential to the life-cycle of many marine species.

*Coastal Plain Depression Communities.* The many ponds on the proposed park site, which may result from limesink depressions or ancient stream beds, hold standing water and rise and fall with the seasons. These support a variety of vegetation in surrounding areas.

*Maritime Wetland Forests.* This theme is represented along the edges of inland marshes and the brackish marshes, including the narrow areas along the foot of the bluff overlooking the river.
Summary. The chart below displays the themes present at the proposed park site and adjoining river that are regarded by the NCDENR Division of Parks and Recreation as highly significant but under-represented in the parks system. The Parks Division allocates the themes to four geographic regions: Mountain, Piedmont, Coastal Plain, and Tidewater. The proposed park site is located at the western extremity of the Tidewater region but proximate to the Coastal Plain region immediately to the north. Thus both Tidewater and Coastal Plain regions are included in the chart.

### Summary of Resource Themes Represented at the Proposed Park Site

<table>
<thead>
<tr>
<th>Resource Theme</th>
<th>Significance</th>
<th>Representation in Park System</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Tidewater</td>
<td>Coastal Plain</td>
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<tr>
<td><strong>Geological Themes</strong></td>
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<tr>
<td>Relict Coastal Features</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Fossils¹</td>
<td>High</td>
<td>High</td>
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<tr>
<td><strong>Scenic Themes</strong></td>
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<tr>
<td>Scenic Vistas</td>
<td>High</td>
<td>High</td>
</tr>
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<td>Rivers</td>
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<td>Marshes</td>
<td>High</td>
<td>High</td>
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<tr>
<td>Islands</td>
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</tr>
<tr>
<td>Scenic Highways²</td>
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<td>High</td>
</tr>
<tr>
<td>Bays/Estuaries</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td><strong>Biological themes</strong></td>
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<td></td>
</tr>
<tr>
<td>Maritime Upland Forests</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>Dry Longleaf Pine Communities</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Brownwater Coastal Plain Floodplains</td>
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<tr>
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<td>High</td>
<td></td>
</tr>
<tr>
<td>Freshwater Tidal Wetlands</td>
<td>High</td>
<td></td>
</tr>
</tbody>
</table>

¹ Marine fossils believed to exist due to geologic history of site

² Wheelchair/bicycle/pedestrian only
**Criterion 2:** Size—sufficient acreage to protect principal resources and provide appropriate facilities with minimal impacts on those resources.

The 600-acre Ports Authority site has substantial upland acreage, of which about 285 acres has been cleared for farming. Much of that would be reforested with longleaf pine in the park plan. The remainder could be improved for visitors’ center and other buildings, parking, camping, exhibits, greenhouses, aviaries and other facilities with minimal loss of habitat and no loss of natural communities sought to be protected.

**Criterion 3:** Absence of incompatible features such as roads, intrusive development, incompatible vistas and air, water and noise pollution.

East Moore Street extends north from Southport to reach the southern edge of the proposed park site, where its status as a State road ends. The pavement continues through the park site, ending at the northern boundary. The former right-of-way has been severed by a canal. From the end of East Moore Street at the southern edge of the site, a residential lane extends east, ending just short of the Cape Fear River.

On the west side of the site, the Brunswick Nuclear Plant is visible in the distance from a few points in the fields in western side of the park site. The plant itself is surrounded by a large, wooded buffer area; only 130 of the 1200 acres of the plant property are occupied by plant facilities. The remainder is kept in the natural state as a buffer. That part of the property adjoining the park site has the same types of woodland and vegetation as the park site, constituting a continuous ecosystem. The plant is inaudible at the park site, and does not emit pollutants. There are not any cooling towers, the plant being cooled by water taken from the Cape Fear River and discharged into the ocean.

State parks and nuclear plants are often neighbors. The extensive buffer areas around the reactors and an adjoining park provides interconnected habitat supporting wildlife that either property could not. Examples are the Calvert Cliffs State Park and the Calvert Cliffs Nuclear Plant, side-by-side on the Chesapeake Bay in Maryland, and Illinois Beach State, on both sides of the site of reactor on Lake Michigan. That reactor has been decommissioned.

The property to the north is owned by Duke Energy, the proprietor of the nuclear plant, whereon the intake canal for cooling water is located. That canal is not visible, being surrounded by a wooded buffer area. Activities at the canal, if any, are inaudible.

To the east of the proposed park site lies a tributary of the Cape Fear River; the shipping channel is on the far side of Snow’s Marsh, an island owned by Duke Energy and maintained in its natural state as a buffer. The vista toward the river is one of undisturbed natural beauty.

The Cape Fear River is not free of pollution. In its 9000 square miles of watershed, there are 280 municipal and industrial discharge points approved and regulated by Federal and State agencies, and innumerable sources of runoff from agricultural operations and urbanized
areas. Among the most troublesome sources are the concentrated animal feeding operations for poultry and swine. Approximately 5000 of North Carolina’s hogs are located in the Cape Fear Basin. This is not a local problem for the proposed park site; it is shared by the many State reservations on the other side of the river: Carolina Beach State Park, Fort Fisher Recreation Area, the North Carolina National Estuarine Research Reserve at Zeke’s Island, and the Bald Head Island State Natural Area.

To the south is a large property owned by Archer-Daniels-Midland, which operates a citric acid plant on the southern part of the property. The plant cannot be seen or heard from the proposed park site. The northern part of the property, nearest the park site, is occupied by a large mound of waste materials. That is unsightly; accordingly, the preliminary plans for the park include reforestation of the southern edge to create a screen.

Part of the proposed park site was owned by Archer-Daniel-Midland and its predecessor, Pfizer, Inc. A yeast cream slurry, a by-product of the citric acid production, had been applied as fertilizer. That was discontinued in 1990 and the site has been given “No Further Action” status by NCDENR. An environmental survey conducted in 2005, which included test borings, did not find evidence of contamination of either land or groundwater.

The citric acid plant was first put into service in 1976. Its useful life is not known. This plant is near neither materials nor markets and seems a poor candidate for renovation or expansion.

Criterion 4: Sufficient access for management and public use.

Southport’s East Moore Street, its primary north-south artery, ends at the site, about two miles from the City. Transiting the City from NC 87, a north-south route, and NC 211, an east-west route, can be avoided by using a new road under construction for completion in 2014 (shown on the map at right as the “Northern Connector”).

That is part of a plan to improve access to the landings for the ferries to Fort Fisher and Bald Head Island, located about a mile south of the park site.

Thus the site is convenient to local population and visitor centers while being sufficiently distant to retain its identity as a State Park.
Step 2: Scoring

If a site meets these basic requirements, then scores are assigned for each of these criteria (the actual scoring system is not published):

Number of high priority resource themes represented. The proposed park site has 12 high priority themes represented, one Geological, five Scenic, and six Biological. Two more are likely: Fossils and Scenic Highways. The geologist inspecting the site believes that marine fossils from the last Interglacial Period, about 125,000 years ago, may be found. And the goals of the Scenic Highway theme can be met in an innovative and socially responsible way by construction of a wheelchair/bicycle/pedestrian road through the Coastal Fringe Evergreen Forest at the top of the bluff overlooking a tranquil portion of the Cape Fear River. Such a highway would present an experience available nowhere else.

Rarity of themes. All of the themes except Fossils and Scenic Highways are represented to some extent in the park system in the Tidewater region. However, the Coastal Fringe Evergreen Forest (embraced by the Biological theme Maritime Upland Forests), with its very old live oaks, was described as “rare” and “one of the most imperiled community types in the state” in the 1995 Inventory of Natural Areas and Rare Species of Brunswick County, North Carolina. That is demonstrated by plans to develop a nearby similar site.

The Geological theme “Relict Coastal Features” is broad, taking in “Coastal Plain scarps and terraces, relict beach ridges, and dune systems.” However, scarps and terraces from the Last Interglacial Period along the shoreline in unmolested condition are quite rare, due to the desirability of such sites for development.

Overall threat to themes. No natural assets in the State of North Carolina are more vulnerable to loss from development than those along the coast. Coastal development continues unrelentingly, and has increased in energy with the state of the economy. Just one mile south of the site, the Southport Ferry Landing Forest, a Natural Heritage Area with good examples of Coastal Fringe Evergreen Forest, Coastal Fringe Sandhill, and Brackish Marsh natural communities, has been zoned by the City of Southport for commercial and multi-family residential development and is on the market. This area may represent the only remaining example of Coastal Fringe Evergreen forest other than that at the proposed park site.

Degree of threat to resources/urgency of acquisition. The proposed park site belongs to the North Carolina State Ports Authority, which had acquired the property in 2006 with the intention of building a very large marine container terminal. This is the second such effort at industrialization: in 1982 Williams Terminal Company purchased the property with the intention of building a coal export terminal like its operation at Newport News. After a conversation with Carolina Power & Light, predecessor to Duke Energy as operator of the nuclear plant, Williams sold the property to Pfizer, which held it for possible expansion of its citric acid plant. Pfizer subsequently sold the plant, but not the park site property, to Archer-Daniels-Midland. Pfizer later sold the park site property to the State Ports Authority.
The plans of the State Ports Authority for a marine terminal were put “on hold” in 2010 for many reasons, not the least of which was the $4.4 billion price tag for the project. The project has not been officially terminated, although the Ports Authority has written off the $10.3 million spent on engineering for the project.

The Ports Authority is very much in need of funds to reduce the debt taken on for the container terminal project and for other capital needs. Thus it is unofficially entertaining ideas for disposition of what it calls a “non-performing asset.” The property is zoned for heavy industry.

The State Ports Authority has cooperated in this project to explore the feasibility of a new State park on the site, but has made no commitment.

Presence of rare and/or endangered species. In visits to the site in December 2013 and January 2014 (which were not by any means thorough inventories), a bald eagle (State Threatened and Federally protected) and peregrine falcon (State Endangered) were observed. The site is known to have been visited by the American alligator (State and Federal Threatened). The red-cockaded woodpecker (State and Federal Endangered) nests in nearby longleaf pine forests and frequents the area to forage.

Immediately to the north, the three Natural Heritage Areas on the property of the Military Ocean Terminal at Sunny Point, with vegetation and terrain similar to that on the site of the proposed park, support 26 species of rare plants and animals, including the Carolina gopher frog, the Cape Fear threetooth, pondspice, rough-leaf loosestrife, and loose watermilfoil.
Interconnection with other protected areas. The proposed park site is in the center of a large complex of protected areas with a large variety of natural habitats. This map shows the State protected areas along with Significant Natural Heritage areas, many of which are subject to conservation easements.

Proceeding south along the east side of the river from upper right, there are the North Carolina National Estuarine Research Reserve at Masonboro Island, Carolina Beach State Park, Fort Fisher State Historic Site, Fort Fisher State Recreation Area (which includes the North Carolina Aquarium, the North Carolina National Estuarine Reserve at Zeke’s Island, the Bald Head Island State Natural Area, and the Bald Head Woods Coastal Reserve.

Then moving north up the western shore of the river, we have the Fort Caswell Dunes and Marshes, the State Maritime Museum in Southport, the proposed park site, and then the Military Ocean Terminal at Sunny Point, which is a de facto protected area because much of its 16,000 acres is maintained as a buffer and kept in its natural state, with a staff biologist to look after it. North of that is the Brunswick Town State Historic Site and a continuous strip of properties protected by conservation easements in favor of the North Carolina Coastal Land Trust, topped by the Brunswick County Nature Park at Town Creek.
This conglomeration suggests rationalization by creating an umbrella designation for all of the protected areas, a “Cape Fear Maritime Heritage Area,” that would be much more than the sum of its parts in fulfillment of conservation purposes, efficient administration, and attractiveness as a destination park. It would include all of the State reservations (including the historic sites and the Maritime Museum) and be the nucleus for affiliation with areas protected by private conservation easements. The proposed park would be the western gateway.

**Quality of resources and/or presence of a superlative (biggest, best example, unique, etc.).**
The proposed park site has these high quality elements, quite rare and perhaps unique:

- A stunning view of the lower Cape Fear River from a high (22 feet) bluff. The lower Cape Fear is largely two-dimensional. A view from a natural site at this high elevation is available at few places on the west shore and nowhere on the east shore. At this point, the river is quite tranquil, the shipping channel being on the other side of a low-lying island (Snow’s Marsh). The near shore of the river is a large brackish marsh, a biologically productive area frequented by spectacular shore birds of many varieties.

- The high bluff is a constructional terrace with a history going back 125,000 years, to the Last Interglacial Period, when much of the existing North Carolina shoreline, including the opposite side of the river, was submerged. This site is unmolested and excavation should yield a picture of the geologic history of this area and may yield marine fossils.

- The Coastal Fringe Evergreen Forest along the top of the bluff is one the last examples of this natural community, a forest of very old, very large live oaks, tall loblolly pines, and sand laurel oaks, along with swamp red bay, American holly, and yaupon. This was called one of the most imperiled natural communities in the State in 1995; the only other example, about a mile directly south, is destined to be sacrificed for development.

- Extensive open areas provide a unique opportunity for reforestation with longleaf pine, restoring an essential habitat for the Endangered red-cockaded woodpecker and other species preferring the clear understory of such pine forests.

**Regional demand for parks system units staffed and open to the public.** The population of Brunswick County, now approximately 120,000, is growing at a rate of about 4.4% a year, the fourth fastest in the State. The increase is entirely in-migration, bringing in retirees and new young families from the northeast who have high expectations for quality parks and recreational facilities. That population swells to more than 300,000 during vacation season, with nearly 200,000 vacationers coming for the beaches, golf, and whatever other recreational facilities are available. The County park system focuses on athletics, providing few nature-based facilities. Brunswick County does not have a State park, and the nearest State recreational facilities and State campgrounds are across the Cape Fear River. Polls at both State and County level show a preference for nature-based activities, such as improved walking trails, picnic facilities, and opportunities to observer nature—opportunities this park would provide. (See the section on Brunswick County parks in Part I of this prospectus.)
Suitability for providing high quality recreation. Analysis of poll results by the NCDENR Division of Parks and Recreation in the 2012 systemwide plan\textsuperscript{1} update shows that “By far, the most preferable activity to do in a North Carolina state park is to walk for pleasure, be it on a hiking trail or a nature trails.” The five most popular facilities in State parks are hiking trails, nature trails, picnic tables with grills, multi-use trails, and observation decks. This result is mirrored in a poll conducted for the Brunswick County parks plan in 2009,\textsuperscript{2} in which all forms of public input showed a strong preference for walking trails, with picnicking ranking third. Opportunities for such passive activities are currently scarce in Brunswick County, a deficiency noted in the County plan.

The compelling characteristic of this park would be the variety of activities available. Extensive and accessible trails with a variety of views, education facilities, water tours, opportunity to see wildlife rehabilitation in action, entertainment, food, much more.

The proposed site could provide trails with a variety of views and natural experiences, both short and long, some strenuous and some not, all interconnected. Observation decks, some with bird blinds, would provide views of the Cape Fear River and its marshland and of interior fresh water marshes, all of which usually have active avian activity.

The primary trails in the proposed park, including the trail along the bluff at river’s edge, would be multiuse, designed for wheelchair access. The Parks Advisory Committees, in the 2012 State parks plan update, placed a high priority on access for people with disabilities. This is particularly import in an area with a high population of retirees. Although such multi-use trails could be used by cyclists, the trail bikers seeking challenge could be referred to the Brunswick County Nature Park, a few miles north, where there is a network of logging trails maintained by a trail bike club.

Picnic areas can be provided in many areas of the proposed park, and particularly by the 30-acre pecan grove in the northern part of the property. The trees are very old and large, and provide a nice canopy over a level area. This is also suitable for tent/trailer campgrounds.

The Parks Advisory Committee also put a high priority on facilities for environmental education. This site, proximate to a large river estuary and coastal environment and immersed in a region of very high biodiversity, has adequate space for a large science and education center that could focus on the unique natural environment of the region. There are opportunities for affiliation with the University of North Carolina Wilmington and the two community colleges in the area for both scientific work and educational programs.

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\textsuperscript{2} L.A. Lose & Associates, \textit{Brunswick County Parks & Recreation Department May, 2009, Comprehensive Parks and Recreation Master Plan}. 
Step 3: Priorities

The “New Parks for a New Century” initiative, in which the foregoing criteria are set forth, also includes priorities for final selection of sites for new parks. This passage explains:

While the scoring system is a valuable tool to evaluate sites, it alone cannot be used to set priorities. Scoring can be only one component of any decision to pursue acquisition. Other factors can develop or change over time, which can, in turn, change priorities. Some of those factors are:

Availability of funding through the principal conservation trust funds of the state or in partnership with local or statewide land trust organizations.
The potential of the site to qualify for special funding such as federal Land and Water Conservation grants or wetlands mitigation programs.
The willingness of property owners to negotiate for sale. In most cases, it is unknown whether sites might be available for acquisition.
Local support for a state parks system unit.
The appearance of an imminent threat to preservation such as impending development.
Further site research that identifies extremely rare or additional resource themes.

For these reasons, priorities for land acquisition at any of the New Parks for a New Century sites will be established in coming years as planning for new parks continues.

Thus the matter of priorities is something of a moving target. Although the items listed above are relevant, this passage acknowledges that creation of a new State park is a complex and somewhat elusive process, involving both administrative and legislative elements, subject to all of the forces that shape decisions of the State government.

Nevertheless, we shall address the factors set forth above.

Availability of funding. A basic premise of this park project is that acquisition of the land would not require drawing funds from the usual state funding sources for parks and land preservation, the Parks and Recreation Trust Fund and the Clean Water Management Trust Fund, both of which are insufficient to meet even current needs.

The financing strategy is based on the impending need of the North Carolina State Ports Authority, the owner of the property, for funds to maintain its ability to service its debt and make needed improvements to its facilities. The only source of such funds would be appropriation by the State General Assembly. The General Assembly does not look with favor on such subsidies, but transfer of the property to the State for a park would provide something in return for that appropriation. Details are set forth in Part I of this report.
**Potential for Federal funding.** A second basic premise of the park project is that a State appropriation could be leveraged by access to Federal grants for parks and recreation facilities and for conservation of coastal areas and estuaries. The Federal government has 2226 grant programs; the Department of Interior alone has 270 programs, the most relevant being the Land and Water Conservation Fund. The Department of Commerce National Oceanographic and Atmospheric Administration, manages the Federal Coastal and Estuarine Land Conservation Program, in which the State of North Carolina participates. The lower Cape Fear, including the proposed park site, is identified as a “Focus Area” in that program.

**Willingness of property owner to sell.** The 600-acre proposed park site is in State Ports Authority inventory of non-producing assets. Plans for its use as a container terminal have been shelved, and the investment in engineering, about $10.3 million, has been written off. A presentation of the preliminary concept for the park in July 2013 was regarded with interest by the Board of Directors and Secretary of Transportation.

**Local support.** These circumstances prevail in Brunswick County:

- The County is the sixth largest of North Carolina’s 100 counties but does not have a State park.
- The County’s population, approximately 120,000, is the fourth fastest growing in the State. All of the increase is attributable to in-migration, a mix of retirees and young families making homes in the northern part of the County near Wilmington.
- The County is the tenth ranked in the State in tourist revenues. The economy is based on tourism and development of life-style based communities. The seasonal population is 2.6 times the permanent population.
- A survey and analysis done for the County in 2009 showed a deficiency in park facilities and demand for the kind of recreation a State park would provide.

All of this suggests substantial need and demand, and that support of local officials and community groups would emerge once the plan was presented. This document has been prepared to provide the material for such presentations.

**Imminent threats.** The owner of the property, the North Carolina State Ports Authority, needs funding for its immediate needs and regards the property as non-producing and surplus to its needs. The development of southeastern Brunswick County proceeds apace, rapidly creating demand for parks while simultaneously swallowing up the land most suitable. A large property immediately to the south with similar natural communities, including a rare Coastal Fringe Evergreen Forest, is destined for development for mixed residential and business uses. While no offer for the site has been forthcoming, there has not been any active sales effort. That may change.
Further site research that identifies extremely rare or additional resource themes. The observations on natural communities and resource themes contained herein are based on a tour of the 600 acres in midwinter, for a few hours, by the Parks Division’s inventory biologist and a volunteer biologist, a later brief visit by a volunteer geologist, and a bird count by volunteers. Many parts of the site, particularly the fresh water swamps and related woodlands, are accessible only with great difficulty, and have not been visited, let alone examined. Accordingly, the site examination should be regarded as cursory, at best, and further exploration and exploration in other seasons should reveal many more plant and animal species in this biologically rich area. The geologist has suggested that excavation on the high terrace on the relict dune bluff may unearth marine fossils from the Last Interglacial Period, about 125,000 years ago.

White Ibis at the Cape Fear
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