

THE VASCULAR FLORAS OF GIVHANS
FERRY STATE PARK AND OLD
SANTEE CANAL STATE PARK

by

Dale C. Soblo

December 1988

THE VASCULAR FLORAS OF GIVHANS


FERRY STATE PARK AND OLD

SANTEE CANAL STATE PARK

by

Dale C. Soblo

December 1988



Digitized by the Internet Archive
in 2012 with funding from
LYRASIS Members and Sloan Foundation

<http://archive.org/details/vascularflorasof00unse>

ABSTRACT

Givhans Ferry State Park consists of approximately 1000 acres on part of the Edisto River in Dorchester and Colleton Counties, South Carolina. A large number of plant communities are found. These are Pine Flatwoods, Non-Alluvial Swamp Forest, Pine Savannah, Swamp Forest, Hardwood Bottom, Ridge Bottom, Oak-Hickory/Spruce Pine Mixed Hardwood Forest, Mesic Mixed Hardwood Forest, and Limestone Cliff-Marl Forest.

The Old Santee Canal State Park consists of approximately 200 acres on the Tailrace Canal in Berkeley County. The plant communities found there are Swamp Forest, Hardwood Bottom, Ridge Bottom, Limestone Cliff-Marl Forest and Marsh.

A study was begun in April of 1987 to catalogue all the plant species and plant communities present in the park. This thesis is the result of that study.

ACKNOWLEDGMENTS

I express a sincere thank you to Dr. John E. Fairey III, my major advisor for this study. Thanks are also due to Dr. Robert Ballard and Dr. Kim Peterson of Clemson University, for serving as committee members.

This study was made possible by the generous financial support of the South Carolina Department of Parks, Recreation and Tourism and Clemson University. My home during most of the field work for this study was Givhans Ferry State Park where Glen and Elaine Far (park superintendent and his wife), and Moody and Bonnie Walters (park rangers) were always concerned with my comfort and well-being.

Dr. Steven Jones of the Clemson University Forestry Department gave me valuable advice in all aspects of the quantitative work used to delineate vegetation types. John Wells of the Clemson University Agricultural Services Lab is credited with analyzing all the soil samples collected by the author. The Clemson University Herbarium Curator, Dr. Steven R. Hill has been of great help to me in all phases of this research.

Last but not most importantly the friendship and assistance of Barbara Soblo was invaluable during the course of this study.

TABLE OF CONTENTS

	Page
TITLE PAGE	i
ABSTRACT	ii
ACKNOWLEDGMENTS	iii
LIST OF TABLES	vi
LIST OF FIGURES	vii
INTRODUCTION	viii
 CHAPTER	
I. METHODS	1
II. THE ENVIRONMENT	3
Geology	3
Past Floras	5
Climate	8
III. FLORA OF GIVHANS FERRY STATE PARK	9
Location	9
Land Use History	9
Soils	10
Plant Association and Community	
Descriptions	13
Pine Flatwoods Association	13
Pine Flatwoods	13
Non-Alluvial Swamp Forest	14
Pine Savannah	14
Swamp Hardwood Forest Association	15
Swamp Forest	16
Hardwood Bottom	17
Ridge Bottom	18
Southern Mixed Hardwood Forest	
Association	19

Table of Contents (Continued)

Page

Oak-Hickory/Spruce Pine Mixed	
Hardwood Forest	19
Mesic Mixed Hardwood Forest	20
Limestone Cliff-Marl Forest	21
Disturbed Areas	29
IV. FLORA OF OLD SANTEE CANAL STATE PARK	32
Location	32
Land Use History	32
Soils	34
Plant Association and Community	
Descriptions	36
Swamp Hardwood Forest Association	36
Swamp Forest	36
Hardwood Bottom	37
Ridge Bottom	38
Southern Mixed Hardwood Forest	
Association	38
Limestone Cliff-Marl Forest	39
Marsh	46
Disturbed Areas	47
APPENDICES	49
A. (add heading) The Vascular Flora of Givhans Ferry State Park	50
B. (add heading) The Vascular Flora of Old Santee Canal State Park	89
C. Sampling Data Tables for Givhans Ferry	
State Park	127
D. Sampling Data Tables for Old Santee Canal	
State Park	152
REFERENCES	175

LIST OF TABLES

Table	Page
I. Soil Data for Both Parks	23
II. Plants Found Growing on Limestone Cliff Faces at Givhans Ferry.....	27
III. Plants Indicating Basic Soils at Old Santee Canal.....	42
C-I. Quantitative Data for Givhans Ferry thru State Park.....	127
C-XXIV.	
C-XXV. Army Corp Plant List for Highland Site Zone C.....	144
C-XXVI. Army Corp Plant List for Swamp Site Zone A.....	147
C-XXVII. Army Corp Plant List for Swamp Site Zone B.....	149
C-XXVIII. Army Corp Plant List for Swamp Site Zone D.....	149
D-I. Quantitative Data for Old Santee Canal thru State Park.....	152
D-XXXIV.	

LIST OF FIGURES

Figure	Page
C-1. Legend for Givhans Ferry State Park Maps.....	141
C-2. Map of Givhans Ferry State Park.....	142
C-3. Map of Givhans Ferry State Park West of Highway 63.....	143
C-4. Map of Army Corp Zone C.....	146
C-5. Map of Army Corp Zone A, B, C and D.....	151
D-1. Legend for Old Santee Canal State Park Map.....	173
D-2. Map of Old Santee Canal State Park.....	174

INTRODUCTION

Givhans Ferry State Park consists of approximately 1000 acres on part of the Edisto River in Dorchester and Colleton Counties, South Carolina (Figure C-2). The Colleton County portion of the park is only a 200-foot buffer zone along the west side of the Edisto River. The swamp hardwood forest association found on the west side of the Edisto River is a rich mosaic of communities, ranging from *Pinus glabra* dominated ridge bottoms to deep water swamps of *Nyssa aquatica*. The southern mixed hardwood forest association found between the Edisto River and Highway 63 is a very diverse group of communities including the relatively rare limestone cliff-marl forest communities. The largest area of the park is on a pine plantation (*Pinus taeda* and *P. palustris*) east of Highway 63. Remnants of a pine savannah flora occur along the service drives of the pine plantation.

The Old Santee Canal State Park consists of approximately 200 acres on the Tailrace Canal in Berkeley County, South Carolina. The park is southeast of the junction between the Tailrace Canal and U.S. Highway 52. Stony landing is at the southern end of the park. The relatively rare limestone cliff-marl forest community type comprises approximately half of the park. The community is well developed along the bluffs and marl spoil mounds. *Carya myristicaceiformis* (nutmeg hickory) is a plant listed as a regional

concern-threatened species by the South Carolina Plant Advisory Committee. Nutmeg hickory is found in the marl forests. The rest of the park is comprised of a rich swamp hardwood forest association and a marsh.

A study of the flora of these two parks was begun in the spring of 1987 and continued through the fall of 1988. Approximately one-thousand voucher specimens were collected and are housed at Clemson University Herbarium. Vegetation sampling was done to determine community types. The plant communities were delineated on vegetation maps (Figures C-2, C-3, and D-2) drawn from aerial photographs, topographic maps, soil maps and ground surveys.

CHAPTER I

METHODS

Both parks were periodically surveyed using a classical method (Porcher 1981) from the spring of 1987 to the summer of 1988. Voucher specimens have been deposited at Clemson University Herbarium.

Using soil maps aerial photographs, topographic maps and field surveys, the least disturbed and most ideal type of each forest community was sampled. The method used was one designed by Jones (1984). First the best representative of a forest community is found and a 40m x 10m plot is laid out in the center of this community. All trees in the area greater than 11 cm in diameter at breast height (dbh) are recorded. Then five 1m x 20m sub-plots are put in the 40m x 10m plot. Each 1m x 20m sub-plot is one meter part. All saplings and shrubs less than 11 cm dbh and greater than 1.5m tall are recorded. Two of the 1m x 20m sub-plots are then used to sample for the number of tree and shrub seedlings. At the outside corners of the two outside sub-plots .25m x .1m plots are used to sample for herbs.

Each plot is marked on one corner with a two foot long, .5 inch diameter, white PVC stake. On each stake there is a metal tag which reads "PRT Botanical Survey. Do Not Remove." The exact location of each stake is given at the beginning of the data tables for each plot. Plots are numbered 1-14

and are circled on Figures C-2 (plot 6), C-3 (plots 1-5) and D-1 (plots 7-14).

Four plots (zones) were sampled in 1985 by the Army Corps of Engineers at Givhans Ferry State Park. The data and figures (maps) from this work are presented after the author's quantitative work in Appendix C, exactly as it is in the letter to Mr. Joe Watson (of the South Carolina Department of Parks Recreation and Tourism) from the regulatory branch of the Army Corps of Engineers.

CHAPTER II

THE ENVIRONMENT

Geology

Most of the geological information presented here comes from Cooke (1936) and Berry (1914). The first rise of the seas and flooding of the coastal plain of South Carolina occurred during the Upper Cretaceous period. The soils at this time were arkosic sands and kaolin deposits. The deposits from this first advance of the seas is referred to as the Middendorf. The Middendorf deposits are fine-grained muds and sands. The drainage patterns leading into the coastal plain were already established at this time and much sedimentation from the Piedmont had already occurred. The Eocene epoch is represented by Barnwell sands, Santee limestone and Cooper marl. The Santee limestone is made of hard and soft layers of glauconitic impure limestone or marlstone. The Cooper marl is brownish in color and generally massive and homogeneous. The Barnwell sands also have a small amount of limestone at the bottom of the formation. The Santee limestone is under the Cooper marl. The Barnwell sands are found between the two. In January of 1842 Charles Lyell visited the calcareous deposits (also known as "white limestone") of South Carolina. He was the first to correctly identify them as being of the Jackson formation deposited during the Eocene. Because he found

them along the Santee River, he gave them the name Santee white limestones. In 1884, Michael Tuomey described and named the Cooper marl for the Cooper River locality where he saw the marl. During the Eocene the coastal plain was covered by deep seas. The Oligocene series is represented on the South Carolina coastal plain by the Flint River Formation. It consists chiefly of yellow vitreous chert in reddish yellow sand. This formation is very small throughout most of the coastal plain. Most of the coastal plain was still covered by seas during this time. During the early and middle Miocene the part of South Carolina north of the Santee River was a peninsula separating the enlarged Chesapeake Bay from the enlarged Gulf of Mexico. Later in the Miocene this peninsula, known as the Great Carolina Ridge of Dall, also became submerged below the rising seas. The three formations attributed to this period are the Hawthorn, Raysor marl and Duplin marl. Natural exposures of the Hawthorn formation are rare. Edisto marl (phosphate rock) is the residual product of the fine-grained sandy phosphatic marl which is most common in the Hawthorn formation. Brittle shale is the most distinctive kind of rock in the Hawthorn formation. Raysor marl is only known to be exposed at one location along the Edisto River. The Duplin marl is the youngest formation of the Miocene. It is chiefly shell marl. Most of this formation was washed away during the period of rising and falling sea levels which followed. What little of this formation that is left, is

confined to the bluffs along the principal rivers. Even here it is covered by Pleistocene terrace deposits. During the Pliocene the lands of the southeast coast sank and the South Carolina coastal plain was completely submerged. The Waccamaw formation was laid down at this time. It consists of several thin shell beds separated by sands. It is very rarely exposed except along river banks. The coastal plain of South Carolina was still submerged at the beginning of the Pleistocene. During the Pleistocene the sea rose and fell at least seven times. The marine terrace formations of this epoch correspond to the seven levels at which the sea stood; each high water level being successively shallower. The Penholoway formation was laid when the seas were about 70 feet higher than they are today and the earth's climate was in an interglacial period. The Penholoway formation consists chiefly of fine sand and clay that was washed out of the older Pleistocene formations. From this time onward the area of the coastal plain that I am concerned with was ready for terrestrial plant colonization.

Past Floras

The information concerning past floras can be found in Braun (1950). The Cretaceous flora of South Carolina was very different from anything that exists today. The flora was well developed on the present day Piedmont, as indicated by the number of fossils found there. The present day coastal plain was underwater for most of the Cretaceous

period. The climate during this period was much warmer than it is at present as indicated by the subtropical flora found in the fossil record. Seasonal changes as depicted in growth rings of petrified wood, are absent indicating little or no seasonal changes. Rainfall was probably heavy as indicated by drip tips on many fossil leaves. The fossil record shows the flora as being continuous along the coast from Alabama to New Jersey. Walnuts, willows and oaks were growing with *Sequoias*, *Eucalyptus*, *Proteoides* and *Araucarias*. These same plants are found well into the Cenozoic era. The present day rain forests of New Zealand may be the closest comparison to the South Carolina Coastal Plain Cretaceous flora that we will ever see (Berry 1914).

By the Eocene the early conifers and cycadophytes had disappeared and the flowering plants were abundant and diverse. The Wilcox flora of the lower Eocene is the largest known collection of fossil plants from the coastal plain. Some authorities have listed over 500 species in this flora and many of the genera are still represented today.

The Oligocene and early Miocene floras contained many palms and other subtropical plants indicating a climate that was once much warmer. By the middle Miocene there is evidence that the climate was changing and the flora was migrating southward. The climate at that time may have been like it is today.

The Gulf coast flora of the Citronella formation was deposited during the Pliocene. This flora still contained a number of genera that are now extinct, however the majority of the flora closely resembles that now found along the Gulf coast.

During the early Pleistocene the ice ages were beginning. The flora of the Appalachian Plateau was much the same as it is today however, no northern species had migrated south into the highlands. This indicates that the ice sheets had yet to extend very far south. The Southern Appalachian Highlands have been rugged land areas continuously from before the rise of the angiosperms. Many species probably evolved in these highlands. Many of the ancestors of coastal plain plants migrated from the Appalachian Highlands as the seas dropped during the Pleistocene. Many other subtropical plants probably migrated from the Gulf coast. These are the pine savannah, swamp and bog species. Approximately 23,000-36,000 years ago the northern hemisphere was locked in a full ice age. Pollen studies and macrofossils show that boreal forests were developed 1000 km south of their present location. The post glacial period following the full Wisconsin Glaciation was a time of marked changes in the flora. *Picea-Pinus banksiana* forests on the coastal plain were replaced by *Quercus* spp. (oaks). Later a *Pinus* dominated vegetation replaced the oaks. In some areas dry, prairie-like communities existed (Watts, 1971, Whitehead, 1973). By 10,000

years ago most of the plants found today were present in the flora.

Climate

The coastal plain has a warm-humid-temperate climate. The biggest influence is the warm Gulf Stream current which provides warm moist air. This warm moist ocean air moderates the temperatures during the winter months. Freezing temperatures occur an average of 30 days per year. The warmest month is July with an average maximum temperature of 90° F. The average annual temperature is 60°F. Average annual rainfall 30 miles from the coast is 50 inches. July is the month with the highest average rainfall, which is 8 inches. October and November normally have the least average monthly rainfall, which is about three inches per month. Hurricanes provide much needed rain during these months when rainfall is least (NOAA, 1982, NOAA, 1983).

CHAPTER IV
THE VASCULAR FLORA OF OLD
SANTEE CANAL STATE PARK

Location

The Old Santee Canal State Park is located in Berkeley County, South Carolina, just southeast of the junction between the Tailrace Canal and U.S. Highway 52. The Tailrace Canal is the eastern border of the park. Stoney Landing is the southernmost point of the park. The western boundary of the park follows the forested bluff tops north to U.S. Highway 52. The park contains approximately 200 acres.

Land Use History

During colonial times and up to the Civil War much of the upland was cultivated or used as pasture. The swamps were used to fatten livestock on acorns or to grow rice (Brockington 1980, Stony 1955, Porcher 1950). There was also a small amount of surface mining of limestone for brickmaking (Stony 1955).

After the Revolutionary War a canal was started that would ultimately link the Santee River to the Cooper River and thus allow ships to avoid the pirate-infested waters of the Atlantic Ocean. It took until the year 1800 before the canal was finally finished.

Today, this canal is known as the Old Santee Canal. It was originally called the Santee Canal. The Old Santee Canal enters the park at its northern end and continues south to a point halfway through the park, where it turns east and enters the Tailrace Canal. The Old Santee Canal was originally five and a half feet deep, thirty-five feet wide at the surface, and twenty feet wide at the bottom. A ten-foot draw path was originally maintained on each side of the canal. The soil and marl dredged to make the canal was used for the draw path. This draw path is still visible as an elevated trail alongside the canal. During the year 1830 the canal saw its heaviest traffic. Seven hundred and twenty boats arrived in Charleston via the canal carrying 70,000 bales of cotton. In 1850 the canal was closed by an Act of the Legislature because of competition from the South Carolina Railroad (Porcher 1950).

The Civil War brought an end to slave labor and with it the end of large plantations of rice, indigo and cotton (Jones 1971).

Much of the present-day park was now left relatively undisturbed until construction of the Tailrace Canal in 1942 (Jones 1971). The marl spoils dredged to make the Tailrace Canal form a large mound along the Tailrace Canal for the entire length of the park.

In March of 1985 redirection of the Santee Cooper lakes was started (Bledsoe 1985). This caused the water table in the park to drop considerably. Between 1985 and the

present, low water in Biggin Creek has allowed marsh vegetation to establish where there was once deep water.

At the present time a dam is being built across the mouth of Biggin Creek and a pumping station is being put in at the north end of the park. A short canal has been dug between the Old Santee Canal and Biggin Creek. The Old Santee Canal has been dammed where it once entered the Tailrace Canal. All of this civil engineering is to raise the water table in the park to the pre-1985 levels. Construction on park facilities and roads began in 1988 and continue. The land became a state park in 1987. The majority of the field work for this survey was done in 1987.

Soils

Most of the soil information presented here comes from the USDA Soil Conservation Service (1956-1983).

The Bonneau series soil is found along the midwestern side of the park on the slopes and in the fields west of the filled-in portion of the Old Santee Canal. It is also found along the bluff throughout most of the park. The soil is a deep, well-drained, loamy sand. The A-horizon is dark grayish brown to light yellowish brown and goes to a depth of 22 inches. The B-horizon goes from a depth of 27 inches to 74 inches and goes from a brownish yellow color at 27 inches to a mottled light gray and yellowish brown sandy clay loam at 74 inches. This whole horizon is described as being very

strongly acid with pH's of 4.5 to 5.2 however the author found pH values of 6.6 in the A-horizon (Plot 9 of Table I).

The Duplin series is found along the bluff tops just north of the Santee Cooper Water Authority Headquarters. These are the highest elevations in the park. The soil is a deep, moderately well-drained, clayey fine sandy loam. The A-horizon is a grayish brown fine sandy loam with pH values of 5.5 to 6.8. The A-horizon is a grayish brown fine sandy loam with pH values of 5.5 to 6.8. The A-horizon goes to a depth of 6 inches. The B-horizon goes to a depth of 80 inches and is yellowish brown clay loam at 7 inches and brownish yellow clay loam at 80 inches. The author's soil samples showed the B-horizon to be red. The B-horizon has pH values between 4.5 and 5.5.

Udorthents are soil materials that were dredged up during the digging of the Tailrace Canal, which connects Lake Moultrie to the Cooper River. Udorthents are found in a large mound which runs the entire length of the park along the Tailrace Canal. Course fragments of marl or limestone are abundant. There is very little soil development. The shallow soil that is found, is a sandy loam, sandy clay loam or sandy clay soil which is moderately alkaline. The soil pH found is 8.0.

Plant Association and Community Descriptions

Swamp Hardwood Forest Association

Three forest communities have been recognized in the Swamp Hardwood Forest Association (SHFA), these are: swamp forest, hardwood bottom and ridge bottom. All of these communities have been recognized in the past by Braun (1950), Penfound (1952), Nelson (1986), Barry (1980) and Porcher (1981). These three communities occur in a complex mosaic between the spoils mound to the east and the bluffs (cliffs) to the west. There is also a small area of hardwood bottom at the southernmost end of the park.

Swamp Forest

The swamp forest communities occur on the lowest, most frequently flooded sites. *Taxodium distichum* (bald cypress) is the dominate tree. The bald cypress trees are massive with large buttresses and canopies at approximately 100 feet. In many places logs, stumps and buttresses form seed beds for *Liquidambar styraciflua*, *Quercus laurifolia*, *Acer rubrum*, *Ulmus alata* and *Quercus nigra*. The shrub layer is very sparse in most of the swamp forest. In areas that receive more sunlight an occasional thicket of *Cephalanthus occidentalis* will be found. Saplings are frequently encountered of many tree species. *Carpinus caroliniana* and *Fraxinus caroliniana* are common understory trees. The herb flora is very diverse. Depending on the site, a variety of herbs

can be found. Where light is abundant, panic grasses and carices are common. *Onoclea sensibilis*, *Arundinaria gigantea*, *Chasmanthium sessiflorum*, *Saururus cernuus*, *Panicum gymnocarpon* and *Asclepias perennis* are some of the other herbs commonly seen. *Polygonum* species are frequently found in standing water. Seedlings of bald cypress are often found.

Hardwood Bottom

Porcher (1981) has described the hardwood bottom communities as being like islands in the swamp forest. This description holds true in the Old Santee Canal State Park. The hardwood bottoms occupy sites that are a little higher and better drained than the swamp forests. All of the tree species found in the swamp forests on logs, stumps and buttresses are found in the hardwood bottoms. *Quercus laurifolia* forms small groves in places. *Liquidambar styraciflua* is present everywhere and is a dominate canopy species. The understory is a tangle of growth in many places, with *Ilex decidua*, *Carpinus caroliniana*, *Ostrya virginiana*, *Sabal minor* and *Smilax bona-nox*. The vine flora is well developed with large specimens of *Berchemia scandens*, *Smilax bona-nox*, *Rhus radicans*, *Vitis rotundifolia*, *Campsis radicans*, *Anisostichus capreolata*, *Gelsemium sempervirens* and *Ampelopsis arborea*. The herb flora is as rich as that found in the swamp forest communities.

Ridge Bottom

Ridge bottom communities are found on the highest ground in the SHFA. Just north of the Tailrace Canal-Old Santee Canal connection, there are a few small groves of *Pinus glabra*. The *Pinus glabra* trees are not dominate canopy trees in the ridge bottoms. They are just 40 to 50 feet in height and the surrounding SHFA communities form the canopy at 70 to 100 feet. The same mixtures of vines, trees, shrubs and herbs occur on the ridge bottoms as on the other SHFA communities. Bald cypress and *Carpinus caroliniana* are exceptions in that they are not found on the ridge bottoms. All together, the ridge bottoms make up a very small portion of the park, probably less than one acre.

Southern Mixed Hardwood Forest Association

In the absence of fire, the climax forest type on the uplands of the southeastern coastal plain is the southern mixed hardwood forest association (SMHFA) (Quarterman 1962). This forest association appears to be a transition between Braun's (1950) mixed mesophytic forest and Richards (1957) mixed tropical rain forest (Quarterman 1962). The communities in this association are complex, with a number of species sharing dominance (Quarterman 1962, Braun 1950 and Nelson 1986).

The narrow band of forest that follows the ridges and bluffs (cliffs) along the western side of the park are

excellent examples of this complex SMHFA. Since all of the area occupied by this SMHFA occurs on the marl (limestone) bluffs, the author will call all of this area a limestone cliff-marl forest community. There are many variations of this community along the bluffs, however a few things remain constant:

- (1) The high diversity of species present,
- (2) marl or limestone outcrops,
- (3) medium to extremely high levels of calcium and magnesium in the soil (Table I), and
- (4) the presence of calcium loving plants.

Limestone Cliff-Marl Forest

The bluffs along the western side of the park rise up from the SHFA that is to the east. East-west running ravines (coves) dissect the ridge along its north-south axis. The forest is narrow in the east-west direction because of the SHFA on the east and agricultural fields or developed areas on the west.

The description of the limestone cliff-marl forest community that follows will start at the south end of the park and proceed northward. Directly north of Stony Landing (Figure D-1), the limestone cliffs are nearly vertical. A rich assortment of plants are found along the cliffs. Some of the more common trees found are *Juglaus nigra*, *Acer saccharum* var. *floridanum*, *Quercus nuehlenbergii*, *Carya cordiformis*, *Carya tomentosa*, *Quercus falcata* var. *pagodae-*

folia, *Liquidambar styraciflua* and *Tilia caroliniana*. *Asimina triloba* forms a very nice thicket. *Aesculus pavia*, *Corylus americana*, *Persea borbonia*, *Vaccinium arboreum*, *Lindera benzoin* and *Callicarpa americana* are some of the shrubs commonly found. These limestone cliffs have the only known naturalized population of *Cyrtomium falcatum* in the state. The population is spread out in clumps on approximately 75 yards of the cliff face. Many other interesting herbs are found here, such as *Thelypteris kunthii*, *Anemone virginiana*, *Samolus valerandi* ssp. *parviflorus*, *Collinsonia tuberosa*, *Elytraria caroliniensis*, *Melanthera hastata*, *Asarum canadense* and *Aster sagittifolius*. Large portions of the limestone cliffs are bare of vegetation. The richest assortments of plants are found on the cliff bases, cliff tops or where the slope is less than 45°.

Continuing north the same groupings of trees will be encountered. There is evidence of past surface mining of limestone here. Pits and bricks are scattered about the landscape. Some very massive specimens of *Quercus virginiana* are found here. Some other commonly seen trees (besides those already mentioned) are *Acer negundo* and *Celtis laevigata*. At the base of the cliffs here a tangle of *Dioscorea batatas* competes with the native flora. The first of the ravines which dissect the cliffs are found here. *Carya myristicaeformis* (listed as a tree of regional concern - threatened, by the South Carolina Plant Advisory Committee)

is found on the uplands just north of this first ravine. *Carya myristicaeformis* (nutmeg hickory) *Carya cordiformis* (bitternut hickory) and *Carya aquatica* (water hickory) are all very similar. Fruit specimens are needed to be absolutely sure of identifications. I was only able to verify two populations of nutmeg hickorys. The one population on the bluff, just mentioned, and another tree in the hardwood bottom at the southern end of the park. During 1984 and 1986 Dr. Doug Raynor (of the South Carolina Department of Wildlife and Marine Resources Heritage Trust Branch) made tours of the property and identified nutmeg hickory as being present all along the bluffs from the Tailrace Canal-Old Santee Canal connection south to the hardwood bottoms at the extreme southern end of the park. The voucher specimen (collected by Dr. Doug Raynor) of nutmeg hickory housed at Clemson University Herbarium has a very broad location given as collection data, therefore it is difficult to know if this specimen is from a different population than the one the author found. The nutmeg hickorys share the canopy with many other species. Some of these are *Carya cordiformis*, *Carya tomentosa* and *Quercus muehlenbergii*. Most of the other trees already mentioned are also present. Out crops of marl are common and *Melanthera hastata* is commonly found growing on them. Table III is a list of plants considered by Radford (1964) to be indicators of basic soils. All of these plants are not found in any one location, however they are all found some place on the bluffs.

Table III

Plants Indicating Basic Soils
at Old Santee Canal

Thelypteris kunthii .
Cyrtomium falcatum .
Anemone virginiana
Pteris multifida
Acer saccharum ssp. *floridanum*
Rhamnus caroliniana
Tilia caroliniana
Samolus valerandi ssp. *parviflorus*
Collinsonia tuberosa
Elytraria caroliniensis
Melanthra hastata
Carya myristicaeformis
Cornus asperifolia
Quercus muehlenbergii
Asarum canadense
Populus deltoides

Some of the bluffs have seepage, and with it an interesting collection of herbs. *Zephyranthes atamasco*, *Podophyllum peltatum*, *Trillium cuneatum*, *Arisaema triphyllum* and *Thelypteris hexagoptera* are all commonly found on the seeps. Along the base of the bluffs, a rich mixture of plants are found. Some of the more interesting ones are *Arisaema dracontium*, *Asarum canadense*, *Sanguinaria canadense*, *Spigela marlandica*, *Aristolochia serpentaria*, *Cornus asperifolia* and *Rhamnus carolinana*. One other interesting plant found here is *Menispermum canadense*.

The bottomland species and upland species form a complex assemblage along the entire length of the bluffs. Continuing north, the swamp forest appears at the foot of the bluffs. *Taxodium disticum* is present, along with many other species characteristic of the swamp forest. The bluffs now gently slope downward to the north, into the largest ravine (cove). On this gently sloping, north facing bluff a grove of beech trees (*Fagus grandifolia*) are found. Beech is an important part of the canopy, however beech shares dominance with *Acer saccharum* var. *floridanum* and *Liquidambar styraciflua*. Many other trees are also found. A large variety of shrubs can be found, however they do not form thickets. The vine flora is particularly notable in that a number of large specimens of *Rhus radicans*, *Berchemia scandens* and *Vitis rotundifolia* are present. *Anisostichus capreolata*, *Campsis radicans* and *Smilax* species are also found. A very diverse group of seedlings were found during

the spring of 1988 when quantitative data was collected. Twenty different shrub or tree seedling species were found in a 40m² area. This was typical of all the marl forest plots that were sampled.

The bluffs are cleared north of the large ravine (the ravine is a hardwood bottom) for the Santee Cooper Water Authority Headquarters (SCWAH). Upon entering the forest again north of the SCWAH the bluffs rise to the highest and driest elevations found in the park. The forest is dominated by *Carya tomentosa*, *Quercus alba* and *Pinus taeda*. A number of other trees are also found such as: *Quercus shumardii*, *Quercus falcata* var. *pagodaefolia*, *Carya cordiformis*, *Carya glabra*, *Ulmus alata* and *Cornus florida*. The shrub layer is rich in species. Some of the more common shrubs are *Hamamelis virginiana*, *Aralia spinosa*, *Aesculus pavia* and *Myrica cerifera*. Once again, the herb layer is very diverse, with many of the species already mentioned present. This area of the marl forest is distinctly different from the beech-dominated forest to the south. The bluffs are sheer 40 to 50-foot cliffs here, with the marshy headwaters of Biggin Creek at their base.

Continuing northward the bluffs gently slope downward to mere 20-foot cliffs. At the base of these cliffs some particularly thick glades of *Thelypteris kunthii* are developed on a thick black loamy soil. This soil is a uniform black loam, down to three feet in depth at places.

More than likely this soil has resulted because of gravity and the constantly humid micro-climate.

The Tailrace Canal-Old Santee Canal connection is now visible to the east.. To the north the bluffs gently rise again into another variation of the upland forest that is just to the south. The forest is dominated by *Carya tomentosa*, *Liquidambar styraciflua* and *Fraxinus pennsylvanica*. *Quercus muehlenbergii* *Quercus shumardii* and *Liriodendron tulipifera* are also commonly found. An understory of *Cornus florida* and *Cercis canadensis* is well developed. Many of the shrubs already mentioned are present. The importance value for *Hamamelis virginiana* seedlings (Plot 9, Appendix D) was 71.6 in the summer of 1987. Apparently 1987 was a good year for *Hamamelis* seedlings. The herb flora is very lush. Some of the herbs that were found here are *Hexastylis arifolia*, *Cocculus carolinus*, *Sanguinaria canadensis*, *Parthenocissus quinquefolia*, *Smilax ecirrhata* var. *hugerii*, *Eupatorium purpureum*, *Polymnia uvedalia* and *Sanicula gregaria*.

Continuing north, the bluffs rise and form 40-foot cliffs on the east. Along the top of the bluffs and the north facing slope there is a well developed grove of beech trees. Well developed groves of beech trees were only found in two locations, both of which are on north facing slopes. Many of the same plant species already mentioned are found.

The large ravine that is immediately north of the beech grove is a hardwood bottom and swamp forest with a rich mix-

ture of upland species. Some of the more interesting plants found in the ravine and adjacent bottomlands are: *Tilia caroliniana*, *Juniperus virginiana*, *Menispermum canadense*, *Asarum canadense*, *Arisaema dracontium*, *Spigelia marlandica*, *Botrychium virginianum*, *Geranium maculatum*, *Aristolochia serpentaria* and *Trillium cuneatum*. Unfortunately, the bluffs north of the ravine are covered with *Lonicera japonica*. The tree species are still present in a rich mixture. One herb species of note that is only found along the creek in the northernmost ravine is *Pteris multifida*. *Pteris multifida* is a plant normally found on rotten cement in moist places (such as grave yards).

Another variation of the marl forest is found on the spoils mound (bank) next to the Tailrace Canal. The vegetation on the spoils mound has been developing since 1942. In the 46 years that have passed a very interesting flora has developed. The tree that dominates this area is *Juniperus virginiana*. Many other trees are also found. Some of these are *Fraxinus pennsylvanica* var. *subintegerrima*, *Celtis laevigata*, *Populus deltoides*, *Acer saccharum* var. *floridanum* and *Acer negundo*. Unfortunately, *Lonicera japonica* overruns much of this area. In all other respects the flora is very similar to that found in the rest of the marl forests to the west.

A marsh community has been developing in the Biggin Creek basin since the redirection of the Santee-Cooper lakes begun in 1985. The marsh is well developed now, with thick glades of *Typha latifolia*, *Zizaniopsis miliacea* and members of the Cyperaceae. Some of the other commonly found herbs here are *Alternanthera philoxeroides*, *Orontium aquaticum*, *Echinoclorus cordifolius*, *Pontederia cordata*, *Rumex verticillatus* and *Amaranthus cannabinus*. Around the edges of the marsh some of the plants found are *Lobelia cardinalis*, *Mikania scandens*, *Aster carolinianus*, *Hibiscus moscheutos*, *Amorpha fruticosa*, *Itea virginica* and *Rosa palustris*. A tree commonly found in the marsh is *Nyssa sylvatica* var. *biflora*.

Disturbed Areas

Manmade disturbances are common throughout the park. Many types of manmade disturbances have already been discussed under the other plant community headings, therefore those will not be mentioned.

All along the western side of the park there are old fields. Many "weedy" species are found in these fields and in the forest-field ecotones to the east of the fields. Some of the more common weeds found are *Sida rhombifolia*, *Salvia lyrata*, *Monarda punctata*, *Solanum carolinense*, *Sisyrinchium angustifolium*, *S. rosulatum*, *Amaranthus spinosus*, *Duchesnea indica* and *Trifolium repens*. Many grasses characteristic of old fields are also found.

Around the south end of the park and scattered in the forests throughout the park is the popcorn tree (*Sapium sebiferum*). This tree is very abundant around the south end of the park. *Albizia julbrissin*, *Ligustrum japonicum* and *Melia azedarach* are also commonly found around the south end of the park. The herbs found are basically the same as those found in the old fields except for a couple plants found in the wetter areas. Along the edges of the mowed yard and paths where it tends to be wet *Siplanthes americana* var. *repens* is found in large patches. *Verbena brasiliensis* is also commonly found in the wetter areas. Some of the live oaks (*Quercus virginiana*) around the south end of the park are quite massive. One tree that is northwest of the landing house has a diameter of 253 cm at breast height. An extremely large specimen of *Vitis rotundifolia* is found at this same location with a diameter of 26.5 cm at breast height.

APPENDICES

Appendix B The Vascular Flora of Old Santee Canal State Park

The list of species contains all plants identified. A voucher specimen for each species is at Clemson University Herbarium. Nomenclature follows Radford (1964). Many other sources were used to identify plants. These sources are listed in the references. For information on where a species is native, the Manual of Vascular Plants of Northeastern United States and Adjacent Canada (Gleason 1963) was followed.

Pteridophytes, gymnosperms, monocotyledons and dicotyledons are the four major groupings respectively in this list. Families are in the order given by Radford (1964). The species within each family are in alphabetical order. For each plant common name follows scientific name. Next is information on where a plant is native to. If Nat then it is native to the United States. If not native the place of origin is given. Next is information on habit, i.e. herb, shrub, vine, tree, annual (Ann), bien (Bien), and perennial (Per). Next is flower color and/or other specific collection data. Following this is frequency, i.e. abundant, frequent, infrequent and rare. Note that these frequencies only pertain to the park. Following this is blooming period and fruiting period as given by Radford. Last is collection number and date collected. All plants were collected by the author unless otherwise stated.

All plants were checked against the "Native vascular plants rare, threatened or endangered in South Carolina" (Rayner, 1984). The bold letter/s **R**, **T**, **U** and/or **S** preceding a species indicate that it is found in Rayner (1984). The letter **R** means of regional concern, **T** means threatened, **U** means status unresolved, and **S** statewide concern (Rayner, 1984).

OPHIOGLOSSACEAE

Botrychium virginianum (L.) Swartz. RATTLESNAKE FERN. Nat Per herb. S end of Tailrace/Santee Canal connection on N facing wooded bank. Infrequent, seen in forests throughout the park. April-June. 401, 5-10-87

PTERIDACEAE

Pteris multifida Poiret. SPIDER BRAKE. E Asia Per herb. Fertile fronds present. Marl creek bank at NW end of property. Rare, only seen along marl creek at NW end of park. April-Nov. 1463, 10-23-87

ASPIDACEAE

Athyrium asplenoides (Michaux) A. A. Eaton. SOUTHERN LADY FERN. Nat Per herb. Bottoms E of Santee Canal. Infrequent, seen in swamp forests throughout the park. May-Sept. 1465, 10-23-87

Onoclea sensibilis L. SENSITIVE FERN. Nat Per herb. Fertile fronds present. Bluffs N of landing house. Infrequent, seen in forests throughout the park. May-June. 673, 6-5-87

Polystichum acrostichoides (Michaux) Schott. CHRISTMAS FERN. Nat Per herb. Forest NW of filled in area of canal. Infrequent to frequent, seen in forests throughout the park. 392, 5-10-87

Thelypteris hexagonoptera (Michaux) Weatherby. BROAD BEECH-FERN. Nat Per herb. Mixed hardwood forest NW of Santee Canal/Tailrace Canal connection. Infrequent, only seen along bluffs. April-Aug. 1192, 9-26-87

Thelypteris kunthii (Desv) Morton. Nat Per herb. Fertile fronds present. Bluffs N of landing house. Infrequent to frequent, seen on marl throughout the park. May-Aug. 672, 6-5-87

ASPLENIACEAE

Asplenium platyneuron (L.) Oakes. EBONY SPLEENWORT. Nat Per herb. Forest NW of filled in area of canal. Infrequent to frequent, in forests throughout the park. April-Oct. 391, 5-10-87

POLYPODIACEAE

Cyrtomium falcatum (L. f.) K. Presl. HOLLY FERN. Asia, S Africa, Polynesia per herb. Fertile fronds present. Marl bluffs N of landing house. Infrequent to rare, only seen on marl bluffs just N of landing house. 1034, 9-12-87

Polypodium polypodioides (L.) Watt. RESURRECTION FERN. Nat Per herb. On tree bases at the banks of bluffs on W side of old Santee Canal. Infrequent to frequent on trees throughout the park. June-Oct. 1574, 3-19-88

PINACEAE

Pinus echinata Miller. SHORT-LEAF PINE. Nat 70' Tree. Forest next to filled in area of canal. Infrequent on high ground throughout the park. March-April; Sept.-Oct. 396, 5-10-87

Pinus glabra Walter. SPRUCE PINE. Nat 30' Tree. Bottomland hardwoods W of Dock restaurant. Infrequent in swamp forests throughout the park. March-April; Sept.-Oct. 490, 5-14-87

Pinus taeda L. LOBLOLLY PINE. Nat 20' Tree. Hardwood forest W of filled in area of canal. Infrequent to frequent along bluffs. March-April; Oct.-Nov. 374, 5-10-87;

TAXODIACEAE

Taxodium distichum (L.) Richard. BALD CYPRESS, SWAMP CYPRESS. Nat 60' Tree. Bottomland hardwoods W of Dock restaurant. March-April; Oct. 332, 5-9-87

CUPRESSACEAE

Juniperus virginiana L. RED CEDAR. Nat 20' Tree. Bottomland hardwoods W of Dock restaurant. Abundant on marl spoil banks next to tail race canal. Frequent to infrequent throughout the rest of the park. Jan-Feb. 280, 5-9-87

TYPHACEAE

Typha latifolia L. COMMON CAT-TAIL. Nat Per herb. Brown fruit. Low ground E of Santee Cooper Water Authority headquarters. Infrequent to frequent, only seen in marsh areas. May-July; June-Nov. 756, 6-24-87

ALISMATACEAE

Sagittaria graminea Michaux. DUCK-POTATO. Nat Per herb. Low ground S of landing house on banks of Tailrace Canal. Rare, only seen at one location May-Nov. 893, 8-11-87

Echinodorus cordifolius (L.) Grisebach. BUR-HEAD. Nat Creeping per. White flowers. Bottoms between Biggin Creek and bluffs to the W. Infrequent to frequent, only seen in marsh areas. June-Nov. 871, 8-11-87

HYDROCHARITACEAE

Egeria densa Planchon. BRAZILIAN WATERWEED. South American Per herb. In Tailrace Canal at boat launch. Frequent, only seen at this location in the Tailrace canal. May-Nov. 666, 6-5-87

POACEAE

Andropogon glomeratus (Walter) BSP. BROOM STRAW. Nat Per grass. Forest S of landing house. Infrequent throughout the park. Sept-Oct. 1324, 10-3-87

Andropogon virginicus L. BROOM SEDGE. Nat Per grass. Banks of Tailrace Canal at S end of property. Sept-Oct. Abundant in open dry areas of park. Frequent to infrequent throughout the rest of the park.

Arundinaria gigantea (Walter) Muhl. CANE. Nat Woody per grass. Ecotone between Dock restaurant and bottoms to the W. Sporadically. Infrequent to frequent throughout the park. 306, 5-9-87

Axonopus affinis Chase. CARPET GRASS. Along service drive leading to landing house. Infrequent around cultivated areas throughout the park. July-Oct. 995, 9-12-87

Briza minor L. QUAKING GRASS. Europe Per grass. Ecotone between Dock restaurant and cypress bottoms. Infrequent around cultivated areas throughout the park. April-June. 289, 5-9-87

Cenchrus echinatus L. SANDSPURS. Nat Ann grass. Ecotone between forest and fields W of Biggin Creek. June-Oct. 1045, 9-12-87

Chasmanthium latifolium (Michaux) Yates. RIVER OATS. Nat Per grass. Banks of Santee Canal/Tailrace Canal connection. Infrequent along banks of Tailrace canal. June-Oct. 1058, 9-12-87

Chasmanthium sessiflorum (Poir.) Yates. CHASMANTHIUM. Nat Per herb. Mixed hardwood forest NW of Santee Canal/Tailrace Canal connection. Infrequent throughout the park. Aug-Oct. 1197, 9-26-87

Digitaria sanguinalis (L.) Scopoli. CRAB GRASS. Europe Ann grass. Low ground S of landing house. Infrequent around cultivated areas throughout the park. July-Oct. 889, 8 11-87

Echinochloa colonum (L.) Link. JUNGLE RICE. Old World tropics Ann grass. High ground E of Santee Cooper Water Authority headquarters. Infrequent around cultivated areas throughout the park. July-Oct. 954, 8-29-87

Eleusine indica (L.) Gaertner. GOOSE GRASS. Ann grass. E. tone between forests and fields W. of Biggin Creek. Infrequent throughout the park. June-Oct. 1046, 9-12-87

Elymus canadensis L. WILD RYE GRASS. Per grass. On marl spoils along S. end of park. Infrequent to rare, only seen in one large clump. July-Oct. 1841, 5-18-88

Elymus virginicus L. WILD RYE GRASS. Nat Per grass. Mixed hardwoods N of landing house. Infrequent in fields throughout the park. June-Oct. 669, 6-5-87

Festuca elatior L. FESCUE. Per grass. Bluffs N. of Santee Cooper Water Authority. Infrequent throughout the park. May-July. 1819, 6-2-88

Hordeum pusillum Nuttall. LITTLE BARLEY. Nat Ann grass. Ecotone between Dock restaurant and cypress bottoms. Infrequent around cultivated areas throughout the park. April-June. 275, 5-9-87

Lolium mutiflorum Lam. ITALIAN RYE GRASS. Europe Short lived Per grass. Field W of filled in canal. Infrequent around cultivated areas throughout the park. April-June. 383, 5-8-87

Melica mutica Walter. MELIC GRASS. Nat Per grass. Bluffs N of landing house. Infrequent in high ground forests throughout the park. April-May. 1751, 5-13-88

Oplismenus setarius (Lam.)R. & S. OPLISMENUS. Nat Per grass. Red flower parts. Cultivated area around landing house. Infrequent around cultivated areas. Frequent to infrequent in dry forests throughout the rest of the park. Aug-Oct. 1365, 10-4-87

Panicum anceps Michaux. var. *anceps*. PANICUM. Nat Per grass. Along service drive at S. end of park. Infrequent in open areas throughout the park. July-Oct. 997, 9-12-87

Panicum anceps Michaux var. *rhizomatum* Hitchcock & Chase. PANICUM. Nat Per grass. Along service drive leading to landing house. Infrequent in open areas throughout the park. Sept-Oct. 987, 9-12-87

Panicum commutatum Schultes var. *commutatum*. PANICUM. Nat Per grass. Banks of Tailrace Canal at S end of property. Infrequent, only seen along Tailrace canal. March-Oct. 1181, 9-26-87

Panicum dichotomum L. var. *dichotomum*. PANICUM. Nat Per grass. Bluffs N of Santee Cooper Water Authy. Infrequent along bluffs and marl spoil banks. May-July. 1820, 6-2-88

Panicum gymnocarpon Ell. PANIC GRASS. Nat Per grass. Swamp forest at N. end of park. Infrequent in swamp forest. Aug.-Oct. 1847, 8-6-88

Panicum oligosanthos Schultes var. *oligosanthos*. PANICUM. Nat Per grass. Field W of filled in canal. Infrequent along bluffs throughout the park. April-July. 1210, 9-26-87

Panicum rigidulum Bosc. ex Nees var. *rigidulum*. PANICUM. Nat Per grass. Bottoms at SE end of park. Infrequent in swamp forests throughout the park. Aug-Oct. 1171, 9-29-87

Paspalum dilatatum Poir. DALLIS GRASS. S Am. Per grass. Low ground S of landing house. Infrequent to frequent around cultivated areas throughout the park. May-Oct. 888, 8-11-87

Paspalum setaceum Michaux. PASPALUM. Nat Per grass. Field W of filled in canal. Infrequent around cultivated areas throughout the park. June-Sept. 1214, 9-26-87

Poa annua L. SPEAR GRASS. Eurasia Ann grass. Ecotone between Dock restaurant and cypress bottoms. Infrequent to frequent around cultivated areas throughout the park. April-May. 291, 5-9-87

Setaria corrugata (Ell.)Schultes. FOXTAIL GRASS. Nat Ann grass. Field W of filled in canal. Infrequent around cultivated areas throughout the park. Oct. 1213, 9-26-87

Setaria geniculata (Lam.)Beauvois. FOXTAIL GRASS. Nat Per grass. Low ground S of landing house. Infrequent around cultivated areas throughout the park. May-Oct. 890, 8-11-87

Setaria glauca (L.)Beauvois. FOXTAIL GRASS. Europe Ann grass. Along service drive leading to landing house. Infrequent around cultivated areas throughout the park. July-Oct. 999, 9-12-87

Sorghastrum elliotti (Mohr)Nash. INDIAN GRASS. Nat Per grass. Field W of filled in canal. Infrequent in fields along W side of park. Sept-Oct. 1212, 9-26-87

Sorghum halepense (L.)Persoon. JOHNSON'S GRASS. Mediterranean Per grass. Field W of mixed hardwoods NW of filled in canal. Abundant in fields along W side of park. Frequent to infrequent around cultivated areas throughout the rest of the park. 1206, 9-26-87

Sphenopholis obtusata (Michaux) Scribner. WEDGE GRASS. Nat Per grass. Ecotone between Dock restaurant and cypress bottoms. Infrequent in cultivated areas throughout the park. April-May. 291A, 5-9-87

Sporobolus indicus (L.) R.Br. SMUT GRASS. Tropical Asia Per grass. Banks of Santee Canal/Tailrace Canal connection. Infrequent throughout the park. July-Oct. 1059, 9-12-87

Triticum aestivum L. WHEAT. Origin unknown (possible Palestine) Ann grass. Field W of filled in canal. Infrequent in fields along W side of park. May-June. 384, 5-10-87

CYPERACEAE

Bulbostylis barbata (Rottboell) Clarke. BULBOSTYLIS. Nat Ann or short lived per herb. Ecotone between forest and fields W of Biggin Creek. Infrequent along ecotones on W side of park. July-Oct. 1043. 9-12-87

Carex albolutescens Schweinitz. CAREX. Nat Per herb. Field S of large live oak and *Vitis*. Infrequent in fields along W side of park. 1717, 5-13-88

Carex comosa Boott. CAREX. Nat Per herb. Floating mat in Biggin creek. April-June. John Nelson, 4851, 7-29-86 USCH

Carex frankii Kunth. CAREX. Nat Per herb. Bottoms between Biggin Creek and bluffs to the W. Infrequent in low areas throughout the park. May-June. 877, 8-11-87

Carex lupulina Muhl. ex Schkuhr. CAREX. Nat Per herb. Bottoms between Biggin Creek and bluffs to the W. Infrequent in swamp forests. June-Sept. 863, 8-11-87

Carex lurida Wahlenberg. SEDGE. Nat Per herb. Bottoms between Biggin Creek and bluffs to the W. Infrequent in swamp forests throughout the park. June-Sept. 656, 6-4-87

Carex vulpinoidea Michaux. SEDGE. Nat Per herb. Bottoms N of landing house. Infrequent in swamp forests throughout the park. May-June. 1738, 5-13-88

Cyperus globulosus Aublet. CYPERUS. Nat Per herb. Low ground S of landing house. Infrequent in wet open areas throughout the park. July-Oct. 885, 8-11-87

Cyperus retrorsus Chapman. CYPERUS. Nat Per herb. Low ground S of landing house. Infrequent in wet open areas throughout the park. July-Oct. 886, 8-11-87

Cyperus strigosus L. CYPERUS. Nat Per herb. Low ground S of landing house. Infrequent to frequent in wet open areas throughout the park. July-Oct. 884, 8-11-87

Cyperus tenuifolius (Steudel) Dandy. CYPERUS. Nat Ann herb. Along service drive leading to landing house. Infrequent in mowed lawns throughout the park. July-Oct. 1016, 9-12-87

Cyperus virens Michaux. CYPERUS. Nat Per herb. Bottoms between Biggin Creek and bluffs to the W. Infrequent in open areas of swamp forests throughout the park. July-

Sept. 862, 8-11-87

Rhynchospora corniculata (Lam.) Gray. BEAKRUSH. Nat Per herb. Bottoms between Biggin Creek and bluffs to the W. Infrequent to frequent in marshy areas of park. July-Sept. 875, 8-11-87

Scirpus cyperinus (L.) Kunth. BULRUSH. Nat Per herb. Bottoms N of landing house. Infrequent to frequent in marshy areas of park. July-Sept. 662, 6-5-87

ARECACEAE

Sabal minor (Jacquin) Persoon. PALMETTO. Nat Shrub. Bottomland hardwoods W of Dock restaurant. Abundant to frequent in swamp forests. Infrequent in forests throughout the rest of the park. May-July; Sept-Nov. 321, 5-9-87

ARACEAE

Arisaema dracontium (L.) Schott. GREEN DRAGON. Nat Per herb. Bluffs N of landing house. Infrequent on the bluffs throughout the park. May; July. 322, 7-21-87

Arisaema triphyllum (L.) Schott. JACK IN THE PULPIT. Nat Per herb. Bluffs N of Santee Cooper Water Authy. Infrequent along bluffs throughout the park. March-April; July. 1818, 6-2-88

Orontium aquaticum L. GOLDEN CLUB. Nat Per herb. Bottoms just N of landing house. Infrequent in marshy areas of park. March-April. 1732, 5-13-88

LEMNACEAE

Lemna valdiviana Philippi. DUCKWEED. Nat Floating thallus herb. Flowers not seen. Pond at headwaters of Biggin Creek. Abundant only at headwaters of Biggin creek. Infrequent to frequent in the rest of Biggin creek. 400, 5-10-87

Spirodela oligorrhiza (Kurz) Hegelm. SPIRODELA. Nat Floating thallus herb. Flowers not seen. Pond at headwaters of Biggin Creek. Abundant only at headwaters of Biggin creek. Infrequent to frequent in the rest of Biggin creek. 400 A, 5-10-87

Wolffiella floridana (J. D. Smith) Thompson. Nat Floating thallus herb. Flowers not seen. Pond at headwaters of Biggin Creek. Abundant only at headwaters of Biggin creek. Infrequent to frequent in the rest of Biggin creek. 400 C, 5-10-87

BROMELIACEAE

Tillandsia usneoides (L.) L. SPANISH MOSS. Nat Per herb. Ecotone between Dock restaurant and bottoms to the W. Abundant to frequent on trees and shrubs throughout the park. April-June. 307, 5-9-87

COMMELINACEAE

Murdannia keisak (Hasskarl) Hand.-Maz. ANEILEMA. Nat Ann herb. Purple flowers. Bottoms along Biggin Creek. Infrequent in open areas of swamp forest. Sept-Oct. 1036, 9-12-87

Tradescantia subaspera Ker. SPIDERWORT. Nat Per herb. Blue flowers. Forest NW of filled in area of canal along bluffs. Infrequent along bluffs throughout the park. June-July. 600, 5-24-87

PONTEDERIACEAE

Pontederia cordata L. PICKERELWEED. Nat Per herb. Blue flowers. Bottoms between Biggin Creek and bluffs on the W. Infrequent to frequent in marsh areas. May-Oct. 665, 6-5-87

JUNCACEAE

Juncus bufonius L. RUSH. Nat Ann herb. Open field on N side of service drive leading to landing house. Infrequent to frequent in fields along W side of park. June-Nov. 412, 5-10-87

Juncus coriaceus Mackenzie. RUSH. Nat Per herb. Bottoms at N end of Biggin Creek. Infrequent in swamp forests throughout the park. June-Sept. 1052, 9-12-87

Juncus effusus L. RUSH. Nat Per herb. Bank of Tailrace Canal just N of landing house. Rare, only seen at one location. June-Sept. 1542, 2-27-88

Juncus tenuis Willd. PATH RUSH. Nat Per herb. Field NW of landing house. Infrequent to frequent around cultivated areas throughout the park. June-Sept. 1741, 5-13-88

Luzula acuminata Raf. var. *acuminata*. WOODRUSH. Nat Per herb. Banks of bluffs W of old Santee Canal. Infrequent along bluffs throughout the park. April-Aug. 1573, 3-19-88

LILIACEAE

Allium canadense L. WILD ONION. Nat Per herb. Purple flowers. Field NW of landing house. Infrequent to frequent around cultivated areas throughout the park. Mid April-May; late May-June. 677, 6-5-87

Allium vineale L. FIELD GARLIC. Europe Per herb. Disturbed field where overflow parking will be. Infrequent to frequent around cultivated areas throughout the park. Late May-June; July-Aug. 1729, 5-13-88

Nothoscordum bivalve (L.) Britt. FALSE GARLIC. Nat Per herb. White flowers.

Cultivated area around landing house. Infrequent to frequent around cultivated areas throughout the park. Mid March-mid May and Sept-Oct; May-June and Oct-Nov. 407, 5-10-87

Smilacina racemosa (L.) Desf. FALSE SOLOMON'S SEAL. Nat Per herb. White flowers. Forest NW of filled in area of canal. Infrequent along bluffs throughout the park. Mid April-early June; Aug-Oct. 394, 5-10-87

Smilax bona-nox L. GREENBRIER, CATBRIER. Nat Per 10' vine. Ecotone between Dock restaurant and bottoms to the W. Frequent on dry ground throughout the park. Late April-May; Sept-Nov. 316, 5-9-87

Smilax ecirrhata var. *huger* (Small) Ahles. Nat Per herb. Bottoms W of landing house. Infrequent along bluffs and bluff bases throughout the park. March-April; Aug-Oct. 1728, 5-13-88

Smilax rotundifolia L. GREENBRIER. Nat 15' Per Vine. Ecotone between Dock restaurant and bottoms to the W. Abundant to frequent in swamp forests throughout the park. Late April-May; Sept-Nov. 324, 5-9-87

Smilax walterii Pursh. CATBRIER. Nat Per Vine. Marl spoil banks at S end of property. Infrequent to frequent along marl spoils banks next to Tailrace canal. April-May; Sept-Nov. 1224, 9-26-87

Trillium cuneatum Raf. SWEET LITTLE BETSY. Nat Per herb. Red seed pod, mottled purple and green leaves. Bluffs N of landing house. Infrequent in forests on high ground throughout the park. Mid March-April; late May-June. 647, 6-4-87

Yucca aloifolia L. SPANISH BAYONET. Nat 1'-5' Shrub. Cultivated area around landing house. Rare, only seen at one location. June-early July; Oct-Dec. 1328, 10-3-87

Yucca gloriosa L. SPANISH-DAGGER. Nat 4' Woody shrub. Forest W of N end of Biggin Creek. Rare, only seen at one location. Nov-Dec. 1054, 9-12-87

DIOSCOREACEAE

Dioscorea batatas Dcne. CINNAMON VINE. China Per vine. Along base of bluffs N of landing house. Abundant along base of bluffs just N of landing house. Infrequent in forests on high ground throughout the rest of the park. June-Aug. 1737, 5-13-88

Dioscorea villosa L. var. *villosa* WILD YAM. Nat Per vine. Green fruit. Bluffs N of landing house. Infrequent along bluffs throughout the park. April-June; Sept-Nov. 1720, 5-13-88

AMARYLLIDACEAE

Hypoxis micrantha Pollard. YELLOW STAR-GRASS. Nat Per herb. Yellow flowers. Bottoms between Biggin Creek and bluffs to the W. Infrequent in wet areas throughout the park. March-April; April-May. 728,

6-24-87

Leucojum aestivum L. SNOWFLAKE. Europe Per herb. White flowers. N of landing house along top of bluffs. Rare, only found in one location. Late March-April. 1541, 2-27-88

Zephyranthes atamasco (L.) Herbert. ATAMASCO LILY. Nat Per herb. White flowers. On bluffs just N of landing house. Infrequent to rare, only seen on bluffs at S end of park on steep wet banks. Late March-April; May-June. 1718, 5-13-88

IRIDACEAE

Sisyrinchium angustifolium Miller. BLUE-EYED GRASS. Nat Per herb. Blue flowers. Ecotone between Dock restaurant and bottoms to the W. Frequent in open areas throughout the park. March-June; May-July. 287 298, 5-9-87

Sisyrinchium rosulatum Michaux. BLUE-EYED GRASS. Nat Ann. Blue flowers. Cultivated area around landing house. Frequent around cultivated areas throughout the park. April-May; May-June. 572, 5-23-87

ORCHIDACEAE

Habenaria repens Nuttall. WATER-SPIDER ORCHID. Nat Per herb. Floating mat in Biggin Creek. John Nelson, 4850, 7-29-88, USCH

SAURURACEAE

Saururus cernuus L. LIZARD'S TAIL. Nat Per herb. Bottoms at N end of park W of canal. Infrequent in swamp forests throughout the park. May-July; Aug-Sept. 602, 5-24-87

SALICACEAE

Populus deltoides Marshall. COTTONWOOD. Nat 80' Tree. Along service drive at N end of property. Abundant to frequent along marl spoils bank next to Tailrace canal. March-April. 349, 5-9-87

Salix caroliniana Michaux. SWAMP WILLOW. Nat 20' Tree. In fruit. Cultivated area around landing house. Infrequent in low wet open areas throughout the park. March-April. 405, 5-10-87

MYRICACEAE

Myrica cerifera L. WAX MYRTLE. Nat 10' Shrub. Forest S of landing house. Abundant around cultivated areas. Frequent to infrequent on open high ground throughout the rest of the park. April; Aug-Oct. 1320, 10-3-87

JUGLANDACEAE

Carya aquatica (Michaux f.) Nuttall. WATER HICKORY. Nat 60' Tree. Fruit present. Bottoms W of Dock restaurant. Infrequent in swamp forests throughout the park. April-

May; Oct. 827, 7-21-87

Carya cordiformis (Wang) K. Koch. BITTERNUT HICKORY. Nat 30' Tree. On marl bluffs in hardwood forest at SW end of property. Frequent along bluffs throughout the park. Infrequent in forest areas throughout the rest of the park. April; Oct. 1286, 10-3-87

Carya glabra (Miller) Sweet. PIGNUT HICKORY. Nat 15' Tree. Bottomland hardwoods W of Dock restaurant. Infrequent in forests throughout the park. April-May; Oct. 335 342, 5-9-87

Carya illinoensis (Wang) K. Koch. PECAN. Nat 70' Tree. Forest NW landing house. Infrequent around cultivated areas at S end of park. April-May; Oct. 1281, 10-3-87

R, T *Carya myristicaeformis* Michaux f. NUTMEG HICKORY. Nat 60' Tree. Fruit present. Forest along bluffs NW of Landing house. Rare to infrequent, seen in only two locations; on the bluffs and in the hardwood bottoms at the S end of the park. April; Oct. 1292, 10-3-87

Carya tomentosa (Poiret) Nuttall. MOCKERNUT HICKORY. Nat 50' Tree. Green fruit present. Bluffs N of landing house. Abundant to frequent along bluffs. Infrequent in forest areas throughout the rest of the park. April-May; Oct. 742, 6-24-87

Juglans nigra L. BLACK WALNUT. Nat 70' Tree. Green flowers. Cultivated area around landing house. Infrequent around cultivated area at S end of park. Rare along bluffs just N of Landing house. April; Oct. 408, 5-10-87

BETULACEAE

Alnus serrulata (Aiton) Willd. TAG ALDER. Nat 3' Shrub. Bottoms N of landing house. Infrequent in marsh areas throughout the the park. Feb-March; Aug-Oct. 1749, 5-13-88

Carpinus caroliniana Walter. IRONWOOD. Nat 15' Tree. Bottomland hardwoods W of Dock restaurant. Abundant to frequent in swamp forests throughout the park. March-April; Sept-Oct. 442, 5-14-87

Corylus americana Walter. HAZEL NUT. Nat 3' Shrub. Along base of bluffs N of landing house. Infrequent along bluffs throughout the park. Feb-March; Aug-Oct. 1740, 5-13-88

Ostrya virginiana (Miller) K. Koch. HOP HORNBEAM. Nat April-May; Aug-Oct.

FAGACEAE

Castanea pumila (L.) Miller. CHINQUAPIN. Nat 15' Shrub. Green flowers. Hardwood forest W of filled in area of canal. Rare, only seen in one location. May-June; Sept-Oct. 373, 5-10-87

Fagus grandifolia Ehrhart. BEECH. Nat 60' Tree. Forest NW of filled in area of canal. Abundant to frequent along bluffs throughout the park. March-April; Sept-Oct. 387, 5-10-87

Quercus alba L. WHITE OAK. Nat 3' Tree. Forest NW of landing house. Frequent to infrequent along bluffs throughout the park. April; Sept-Nov. 1301, 10-3-87

Quercus falcata Michaux. SPANISH OAK. Nat Tree. Fruit present. High ground NW of filled in canal. Infrequent along bluffs throughout the park. April; Sept-Oct. 1469, 10-23-87

Quercus falcata var. *pagodaefolia* Elli. SWAMP SPANISH OAK. Nat 40' Tree. Bluffs N of landing house. Frequent to infrequent along bluffs throughout the park. April; Sept-Nov. 1750, 5-13-88

Quercus lyrata Walter. OVERCUP OAK. Nat 25' tree. Along old Santee canal at N end of park. Frequent to infrequent in swamp forests throughout the park. March-April; Sept-Oct. 1824, 6-2-88

Quercus michauxii Nuttall. SWAMP CHESTNUT OAK. Nat 8' tree. Bottomland hardwoods at NE end of park. Frequent to infrequent in swamp forests throughout the park. April; Sept.-Nov. 325, 5-9-87

Quercus muehlenbergii Engelm. YELLOW CHESTNUT OAK. Nat 15' Tree. Hardwood forest W of filled in area of canal. Infrequent along bluffs throughout the the park. April; Sept-Oct. 369, 5-10-87

Quercus nigra L. WATER OAK. Nat 15' Tree. Hardwood forest W of filled in area of canal. Infrequent throughout the park. April; Sept-Oct. 367, 5-10-87

Quercus phellos L. WILLOW OAK. Nat 10' Tree. Along service drive leading to landing house. Infrequent, only seen around cultivated areas st S end of park. March-April; Sept-Nov. 1019, 9-12-87

Quercus shumardii Buckley. SWAMP RED OAK. Nat 8' Tree. Hardwood forest W of filled in area of canal. Abundant to frequent along bluffs. Infrequent throughout the rest of the park. April; Sept-Oct. 363, 364, 5-10-87

Quercus virginiana Miller. LIVE OAK. Nat 60' Tree. Hardwood forest W of filled in area of canal. Frequent to infrequent throughout the park. April; Sept-Oct. 359, 5-10-87

ULMACEAE

Celtis laevigata Willd. HACKBERRY. Nat 60' Tree. Green fruit. Along bluff next to Biggin Creek at S end of park. Abundant to frequent throughout the park. April-May; Aug-Oct. 681, 6-7-87

Ulmus alata Michaux. WINGED ELM. Nat 70' Tree. Cultivated area around landing house.

Infrequent in forest areas throughout the park. Feb-March; March-April. 1333, 10-3-87

Ulmus rubra Muhl. SLIPPERY ELM. Nat 40' Tree. Bluffs N of landing house. Infrequent in forest areas throughout the park. Feb-March; March-April. 759, 6-24-87

MORACEAE

Ficus carica L. FIG. Mediterranean 10' Shrub. Cultivated area around landing house. Rare, only seen in one location. May-Aug; July-Oct. 402, 5-10-87

Morus rubra L. RED MULBERRY. Nat 30' Tree. Ecotone between Dock restaurant and bottoms to the W. Infrequent in forest areas throughout the park. April-May; mid May-June. 312, 5-9-87

URTICACEAE

Boehmeria cylindrica (L.) Swartz. FALSE NETTLE. Nat Per herb. White flowers. Bottoms between Biggin Creek and bluffs to the W. Infrequent in moist areas throughout the park. July-Aug; Sept-Oct. 872, 8-11-87

Pilea pumila (L.) Gray. CLEARWEED. Nat Ann. Swamp forest at NW end of park. Infrequent in swamp forests throughout the park. Aug.-Sept.; Sept.-Nov. 1833, 6-2-88

ARISTOLOCHIACEAE

Asarum canadense L. WILD GINGER. Nat Per herb. Forest NW of filled in area of canal. Abundant to frequent along bluffs throughout the park. April-May. 390 395, 5-10-87

Aristolochia serpentaria L. BIRTHWORT. Nat Per herb. Maroon flowers. Along bottom of bluffs just N of landing house. Rare, only seen in one location. May-June; June-July. 1722, 5-13-88

Hexastylis arifolia (Michaux) Small. WILD GINGER. Purple flowers. Banks of bluffs W of old Santee Canal. Frequent to infrequent in forests on high ground throughout the park. March-May. 1575, 3-19-88

POLYGONACEAE

Polygonum hydropiperoides Michaux. POLYGONUM. Nat Per herb. White flowers. S end of park along service drive leading to landing house. Infrequent in wet areas throughout the park. May-frost 986, 9-12-87

Polygonum punctatum Ell. POLYGONUM. Nat Ann or per herb. White flowers. Bottoms between Biggin Creek and bluffs to the W. Infrequent in swamp forests throughout the park. July-frost 868, 8-11-87

Polygonum setaceum Baldwin ex Ell. POLYGONUM. Nat Per herb. White flowers. Bottoms

SE of Santee Cooper headquarters and W of Biggin Creek. Infrequent in swamp forests throughout the park. July-frost 1294, 10-3-87

Rumex conglomeratus Murray. DOCK. Europe Bien or per herb. White flowers. Swale W of landing house. Infrequent around cultivated areas at S end of park. May-June; May-July. 583, 5-23-87

Rumex crispus L. SOUR DOCK. Europe Per herb. Green flowers. Field N of service drive leading to landing house. Infrequent in fields along W side of park. March-May; May-July. 411, 5-10-87

Rumex hastatulus Baldwin ex. Ell. WILD SORREL. Nat Per herb. Reddish flowers. Field N of service drive leading to landing house. Infrequent in fields along W side of park. March-April; April-June. 413, 5-10-87

Rumex pulcher L. DOCK. Europe Bien or per. Bluffs N of landing house. Infrequent around cultivated areas at S end of park. 674, 6-5-87

Rumex verticillatus L. SWAMP DOCK. Nat Per herb. Bottoms along Biggin Creek just N of landing house. Infrequent in marsh areas throughout the park. April-May; May-July or sporadically later. 1748, 5-13-88

Tovara virginiana (L.) Raf. JUMPSEED. Nat Per herb. Forest S of landing house. July-Oct; Aug-Nov. Abundant to frequent along bluffs. Infrequent in forest areas or ecotones throughout the rest of the park. 1029, 9-12-87

AMARANTHACEAE

Alternanthera philoxeroides (Martius) Grisebach. ALLIGATOR-WEED. Tropical Am. Per herb. White flowers. Swale W of landing house. Frequent to infrequent in wet open areas throughout the park. April-Oct. 580, 5-23-87

Amaranthus cannabinus (L.) J. D. Sauer. WATER-HEMP. Nat 5' Ann. Yellow flowers. Bottoms between Biggin Creek and bluffs to the W. Rare, only seen in one location. July-frost 870, 8-11-87

Amaranthus spinosus L. THORNY AMARANTH. Nat Ann. Greenish-tan fruit. Field W of filled in canal. Infrequent in fields along W side of park. May-frost 1218, 9-26-87

PHYTOLACCACEAE

Phytolacca americana L. POKE. Nat Per herb. White flowers. Bluffs N of landing house. Infrequent throughout the park. May-frost 668, 6-5-87

CARYOPHYLLACEAE

Stellaria media (L.) Cyrillo. CHICKWEED. Old World Ann. White flowers. Cultivated area around landing house. Frequent around cultivated area at S end of park. Jan-May. 1544, 2-27-88

RANUNCULACEAE

Anemone virginiana L. THIMBLEWEED. Nat Per herb. Marl spoils bank between Biggin creek and Tailrace canal. Infrequent on marl throughout the park. May-July. 1840, 6-2-88

Clematis crispa L. LEATHER FLOWER. Nat Per 6' vine. Blue flowers. Bottomland hardwoods W of Dock restaurant. About 100 meters N of Santee canal/Tailrace canal connection. Rare, only found in one location. April-Aug. 330, 331, 5-9-87

Hepatica americana (D.C.) Ker. LIVERLEAF. Nat Per herb. Bluffs NW of filled in portion of canal. Rare, only seen at one location. Feb- April. 1844, 6-2-88

Ranunculus carolinianus DC. BUTTERCUP. Nat Per herb. Yellow flowers. In creek at NW end of park. Infrequent in swamp forests throughout the park. April-Aug. 1572, 3-19-88

Ranunculus muricatus L. BUTTERCUP. Europe Ann. Yellow flowers. Cultivated area around landing house. Infrequent around cultivated area at S end of park. April-June. 570, 5-23-87

Ranunculus pusillus Poir. SPEARWORT. Nat Ann. Yellow flowers. S of large live oak and *Vitis* in disturbed field. Infrequent around cultivated areas at S end of park. April-June. 1747, 5-13-88

Ranunculus recurvatus Poir. BUTTERCUP. Nat Per herb. Along bottoms at base of bluffs N of landing house. Infrequent in swamp forests throughout the park. April-June. 1756, 5-13-88

Thalictrum polygamum Muhl. MEADOW RUE. Nat Per herb. Bluffs N of landing house, where bluffs slope into bottoms just S of Santee Cooper Water Authy. Rare, only seen in one location. May-July. 670, 6-5-87

BERBERIDACEAE

Podophyllum peltatum L. MAY APPLE. Nat Per herb. On bluff just N of landing house. Infrequent along bluffs throughout the park. March-April; May-June. 1719, 5-13-88

MENISPERMACEAE

Cocculus carolinus (L.) DC. CORALBEADS. Nat Per vine. White flowers. Bluffs N of landing house. Rare, only seen along bluffs at one location. 732, 6-24-87

U Menispermum canadense L. MOONSEED. Nat Per 3' sprawling vine. Along base of bluffs just N of landing house. Rare, only seen along bluffs at one location. June-Aug. 1721, 5-13-88

MAGNOLIACEAE

Magnolia grandiflora L. BULL BAY. Nat 30' Tree. Bluffs NW of landing house. Infrequent in forests throughout the park. May-June; Oct. 1539, 2-27-88

Liriodendron tulipifera L. TULIP TREE, YELLOW POPLAR. Nat 10' Tree. Hardwood forest W of filled in area of canal. Infrequent in forests throughout the park. April-June; Sept-Oct. 372, 5-10-87

ANNONACEAE

Asimina triloba (L.) Dunal. PAW PAW. Nat 7' Shrub. Bluffs N of landing house. Frequent to infrequent along bluffs N of landing house. April-May; July-Sept. 737, 6-24-87

CALYCANTHACEAE

Calycanthus floridus L. var. *laevigatus* (Willd) T. & G. SWEET-SHRUB. Nat 2' Shrub. Bluffs N of landing house. Infrequent on dry ground throughout the park. March-July; July-Sept. 736, 6-24-87

LAURACEAE

Lindera benzoin (L.) Blume. SPICE BUSH. Nat 3' Shrub. Bluffs N of landing house. Infrequent in forests throughout the park. March-April; Aug-Sept. 739, 6-24-87

Persea borbonia (L.) Sprengel. RED BAY. Nat 15' Tree. Bluish-black fruit. High ground NW of filled in canal. Infrequent in forests throughout the park. May-June; Sept-Oct. 1477, 10-23-87

Sassafras albidum (Nuttall) Nees. SASSAFRAS. Nat 4' Tree. Bluffs N of landing house. Infrequent in forests throughout the park. March-April; June-July. 734, 6-24-87

PAPAVERACEAE

Sanguinaria canadensis L. BLOOD ROOT. Nat Per herb. Bluffs N of landing house. Infrequent along bluffs throughout the park. March-April; April-May. 740, 6-24-87

BRASSICACEAE

Cardamine hirsuta L. CARDAMINE. Old World Ann. White flowers. Bottoms E of Santee Cooper Water Authority headquarters. Infrequent throughout the park. Feb-May. 1536, 27-88

Cardamine pensylvanica Muhl. CARDAMINE. Nat Ann or bien herb. White flowers. In creek at NW end of park. Infrequent, only seen along marl creek at NW end of park. March-May. 1571, 3-19-88

Lepidium virginicum L. POOR MAN'S PEPPER. Nat Ann or Bien herb. White flowers.

Field NW of landing house. Infrequent to frequent in fields along W side of park. April-June. 1734, 5-13-88

SAXIFRAGACEAE

Decumaria barbara L. CLIMBING HYDRANGEA. Nat Climbing vine. No flowers, no fruit. Hanging on marl bluffs in forest NW of Landing house. Infrequent in forests throughout the park. May-July; June-Oct. 1302, 10-3-87

Itea virginica L. VIRGINIA WILLOW. Nat 3' Shrub. Next to Santee Canal, where it connects to Tailrace Canal. Infrequent to frequent in open areas of swamp forest throughout the park. May-June. 352, 6-24-87

HAMAMELIDACEAE

Hamamelis virginiana L. WITCH- HAZEL. Nat 8' Shrub. Green fruit. Bluffs N of landing house. Infrequent to frequent in upland forests throughout the park. Oct-Dec; Oct-Nov of the following year. 747, 6-24-87

Liquidambar styraciflua L. SWEET-GUM. Nat Tree. Ecotone between Dock restaurant and bottoms to the W. Abundant to frequent in forests throughout the park. April-Oct. 740, 6-24-87

PLATANACEAE

Platanus occidentalis L. SYCAMORE. Nat 50' Tree. Ecotone between Dock restaurant and bottoms to the W. Infrequent in swamp forests throughout the park. April-May; Oct. 310, 5-9-87

ROSACEAE

Agrimonia microcarpa Wallroth. HARVEST-LICE. Nat Per herb. Yellow flowers. Marl banks in forest N of landing house. Infrequent to frequent in upland forests throughout the park. July-early Sept; Aug-Oct. 821, 7-22-87

Duchesnea indica (Andrz.) Focke. INDIAN STRAWBERRY, MOCK STRAWBERRY, SNAKEBERRY. Asia Per herb. Red fruit. Along service drive at N end of property. Frequent to abundant around cultivated areas throughout the park. Feb-frost 355, 5-9-87

Geum canadense Jacquin. AVENS. Nat Per herb. White flowers. Ecotone at NE corner of park between field and bottoms. Infrequent throughout the park. May-frost 657, 6-4-87

Potentilla simplex Michaux. POTENTILLA. Nat Per herb. Yellow flowers. Hardwood forest W of filled in area of canal. Infrequent throughout the park. April-June; April-July. 375, 5-10-87

Prunus serotina Ehrhart. BLACK CHERRY. Nat 15' Tree. Edge of field W of filled in canal. Infrequent throughout the park. April-May; July-Aug. 1215, 9-26-87

Pyracantha crenulata (D. Don) M. J. Roem. FIRE THORN. Himalaya 6' Shrub. Orange fruit. Cultivated area around landing house. Infrequent, only seen in cultivated area at S end of park. 1332, 10-3-87

Rosa palustris Marshall. SWAMP ROSE. Nat 15' Shrub. Pink flowers. Next to Tailrace Canal at S end of park. Infrequent, seen next to Tailrace canal and along Biggin creek. May-July; Sept-Oct. 680, 6-7-87

Rosa wichuraiana Crepin. MEMORIAL ROSE. E Asia 10' shrub. Dark pink flowers. Cultivated area around landing house. Rare, only seen at one location. May-June; Sept-Oct. 568, 5-23-87

Rubus betulifolius Small. BLACKBERRY. Nat Shrub. Bottomland hardwoods W of Dock restaurant. Infrequent to frequent in forest/field ecotones throughout the park. Abundant to frequent in fields along W side of park. April-May; late May-July. 339, 5-9-87

FABACEAE

Albizia julbrissin Durazzini. MIMOSA. Tropical Asia 30' tree. Green flowers. Ecotone at NE corner of park. Infrequent around cultivated areas throughout the park. May-Aug; July-Nov. 659, 6-4-87

Amorpha fruticosa L. AMORPHA. Nat 5' Shrub. Purplish flowers. Cultivated area around landing house. Infrequent, seen in open areas throughout the park. April-June; June-Oct. 410, 5-10-87

Amphicarpaea bracteata (L.) Fernald. HOG PEANUT. Nat Ann vine. Purple flowers. Mixed hardwood forest NW of Santee Canal/ Tailrace Canal connection. Infrequent along bluffs throughout the park and also on marl spoil banks next to Tailrace canal. July-Sept; Aug-Oct. 1194 A, 9-26-87

Apios americana Medicus. APIOS. Nat Climbing vine. Purplish flowers. Bottoms between Biggin Creek and bluffs to the W. Infrequent along bluffs throughout the park. June-Aug; July-Sept. 880, 8-11-87

Cassia fasciculata Michaux. PARTRIDGE PEA. Nat Ann herb. Yellow flowers. S end of park along service drive leading to landing house. Infrequent to frequent around cultivated areas throughout the park. June-Sept; July-Nov. 985, 9-12-87

Cassia nictitans L. WILD SENSITIVE PLANT. Nat Ann herb. Yellow flowers. Ecotone between forest and fields W of Biggin Creek. Infrequent to frequent around cultivated areas throughout the park. June-Oct; July-Nov. 1051, 9-12-87

Cassia obtusifolia L. SICKLEPOD. Nat Ann herb. Orange flowers. High ground E of Santee Cooper Water Authority headquarters. Infrequent, only seen at one location. July-Sept; Aug-Nov. 957, 8-29-87

Cercis canadensis L. REDBUD, JUDAS TREE. Nat 15' Tree. Hardwood forest W of filled in area of canal. Infrequent to frequent in forests throughout the park. March-May; June-Nov. 202, 4-4-87

Crotalaria spectabilis Roth. RATTLEBOX. Old World tropics Ann herb. Yellow flowers. Ecotone between Dock restaurant and bottoms to the W. Infrequent, only seen around cultivated areas. Aug-Oct. 1480, 10-23-87

Centrosema virginianum (L.) Benth. BUTTERFLY PEA. Nat Per vine. Purplish flowers. Ecotone between forest and fields W of Biggin Creek. Infrequent throughout the park. June-Aug; July-Oct. 1038, 9-12-87

Clitoria mariana L. BUTTERFLY PEA. Nat Trailing per. High ground E of Santee Cooper Water Authority headquarters. Infrequent throughout the park. 814, 7-9-87

Desmodium fernaldii Schubert. BEGGAR LICE. Nat Per herb. Purple flowers. Ecotone between forest and fields W of Biggin Creek. Infrequent along bluffs throughout the park. June-Sept; Aug-Oct. 1044, 9-12-87

Desmodium paniculatum (L.) DC. BEGGAR LICE. Nat Per herb. In fruit. Ecotone between forest and field at SW end of Santee Canal. Infrequent throughout the park. June-Sept; Aug-Oct. 1222, 9-26-87

Desmodium tortuosum (Swartz) DC. BEGGAR LICE. Nat Ann herb. In fruit. Spoil banks next to S end of Tailrace Canal. Infrequent, only seen on marl spoil banks between Biggin creek and Tailrace canal. July-Aug; Aug-Oct. 1177, 9-29-87

Desmodium viridiflorum (L.) DC. BEGGAR LICE. Nat Per herb. Purple flowers. Mixed hardwoods NW of Santee Canal/Tailrace Canal connection. Infrequent in forests throughout the park. July-Sept; Aug-Oct. 1194, 9-26-87

Erythrina herbacea L. CORAL BEAN. Nat Per herb. Red flowers. Bluffs N of landing house and just S of Santee Cooper Water Authy. Infrequent, only seen along bluffs. May-July; July-Sept. 745, 6-24-87

Lespedeza cuneata (Dumort) G. Don. LESPEDeza. E Asia Per herb. White flowers. High ground E of Santee Cooper Water Authority headquarters. Infrequent to frequent around cultivated areas throughout the park. July-Sept; Oct-Nov. 958, 8-29-87

Lespedeza striata (Thunberg) H. & A. JAPANESE CLOVER. E Asia Ann herb. Purple flowers. Along service drive leading to landing house. Frequent to infrequent around cultivated areas throughout the park. July-Sept; Aug-Nov. 1015, 9-12-87

Melilotus indica (L.) All. SOUR CLOVER. Mediterranean ann. Yellow flowers. Ecotone between Dock restaurant and bottoms to the W. Infrequent to frequent around cultivated areas throughout the park. April-Oct. 278, 5-9-87

Trifolium campestre Schreber. LOW HOP CLOVER. Eurasia and N Afr ann. Yellow flowers. Ecotone between Dock restaurant and bottoms to the W. Frequent around cultivated areas throughout the park. April-Oct. 277, 5-9-87

Trifolium repens L. WHITE CLOVER. Eurasia per herb. White flowers. Ecotone between Dock restaurant and bottoms to the W. Abundant to frequent around cultivated areas throughout the park. April-Sept. 277, 5-9-87

Vicia angustifolia Reichard. VETCH. Nat Ann herb. Purple flowers. Ecotone between Dock restaurant and bottoms to the W. Frequent to infrequent around cultivated areas throughout the park. March-June; May-July. 282, 5-9-87

Vicia dasycarpa Tenore. SMOOTH VETCH. S Europe Per herb. Purple flowers. Banks of bluffs W of old Santee Canal. Infrequent, only seen along bluffs. May-Sept. 1576, 3-19-88

Vicia hirsuta (L.) S. F. Gray. VETCH. Europe Ann. White flowers. Field W of swale and landing house. Infrequent around cultivated areas throughout the park. April-June; May July. 587, 5-23-87

OXALIDACEAE

Oxalis dillenii Jacquin. WOOD SORREL. Nat Per or ann herb. Orange flowers. Hardwood forest W of filled in area of canal. Infrequent in upland forests throughout the park. March-June. 378, 5-10-87

Oxalis rubra Saint Hil. WOOD SORREL. Brazil Per herb. Dark pink flowers. Cultivated area around landing house. Rare, only found in one location. March-Sept. 403, 5-10-87

GERANIACEAE

Geranium carolinianum L. CRANESBILL. Nat Ann herb. Purple flowers. Ecotone between Dock restaurant and bottoms to the W. Frequent to abundant in open dry areas throughout the park. April-June. 290, 5-9-87

Geranium maculatum L. WILD GERANIUM. Nat Per herb. In fruit. Bluffs just N of landing house. Infrequent in forests throughout the park. April-June. 1731, 5-13-88

MELIACEAE

Melia azedarach L. CHINA BERRY. Asia 20' Tree. Top of swale W of landing house. Infrequent, only seen around cultivated area at S end of park. April-May; Sept-Oct. 675, 6-5-87

EUPHORBIACEAE

Acalypha gracilens Gray. THREE-SEEDED MERCURY. Nat Ann herb. Along service drive leading to landing house. Infrequent to frequent around cultivated areas throughout the park. Late June-frost 1013, 9-12-87

Croton glandulosus var. *septentrionalis* Muell-Arg. CROTON. Nat Ann herb. White flowers. Ecotone between forest and fields W of Biggin Creek. Infrequent, only seen around cultivated area at S end of park. May-Oct. 1048, 9-12-87

Euphorbia corollata L. FLOWERING SPURGE. Nat Per herb. White flowers. Bottoms between Biggin Creek and Bluffs to the W. Infrequent in forests throughout the park. May-Sept. 651, 6-4-87

Euphorbia maculata L. WORTWEED. Nat Ann herb. Whitish-pink flowers. In driveway leading to landing house. Infrequent around cultivated areas at S end of park. May-Nov. 1282, 10-3-87

Sapium sebiferum (L.) Roxb. CHINESE TALLOW TREE. China, Japan 10' shrub. Cultivated area around landing house. Frequent around cultivated areas at S end of park. Infrequent throughout the rest of the park. May-June; Aug-Nov. 406, 5-10-87

ANACARDIACEAE

Rhus copallina L. WINGED SUMAC. Nat 6' Shrub. Ecotone between Dock restaurant and bottoms to the W. Infrequent to frequent along forest field ecotones throughout the park. June; Aug-Sept. 314, 5-9-87

Toxicodendron radicans (L.) Kuntze. [= *Rhus radicans* L.] POISON IVY. Nat Per vine. Marl spoil banks at SE end of property. Frequent to infrequent throughout the park. Late April-May; Aug-Oct. 1173, 9-26-87

AQUIFOLIACEAE

Ilex cornuta var. *burfordii* Lindl & Paxt. CHINESE HOLLY. China 5' Shrub. Cultivated area around landing house. Rare, only seen in one location. 1331, 10-3-87

Ilex decidua Walter. POSSUM HAW. Nat 6' Shrub. Bottomland hardwoods W of Dock restaurant. Frequent to infrequent in swamp forests throughout the park. Infrequent in other forest areas throughout the park. April-May; Sept-Oct. 336 341, 5-9-87

Ilex opaca Aiton. HOLLY. Nat 30' Tree. In fruit. Forest NW of filled in area of canal. Infrequent in forests throughout the park. April-June; Sept-Oct. 388, 5-10-87

CELASTRACEAE

Euonymus americanus L. STRAWBERRY BUSH. Nat 3' Shrub. On high ground SE of Santee Cooper headquarters and W of Biggin Creek. Infrequent in forests throughout the park. May-June; Sept-Oct. 1295, 10-3-87

ACERACEAE

Acer negundo L. BOX ELDER. Nat 25' Tree. Green fruit. Ecotone between Dock restaurant and bottoms to the W. Abundant to frequent in swamp forests. Infrequent in other forests throughout the park. March-April; May-Oct. 302, 5-9-87

Acer rubrum L. RED MAPLE. Nat 15' Tree. Bottomland hardwoods W of Dock restaurant. Frequent to abundant in swamp forests. Jan-March; April-May. 327, 5-9-87

Acer saccharum ssp. *floridanum* (Chapman) Desmarias. SOUTHERN SUGAR MAPLE. Nat 20' Tree. Bluffs N of landing house. Frequent to infrequent along marl throughout the park. Infrequent in swamp forests. April-May; June-Oct. 744, 6-24-87

HIPPOCASTANACEAE

Aesculus pavia L. RED BUCKEYE. Nat Small 6' Shrub. Forest W of filled in canal. Frequent to infrequent on marl throughout the park. April-early May; July-Aug. 397, 5-10-87

BALSAMINACEAE

Impatiens capensis Meerb. SPOTTED TOUCH-ME-NOT. Nat Ann. Orange flowers. Bottoms between Biggin Creek and bluffs to the W. Frequent to infrequent in swamp forests. May-frost 664, 6-5-87

RHAMNACEAE

Berchemia scandens (Hill) K. Koch. SUPPLE JACK. Nat 8' Woody vine. Forest S of landing house. Frequent to infrequent throughout the park. April-May; Aug-Oct. 650, 6-4-87

Ceanothus americanus L. NEW JERSEY TEA. Nat 2' Shrub. White flowers. Forest between Biggin Creek and bluffs to the W. Frequent to infrequent on marl throughout the park. May-June; June-July. 650 653, 6-4-87

Rhamnus caroliniana Walter. BUCKTHORN. Nat 4' Shrub. Bottoms N of landing house. Infrequent on marl throughout the park. May-June; Sept-Oct. 1744, 5-13-88

VITACEAE

Ampelopsis arborea (L.) Koehne. PEPPER-VINE. Nat Per 2' vine. Bottomland hardwoods W of Dock restaurant. Frequent to infrequent in swamp forests. June-Oct. 338, 5-9-87

Parthenocissus quinquefolia (L.) Planchon. VIRGINIA CREEPER. Nat 5' Vine. Hardwood forest W of filled in canal. Frequent to infrequent in forests throughout the park. May-July; July-Aug. 344, 5-9-87

Vitis labrusca L. FOX GRAPE. Nat 20' Woody vine. Flowers in bud. Ecotone between

bottoms and mowed field at NE corner of park. Infrequent, only seen at one location. 648, 6-4-87

Vitis rotundifolia Michaux. MUSCADINE. Nat 3' Vine. Bluffs N of landing house. Infrequent to frequent throughout the park. May-June; Aug-Oct. 1733, 5-13-88

TILIACEAE

Tilia caroliniana Miller. LINDEN. Nat 20' Tree. Forest NW of filled in canal. Infrequent on marl throughout the park. June; July-Aug. 389, 5-10-87

MALVACEAE

Hibiscus moscheutos L. ROSE MALLOW. Nat 5' Per herb. White flowers. Low ground E of Santee Cooper Water Authority headquarters. Rare, only seen in one location. June-Sept; July-Oct. 812, 7-9-87

Modiola caroliniana (L.) G. Don. Nat Ann or Bien herb. Along service drive at N end of property. Infrequent, only seen around cultivated areas at N end of park. March-June. 354, 5-9-87

Sida rhombifolia L. SIDA. Nat Ann herb. Green fruit. Bluffs N of landing house. Infrequent to frequent throughout the park. June-Oct. 758, 6-24-87

HYPERICACEAE

Ascyrum hypericoides L. SAINT ANDREW'S CROSS. Nat 2' Shrub. Orange flowers. Low ground S of landing house. Infrequent around cultivated areas at S end of park. May-Aug. 887, 8-11-87

Hypericum mutilum L. SAINT JOHN'S-WORT. Nat Per herb. Yellow flowers. Along service drive leading to landing house. Infrequent to frequent around cultivated areas at S end of park. June-Oct. 1004, 9-12-87

VIOLACEAE

Viola walteri House. VIOLET. Nat Per herb. Along bluffs W. of old Santee canal. Infrequent in upland forests throughout the park. March-May. 1577, 3-19-88

PASSIFLORACEAE

Passiflora lutea L. PASSION-FLOWER. Nat Herb vine. Along service drive leading to landing house. Infrequent throughout the park. June-Sept; Aug-Oct. 1023, 9-12-87

LYTHRACEAE

Cuphea carthagenensis (Jaquin) Macbride. WAXWEED. Nat Ann herb. Purple flowers.

Along service drive leading to landing house. Infrequent to frequent around cultivated area at S end of park. June-Sept. 990, 9-12-87

ONAGRACEAE

Oenothera laciniata Hill. EVENING PRIMROSE. Nat Ann or Bien herb. Yellow flowers. Field W of filled in area of canal. Infrequent to frequent in fields along W side of park. Infrequent around cultivated areas throughout the rest of the park. March-July. 380, 5 10-87

ARALIACEAE

Aralia spinosa L. HERCULE'S CLUB. Nat 20' Tree. Mixed hardwoods NE of Santee Canal/Tailrace Canal connection. Infrequent in upland forests throughout the park. June-Sept. 1205, 9-26-87

APIACEAE

Centella asiatica (L.) Urban. CENTELLA. Nat Per herb. Green fruit. S end of park along service drive leading to landing house. Frequent to infrequent in wet open areas throughout the park. 983, 9-12-87

Chaerophyllum tainturieri Hooker. WILD CHERVIL. Nat Ann herb. Green fruit. Ecotone between Dock restaurant and bottoms to the W. Infrequent to frequent in open areas throughout the park. March-April; April-May. 317, 5-9-87

Cryptotaenia canadensis (L.) DC. HONEWORT. Nat Per herb. White flowers. Pond at headwaters of Biggin Creek. Infrequent in forests throughout the park. May-June; June-Aug. 399, 5-10-87

Hydrocotyle ranunculoides L. f. HYDROCOTLE. Nat Per herb. Headwaters of Biggin Creek. Abundant to frequent at the headwaters of Biggin creek. Infrequent in swamp forests throughout the rest of the park. April-July. 950, 8-29-87

Hydrocotyle umbellata L. MARSH PENNYWORT. Nat Per herb. White flowers. Swale W of landing house. Infrequent to frequent in open wet areas throughout the park. April-Sept. 604, 5-24-87

Sanicula canadensis L. SNAKE ROOT. Nat Per herb. Swamp forest at NW end of park. Infrequent to frequent in forests throughout the park. April-May; June-July. 1827, 6-2-88

Sanicula gregaria Bicknell. SNAKEROOT. Nat Bien or per herb. Yellow flowers. Hardwood forest W of filled in area of canal. Infrequent in forests throughout the park. May-June;

June-July. 346, 5-9-87

Thaspium barbinode (Michaux) Nuttall. MEADOW PARSNIP. Nat Per herb. Yellow flowers. Hardwood forest W of filled in area of canal. Infrequent in upland forests throughout the park. April-May; July-Sept. 361, 5-10-87

NYSSACEAE

Nyssa sylvatica var. *biflora* (Walter) Sargent. BLACK GUM. Nat 30' tree. Black fruit. On an island in Biggin Creek. Frequent to infrequent in swamp forests throughout the park. April-June; Aug-Oct. 682, 6-7-87

CORNACEAE

Cornus florida L. FLOWERING DOGWOOD. Nat 30' Tree. Green fruit. Bluffs N of landing house. Frequent to infrequent in upland forests throughout the park. March-April; Sept-Oct. 735, 6-24-87

Cornus stricta Lam. SWAMP DOGWOOD. Nat 6' Shrub. Bottoms just N of landing house. Infrequent along base of bluffs at S end of park. April-May; July-Aug. 1727, 5-13-88

ERICACEAE

Chimaphila maculata (L.) Pursh. SPOTTED WINTER GREEN. Bluffs NW of filled in area of canal. Infrequent in upland forests throughout the park. May-June; July-Oct. 1846, 8-6-88

Rhododendron canescens (Michaux) Sweet. WILD AZALEA. Nat 5' shrub. Bluffs NW of filled in portion of canal. Infrequent along bluffs throughout the park. March- early May; Sept.-Oct. 1842, 6-2-88

Vaccinium arboreum Marshall. SPARKLEBERRY. Nat 6' Shrub. White flowers. Along bluffs N of landing house. Infrequent to frequent in upland forests throughout the park. Late April-June; Sept-Oct. 743 A 6-24-87

Vaccinium atrococcum (Gray) Porter. BLACK Highbush BLUEBERRY. Nat 2' shrub. Bluffs NW of filled in portion of canal. Infrequent along bluffs throughout the park. Late Feb.-May; June-Aug. 1843, 6-2-88

PRIMULACEAE

Samolus valerandi ssp. *parviflorus* (Raf.) Hulten. WATER PIMPERNEL. Nat Ann or per herb. Along service drive at N end of property. Infrequent on marl throughout the park. April-Oct. 350, 6-24-87

SAPOTACEAE

Bumelia lycioides (L.) Persoon. BUCKTHORN. Nat 20' Tree. Bluffs N of landing house. Infrequent in forests throughout the park. 1739, 5-13-88

STYRACACEAE

Styrax grandifolia Aiton. STORAX. Nat 4' shrub. Bluffs NW of filled in portion of canal. Infrequent along bluffs throughout the park. April-May; Aug.-Sept. 1837, 6-2-88

OLEACEAE

Chionanthus virginicus L. FRINGE-TREE. Nat 6' Shrub. Bluffs N of landing house. Infrequent in forests throughout the park. April-May; July-Sept. 746, 6-24-87

Fraxinus caroliniana Miller. WATER ASH. Nat 20' Tree. Bottomland hardwoods W of Dock restaurant. Infrequent to frequent in swamp forests throughout the park. May; July-Oct. 334 343, 6-24-87

Fraxinus pennsylvanica Marsh. var. *subintegerrima*. (Vahl.) Fern.. RED ASH. Nat 30' Tree. Next to Tailrace Canal at S end of park. Infrequent in forests throughout the park. April; Aug-Oct. 678, 6-7-87

Ligustrum japonicum Thunberg. PRIVET. Japan 15' Tree. Edge of field W of filled in canal. Infrequent in forests throughout the park. June-July; Sept-Nov. 1223, 9-26-87

Ligustrum sinense Lour. PRIVET. China 8' Shrub. White flowers. Cultivated area around landing house. Infrequent to frequent around cultivated areas throughout the park. May-June; Sept-Oct. 409, 5-10-87

LOGANIACEAE

Cynoctonum mitreola (L.) Britton. MITERWORT. Nat Ann or per herb. Bluff, spoil bank woods. July-Sept; Sept-Frost. 873, 8-11-87

Gelsemium sempervirens (L.) Aiton f. YELLOW JESSAMINE. Nat 7'+ climbing vine. Yellow flowers. Bottoms at NW end of park. Infrequent to frequent throughout the park. March-early May; Sept.-Nov. 1570, 3-19-88

Polypremum procumbens L. POLYPREMUM. Nat Per herb. White flowers. In field W of swale and landing house. Frequent to infrequent around cultivated areas throughout the park. Late May-Sept; Aug-Oct. 820, 7-22-87

Spigela marilandica L. INDIAN PINK. Nat Per herb. Red flowers with yellow inner tips. Forest area on S portion of bluffs. Frequent to infrequent in upland forests throughout the park. May-June; late June-July. 592, 5-23-87

ASCLEPIADACEAE

Asclepias perennis Walter. SWAMP MILKWEED. Nat Per herb. Swamp forest at NW end of park. Rare, only seen in one location. June-Aug.; Aug.-Sept. 1831, 6-2-88

Asclepias tuberosa L. BUTTERFLY-WEED. Nat Per herb. Orange flowers. Ecotone between bottoms at NE corner of park and mowed field. Infrequent in forest/field ecotones throughout the park. May-Aug; Aug-Oct. 649, 6-4-87

Asclepias variegata L. MILKWEED. Nat Per herb. White flowers. Forest area on S portion of bluffs. Infrequent, only seen on bluffs. May-June; July-Sept. 593, 5-23-87

Matelea flavidula (Chapman) Woodson. Nat Per 4' vine. Green flowers. Bottoms along bluffs N of landing house. Rare, only seen in one location. May-June; Aug-Oct. 1730, 5-13-88

Matelea suberosa (L.) Shinnars. Nat Per vine. Flowers purple with greenish-yellow tips. Marl spoils bank between Biggin creek and tailrace canal at S end of park. Rare, only seen at this location. June-Aug.; Sept.-Nov. 1835, 6-2-88

CONVOLVULACEAE

Dichondra carolinensis Michaux. DICHONDRA. Nat Per herb. Cultivated area around landing house. Infrequent to frequent around cultivated areas throughout the park. Marcl May. 576, 5-23-87

Ipomoea lacunosa L. IPOMOEA. Nat Ann . Purple flowers. Along service drive leading to landing house. Infrequent around cultivated areas throughout the park. Sept-frost 1014, 9-12-87

Ipomoea pandurata (L.) G. F. W. Meyer. MAN-ROOT. Nat Per vine. White flowers. High ground E of Santee Cooper Water Authority. Infrequent, only seen in fields along W side of park. May-June; July-Sept. 748, 6-24-87

Ipomoea purpurea (L.) Roth. COMMON MORNING GLORY. Tropical America Ann herb. Purple flowers. High ground E of Santee Cooper Water Authority headquarters. Infrequent, only seen in one location. July-Sept. 959, 8-29-87

Ipomoea quamoclit L. CYPRESS VINE. Tropical America ann vine. Red flowers. High ground E of Santee Cooper Water Authority. Infrequent, only seen in one location. Aug-frost 749, 6-24-87

HYDROPHYLLACEAE

Hydrolea quadrivalvis Walter. HYDROLEA. Nat Per herb. Blue flowers. Bottoms between Biggin Creek and bluffs to the W. Infrequent around Biggin creek. June-Sept. 866, 8-11-87

VERBENACEAE

Callicarpa americana L. FRENCH MULBERRY. Nat 3' Shrub. Purplish flowers. Bluffs N

of landing house. Infrequent throughout the park. June-July; Aug-Oct. 731, 6-24-87

Phyla nodiflora (L.) Greene. FOG FRUIT. Nat Per herb. Lavender flowers. Cultivated area around landing house. Infrequent to frequent around cultivated areas throughout the park. Late May-frost 571, 5-23-87

Verbena brasiliensis Vellozo. S.America per herb. Blue flowers. Ecotone between Dock restaurant and bottoms to the W. Infrequent to frequent in open areas throughout the park. May-Oct. 301, 5-9-87

Verbena scabra Vahl. VERBENA. Nat Per herb. Purplish-pink flowers. Low ground S of landing house. Infrequent to frequent in open areas throughout the park. May-Oct. 883, 8-11-87

PHRYMACEAE

Phryma leptostachya L. LOP-SEED. Nat Per herb. Blue flowers. Bluffs N of landing house. Frequent to abundant on high ground throughout the park. June-Aug; Aug-Oct. 730, 6-24-87

LAMIACEAE

Collinsonia tuberosa Michaux. COLLINSONIA. Nat Per herb. Pinkish-white flowers. Mixed hardwoods NW of Santee Canal/Tailrace Canal connection. Infrequent on marl throughout the park. Late April-early June; June-July. 1193, 9-26-87

Lamium amplexicaule L. MINT. Eurasia & n Africa Ann. Purple flowers. Cultivated area around landing house. Abundant to frequent around cultivated areas throughout the park. March-May; March-June, Sept-Oct. 1543, 2-27-88

Monarda punctata L. MONARDA. Nat Per herb. Yellow flowers, purple bracts. Ecotone between forest and fields W of Biggin Creek. Infrequent in fields along W side of park. Late July-Sept; Sept-Oct. 1050, 9-12-87

Physostegia purpureum (Walter) Blake. OBEDIENT PLANT. Nat Per herb. Violet flowers. Swale W of landing house. Infrequent throughout the park. May-June; June-Sept. 585, 5-23-87

Prunella vulgaris L. PRUNELLA. Europe Per herb. Blue flowers. Cultivated area around landing house. Infrequent to frequent around cultivated areas throughout the park. April-frost 579, 5-23-87

Salvia lyrata L. SAGE. Nat Per herb. Blue flowers. Ecotone between Dock restaurant and bottoms to the W. Abundant to frequent around cultivated areas throughout the park. April-May; May-July. 297, 5-9-87

Scutellaria elliptica Muhl. SCULLCAP. Nat Per herb. Bluffs S of Santee Cooper Water Authy. Infrequent, only seen along bluffs. Late May-June; June-July. 1821, 6-2-88

SOLANACEAE

Solanum carolinense L. HORSE-NETTLE. Nat Per herb. White flowers. Field NW of swale and landing house. Infrequent to frequent around cultivated areas throughout the park. May-July; Aug-Sept. 594, 5-23-87

SCROPHULARIACEAE

Aureolaria virginica (L.) Pennell. FALSE FOXGLOVE. Nat Per herb. Yellow flowers. Field NW of filled in area of canal. Infrequent to frequent in upland forests throughout the park. May-July; Aug-Sept. 597, 5-24-87

Gratiola virginiana L. HEDGE HYSSOP. Nat Ann. Cypress bottoms W of Dock restaurant. Infrequent in swamp forests throughout the park. March-May. 333, 5-9-87

Linaria canadensis (L.) Dumont. TOAD-FLAX. Nat Bien or Winter ann. Blue flowers. Field W of forest W of filled in canal. Abundant to frequent in fields along W side of park. Infrequent throughout the rest of the park. March-May. 381, 5-10-87

Mecardonia acuminata (Walter) Small. Nat Per herb. Yard area. July-Sept; Aug.-Oct. John Nelson, 3638, 8-21-84 USCH, CLEM

Micranthemum umbrosa (J.F.Gmelin) Blake. MIRCRANTHEMUM. Nat Per submersed matted aquatic herb. Submersed in Biggin Creek. Infrequent in Biggin creek. May-Oct. 683, 6-7-87

Penstemon laevigatus Solander ex Aiton. BEARD-TONGUE. Nat Per herb. Pinkish-white flowers. Field S of large live oak and *Vitis*. Infrequent, only seen around cultivated areas at S end of park. 1715, 5-13-88

Verbascum blattaria L. MULLEIN. Europe Per or Bien herb. Yellow flowers. Field N of service drive leading to landing house. Infrequent in fields along W side of park. May-June; June-July. 415, 5-10-87

Verbascum thapsus L. WOOLY MULLEIN. Europe 2.5' Bien or per herb. Field W of swale and landing house. Infrequent in fields along W side of park. June-Sept. 881, 8-11-87

Veronica arvensis L. SPEEDWELL. Eurasia Ann. Purple flowers. Cultivated area around landing house. Infrequent to frequent around cultivated areas throughout the park. March early May. 575, 5-23-87

Veronica peregrina L. SPEEDWELL. Nat Ann. Ecotone between Dock restaurant and cypress bottoms. Infrequent, only seen around cultivated area at N end of park. April-May. 309, 5-9-87

Veronica persica Poiret. SPEEDWELL. SW Asia Ann. Blue flowers. Cultivated area around landing house. Infrequent around cultivated areas throughout the park. March-June. 1535, 2-27-88

BIGNONIACEAE

Bignonia capreolata L. [= *Anisostichus capreolata* (L.) Bureau.] CROSS VINE. Nat Vine. On high ground SE of Santee Copper headquarters and W of Biggin Creek. Infrequent to frequent throughout the park. April-May; July-Aug. 1297, 10-3-87

Campsis radicans (L.) Seeman. TRUMPET VINE. Nat Woody vine. Orange flowers. Along service drive leading to landing house. Infrequent to frequent throughout the park. June-July; Sept-Oct. 898, 8-11-87

OROBANCHACEAE

Conopholis americana (L.) Wallroth. SQUAW-ROOT, CANCER-ROOT. Nat Per herb. In fruit. Bottoms at NW end of park, next to canal on E bank. Infrequent on high ground throughout the park. March-June. 647 A, 6-4-87

ACANTHACEAE

Elytraria caroliniensis (J. F. Gmelin) Persoon. ELYTRARIA. Nat Per herb. White flowers. Banks of Tailrace Canal E of landing house. Infrequent, only seen around S end of park. June-Aug. 824, 7-22-87

Ruellia caroliniensis (Walter) Steudel. RUELLIA. Nat Per herb. Purple flowers. Forest NW of filled in area of canal. Infrequent throughout the park. May-Sept. 599, 5-24-87

PLANTAGINACEAE

Plantago lanceolata L. ENGLISH PLANTAIN. Europe per herb. Ecotone between Dock restaurant and bottoms to the W. Infrequent to frequent in cultivated areas throughout the park. April-frost 315, 5-9-87

RUBIACEAE

Cephalanthus occidentalis L. BUTTON BUSH. Nat 8' Shrub. Bottoms between Biggin Creek and bluffs to the W. Infrequent in bottoms throughout the park. June-Aug; Aug-Sept. 729, 6-24-87

Galium circaeazans Michaux. BEDSTRAW. Nat Per herb. Bottoms along bluffs N of landing house. Infrequent along bluff base at S end of park. April-June. 1746, 5-13-88

Galium hispidulum Michaux. BEDSTRAW. Nat Per herb. Black, fleshy fruit. Bottoms along bluffs N of landing house. Infrequent along bluff base at S end of park. June-Aug; Aug-Sept. 1745, 5-13-88

Galium tinctorium L. BEDSTRAW. Nat Per herb. White flowers. Bottoms between Biggin

Creek and bluffs to the W. Infrequent in bottoms throughout the park. April-June; June-Aug. 655, 6-4-87

Galium triflorum Michaux. BEDSTRAW. Nat Per herb. Ecotone between Dock restaurant and bottoms to the W. Infrequent around cultivated areas throughout the park. 311, 5-9-87

Richardia scabra L. MEXICAN CLOVER. Tropical Am. Ann herb. White flowers. Field W of mixed hardwoods NW of filled in canal. Frequent to infrequent around cultivated areas throughout the park. May-frost 831, 7-23-87

CAPRIFOLIACEAE

Lonicera japonica Thunberg. JAPANESE HONEYSUCKLE. Japan per 8' vine. Whitish-pink flowers. Ecotone between Dock restaurant and bottoms to the W. Frequent to infrequent throughout the park. Abundant on marl spoil banks next to tailrace canal. April-June; Aug-Oct. 281, 5-9-87

Lonicera sempervirens L. CORAL HONEYSUCKLE. Nat 10' Vine. Along service drive at N end of property. Infrequent throughout the park. March-July; July-Sept. 353, 5-9-87

Sambucus canadensis L. ELDERBERRY. Nat 6' Shrub. White flowers. Low ground E of Santee Cooper Water Authority headquarters. Infrequent in low wet areas throughout the park. July-Aug. 754, 6-24-87

Viburnum prunifolium L. BLACKHAW. Nat 4' Shrub. Along bottom of bluffs N of landing house. Infrequent along bluffs throughout the park. March-April; Sept-Oct. 1724, 5-13-88

VALERIANACEAE

Valerianella radiata (L.) Dufr. CORN SALAD. Nat Ann. White flowers. Ecotone between Dock restaurant and bottoms to the W. Infrequent around cultivated areas throughout the park. April-May. 288, 300, 5-9-87

CUCURBITACEAE

Melothria pendula L. CREEPING CUCUMBER. Nat Ann slender climbing vine. Shady bluff near dog pen. John Nelson, 3629, 8-4-84, USCH

CAMPANULACEAE

Lobelia cardinalis L. CARDINAL FLOWER. Nat 5' Per herb. Red flowers. Bottoms between Biggin Creek and bluffs to the W. Infrequent in open areas around Biggin creek. July-Oct. 878, 8-11-87

Lobelia elongata Small. LOBELIA. Nat Per herb. Blue flowers. Banks of Tailrace Canal at S end of property. Infrequent along Tailrace canal. Aug-Oct. 1175, 9-26-87

Triodanis perfoliata (L.) Nieuwl. [= *Specularia perfoliata* (L.) A. D.C. VENUS' LOOKING GLASS. Nat Ann. Blue flowers. Field W of forest W of filled in area of canal. Frequent to infrequent around cultivated areas throughout the park. April-June. 382, 5-10-87

ASTERACEAE

Ambrosia artemisiifolia L. RAGWEED. Nat Ann herb. Green flowers. Along service drive leading to landing house. Abundant to frequent in open areas throughout the park. Infrequent throughout the rest of the park. Aug-frost 991, 9-12-87

Aster carolinianus Walter. ASTER. Nat 6' Per herb. Purple ray, yellow disc flowers. Bottoms on island at S end of Biggin Creek. Infrequent in open areas around Biggin creek and along Tailrace canal. Late Sept-Oct. 1033, 9-12-87

Aster patens Aiton. ASTER. Nat Per herb. Violet rays, yellow disc flowers. Along Tailrace Canal S of landing house. Infrequent, only seen in open areas around S end of park. Sept-Oct. 1499, 10-23-87

Aster pilosus Willd. ASTER. Nat Per herb. White flowers. Bottoms SE of Santee Cooper Water Authority headquarters and W of Biggin Creek. Infrequent to frequent in open areas throughout the park. Sept-Nov. 1296, 10-3-87

Aster sagittifolius Wedem. ex Willd. ASTER. Nat Per herb. Violet ray, yellow disc flowers. Bottoms along marl bluffs N of landing house. Frequent, only along bluffs just N of Landing house. Infrequent on marl throughout the rest of the park. 1491, 10-23-87

Aster undulatus L. ASTER. Nat Per herb. Purple ray, yellow disc flowers. High ground NW of filled in canal. Infrequent in upland forests throughout the park. 1472, 10-23-87

Aster vimineus Lam. ASTER. Nat Per herb. White flowers. High ground E of Santee Cooper Water Authority headquarters. Infrequent to frequent around cultivated areas throughout the park. Sept-Oct. 753, 6-24-87

Baccharis halimifolia L. GROUNDSEL-TREE. Nat 10' Shrub. Flowers in bud. Forest edge NW of landing house. Abundant to frequent around cultivated areas throughout the park. Infrequent throughout the rest of the park. Sept-Oct. 1313, 10-3-87

Bidens bipinnata L. SPANISH NEEDLES. Nat Ann herb. Yellow flowers. Ecotone between forest and field W of Biggin Creek. Infrequent in fields along W side of park. Late July-Oct. 1041, 9-12-87

Bidens frondosa L. BEGGAR TREE. Nat Ann herb. Yellow flowers. Bottoms SE of Santee Cooper headquarters and W of Biggin Creek. Infrequent in swamp forests throughout the

park. Sept-Oct. 1293, 10-3-87

Bidens laevis (L.) BSP. BEGGAR TICKS. Nat Per or ann herb. Yellow flowers. Next to Tailrace Canal S of landing house. Infrequent, only seen around cultivated area at S end of park. Late Sept-Nov. 1483, 10-23-87

Cacalia atripicifolia L. PALE INDIAN-PLANTAIN. Nat Per herb. Mixed hardwoods NW of filled in canal. Infrequent, only seen along bluffs. June-Oct. 835, 7-23-87

Chrysanthemum leucanthemum L. OX-EYE DAISY. Europe Per herb. White flowers. Field W of swale and landing house. Rare, only seen in one location. April-July. 586, 5-23-87

Chrysogonum virginianum L. GREEN-AND-GOLD. Nat Per herb. Yellow flowers. Hardwood forest W of filled in area of canal. Late March-early June. 362, 5-10-87

Cirsium virginianum (L.) Michaux. THISTLE. Nat 3.5' Bien herb. White flowers. Bluffs N of landing house. Infrequent, seen in open upland areas throughout the park. Aug-frost 762, 6-24-87

Cirsium vittatum Small.(=C. *horridulum* Michaux-S,F,G.) THISTLE. Nat Bien herb. Purple flowers. Field NW of swale and landing house. Infrequent around cultivated areas throughout the park. May-July. 588, 5-23-87

Conyza canadensis (L.) Cronq. var. *pusillus* (Nuttall) Cronq.. HORSEWEED. Nat Ann herb. White flowers. Along service drive leading to landing house. Infrequent around cultivated areas at S end of park. July-frost 988, 9-12-87

Elephantopus carolinianus Willd. ELEPHANT'S-FOOT. Nat Per herb. Purple flowers. Marl spoil banks at SE end of property. Infrequent throughout the park. Aug-frost 1169, 9-26-87

Elephantopus nudatus Gray. ELEPHANT'S-FOOT. Nat Per herb. Purple flowers. Along service drive leading to landing house. Infrequent around cultivated areas throughout the park. Late July-Sept; Aug-frost 1002, 9-12-87

Erechtites hieracifolia (L.) Raf. FIREWEED. Nat Ann herb. White flowers. Bottoms between Biggin Creek and bluffs to the W. Infrequent around cultivated areas throughout the park. Late July-frost 869, 8-11-87

Erigeron pulchellus Michaux. ROBIN'S PLANTAIN. Nat Bien or short lived per herb. White rays, purple pappus. Field S of large live oak and *Vitis*. Infrequent, only seen around cultivated area at S end of park. April-early June. 1716, 5-13-88

Erigeron philadelphicus L. DAISY FLEABANE. Nat Per herb. White pappus, yellow disc flowers. Ecotone between Dock restaurant and bottoms to the W. Infrequent around cultivated areas throughout the park. 303, 5-9-87

Erigeron quercifolius Lam. DAISY FLEABANE. Nat Bien or short lived per herb. Purple

ray flowers, yellow disc flowers. Ecotone between Dock restaurant and bottoms to the W. Infrequent around cultivated area at N end of park. April-June. 284, 5-9-87

Erigeron strigosus Muhl.ex Willd. DAISY FLEABANE. Nat Ann or bien. White ray flowers, yellow disc flowers. Ecotone between Dock restaurant and bottoms to the W. Infrequent around cultivated area at N end of park. Late April-Oct. 285, 5-9-87

;

Eupatorium capillifolium (Lam.) Small. DOG-FENNEL. Nat Robust ann or short lived per herb. Whitish-green flowers. Banks of Tailrace Canal at S end of property. Infrequent to frequent in open areas throughout the park. Mid Sept-frost 1186, 9-26 -87

Eupatorium coelestinum L. AGERATUM. Nat Per herb. Purple flowers. Along service drive leading to landing house. Infrequent to frequent throughout the park. Late July -Oct. 1020, 9-12-87

Eupatorium purpureum L. JOE-PYE-WEED. Nat Per herb. purplish flowers. Bluffs N of landing house. Infrequent, only seen along bluffs. July-Oct. 733, 6-24-87

Eupatorium recurvans Small. THOROUGHWORT. Nat Per herb. White flowers. Along service drive leading to landing house. Infrequent around cultivated areas at S end of park. Aug-Oct. 1008, 9-12-87

Eupatorium rugosum Houttun. THOROUGHWORT. Nat Per herb. Greenish-white flowers. Marl spoil banks at SE end of property. Infrequent on marl throughout the park. Late July-Oct. 1170, 9-26-87

Eupatorium serotinum Michaux. THOROUGHWORT. Nat Per herb. White flowers. Bottoms SE of Santee Cooper headquarters and W of Biggin Creek. Infrequent throughout the park. Late Aug-Sept. 1238, 10-3-87

Gaillardia pulchella Foug. GAILLARDIA. Nat Ann. Red, orange and yellow flowers. High ground E of Santee Copper Water Authority. Infrequent to rare, only seen in one location. April-frost 751, 6-24-87

Gnaphalium obtusifolium L. RABBIT TOBACCO. Nat Ann herb. White flowers. Along service drive leading to landing house. Infrequent to frequent around cultivated areas throughout the park. Aug-Oct. 1011, 9-12-87

Gnaphalium purpureum L. CUDWEED. Nat Ann or Bien herb. Along service drive at N end of property. Infrequent to frequent around cultivated areas throughout the park. Late March-early June. 356, 5-9-87

Helenium amarum (Raf.) H. Rock. BITTER-WEED. Nat Ann. Yellow flowers. Field NW of swale and landing house. Frequent to abundant around cultivated areas throughout the park. May-frost 589, 5-23-87

Helianthus hirsutus Raf. SUNFLOWER. Nat Per herb. Yellow flowers. Field W of filled in canal. Infrequent in fields along W side of park. July-Oct. 1219, 9-26-87

Helianthus microcephalus T. & G. SUNFLOWER. Nat Per herb. Orange flowers. High ground E of Santee Copper Water Authority headquarters. Rare to infrequent, only seen at one location. Aug-Oct. 951, 8-29-87

Helianthus strumosus L. SUNFLOWER. Nat Per herb. Forest NW of filled in area of canal along bluffs. Infrequent, only seen in fields along W side of park. July-Sept. 598, 5-24-87

Heliopsis helianthoides (L.) BSP. OX-EYE. Nat Per herb. Yellow flowers. Hardwood forest W of filled in area of canal. Infrequent, only seen along bluffs. May-Oct. 376, 5-10-87

Hieracium gronovii L. HAWKWEED. Nat Per herb. Yellow flowers. Mixed hardwood forest NW of Santee Canal/Tailrace Canal connection. Infrequent throughout the park. July-frost 1199, 9-26-87

Hypchoeris elata (Weddell) Grisebach. CAT'S-EAR. Eurasia Bien or per herb. Yellow flowers. Cultivated area around landing house. Infrequent around cultivated areas throughout the park. May-frost 569, 5-23-87

Iva annua L. MARSH-ELDER. Nat Ann herb. White flowers. Banks of Tailrace Canal at S end of park. Infrequent throughout the park except next to Tailrace canal where it is frequent. Sept-Nov. 1174, 9-26-87

Lactuca canadensis L. WILD LETTUCE. Nat 4' Bien or ann herb. Yellow flowers. Marl Banks in forest N of landing house. Infrequent throughout the park. June-frost 828, 7-22-87

Lactuca floridana (L.) Gaertner. WILD LETTUCE. Nat Bien or robust ann herb. Purple flowers. Marl bluffs N of landing house. Infrequent to frequent throughout the park. Aug-frost 1032, 9-12-87

Lactuca graminifolia Michaux. LETTUCE. Nat Bien herb. Purple flowers. W of swale and landing house. Infrequent, only seen around cultivated areas at S end of park. April-July. 819, 7-22-87

Melanthera hastata Michaux. MELANTHERA. Nat Per herb. White flowers. Marl banks in forest N of landing house. Infrequent on marl throughout the park. June-Oct. 823, 7-22-87

Mikania scandens (L.) Willd. CLIMBING HEMPWEED. Nat 5' Per vine. White flowers. Bottoms between Biggin Creek and bluffs to the W. Infrequent to frequent in bottoms and along forest/field ecotones throughout the park. July-Oct. 879, 8-11-87

Pluchea camphorata (L.) DC. MARSH-FLEABANE. Nat Ann or short lived per. Pinkish-white flowers. Along service drive leading to landing house. Infrequent around cultivated areas at S end of park. Aug-Oct. 992, 9-12-87

Polymnia uvedalia L. BEAR'S-FOOT. Nat Per herb. Yellow flowers. Bluffs N of landing house. Abundant to frequent along bluffs just N of Landing house. Infrequent throughout the rest of the park. July-Oct, 671, 6-5-87

Pyrrhopappus carolinianus (Walter) DC. PYRRHAPAPPUS. Nat Bien herb. Yellow flowers. Along service drive at N end of park. Infrequent around cultivated areas throughout the park. April-June. 595, 5-24-87

Senecio glabellus Poirlet. BUTTERWEED. Nat Ann. Yellow flowers. Bottomland hardwoods W of Dock restaurant. Infrequent in swamp forests throughout the park. March-early June. 340, 5-9-87

Solidago altissima L. GOLDENROD. Nat Per herb. Yellow flowers in bud. Forest S of landing house. Infrequent throughout the park. Sept-Oct. 1030, 9-12-87

Solidago arguta Aiton. GOLDENROD. Nat Per herb. Yellow flowers. Mixed hardwood forest NW of Santee Canal/Tailrace Canal connection. Infrequent along bluffs. July-Oct. 1195, 9-26-87

Solidago caesia L. BLUE-STEM. Nat Per herb. Yellow flowers. High ground NW of filled in canal. Infrequent throughout the park. Sept-Oct. 1470, 10-23-87

Solidago leavenworthii T. & G. GOLDENROD. Nat Per herb. Yellow flowers. Along service drive leading to landing house. Infrequent to frequent throughout the park. July-Oct. 1010, 9-12-87

Solidago nemoralis Aiton. GOLDENROD. Nat Per herb. Yellow flowers. Ecotone between forest and fields W of Biggin Creek. Infrequent to frequent in fields along W side of park. Sept-frost 1056, 9-12-87

Solidago rugosa Miller. var. *rugosa* . GOLDENROD. Nat 4' Per herb. Forest S of landing house. Infrequent around cultivated area at S end of park. Sept-Oct. 1325, 10-3-87

Sonchus asper (L.) Hill. SPINY-LEAVED SOW-THISTLE. Europe ann. Yellow flowers. Ecotone between Dock restaurant and bottoms to the W. Infrequent around cultivated areas throughout the park. Late March-July and sporadically later. 293, 5-9-87

Spilanthes americana (Mutis) Hieron. var. *repens* (Walter) A. H. Moore. SPILANTHES. Nat Per herb. Yellow flowers. Forest S of landing house. Frequent, only seen in bottoms along S end of park. Late Aug-Oct. 1322, 10-3-87

Taraxacum officinale Weber. COMMON DANDELION. Eurasia Per herb. Yellow flowers. Ecotone between Dock restaurant and bottoms to the W. Infrequent around cultivated areas. Late Feb-June and sporadically later. 305, 5-9-87

Verbesina occidentalis (L.) Walter. WINGSTEM. Nat Per herb. Yellow flowers. Along service drive leading to landing house. Frequent to abundant in open areas throughout the park. Infrequent in the rest of the park. Late Aug-Oct. 998, 9-12-87

Verbesina virginica L. WINGSTEM. Nat Per herb. White flowers. Along service drive leading to landing house. Frequent to infrequent in open areas throughout the park. Infrequent in the rest of the park. July-Oct. 1026, 9-12-87

Xanthium strumarium L. COCKLEBUR. Nat Ann herb. Green fruit. Field W of filled in canal. Infrequent to frequent in fields along W side of park. July-frost 1209, 9-26-87

Appendix D

Sampling Data Tables for Old
Santee Canal State Park

Plot 7. Old Santee Canal State Park

Location: From SE corner of forest across from Dock Restaurant, go 87m at 240° then 200m at 165°. Stake is in NE corner of plot. Plot runs E-W in length.

Table D-I

Trees
(> 11cm dbh.)/400 m²

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value ¹
<i>Celtis laevigata</i>	1	8.33	29.5	8.0	8.16
<i>Quercus laurifolia</i>	2	16.66	85.0	23.0	19.83
<i>Acer rubrum</i>	1	8.33	45.5	12.0	10.16
<i>Liquidambar styraciflua</i>	8	66.66	212.4	57.0	61.83
Total	12		372.4		

¹Importance value = Rel. density + Rel. basal area/2.

Table D-II

Saplings and Shrubs
(< 11cm dbh. & > 1.5m tall)/100 m²

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value ¹
<i>Carpinus caroliniana</i>	5	55.50	16.0	41.0	48.25
<i>Ilex decidua</i>	1	11.11	5.5	14.1	12.60
<i>Quercus laurifolia</i>	2	22.22	11.5	29.5	25.86
<i>Ostrya virginiana</i>	1	11.11	6.0	15.4	13.25
Total	9		39.0		

Table D-III

Vines
(> 1m tall)

Species	#/100 m ²	Rel. density
<i>Smilax rotundifolia</i>	63	98.43
<i>Smilax bona-nox</i>	1	1.56
Total	64	

Table D-IV

Herbaceous Species

Species	#/100 m ²	Rel. density
<i>Sabal minor</i>	35	81.39
<i>Arundinaria gigantea</i>	2	4.65
<i>Ampelopsis arborea</i>	6	13.95
Total	43	

Table D-V

Tree and Shrub Seedlings

Species	#/40 m ²	Rel. density
<i>Quercus laurifolia</i>	54	93.10
<i>Carpinus caroliniana</i>	3	5.17
<i>Liquidambar styraciflua</i>	1	1.72
Total	58	

Plot 8. Old Santee Canal State Park

Location: E from catfish on Dock restaurant and 29m into forest. Stake is in NE corner of plot. Plot runs N-S in length.

Table D-VI
Trees
($> 11\text{cm dbh.}/400\text{ m}^2$)

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value ¹
<i>Quercus laurifolia</i>	8	33.33	130.5	18.0	25.66
<i>Taxodium distichum</i>	4	16.66	309.0	42.6	29.63
<i>Liquidambar styraciflua</i>	2	8.33	81.5	11.2	9.76
<i>Celtis laevigata</i>	6	25.00	82.5	11.4	18.20
<i>Ulmus rubra</i>	1	4.16	13.0	1.8	2.98
<i>Acer rubrum</i>	1	4.16	44.5	6.0	5.08
<i>Carpinus caroliniana</i>	1	4.16	13.0	1.8	2.98
<i>Fraxinus pennsylvanica</i>	1	4.16	52.5	7.2	5.68
Total	24		726.0		

¹Importance value = Rel. density + Rel. basal area/2.

Table D-VII
Saplings and Shrubs
($< 11\text{cm dbh.} \& > 1.5\text{m tall}/100\text{ m}^2$)

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value
<i>Quercus laurifolia</i>	4	66.66	24.0	63.2	64.94
<i>Celtis laevigata</i>	1	16.66	10.5	27.6	22.13
<i>Carpinus caroliniana</i>	1	16.66	3.5	9.2	12.93
Total	6		38.0		

Table D-VIII
Herbaceous Species

Species	#/1 m ²	Rel. density
<i>Sabal minor</i>	2	50
<i>Ampelopsis arborea</i>	1	25
<i>Polygonum</i> sp.	1	25
Total	4	

Table D-IX
Tree and Shrub Seedlings

Species	#/40 m ²	Rel. density
<i>Quercus laurifolia</i>	3	50.00
<i>Liquidambar styraciflua</i>	2, however these were really root sprouts.	33.33
<i>Taxodium distichum</i>	1	16.66
Total	6	

Plot 9. Old Santee Canal State Park

Location: W of filled in portion of old Santee Canal. Stake is in SW corner of plot.
Plot runs N-S in length. SE exposure with 8-10° of slope.

Table D-X

Trees
(> 11cm dbh.)/400 m²

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value
<i>Liquidambar styraciflua</i>	4	21.05	202.0	33.0	27.02
<i>Fraxinus pennsylvanica</i>	2	10.52	61.0	10.0	10.26
<i>Quercus muehlenbergii</i>	1	5.26	32.0	5.0	5.13
<i>Carya tomentosa</i>	6	31.57	199.5	33.0	32.28
<i>Quercus shumardii</i>	2	10.52	44.5	7.0	8.76
<i>Liriodendron tulipifera</i>	1	5.26	24.0	4.0	4.63
<i>Cornus florida</i>	3	15.78	42.5	7.0	11.39
Total	19		605.5		

Table D-XI

Saplings and Shrubs
(< 11cm dbh. & > 1.5m tall)/100 m²

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value
<i>Cornus florida</i>	1	33.3	10.0	45.4	39.35
<i>Carya tomentosa</i>	2	66.6	12.0	56.6	61.60
Total	3		22.0		

Table D-XII
Herbaceous Species

Species	#/1 m ²	Rel. density
<i>Verbesina</i> sp.	1	2.85
<i>Panicum boscii</i>	20	57.14
<i>Hexastylis arifolia</i>	2	5.71
<i>Cocculus carolinus</i>	1	2.85
<i>Sanguinaria canadensis</i>	1	2.85
<i>Parthenocissus quinquefolia</i>	2	5.71
<i>Smilax ecirrhata</i> var. <i>hugerii</i>	1	2.85
<i>Ruellia caroliniensis</i>	1	2.85
<i>Eupatorium purpureum</i>	1	2.85
<i>Rhus radicans</i>	1	2.85
<i>Polymnia uvedalia</i>	1	2.85
<i>Desmodium viridiflorum</i>	1	2.85
<i>Sanicula gregaria</i>	1	2.85
Total	35	

Table D-XIII
Tree and Shrub Seedlings

Species	#/40 m ²	Rel. density
<i>Cercis canadensis</i>	3	3.70
<i>Hamamelis virginiana</i>	58	71.60
<i>Sassafras albidum</i>	3	3.70
<i>Quercus muehlenbergii</i>	1	1.23
<i>Fraxinus pennsylvanica</i>	4	4.93
<i>Quercus alba</i>	1	1.23
<i>Quercus shumardii</i>	7	8.64
<i>Aesculus pavia</i>	2	2.46
<i>Ulmus rubra</i>	1	1.23
<i>Carya tomentosa</i>	1	1.23
Total	81	

Plot 10. Old Santee Canal State Park

Location: Approximately 200m from filled in portion of old Santee Canal. On W side of Old Santee Canal with bluffs to the W and cypress bottoms to the E. Stake is in NE corner of plot. Plot runs N-S in length.

Table D-XIV
Trees
($> 11\text{cm dbh.}$)/400 m^2

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value
<i>Carpinus caroliniana</i>	3	18.75	51.5	11.61	15.18
<i>Celtis laevigata</i>	5	31.25	114.0	25.70	28.47
<i>Liquidambar styraciflua</i>	2	12.50	79.5	17.92	15.21
<i>Acer negundo</i>	3	18.75	51.5	11.61	15.18
<i>Quercus shumardii</i>	2	12.50	120.0	27.05	19.77
<i>Fraxinus pennsylvanica</i> var. <i>subintegerrima</i>	1	6.25	27.0	6.08	6.16
Total	16		443.5		

Plantanus occidentalis, *Quercus laurifolia*, *Acer saccharum* ssp. *floridanum*, *Planera aquatica* and *Quercus lyrata* were also present however no trees were in the sample plot.

Table D-XV
Saplings and Shrubs
($< 11\text{cm dbh.}$ & $> 1.5\text{m tall}$)/100 m^2

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value
<i>Carpinus caroliniana</i>	6	35.29	30.5	32.4	33.84
<i>Celtis laevigata</i>	4	23.52	15.0	16.0	19.76
<i>Ulmus alata</i>	2	11.76	14.0	15.0	13.38
<i>Acer negundo</i>	2	11.76	22.0	23.4	17.58
<i>Quercus muehlenbergii</i>	1	5.88	2.5	2.6	4.24
<i>Quercus shumardii</i>	1	5.88	5.0	5.3	5.59
<i>Acer rubrum</i>	1	5.88	5.0	5.3	5.59
Total	17		94.0		

Ligustrum sinense and *Lindera benzoin* were also present however no shrubs were in the sample plots.

Table D-XVI
Herbaceous Species

Species	#/1 m ²	Rel. density
<i>Impatiens capensis</i>	1	4.34
<i>Arundinaria gigantea</i>	1	4.34
<i>Smilax bona-nox</i>	3	13.00
<i>Smilax glauca</i>	1	4.34
<i>Berchemia scandens</i>	5	21.73
<i>Parthenocissus quinquefolia</i>	1	4.34
<i>Sabal minor</i>	1	4.34
<i>Campsis radicans</i>	1	4.34
<i>Ampelopsis arborea</i>	1	4.34
<i>Rhus radicans</i>	1	4.34
<i>Carex</i> sp.	1	4.34
<i>Tovaria virginiana</i>	1	4.34
<i>Tillandsia usneoides</i>	1	4.34
<i>Hydrocotyle ranunculoides</i>	1	4.34
<i>Lonicera japonica</i>	1	4.34
Total	23	

Table D-XVII
Tree and Shrub Seedlings

Species	#/40 m ²	Rel. density
<i>Carpinus caroliniana</i>	21	13.90
<i>Acer rubrum</i>	6	3.97
<i>Celtis laevigata</i>	114	75.49
<i>Quercus muehlenbergii</i>	6	3.97
<i>Liquidambar styraciflua</i>	1	0.66
<i>Acer negundo</i>	3	1.98
Total	151	

Plot 11. Old Santee Canal State Park

Location: Plot is approximately adjacent to plot 10. Length is at a bearing of 40°. Stake is in SE corner of plot.

Table D-XVIII

Trees
($> 11\text{cm dbh.}$)/400 m^2

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value ¹
<i>Ulmus rubra</i>	4	26.66	70.5	20.4	23.53
<i>Liquidambar styraciflua</i>	1	6.66	35.5	10.3	8.48
<i>Acer negundo</i>	1	6.66	23.0	6.6	6.63
<i>Carpinus caroliniana</i>	1	6.66	12.5	3.6	5.13
<i>Tilia caroliniana</i>	1	6.66	12.0	3.5	5.08
<i>Celtis laevigata</i>	3	20.00	65.5	18.9	19.45
<i>Quercus shumardii</i>	2	13.33	89	25.7	19.51
<i>Fraxinus pennsylvanica</i> var. <i>subintegerrima</i>	2	13.33	38	11	12.16
Total	15		346.6		

Juniperus virginiana, *Morus rubra*, *Acer saccharum* ssp. *floridanum*, *Ligustrum japonicum* and *Cornus stricta* were also present, however no trees were in the sample plot.

Table D-XIX

Saplings and Shrubs
($< 11\text{cm dbh.}$ & $> 1.5\text{m tall}$)/100 m^2

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value
<i>Celtis laevigata</i>	2	25.0	5.1	16.7	20.85
<i>Carpinus caroliniana</i>	1	12.5	2.5	8.2	10.35
<i>Acer negundo</i>	3	37.5	12.7	41.6	39.55
<i>Ulmus rubra</i>	2	25.0	10.2	33.4	29.20
Total	8		30.5		

Ligustrum sinense and *Lindera benzoin* were also present however none were in the sample plots.

Table D-XX
Herbaceous Species

Species	#/1 m ²	Rel. density
<i>Menispermum canadense</i>	1	1.92
<i>Asarum canadense</i>	6	11.53
<i>Carex</i> sp.	18	34.61
<i>Parthenocissus quinquefolia</i>	3	5.76
<i>Tillandsia usneoides</i>	1	1.92
<i>Smilax</i> sp.	2	3.84
<i>Sabal minor</i>	1	1.92
<i>Anisaema dracontium</i>	1	1.92
<i>Anisostichus capreolata</i>	1	1.92
<i>Thaspium barbinode</i>	1	1.92
<i>Polymnia uvedalia</i>	1	1.92
<i>Spigelia marilandica</i>	1	1.92
<i>Botrychium virginianum</i>	1	1.92
<i>Phryma leptostachyna</i>	1	1.92
<i>Rubus</i> sp.	1	1.92
<i>Panicum</i> sp.	1	1.92
<i>Ariundinaria gigantea</i>	1	1.92
<i>Boehmeria cylindrica</i>	1	1.92
<i>Vitis</i> sp.	1	1.92
<i>Rhus radicans</i>	1	1.92
<i>Geranium maculatum</i>	1	1.92
<i>Galium</i> sp.	1	1.92
<i>Aristolochia serpentaria</i>	1	1.92
<i>Asplenium platyneuron</i>	1	1.92
<i>Polystichum acrostichoides</i>	1	1.92
<i>Trillium cuneatum</i> var. <i>cuneatum</i>	1	1.92
<i>Lonicera japonica</i>	1	1.92
Total	52	

Lonicera japonica forms a thick ground cover in most of this area.

Table D-XXI
Tree and Shrub Seedlings

Species	#/40 m ²	Rel. density
<i>Celtis laevigata</i>	8	15.38
<i>Quercus muehlenbergii</i>	4	7.69
<i>Ulmus rubra</i>	15	28.84
<i>Aesculus pavia</i>	4	7.69
<i>Cerris canadensis</i>	1	1.92
<i>Carya cordiformis</i>	2	3.84
<i>Prunus serotina</i>	1	1.92
<i>Acer negundo</i>	1	1.92
<i>Fraxinus</i> sp.	4	7.69
<i>Lindera benzoin</i>	4	7.69
<i>Euonymus americanus</i>	2	3.84
<i>Carpinus caroliniana</i>	1	1.92
<i>Sabal minor</i>	5	9.61
Total	52	

Plot 12. Old Santee Canal State Park

Location: Marl spoil banks, S end of park between Tailrace Canal and old Santee Canal; approximately 200m from filled in area of old Santee Canal. Plot length runs N-S. Stake is in NW corner of plot.

Table D-XXII

Trees
(> 11cm dbh.)/400 m²

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value
<i>Fraxinus pennsylvanica</i>					
var. <i>subintegerrima</i>	5	21.73	85.0	16.1	18.91
<i>Celtis laevigata</i>	2	8.69	25.5	4.8	6.74
<i>Juniperus virginiana</i>	8	34.78	193.5	36.7	35.74
<i>Ligustrum japonica</i>	1 (5 trunks)	4.34	33.5	6.4	5.37
<i>Ulmus alata</i>	1	4.34	15.5	2.9	3.62
<i>Populus deltoides</i>	2	8.69	106.0	20.1	14.39
<i>Acer saccharum</i>					
var. <i>floridanum</i>	1	4.34	21.0	4.0	4.17
<i>Acer negundo</i>	2	8.69	29.0	5.5	7.09
<i>Ulmus rubra</i>	1	4.34	18.5	3.5	3.92
Total	23		527.5		

Morus rubra, *Carya cordiformis*, *Ilex decidua*, *Quercus laurifolia* and *Cercis canadensis* were also seen however not in the sample plot.

Table D-XXIII
Saplings and Shrubs
($< 11\text{cm dbh. \& } > 1.5\text{m tall}$)/100 m^2

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value
<i>Ligustrum japonicum</i>	6	40.00	15.2	24.0	32.00
<i>Liriodendron tulipifera</i>	1	6.66	7.6	12.0	9.33
<i>Ulmus rubra</i>	1	6.66	2.5	4.0	5.33
<i>Fraxinus</i> sp.	1	6.66	5.1	8.0	7.33
<i>Cornus asperifolia</i>	1	6.66	5.1	8.0	7.33
<i>Juniperus virginiana</i>	2	13.33	15.2	24.0	18.66
<i>Celtis laevigata</i>	2	13.33	10.2	16.0	14.66
<i>Ulmus alata</i>	1	6.66	2.5	4.0	5.33
Total	16		63.4		

Ligustrum sinense, *Aesculus pavia* and *Rhamnus caroliniana* were also seen however not in the sample plots.

Table D-XXIV
Herbaceous Species

Species	#/1 m ²	Rel. density
<i>Parthenocissus quinquefolia</i>	1	2.94
<i>Rhus radicans</i>	14	41.17
<i>Collinsonia tuberosa</i>	1	2.94
<i>Arundinaria gigantea</i>	1	2.94
<i>Sabal minor</i>	1	2.94
<i>Anemone virginiana</i>	1	2.94
<i>Amorpha fruticosa</i>	1	2.94
<i>Rubus</i> sp.	1	2.94
<i>Anisostichus capreolata</i>	1	2.94
<i>Matelea subaspera</i>	1	2.94
<i>Solidago</i> sp.	1	2.94
<i>Berchemia scandens</i>	1	2.94
<i>Dioscorea batatas</i>	1	2.94
<i>Lonicera japonica</i>	1	2.94
<i>Lactuca</i> sp.	1	2.94
<i>Smilax</i> sp.	1	2.94
<i>Carex</i> sp.	1	2.94
<i>Trillium cuneatum</i>	1	2.94
<i>Tradescantia subaspera</i>	1	2.94
<i>Campsis radicans</i>	1	2.94
<i>Vitis</i> sp.	1	2.94
Total	34	

This entire area is overgrown with *Lonicera japonica*.. Some large *Berchemia scandens*, *Campsis radicans*, *Vitis* sp., and *Smilax* sp. are present in this area.

Table D-XXV
Tree and Shrub Seedlings

Species	#/40 m ²	Rel. density
<i>Ligustrum japonica</i>	9	50.00
<i>Magnolia grandiflora</i>	1	5.55
<i>Sabal minor</i>	2	11.11
<i>Celtis laevigata</i>	1	5.55
<i>Lindera benzoin</i>	1	5.55
<i>Ulmus alata</i>	1	5.55
<i>Prunus serotina</i>	1	5.55
<i>Juniperus virginiana</i>	1	5.55
<i>Quercus muehlenbergii</i>	1	5.55
Total	18	

Prunus serotina, *Juniperus virginiana* and *Quercus muehlenbergii* seedlings were also present however not in the sample plot.

Plot 13. Old Santee Canal State Park

Location: S of filled in portion of old Santee Canal at headwaters of Biggin Creek; on W bluff approximately 12m above creek. Plot runs N-S in length. Stake is in SW corner of plot.

Table D-XXVI

Trees
(> 11cm dbh.)/400 m²

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value
<i>Quercus alba</i>	3	11.53	186.0	25.5	18.51
<i>Carya tomentosa</i>	12	46.15	238.5	32.7	39.42
<i>Quercus shumardii</i>	2	7.69	40.5	5.5	6.59
<i>Pinus taeda</i>	3	11.53	128.0	17.5	14.51
<i>Quercus falcata</i>					
var. <i>pagodaefolia</i>	1	3.84	51.0	7.0	5.42
<i>Carya cordiformis</i>	2	7.69	33.0	4.5	6.09
<i>Carya glabra</i>	1	3.84	18.0	2.5	3.17
<i>Ulmus alata</i>	1	3.84	22.0	3.0	3.42
<i>Cornus florida</i>	1	3.84	12.5	1.7	2.76
Total	26		729.5		

Table D-XXVII

Saplings and Shrubs
(< 11cm dbh. & > 1.5m tall)/100 m²

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value
<i>Hamamelis virginiana</i>	5	50.0	13.0	50.0	50
<i>Chionanthus virginicus</i>	1	10.0	2.5	10.0	10
<i>Quercus shumardii</i>	1	10.0	2.5	10.0	10
<i>Aralia spinosa</i>	2	20.0	5.0	20.0	20
<i>Carya tomentosa</i>	1	10.0	2.5	10.0	10
Total	10		25.5		

Magnolia grandifolia, *Aesculus pavia*, *Myrica cerifera* and *Morus rubra* were also present however not in the sample plot.

Table D-XXVIII
Herbaceous Species

Species	#/1 m ²	Rel. density
<i>Desmodium</i> sp.	1	5.26
<i>Ceanothus americanus</i>	3	15.78
<i>Parthenocissus quinquefolia</i>	1	5.26
<i>Carex</i> sp.	3	15.78
<i>Vitis rotundifolia</i>	1	5.26
<i>Spigelia marilandica</i>	1	5.26
<i>Eupatorium purpureum</i>	1	5.26
<i>Aureolaria virginica</i>	1	5.26
<i>Helianthus strumosus</i>	1	5.26
<i>Panicum boscii</i>	1	5.26
<i>Vicia</i> sp.	1	5.26
<i>Thelypteris kunthii</i>	1	5.26
<i>Dioscorea villosa</i>	1	5.26
<i>Smilax ecirrhata</i> var. <i>hugeri</i>	1	5.26
<i>Rhus radicans</i>	1	5.26
<i>Anisostichus capreolata</i>	1	5.26
<i>Arundinaria gigantea</i>	1	5.26
<i>Panicum</i> sp.	1	5.26
<i>Amphicarpa bracteata</i>	1	5.26
Total	19	

Table D-XXIX
Tree and Shrub Seedlings

Species	#/40 m ²	Rel. density
<i>Chionanthus virginicus</i>	2	
<i>Cornus florida</i>	1	
<i>Acer saccharum</i> ssp. <i>florida</i>	3	
<i>Quercus falcata</i> var. <i>pagodaefolia</i>	2	

Plot 14. Old Santee Canal State Park

Location: On E-W running bluff E of Santee Cooper Water Authority headquarters; bottoms are to the N. From W most edge of bluff, plot runs E-W in length. Stake is in NW corner of plot.

Table D-XXX

Trees
(> 11cm dbh.)/400 m²

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value
<i>Acer saccharum</i>					
var. <i>floridanum</i>	5	18.51	91.5	14.3	16.4
<i>Quercus muehlenbergii</i>	3	11.11	58.0	9.1	10.10
<i>Liquidambar styraciflua</i>	5	18.51	143.5	22.4	20.45
<i>Quercus virginiana</i>	1	3.7	33.0	5.2	4.45
<i>Fagus grandifolia</i>	7	25.9	124.5	19.5	22.7
<i>Carya cordiformis</i>	2	7.4	63.5	9.9	8.65
<i>Fraxinus pennsylvanica</i>					
var. <i>subintegerrima</i>	1	3.7	59.0	9.2	6.45
<i>Quercus falcata</i>					
var. <i>pagodaefolia</i>	1	3.7	13.5	2.1	2.9
<i>Ulmus rubra</i>	1	3.7	16.0	2.5	3.1
<i>Carya tomentosa</i>	1	3.7	37.0	5.8	4.75
Total	27		639.5		

Tilia caroliniana, *Quercus alba* and *Quercus shumardii* were also present however not in the sample plot.

Table D-XXXI

Saplings and Shrubs
(< 11cm dbh. & > 1.5m tall)/100 m²

Species	# of specimens	Rel. density	Total basal area for each species	% of grand total of basal area	Importance value
<i>Ilex opaca</i>	1	7.69	11.4	17.6	12.64
<i>Fagus grandifolia</i>	2	15.38	12.7	19.6	17.49
<i>Acer saccharum</i> var. <i>floridanum</i>	3	23.07	12.7	19.6	21.33
<i>Corylus americana</i>	3	23.07	7.6	11.8	17.43
<i>Quercus laurifolia</i>	1	7.69	7.6	11.8	9.74
<i>Fraxinus pennsylvanica</i> var. <i>subintegerrima</i>	1	7.69	7.6	11.8	9.74
<i>Aesculus pavia</i>	2	15.38	5.0	7.7	11.54
Total	13		64.6		

Table D-XXXII

Vines
(> 1m tall) dbh (cm)

Species	dbh
<i>Rhus radicans</i>	3.0
<i>Berchemia scandens</i>	4.5
<i>Vitis rotundifolia</i>	11.5

Anisostichus capreolata, *Campsis radicans* and *Smilax* sp. were also here; vines in this area are abundant and large.

Table D-XXXIII
Herbaceous Species

Species	#/1 m ²	Rel. density
<i>Arundinaria gigantea</i>	1	6.66
<i>Hexastylis arifolia</i>	1	6.66
<i>Phryma leptostachya</i>	1	6.66
<i>Parthenocissus quinquefolia</i>	1	6.66
<i>Rhus radicans</i>	1	6.66
<i>Berchemia scandens</i>	1	6.66
<i>Vitis rotundifolia</i>	1	6.66
<i>Anisostichus capreolata</i>	1	6.66
<i>Campsis radicans</i>	1	6.66
<i>Smilax</i> sp.	1	6.66
<i>Sanguinaria canadensis</i>	1	6.66
<i>Polystichum acrostichoides</i>	1	6.66
<i>Asplenium platyneuron</i>	1	6.66
<i>Trillium cuneatum</i>	1	6.66
<i>Carex</i> sp.	1	6.66
Total	15	

Table D-XXXIV
Tree and Shrub Seedlings

Species	#/40 m ²	Rel. density
<i>Aesculus pavia</i>	6	7.1
<i>Hamamelis virginiana</i>	14	16.66
<i>Carya cordiformis</i>	6	7.1
<i>Acer saccharum</i>		
var. <i>floridanum</i>	11	13.09
<i>Ulmus rubra</i>	1	1.19
<i>Fraxinus</i> sp.	11	13.09
<i>Carya tomentosa</i>	1	1.19
<i>Fagus grandifolia</i>	1	1.19
<i>Quercus muehlenbergii</i>	1	1.19
<i>Euonymus americanus</i>	9	10.71
<i>Quercus laurifolia</i>	1	1.19
<i>Prunus serotina</i>	5	5.95
<i>Quercus virginiana</i>	1	1.19
<i>Liquidambar styraciflua</i>	1	1.19
<i>Corylus americana</i>	6	7.1
<i>Acer negundo</i>	1	1.19
<i>Quercus alba</i>	1	1.19
<i>Styrax grandifolia</i>	2	2.38
<i>Liriodendron tulipifera</i>	1	1.19
<i>Cornus stricta</i>	2	2.38
<i>Cercis canadensis</i>	1	1.19
<i>Celtis laevigata</i>	1	1.19
Total	84	

Legend for Figure D-2

- = Vegetation boundaries
- ⊕ = Site of plot used for quantitative work
- ==== = Park roads
- ===== = South Carolina highways
- = Park boundaries
- = Drainage patterns
- 1 = Stony Landing
- 2 = Landing House
- 3 = Santee Cooper Water Authority Headquarters
- 4 = Old Santee Canal-Tailrace Canal connection
- 5 = Dock Restaurant

Figure D-1. Legend for Old Santee Canal State Park Map

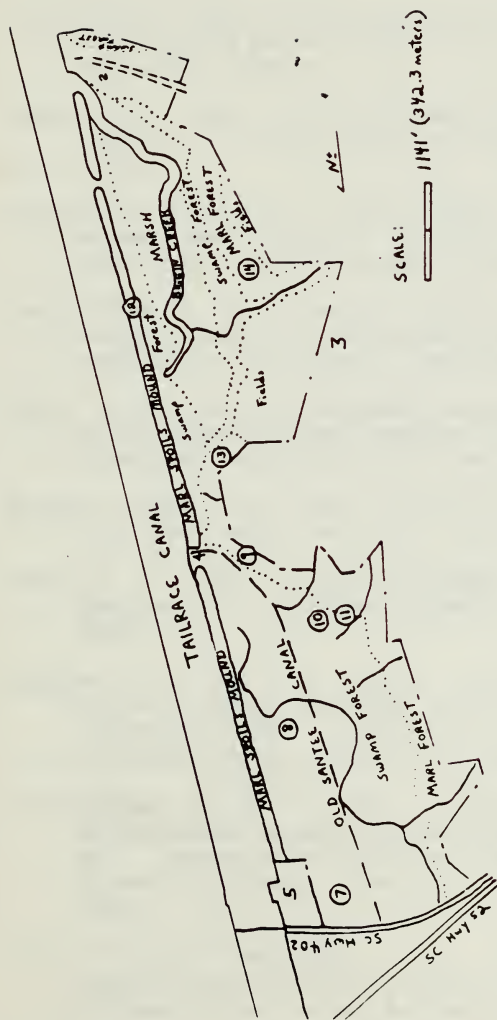


Figure D-2. Map of Old Santee Canal State Park

REFERENCES

- Argus, G. W. 1986. The Genus *Salix* (Salicaceae) in the Southeastern United States. Systematic Botany Monographs 9:18-22.
- Barry, J. M. 1980. Natural Vegetation of South Carolina. University of South Carolina Press, Columbia, SC. 214pp.
- Bartgis, R. L. and G. E. Long. 1984. Marl wetlands in eastern West Virginia: distribution, rare plant species and recent history. *Castanea* 49:17-25.
- Barry, John M., W. T. Batson. 1969. The vegetation of the Baruch Plantation, Georgetown, South Carolina, in relation to soil types. *Castanea* 34:71-77.
- Berry, E. W. 1914. The Upper Cretaceous and Eocene Floras of South Carolina and Georgia. United States Government Printing Office, Washington, D. C. 200pp.
- Bledsoe, Debra-Lynn. 1985. Watch on Santee, South Carolina Wildlife. May-June 1986. Vol. 32, No. 2:12-15.
- Braun, E. L. 1950. Decidious Forest of Eastern North America. The Blakiston Company, Philadelphia, PA. 596pp.
- Bridges, E. L. and S. L. Orzell. 1986. Distribution patterns of the non-endemic flora of middle Tennessee limestone glades. *Association of Southeastern Biologists Bulletin* 33(4):155-166.
- Brockington, Jr., P. E. 1980. Cooper River Redivision Archeological Survey: Research Manuscript Series No. 169. Institute of Archeology and Anthropology. University of South Carolina Press, Columbia, SC. 108pp.
- Clark, J. R., J. Benforado. 1981. Developments in Agricultural and Managed-Forest Ecology, Vol. II. Wetlands of bottomland hardwood forests. Elsevier Scientific Publishing Company, New York, NY. 401pp.

- Cooke, C. W. 1936. Geology of the Coastal Plain of South Carolina. United States Government Printing Office, Washington, D. C. 196pp.
- Cronquist, A. 1980. Vascular Flora of the Southeastern United States, Vol. I. Asteraceae. University of North Carolina Press, Chapel Hill, NC. 261pp.
- Cushing, E. J. and H. E. Wright, Jr. 1967. Quaternary Paleoecology. Yale University Press, New Haven, CT. 433pp.
- Dennis, W. M., W. T. Batson. 1974. The floating log and stump communities in the Santee swamp of South Carolina. *Castanea*, 39:166-170.
- Devlin, R. M. and F. H. Witham. 1983. Plant Physiology. Willard Grant Press, Boston, MA. 577pp.
- Dieter, Mueller-Dombois, Heinz and Ellenberg. 1974. Aims and Methods of Vegetation Ecology. John Wiley & Sons, Inc., New York, NY. 547pp.
- Dyksterhuis, E. J. 1957. The Savannah concept and its use. *Ecology* 38:435-442.
- Eickmeier, W. G. 1986. The distribution of photosynthetic pathways among cedar glade plants. *Association of Southeastern Biologists Bulletin* 33(4):200-205.
- Etherington, J. R. 1985. Environment and Plant Ecology. John Wiley and Sons, New York, NY.
- Gaddy, L. L. 1982. The floristics of three South Carolina pine savannahs. *Castanea* 47:393-402.
- Gleason, H. A. 1952. The Britton and Brown Illustrated Flora of the Northeastern United States and Adjacent Canada, Vols. I, II, III. Willard Grant Press, Boston, MA.
- Godfrey, R. K. and J. W. Wooten. 1979. Aquatic and Wetland Plants of the Southeastern United States, Monocotyledons. University of Georgia Press, Athens, GA. 712pp.
- Godfrey, R. K. and J. W. Wooten. 1981. Aquatic and Wetland Plants of the Southeastern United States, Dicotyledons. University of Georgia Press, Athens, GA. 933pp.

- Hattaway, R. 1980. The calciphilous bryophytes of three limestone sinks in eastern Tennessee. *The Bryologist* 83(2):161-169.
- Heyward, F. 1939. The relation of fire to stand composition of long-leaf pine forests. *Ecology* 20:287-304.
- Hitchcock, A. S. 1971. Manual of the Grasses of the United States, Vol. I and II. Dover Publications, Inc., New York, NY. 1049pp.
- Hunt, K. W. 1947. The Charleston woody flora. *The American Midland Naturalist* 37(3):670-756.
- Jenny, Hans. 1980. The Soil Resource, Origin and Behavior. Ecological Studies, Vol. 37. Springer-Verlag, New York, NY. 377pp.
- Jones, L. P. 1971. South Carolina: A Synoptic History for Laymen. Sandlapper Press, Inc.:Columbia. 272pp.
- Jones, S. M., D. R. Lear and S. K. Cox. 1984. A vegetation-landform classification of forest sites within the upper coastal plain of South Carolina. *Bulletin of the Torrey Botanical Club* 111(3):349-360.
- Kartesz, J. T. and R. Kartesz. 1980. A Synonymized Checklist of the Vascular Flora of the United States, Canada and Greenland, Vol. II. The Biota of North America. The University of North Carolina, Press, Chapel Hill, NC. 489pp.
- Myers, R. K., R. Zahner and S. M. Jones. 1986. Forest habitat regions of South Carolina from landsat imagery. Department of Forestry Research Series No. 42. College of Forest and Recreation Resources, Clemson University, Clemson, SC. 31pp.
- Nelson, J. B. 1986. Natural Communities of South Carolina: Initial Classification and Description. South Carolina Wildlife and Marine Resources Department. 55pp.
- Nesom, G. L. and M. Treibner. 1977. Beech-mixed hardwood communities: A topo-edaphic climax on the North Carolina coastal plain. *Castanea* 42:119-140.

- NOAA (National Oceanographic and Atmospheric Administration). 1982. Climate of South Carolina. Climate of the US. No. 60. National Climatic Data Center. Asheville, NC. 18pp.
- NOAA. 1983. South Carolina Statewide Average Climatic History, 1887-1982. National Climatic Data Center. Asheville, NC. 33pp.
- Porcher, F. A. 1950. The History of the Santee Canal. South Carolina Public Service Authority, Moncks Corner, SC. 11pp.
- Porcher, R. D. 1981. The Vascular flora of th Francis Beidler Forest in Four Holes Swamp, Berkeley and Dorchester Counties, South Carolina. Castanea 46:248-280.
- Penfound, W. T. 1952. The southern swamps and marshes. Bot. Rev. 18:413-446.
- Quarterman, E., C. Keever. 1962. Southern mixed hardwood forest: climax in the southeastern coastal plain. Ecological Monographs, 32:167-185.
- Radford, E. A., H. E. Ahles and C. R. Bell. 1964. Manual of the Vascular Flora of the Carolinas. University of North Carolina Press, Chapel Hill, NC. 1183pp.
- Rayner, D. A., C. Aulback-Smith, W. T. Batson, C. L. Rogers and other members of the South Carolina Advisory Committee on Rare, Threatened and Endangered Vascular Plants. 1984. Native Vascular Plants Rare, Threatened or Endangered in South Carolina. Unofficial list of the S. C. Heritage Program and the S. C. Nature Conservancy. Heritage Trust Program, Columbia, SC. 25pp.
- Richards, P. W. 1952. The Tropical Rain Forest. Cambridge University Press:London. 450pp.
- Rorison, I. H. 1968. Ecological aspects of the mineral nutrition of plants. A symposium of the British Ecological Society. Blackwell Scientific Publications, Oxford and Edinburgh.
- Snyder, L. H., Jr. and J. G. Bruce. 1986. Field Guide to the Ferns and Other Pteridiophytes of Georgia. University of Georgia Press, Athens, GA. 270pp.

- Soblo, D. E. and J. E. Fairey. 1988. Flora of Givhans Ferry State Park. Association of Southeastern Biologists Bulletin 35(2):87.
- Staff of the Liberty Hyde Bailey Hortorium. 1976. Hortus Third. Macmillan Publishing Company, New York, NY. 1290pp.
- Stoney, J. G. 1955. Plantations of the Carolina Low Country. Carolina Art Association, Charleston, SC. 247pp.
- The South Carolina Nature Conservancy (SCNC) 1988. The Carolina Conservancy News, Summer 1988. SCNC, Columbia, SC.
- United States Department of Agriculture (USDA) Soil Conservation Service. 1956-1983. County soil surveys for South Carolina. National Cooperative Soil Survey. USDA Soil Conservation Service, South Carolina Agricultural Experiment Station, and South Carolina Land Resources Conservation Commission.
- Watts, W. A. 1971. Postglacial and interglacial vegetation history of Southern Georgia and Central Florida. Ecology 54(4):676-690.
- Wells, B. W. 1942. Ecological problems of the southeastern United States coastal plain. Bot. Rev. 8:533-561.
- Whitehead, D. R. 1973. Late-Wisconsin regetational changes in unglaciated eastern North America. Quaternary Research 3:621-631.

