VEGETATION of SAPELO ISLAND

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THE VASCULAR VEGETATION OF SAPELO ISLAND, GEORGIA

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The purpose of this study was to determine the taxa of vascular plants reproducing naturally on Sapelo Island, to describe the vegetative types involved, and to enumerate factors which have affected the flora and those which possibly have done so. To this end field surveys were initiated in 1954, an intensive all-seasons study conducted in 1956, and occasional trips made through 1978. In all 105 days were spent on the surveys. Most of the time one or more persons assisted with these. Specimens were collected for study and deposited as vouchers in the University of Georgia Herbarium. Literature review, personal interviews, and my own observations provided the data on factors influencing the flora.

The presentation to follow gives a brief description of Sapelo Island, reviews factors that may have influenced the flora, and describes the flora primarily as it was in the 1950's. During my last visits to Sapelo Island I saw no evidence that heavy lumbering or other management practices had altered appreciably the taxa present or the vegetative types. The assumption is logical, therefore, that the analysis of the flora as presented here is applicable today.
INTRODUCTION

Sapelo Island is one of Georgia's several "Golden Isles." It is approximately midway of the Georgia coastline being about 40 miles south-southwest of Savannah and 49 miles north-northeast of the Florida-Georgia boundary. United States Coast and Geodetic Survey Chart #574 shows the center of the island at approximately 81° 15' W longitude and 31° 27' N latitude. Immediately to the southwest across Doboy Sound is the delta of the Altamaha River. Sediments from this river reach the salt marshes of Sapelo and probably the beach at the southern end.

A number of smaller islands closely associated with Sapelo may have been considered at one time a part of it. An unpublished map of Sappola (Sapelo) Island (DeBrahm, 1760) shows Blackbeard Island, Cabrata (Cabretta) Island, Naney (Nanny) Goat Island, Billy Goat Island, and Little Sappola (Sapelo) Islands as parts of Sapelo. Blackbeard Island, which is a United States Fish and Wildlife Refuge, is now recognized as a separate island. Little Sapelo and Billy Goat Islands, which are on the inland side of the main island, are respectively about 93 and 85 per cent marshland with only about 220 and 80 acres being above high spring tide. Cabretta and Nanny Goat Islands are adjacent to the main part of Sapelo on the ocean side. They are separated from each other by an inlet and on the inland side from Sapelo by narrow salt marshes.

Blackbeard, Little Sapelo, and Billy Goat Islands were not included in the present study. Without these islands, and exclusive of salt marshes, Sapelo Island is about ten miles long, three miles
wide, and has an area of approximately 10,900 acres. There are over
four miles of beaches.

Much of Sapelo is over 8 feet above sea level, the highest
point being approximately 20 feet, no 20-foot contour line being
shown on the United States Geologic Survey contour maps.

FACTORS AFFECTING FLORA

Factors that affected or possibly affected the flora of Sapelo
may be conveniently considered under five headings: geology, climate,
soils, activities of man, and miscellaneous factors.

GEOLOGY

According to data presented by Hoyt (1968), the Sapelo complex
consists of Holocene and Pleistocene deposits. About 10% is of the
former and mostly involves Cabretta and Nanny Goat Islands. These
sediments are less than 5,000 years old. The Pleistocene deposits
are 20,000 to 40,000 years old and involve mostly the main part of
Sapelo. The sea fell to about 100-120 m below present levels about
19,000 to 18,000 b.p. (before present) and rose again to 1.5-2.0 m
below present level about 4,500 b.p. The consensus has generally
been that sea level has since remained between this and the present
level. This may not necessarily be correct for DePratter and Howard
(1981) present evidence that levels may have been 4 m lower 3,000-
2,400 b.p. If these analyses of the varying sea levels are essen-
tially accurate, then at least part of Sapelo has been available for
occupancy by land plants for 20,000-40,000 years.
The earliest Sapelo deposits likely were beach and dune ridges of the "mainland" of that time and easily could be directly colonized by vascular plants from it. Following this initial direct colonization, changing sea levels probably affected additions to the flora of Sapelo in several stages:

1. Migration was across salt marshes and streams during a period of higher seas.
2. Direct colonization occurred again with lowered seas until about 4,500 b.p.
3. From about 4,500 b.p. new migrants had to cross marshes and streams.
4. During the period 3,000-2,400 b.p. the sea level lowstand suggested by DePratter and Howard would provide a land bridge for direct colonization.
5. Since about 2,400 b.p. conditions were very likely as at the present.

Whatever the sequence of events, colonizing plants have had ready access to Sapelo over several millennia.

Another natural phenomenon, beach erosion, is considered the result of a slight persistent rise in sea level (ca. 15 cm per century) during approximately the last 2,400 years. The rate of this general erosion is slow. Nevertheless, one or more portions of the beach may undergo above average to severe erosion as depths of frontal shoals change and allow increased wave action locally. The net erosion for the beach as a whole remains low as much of the sand is deposited down-drift or is trapped by shoals which may serve as a
later source of sand for beach nourishment. These shifts in shoreline erosion and deposition have, of course, a profound effect on the vegetation of the beaches and dunes a major one being that extensive colonization is nearly always active somewhere along the shoreline.

Deposition on a beach leads to dune formation. On Sapelo the processes are essentially as described by Oertel and Larsen (1976) for St. Catherines, Ossabaw, Wassaw, and Tybee Islands, which lie on the Georgia coast north of Sapelo.

CLIMATE

The climate of Sapelo is too cold in most winters to allow tropical or subtropical vegetation to persist. The climate is sufficiently mild to allow some species characteristic of warmer areas to grow and reproduce naturally, e.g., Citrus aurantium, Sapindus marginatus, Forestiera segregata, and Ipomoea pes-caprae. Characteristics of the climate of the area are indicated by data provided by Plummer (1980) and presented below.

Weather data from 1944 through 1964 from McKinnon Airport on the southern end of Saint Simons Island, ca. 7 miles south of Sapelo, seem representative. Average annual rainfall was about 53 inches with one-half falling in the four months, June-September. Monthly values ranged from 0.1 to 21.2 inches. Mean minimum temperatures for the coldest months were about 43°F, temperatures as low as 32°F occurring on only 15 days per year. The lowest recorded temperatures were 14°F in December 1962 and 18°F in February 1958. The mean daily
maximum temperature in the summer was under 90°, only 49 days a year having a maximum of 90° or above. The highest recorded temperature was 102° in June 1950. A few 100° highs are recorded for May, July, and August in other years.

At Brunswick, about 20 miles from Sapelo, average annual rainfall over a 78-year period was 51.2 inches with a S.D. of 10.7 inches. During the period 1954-1973 the lowest annual rainfall was 32.9 inches in 1954 and the highest 74.9 inches in 1964. Thirty years of data through 1938 show the average date of the earliest frost as 3 December and the latest in the spring as 2 March, the average growing season, therefore, being 276 days, the longest of any recording weather station in Georgia.

Another climatic feature, hurricanes, may have had a profound influence on the vegetation of Sapelo. During some storms sea water has covered parts of the island and may have spread over the entire island for periods of a few hours on a number of occasions. Legaree (1833) tells of a gale in 1824 "which overflowed the island doing considerable damage from which the land has not yet recovered." Coulter (1940) reports that the hurricane of 1824 was severe, a wall of water six feet high sweeping across most of the island. Species intolerant of sea water would be at least severely damaged and perhaps even eradicated from the island under such circumstances.

Since fires are known to have been started by lightning and have burned over areas on Sapelo (personal interviews with long-time residents) it is reasonable to assume that these occurred and had their effects on the vegetation at intervals beginning not long after the first plant communities developed on the island.
SOILS

The soils of Sapelo seem typical of the barrier islands of Georgia as a whole as described by Hillestad, et al. (1975). They are derived primarily from quartz sands and are little changed from their parent materials. They generally have high permeability which results in low water-holding capacity and rapid leaching. Low cation exchange capacity puts nutrients at a premium, and they are vigorously recycled. Plants well adapted to these conditions include those with shallow wide-spreading root systems and evergreen leaves. Monk (1966) points out that recycling of the nutrients is favored by the more gradual leaf fall of evergreens and the moderate to strong resistance to decomposition, which spreads out nutrient release.

The soils of Sapelo range from deep extremely well-drained sands to very poorly drained thick black loam surface and subsurface horizons of gray sands. Most are strongly acidic but vary to basic, especially where seashells are present, e.g., the dunes and Indian kitchen middens. The distribution of many species on the island seems related to soil types, among the most obvious being those species needing or being favored by basic soil conditions.

Salts from the sea directly affect the vegetation of the beaches and nearby dunes by excluding most species and often altering individual plants that are able to grow there. High salt concentrations in some dune sands inhibit vertical percolation of rainfall through the dune, thus reducing the amount of vegetation through limited water supply. These salts also exert a profound influence on the vegetation of the salt and brackish marshes, especially limiting
species diversity. The abundant nutrients, however, allow the relatively few species present to be highly productive. Salt pans of the high salt marsh are so concentrated in salts (often two or more times that of sea water) that few if any vascular plants grow there. Plants are usually scattered in the margins of these pans, and in pans with relatively low salt concentrations.

ACTIVITIES OF MAN

Archaeological excavations reveal that pottery-making aboriginal populations inhabited the coastal islands of Georgia as early as 4,000 b.p. (Hillestad, et al., 1975). These early peoples did not practice agriculture and their influence on the vegetation was probably minor. Their refuse shells provided, and still provide, basic sites which support plant species absent to rare elsewhere. Fires, however, accidental or intentional, undoubtedly did affect the vegetation.

Indians inhabiting Sapelo adopted an agrarian culture which they practiced from about 830 b.p. until around 300 b.p., when Indians mostly left the islands (DePratter, 1980). In connection with voyages of 1562, '64, and '65 from Europe to the southeastern United States, Laudonniere (1975 translation) reported cultivated fields on a number of islands from northeastern Florida to southern South Carolina and, although he does not refer specifically to Sapelo, it is logical to include it among his observations as Indians of the agricultural era were present on Sapelo at that time. It follows as highly probable that vegetation was cleared for growing crops.
Indians may have introduced plants to Sapelo from other areas but, if so, I see no evidence that any species became naturalized, such as occurs in a disjunct population of *Ilex vomitoria* (which the Indians used) at an Indian site in Morgan County, Georgia.

The vegetation of Sapelo was affected by white man as early as 1595 for Jones (1978) reports that San Miguel, one of a party of shipwrecked Spaniards, found wild pigs there in that year. Jones also states that a mission, San Jose's, was established on the island about 1613. Fields are known to have been cleared around the mission. Later, around 1680, the Spaniards built a fort on Sapelo and attempted agricultural practices, including drainage of low land (Coulter, 1937). They abandoned the island in 1686, burning their buildings and "cutting down great orange trees."

In 1757, Oglethorpe made a treaty with the Indians giving the English control of areas that included Sapelo, but skirmishes with the Spanish over these areas occurred until the Treaty of Paris in 1763 (Jones, 1978). Sapelo was sold at public outcry in 1760 (Coulter, 1937) and this date marks the beginning of major changes in the vegetation brought about by man. These changes reached their peak just before the Civil War.

The important changes were effected by Thomas Spalding who eventually purchased much of Sapelo (4,000 acres in 1802). Under a slave system Spalding put much of his holdings in agriculture. As described by Coulter (1940), originally there were around 3,000 acres of natural prairie, the remaining land largely occupied by live oak and pine. Spalding drained most of the prairies and cleared much of the uplands of the forests. Live oak timber was sold to the
government for shipbuilding, probably a profitable endeavor. A scattering of individual live oaks was left in the uplands to provide shade for workers in the fields. In my opinion these later played an important role in reseeding nearby areas when they were essentially abandoned to natural succession at the end of the Civil War.

Spalding raised cotton, corn, and sugar cane principally. He introduced many plant species on Sapelo, testing the practicality of many fruits and shrubs. Among those he tried were grapes (Vitis); olives (Olea), mostly killed by the cold winter of 1835; indigo (Indigofera) about 1828; Mulberry trees (Morus) in great abundance; guinea grass (Panicum maximum Jacq.), which failed; gama grass (Tripsacum sp.), which the animals wouldn't eat; bermuda grass (Cynodon dactylon); Spanish bayonets (Yucca aloifolia) as a hedge for fencing but was eaten by the cattle; and Cherokee roses (Rosa laevigata) as fences.

Of all these introductions bermuda grass, Spalding's favorite, is now quite abundant. It should be noted that Governor Henry Ellis first brought bermuda grass to Georgia in 1751 and Spalding may not have made the first introduction of it on Sapelo. Mulberry plants are scattered throughout the island and are quite variable in leaf shape and hairiness, which may be due to Spalding's introductions. The Cudrania tricuspidata, which has reproduced naturally in the vicinity of the plantation buildings, may have been one of Spalding's "mulberry" introductions that has been able to persist. No exotic grapes are now on the island but an occasional naturally occurring Vitis vulpina has odd characteristics that may be due to gene "pollution" from the introduced grapes. Tripsicum dactyloides is of
rare occurrence on the island and might be descendent from Spalding's introduction. Cherokee roses occur only around the plantation buildings. They likely persist from Spalding's introductions. Spanish bayonets present on Sapelo may have been introduced but are more likely native. Plants of it are now scattered around the island, being the most common on the dunes area. There is no evidence that any other of the species listed above as planted by Spalding still exist on Sapelo. Additional species that are now reproducing naturally and were probably introduced intentionally, perhaps by Spalding, are:

- Paspalum notatum
- Populus alba
- Maclura pomifera
- Nymphaea mexicana
- Cinnamonum camphora
- Wisteria sinensis
- Kummerowa striata
- Citrus aurantinum
- Mentha X piperita

There are many other exotic species on the island that were probably not introduced intentionally although it is likely they are there incidental to white man's activities.

At the height of Spalding's agricultural efforts the southern half of Sapelo was cleared of natural vegetation except for the dunes areas, a band of woods along much of the salt marsh, selected areas near buildings (especially those near the mansion buildings), some undrained wet areas, and the scattered trees in the fields.

Spalding died in 1851, and after his death many cultivated areas were abandoned. Following the Civil War almost all of the island was essentially left to "return to nature". Extensive areas of pine and live oak-pine and some of the live oak communities are
of about the proper age to have arisen since that time through secondary succession. Of special interest to me is the occasional giant live oak which could easily have been one of the field shade trees, possibly providing acorns for seeding the surrounding abandoned fields.

Apparently the early owners of the north part of the island never developed agriculture as extensively as did Spalding, but much of what I have summarized for the south part of Sapelo applies to the north also, but to a lesser extent.

Man's influence on Sapelo after the Civil War is difficult to sort out chronologically. To do this is not especially important here, but some activities that have had a strong impact should be reviewed. Two large artificial lakes at the north end and a small one at the south end were built. Artesian wells were dug and the flow from them, often free, provided ample water for the lakes and other aquatic habitats that developed. This seems to have greatly increased the opportunity for aquatic plants, a number of species occurring only in these habitats. Further alterations in the environment included construction of canals and drainage ditches, enlargement of pastures and establishment of additional ones, construction of an airport, free grazing of swine and cattle over most of the island, and promotion of deer populations. Grazing, browsing, and grubbing by the animals had the greatest impact of all factors on the vegetation for the biomass of almost all herbaceous and many woody species was obviously lowered greatly and reproduction of most species, especially trees, was much reduced. A few exclosures, incidental to other activities, provide contrasting evidence of this occurrence.
In 1948-49 the Soil Conservation Service with cooperation of the owner, J. K. Reynolds, diked about twenty acres of salt marsh near and east of the Marine Institute buildings at the south end, and installed tidal gates. The facilities were in full operation by 1954. The purpose was to exclude salt water and improve the area for pasture and possibly other agronomic uses. Instead the area became highly acidic and completely devoid of vascular plants, the surface bleached to a nearly white condition. In 1958-59, tidal water began to reach the twenty acres, and soon clumps of vegetation appeared, mostly *Spartina alterniflora*, increasing in number and size as time passed. By 1964 vegetation covered about half of the area and a full return to the natural state, except for the dikes, is expected.

Other factors altering the character of the vegetation include periodic lumbering and fires, natural and man made. According to several long time residents, some fires were quite destructive.

**MISCELLANEOUS FACTORS**

The vegetation has also been influenced by activities that do not fall into the above categories. I observed that opossums are abundant on the island and defecate in a wide variety of places. *Persimmon* (*Diospyros*) seeds were observed in the feces, which could account for the frequent scattered plants of the species. The occurrence of young seedlings and feces with seeds in intermittent ponds was especially significant.

Squirrels were observed carrying and burying live oak acorns. They and other rodents could have been a factor in seeding areas.
during secondary succession, e.g. following the Civil War. Blue jays also were observed carrying live oak acorns and they as well as other birds were likely more important than the rodents in migration of live oak. Dominance of birds as a factor in migration of certain other tree species is described by Duncan and Gunn (1971). These combined actions could even have allowed live oak to be a primary occupant in many places.

VASCULAR FLORA

Presentation of the materials on the vascular flora of Sapelo will be under two major headings, vegetative types, and checklist of the naturally reproducing taxa.

VEGETATIVE TYPES

This analysis is designed to describe best the vegetation on Sapelo. If the various types chosen follow analyses of other islands, it is coincidental as analyses of most islands differ from each other and provide no uniform system to follow. I have chosen to divide the vegetation into 14 types; open dunes, wooded dunes, live oak, live oak-pine, pine-palmetto, pinelands, hammocks, cypress, salt marshes, pastures, ponds and lakes, freshwater lowlands, waste places, and cultivated grounds. Each will be considered in this order separately.

In this presentation woody plants are interpreted as being those species having some individuals known to have aboveground stems which live through winter freezes of the area. Tree species are those having some individuals 12 feet or more tall and a single basal stem 2 inches or more in diameter 4.5 feet above the ground.
1. Open Dunes

This element consists primarily of non-wooded active and arrested dunes. Included also are the upper beaches and high tide overwash areas which often have low small mounds of sand (mini-dunes). The mini-dunes primarily are in an accretion area at the south end of Sapelo (on Nanny Goat Island) where they are mostly in a broad band that narrows rapidly to the north. There are few to no active dunes along the northern part of the beaches (Cabretta Island). Here beach erosion has removed the dunes leaving an escarpment to seven feet tall cut into the wooded dunes. In one area this cutting has made a break through to the salt marsh behind Cabretta. Inter-dune flats are also included in this element.

Plants on beaches at high tide level and on overwash areas (exclusive of the mini-dunes) are usually scattered. Characteristic species present include:

- Atriplex pentandra
- Ipomoea pes-caprae
- Panicum amarum var. amarum
- Polygonum glaucum

On active dunes adjacent to or near the beaches occur the shrub, Iva imbricata, and herbs as follows:

- Cenchrus tribuloides
- Chamaesyce bombensis
- Chamaesyce polygonifolia
- Croton punctatus
- Heterotheca subaxilaris
- Hydrocotyle bonariensis
- Ipomoea stolonifera

- Salsola kali
- Sesuvium portulacastrum
- Spartina patens
- Oenothera humifusa
- Salsola kali
- Smilax auriculata
- Triplasis purpurea
- Uniola paniculata
- Yucca gloriosa
A comparison of species composition presented for similar habitats by Oertel and Larsen (1976) for St. Catherines, Ossabaw, Wassaw, and Tybee Islands shows strong similarities. One obvious difference in species listed, *Smilax bona-nox* on the four islands and *S. auriculata* on Sapelo, is apparently due to misidentifications. I have visited beaches and dunes on three of the islands and found that the dunes *Smilax* was almost entirely *S. auriculata*. These two species are easily confused unless specific characters are checked (See Duncan, 1975) and such an error is easily made.

As the dunes become older and less active, largely because of the vegetation present, additional species occupy them and further inactivate them. The most important species, including usually small and/or scattered individuals of tree species, are:

- *Bumelia tenax*
- *Cenchrus incertus*
- *Conyza canadensis* var. *pusilla*
- *Croton glandulosus* var. *septentrionalis*
- *Diodia teres*
- *Helianthemum corymbosum*
- *Ilex vomitoria*
- *Juniperus silicicola*
- *Myrica cerifera*
- *Opuntia humifusa* var. *humifusa*
- *Persea borbonia*
- *Pinus taeda*
- *Quercus geminata*
- *Yucca aloifolia*
- *Zanthoxylum clava-herculis*

Interdune areas and dune bases are frequently occupied by the above species but include others which are uncommon or absent on the dunes proper. Characteristic species include:

- *Andropogon glomeratus*
- *Andropogon longiberbis*
- *Monarda punctata*
- *Muhlenbergia filipes*
Baccharis halimifolia     Paryonychia baldwinii ssp. baldwinii
Centella asiatica          Phyla nodiflora
Cyperus retrorsus
    var. retrorsus
Dichromena colorata       Physalis viscosa ssp. maritima
Eragrostis refracta        Phytolacca rigida
Eustachys petraea          Polypogon maritimus
Fimbristylis caroliniana  Polypremum procumbens
Gaura angustifolia         Rhynchospora fascicularis var. fascicularis
Hedyotis procumbens        Sabatia stellaris
Krigia virginica           Sagina decumbens ssp. decumbens
Linum medium var. texanum
Ludwigia maritima          Vulpina octoflora

Interdune areas are also occupied by swales or ponds. On Sapelo these are few and mostly small and will be included under fresh water lowlands.

2. Wooded Dunes

Wooded dunes are prominent on Cabretta Island where they are adjacent to or near the shore because of erosion by the sea. In the southern part, on Nanny Goat Island, these are more inland, being separated from the beach by several open dunes and flats.

The canopy is composed of trees and tall shrubs. The common species involved are those on the arrested dunes list. Vines and other shrubs include:

Ampelopsis arborea       Smilax auriculata
Callicarpa americana     Smilax bona-nox
Farthenotissus quinquefolia  Toxicodendron radicans
Serenoa repens  Vitis rotundifolia

Herbs are uncommon or absent.

3. Live Oak

This vegetation type is not clearly differentiated from live oak-pine, there being intergrading stands, but the live oak, Quercus virginiana, singly dominates such large areas that a separate category is recognized. If any vegetative type characterizes the island, it would be the live oak with its huge trunks and giant branches draped with Spanish moss (Tillandsia usneoides). The northeast portion of the island is almost entirely of this type, but in less extensive separate areas this type occurs nearly throughout the wooded parts of the island. In regard to the number of species present the live oak type is also one of the highest of the island.

The canopy is, of course, almost entirely of live oak, being interrupted occasionally by one to a few individuals of other species, but mainly Magnolia grandiflora and Pinus taeda. A modification involving the addition of Liquidambar styraciflua to the canopy occurs mostly around parts of the large fresh water lake at the northern end of the island. Acer rubrum var. rubrum is occasional in this area.

Another modification occurs at the edge of salt marshes and river banks. Here Bumelia tenax (reaching 11 in. DBH) and Celtis laevigata (to 15 in. DBH) attain greater frequency and size than elsewhere. Carya glabra is occasionally found here. The occurrence solely in this community of such species as Sapindus marginatus and
Aesculus pavia, and of large plants of Vitis riparia (to 8 in. DBH) suggests these margins represent modified remnants of the original virgin forests in contrast to the other live oak communities which are very likely secondary growth.

There is a distinct tree understory element in the live oak communities. The most characteristic species are:

- *Aralia spinosa*
- *Carya ovalis*
- *Cornus asperifolia*
- *Ilex opaca*
- *Ilex vomitoria*

Other shrubs and vines in the live oak communities include:

- *Berchemia scandens*
- *Callicarpa americana*
- *Gaylussacia frondosa var. tomentosa*
- *Indigofera caroliniana*
- *Lyonia ferruginea*
- *Parthenocissus quinquefolia*

Under a closed canopy herbs are generally scattered except in the wetter depressions and where the canopy is thin. Herbs in the wet situations are not unique to the community, being characteristic of most other wet habitats and will not be enumerated here. Otherwise the most characteristic herbs are:

- *Carex cherokeensis*
- *Chasmanthium laxum*
- *Chasmanthium sessiliflorum*
- *Elephantopus tomentosus*
- *Oplismenus hirtellus ssp. setarius*
Dichanthelium commutatum
Dichanthelium oligosanthes var. oligosanthes
Polypodium polypodioides
Scleria triglomerata
Verbesina occidentalis

Herbs become more frequent as the canopy thins and may be quite abundant. Species diversity is high. Poaceae, Fabaceae, and Asteraceae are especially common. Many species are well distributed and it is difficult to select a few representative ones without the risk of being misleading. A few of the characteristic species, but not necessarily the most common, are:

- Andropogon ternarius
- Andropogon virginicus var. virginicus
- Aristida lanosa
- Aster dumosus
- Centrosema virginiana
- Cirsium nuttallii
- Desmodium ciliare
- Dicanthelium ovale var. ovale
- Erechtites hieracifolia
- Eupatorium recurvans
- Eupatorium capillifolium
- Galium hispidulum
- Hieracium gronovii
- Lechea villosa
- Lespedeza hirta
- Polymnia uvedalia
- Rubus betuifolius
- Sanicula canadensis
- Tradescantia ohiensis var. ohiensis
- Trichostema dichotomum
- Tridens flavus

4. Live Oak-Pine

The live oak-pine vegetative type was found over extensive areas. The pines were often large (35 in. DBH, 92 yrs. old; 38.5 in. DBH, 75 yrs. old) and most have been cut. An essentially closed live oak canopy was under many of the pines. It appears that removal
of the pines has hastened the succession to live oak in many parts of the lumbered areas.

The canopy of the live oak-pine areas consists predominately of *Quercus virginiana* and *Pinus taeda* and is mostly complete, but there are more thin places than in the live oak. Other species rarely occurring in the canopy of the live oak communities occur occasionally with these two species, *Magnolia grandiflora*, *Prunus serotina*, *Quercus hemispherica*, and *Sabal palmetto*.

Understory trees are essentially those of the live oak communities with the addition of:

- *Asimina parviflora*
- *Castanea ashei*
- *Cinnamomum camphora*

Several individuals of *Serenoa repens* in the live oak-pine were of tree size, to 22 feet tall. Shrubs and vines include:

- *Cocculus carolinus*
- *Ilex ambiguа*
- *Ilex glabra*

In the wettest parts of the live oak-pine occur *Itea virginica* and *Lyonia lucida*.

Herbaceous taxa of the live oak-pine communities include those of the live oak communities plus other species such as:

- *Apocynum cannabinum*
- *Asplenium platyneuron*
- *Dicanthelium aciculare*
- *Dicanthelium acuminatum* var. *acuminatum*
- *Pityopsis graminifolia* var. *microcephala*
- *Pteridium aquilinum* var. *pseudocaudatum*
- *Ruellia caroliniensis* ssp.
5. Pine-Palmetto.

Considerable areas are occupied by pine-palmetto vegetation. The pine canopy is rarely closed and often quite open. These pines are being cut but natural seeding is very good in most areas. The palmetto, *Serenoa repens*, forms dense thickets 4-5 feet tall, broken into large patches and interspersed and often encircled by a dense growth of other shrubs.

There are three variants in this vegetative type. One is characterized by *Pinus taeda* or *Pinus serotina* alone or in combination. In the second variant the canopy is predominately of *Pinus palustris*. The third variant may be designated as pine-shrub. Here the palmetto is mostly replaced by three codominants, *Quercus geminata*, *Persea borbonia*, and *Lyonia* spp. Other species are also common to the three variants. Tree species are:

- *Quercus nigra*
- *Quercus hemispherica*

Shrub-vines are abundant and include species that in more favorable habitats are distinctly of tree size. Characteristic species include:

- *Gaylussacia frondosa* var. *tomentosa*
- *Myrica cerifera*
- *Ilex glabra*
- *Smilax auriculata*
- *Vaccinium corymbosum*
Lyonia ferruginea    Vaccinium myrsinites
Lyonia fruticosa    Vaccinium stamineum
Lyonia lucida

Most herbs occur where the shrub growth is not dense. They are rarely abundant. Characteristic species include:

Aristida virgata    Eragrostis refracta
Carphephorus odoratissimus    Hypoxis juncea
Dicanthelium dichotomum var. ensifolium    Pterocaulon pycnostachyum
Dicanthelium sabulorum var. patulum    Rhynchospora plumosa
Xyris caroliniana

The canopy of the Pinus palustris community sometimes includes Pinus taeda and Quercus virginiana. Herbaceous species frequent to the community include Aristida purpurascens and A. spiciformis. The rare Asclepias pedicellata was found only here. Quercus myrtifolia of shrub stature is scattered in the community. It also occurs uncommonly in the pine-scrub variant for the only other locality on the island. On Sapelo a few specimens of Quercus chapmanii occur only in pine-shrub.

6. Pinelands.

These consist of pure stands of Pinus taeda (some attaining 30 in. DBH). Such stands often grade into pine-palmetto but are typically characterized by the lack of palmetto except for scattered plants. Subdominants are often poorly developed, the most common being Prunus serotina, Quercus geminata, Q. hemispherica, and Q. virginiana. Most of the tree species listed for the other vegetative types already discussed occur in the pinelands usually as
scattered individuals, as do the shrub-vines and herbs. Notably absent species include Aristida purpurascens, A. spiciformis, Pinus palustris, and Sapindus marginatus. Lumbering of the pines is extensive but natural reproduction is good.


The term "hammock" has been used variously but here is used for the live oak-palmetto association which is surrounded typically by pineland or pine-palmetto. Hammocks are not extensive in area but are distinctive due to the dense tree layer of live oak and dense shrub layer of Serenoa repens which excludes most other low trees and shrubs except for the few breaks in the palmetto cover. The hammocks therefore are essentially composed of live oak and palmetto.

The canopy occasionally contains scattered individuals of other species such as:

- Liquidambar styraciflua
- Magnolia grandiflora
- Quercus hemisphaerica
- Sabal palmetto

In the shrub-vine category the interior of the hammocks has few individuals other than of palmetto. However, frequently present are occasional plants of:

- Ilex opaca
- Ilex vomitoria
- Smilax pumila
- Vaccinium arboreum
- Vitis vulpina

At or near the margins of the hammocks are species commonly occurring in the pinelands or pine-palmetto communities. These occupy what might be considered a transition zone. Shrub-vines include:
Gaylussacia frondosa var. tomentosa
Lyonia ferruginea

Herbs are few, the most conspicuous usually being:
Asplenium platyneuron
Hedyotis procumbens

8. Cypress

The cypress occurs in a few small ponds and in some of the wet areas that were formerly rice fields. These occur inland across from the southern end of Blackbeard Island.

The canopy is generally thin and is composed primarily of Taxodium ascendens. A few trees of Nyssa biflora and Pinus serotina are usually present. Beneath the canopy occur a considerable number of species some of which occur in no other type of habitat. The shrub-vines include:
Cephalanthus occidentalis
Eupatorium leptophyllum

Characteristic herbs include:
Carex verrucosa
Dichanthelium acuminatum var. implicatum
Eleocharis parvula
Eriocaulon compressum
Eriocaulon decangulare
Gratiola ramosa
Hypericum cistifolium
Juncus polycephalus

Juncus repens
Panicum laeve var. pilosum
Pinguicula pumila
Polygala cymosa
Rhynchospora caudata
Rhynchospora cephalantha var. cephalantha
Rhynchospora filifolia
Spartina bakeri

This type of vegetation occurs throughout the mid- to high-tidal areas on the inland side of the island and along tidal creeks, rivers, and sounds. Counting these marshes as part of the total island area they cover approximately 35 percent.

The vegetation may be conveniently divided into four zones; (1) Grass, (2) Grass-Forb-Rush, (3) Shrub Border, and (4) Transition. Viewing the first two zones from the ground and at a distance of around 100 feet or more the vegetation seems to consist almost entirely of two species, Spartina alterniflora and Juncus roemerianus, the latter in the high-tide area only. In many areas this is actually true. At or near high tide levels plants of associated species become more numerous. However, the total number of species present in the saltmarsh is low when compared to vegetative types elsewhere. Analyses of the four zones follow.

**Grass Zone**

This zone begins at about median tide levels and intergrades with the Grass-Forb-Rush zone. The zone is dominated almost entirely by Spartina alterniflora with a few individuals of Sarcocornia perennis occurring from near midzone to the upper margin. Distichlis spicata is sometimes mixed with these two in the upper part of the zone.

**Grass-Forb-Rush Zone**

This occurs in the high tide areas and includes a special feature, salt pans. Spartina alterniflora is abundant to scattered
but is of short stature. It is often less obvious than the shrubs, which are of low stature, and the other herbs. *Juncus roemerianus* is often quite conspicuous, forming large essentially monospecific communities. Some of the other species, but to a lesser extent, also form such communities. Almost the only shrubs, which are common, are:

- *Batis maritima*
- *Borrichia frutescens*
- *Sarcocornia perennis*

The other principal herbs are:

- *Aster subulatus* var. *subulatus*
- *Aster tenuifolius*
- *Distichlis spicata*
- *Fimbristylis castanea*
- *Juncus marginatus*
- *Limonium carolinanum*
- *Salicornia europea*
- *Salicornia virginica*
- *Scirpus robustus*
- *Spartina patens*
- *Sporobolus virginicus*

Salt pans, which consist of flat firm sandy areas bare of vegetation, are unique to this zone. The salt concentration in the soil may be two or more times that of sea water. Plants with stems, usually rhizomes, that enable them to "run" into the flats from the margins are the most successful invaders. The species involved are usually *Batis maritima*, *Distichlis spicata*, and *Sporobolus virginicus*.

*Spartina cynosuroides* is rare on Sapelo, occurring only along a brackish creek penetrating the island. Apparently salt concentrations in the marshes are mostly not suitable for the species, in contrast to the situation on many other of the coastal islands where it does occur frequently.
Shrub Border Zone

The upper border of the salt marsh is infrequently to rarely flooded. It is dominated by shrubs but beneath are several species of herbs, some of which are peculiar to the zone. The zone is usually narrow but is sometimes broad where the marsh enters indentations of the shoreline. Common shrubs include:

- Baccharis angustifolia
- Baccharis halimifolia

Herbs are sometimes scarce under the shrubs but can be abundant where the shrub canopy is thin or absent. Among the plants present are occasional individuals of species common at lower tide levels. Other characteristic taxa include:

- Cynanchium angustifolium
- Cynanchium palustris
- Eleocharis albida
- Eleocharis flavescens
  - var. flavescens
- Heliotropium curassavicum
- Paspalum distichum
- Scirpus americanus
- Spartina bakeri
- Spartina patens
- Suaeda linearis

Transition Zone

This zone normally is not covered by high tides although strong northeasterly winds, especially during spring tides, and hurricanes may push sea water over these areas. In this sense these do not belong with the other saltmarsh zones. The vegetation, however, is so distinctly associated with the margin of the saltmarsh that I have chosen to include it in the treatment of the saltmarsh.
Trees common to the zone are:

- *Ilex vomitoria*
- *Juniperus silicicola*

Less common trees include:

- *Forestiera segregata*
- *Xanthoxylum clava-herculis*
- *Sabal palmetto*

Shrub-vines include:

- *Ampelopsis arborea*
- *Vitis aestivalis*
- *Baccharis halimifolia* (shrub size here)

Characteristic herbs are:

- *Atriplex pentandra*
- *Solidago sempervirens* var.
- *Chenopodium album*
- *Euthamnia tenuifolia*
- *Suaeda linearis*
- *Panicum virgatum* var. *virgatum*


These are mostly grasslands with a few to rarely abundant broadleaf herbs and a few scattered trees and shrubs. The latter sometimes occur in clumps. Woody plants are generally limited in numbers principally because of grazing and periodic mowing. Most parts of the pastures are on sandy upland soils or are well drained, although some are poorly drained. Species more typical of the latter in the lists below are indicated with an asterisk.

Principal trees (often shrub size) are:

- *Baccharis halimifolia*
- *Pinus elliottii*
Diospyros virginiana  Pinus taeda
Myrica cerifera  Sabal palmetto

Shrub-vines include small individuals of some of the above and:

Helianthemum corymbosum  Rubus betulifolius
Hypericum myrtifolium  Rubus trivialis
Hypericum tetrapteralum*  Serenoa repens

Herbs are mostly grasses, mainly Cynodon dactylon and Paspalum notatum var. saurae. Other species include:

Arenaria serpyllifolia  Gnaphalium obtusifolium var. obtusifolium
Cassia nictitans
Cenchrus incertus  Hydrocotyle bonariensis*
Centella asiatica*  Krigia virginica
Cnidoscolus stimulosus  Paspalum floridanum var. floridanum*
Coelorachis rugosa*  Paspalum laeve var. laeve*
Cuscuta pentagonia  Rhynchospora rariflora*
Eriochloa michauxii*  Spartina bakeri*
Fimbristylis castanea*  Sporobolus indicus
Galactia elliottii

11. Ponds and Lakes.

Both artificial and natural bodies of water occur on the island. The former were supplied with water from artesian wells and generally maintained a distinct level until the wells quit flowing. The natural ones are generally intermittent although a few persist at low levels, the number persisting and the amount of water in any of them being closely correlated with rainfall. Marginal vegetation of the ponds and lakes is so similar to that of some of the lowlands...
communities that it is treated with them, although somewhat arbitrarily since it usually is a narrow band intimately associated with the water of the ponds. Cypress ponds, too, have been treated separately.

Trees occurring within the pond and lake areas are almost exclusively:

- **Cephalanthus occidentalis**
- **Nyssa biflora**
- **Diospyros virginiana**
- **Salix caroliniana**

Species at the margins include the above and:

- **Acer rubrum var. rubrum**
- **Magnolia virginiana**
- **Acer rubrum var. trilobum**
- **Persea pubescens**
- **Ilex cassine**
- **Pinus elliottii**

Shrub-vines are almost always at or near the margins and include:

- **Baccharis halimifolia**
- **Smilax laurifolia**
- **Decodon verticillata**
- **Toxicodendron radicans**
- **Sambucus simpsonii**
- **Vitis vulpina**

Herbs are abundant. It is convenient to divide them into three groups of species; free floating, rooted plants with submerged or floating leaves, and rooted plants with emergent leaves. Free floating species include:

- **Azolla caroliniana**
- **Salvinia minima**
- **Lemna aequinoctialis**
- **Spirodela polyrhiza**
- **Lemna obscura**
- **Wolffia columbiana**
- **Lemna valdiviana**
- **Wolffiella gladiata**

Rooted plants with submerged or floating leaves include:

- **Ceratophyllum demersum**
- **Potamogeton nodosus**
- **Limnobium spongia**
- **Potamogeton illinoensis**
here used includes a strongly overlapping series of different communities from areas nearly free of plants to impenetrable masses and from complete exposure to the sun to forest with dense storied vegetation. The species components also intergrade and a considerable number occur in almost all types. There is one major binding element: the species have a requirement, preference, or tolerance for moist or wet substratum. Since there is no clear vegetative distinction between the kinds of communities and they have this common bond, they have been lumped as fresh water lowlands. They are almost all of limited size. As has already been pointed out the marginal vegetation of ponds and lakes is also included in the fresh water lowlands.

Quite a variety of species occur in the fresh water lowlands. The most distinctive species are those that rarely or never grow in drier habitats. The more characteristic of these species will be included below. Species occupying a range of habitats, such as Diospyros virginiana and Liquidambar styraciflua will be omitted.

The most distinctive trees of the fresh water lowlands are:

- Betula nigra
- Cephalanthus occidentalis
- Ilex cassine
- Magnolia virginiana
- Nyssa biflora
- Salix caroliniana

The more characteristic shrubs are:

- Aronia arbutifolia
- Itea virginica
- Lyonia lucida
- Sabal minor
Luziola fluitans  
Myriophyllum pinnatum  
Najas guadalupensis  
Nymphaea mexicana  
Nymphaea odorata

*Note: In a brackish pond.

Rooted plants with emergent leaves include:

Asclepias lanceolata  
Bidens laevis  
Carex walteriana  
Cicuta mexicana  
Cynoctonum mitreola  
Cyperus odoratus  
Echinochloa walteri  
Eleocharis tuberculosa  
Erianthus giganteus  
Eupatorium serotinum  
Fimbristylis autumnalis  
Hypericum cistifolium  
Juncus megacephalus  
Ludwigia leptocarpa  
Ruppia maritima*  
Sagittaria graminea var. chapmanii  
Sagittaria subulata  
Utricularia inflata  
Vallisneria americana

12. Fresh Water Lowlands.

Some of these communities are broadly dissimilar and could be treated as separate vegetative types. For example, open canals and ditches, forb-shrub depressions, and lowland forests are certainly different environments. However, the entire range of lowlands as
Other characteristic species are:

- Aeschynomene indica
- Abutilon theophrasti
- Amaranthus gracilis
- Conyza bonariensis
- Eleusine indica
- Ipomoea pandurata
- Lepidium virginicum
- Nothoscordum bivalve
- Portulaca oleracea
- Rubus trivialis
- Triodanis spp.
- Xanthium strumarium var. strumarium


These include fields, gardens, yards, and ornamental borders. Obviously waste places as used in the previous category often lie immediately adjacent to such cultivated areas. However, the cultivated areas are in general much more influenced by man's activities. This difference has some bearing on the species present and justifies separate treatment.

Species which are planted and do not reproduce naturally are not considered in this analysis.

Trees include:

- Carya illinoensis
- Cinnamomum camphora
- Cudrinia tricuspidata

Shrubs-vines include:

- Lonicera japonica
- Lantana camara var. camara
- Rosa laevigata
- Wisteria sinensis
Herbaceous species are many and only a selection of representative ones is listed as follows:

- Ammannia latifolia
- Bacopa monnieri
- Boehmeria cylindrica
- Cyperus brevifolius
- Cyperus haspan
- Diodia virginiana
- Echinochloa walteri
- Eleocharis tricostata
- Fuirena breviseta
- Hibiscus grandiflorus
- Hydrocotyle umbellata
- Juncus effusus var. solutus
- Juncus scirpoides
- Kosteletzkya virginica
- Ludwigia linearis
- Ludwigia palustris
- Micranthemum umbrosum
- Phyla nodiflora
- Ptilimnium capillaceum
- Sciolepis striata
- Saururus cernuus
- Spartina bakeri
- Triadenum virginicum
- Woodwardia areolata


A number of species occur primarily along roadsides and the drier sides of drainage ditches and canals, at edges of fields and pastures, and in relatively unkept areas around buildings. For example, the Thelypteris spp. occur largely on banks of ditches and canals, Cerastium glomeratum at borders of yards, and Sesbania punicea on banks of ditches and canals and at edge of fields and pastures. Additional species invade the waste places from adjacent areas having different types of vegetation.
Common herbs include:

- Arenaria serphyllifolia
- Boerhaavia erecta
- Cassia obtusifolia
- Clerodendron indicum
- Cyperus globosus
- Lamium amplexicaule
- Lepidium virginicum
- Medicago spp.
- Modiola caroliniana
- Mollugo verticillata
- Physalis angulata
- Pyrrhopappus georgianus
- Richardia scabra
- Sonchus asper
- Sorghum halapense
- Stellaria media
- Trifolium carolinianum
- Veronica peregrina var. xalapensis

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CHECKLIST OF VASCULAR PLANTS

The species listed below are those vascular plants known to reproduce naturally on the island. They are divided into PTERIDOPHYTA and SPERMATOPHYTA and these into families as presented by Duncan and Kartesz (1981). One or more voucher specimens of each taxon (species, subspecies, or variety) is on deposit in the University of Georgia herbarium, where they are filed by genera according to generic numbers (except for Pteridophyta) which for convenience are presented in the list. Nomenclature is also that of Duncan and Kartesz except for a few changes due to recent taxonomic studies. Synonyms are given for most of the recent name changes.

The list to follow includes the following numbers of taxa:

PTERIDOPHYTA

SPERMATOPHYTA

Gymnosperms

Angiosperms

Monocots

Dicots

TOTAL

Of these taxa 65 are trees and 64 shrubs or vines and are indicated by T and S respectively. Abundance of each of the 604 taxa is indicated as common (C), infrequent (I), or rare (R). The 604 taxa are approximately one-sixth of the total reported for Georgia by Duncan and Kartesz. Comparison with the flora of two other Georgia islands seems useful. Terry Denise Holcomb, Georgia Department of Natural Resources, (personal communication, 22 August 1980) reports
454 taxa in a survey in progress of the Flora of Ossabaw Island. Of these, 69 species are trees and 49 shrubs or vines. For Cumberland Island Hillestad, et al. (1975) report 410 taxa with 56 taxa being trees and 80 shrubs or vines. Forty-two woody and 59 herbaceous taxa reported are not known from Sapelo. Conversely 29 woody and 268 herbaceous taxa occur naturally on Sapelo and are not reported for Cumberland.
OSMUNDACEAE

Osmunda cinnamomea L. C
O. regalis L. var. spectabilis (Willd.) Gray I

POLYPODIACEAE

Polypodium polypodioides (L.) Watt. C

DENNSTAEDTACEAE

Pteridium aquilinum (L.) Kuhn var. pseudocaudatum (Clute)
Heller C

ASPLENIACEAE

Asplenium platyneuron (L.) Oakes ex D. C. Eaton C
Thelypteris kunthii (Desv.) Morton I
Dryopteris normalis Christens.
T. palustris Schott var. haleana Fern. I
Dryopteris thelypteris (L.) Sw.

BLECHNACEAE

Woodwardia areolata (L.) Moore C
W. virginica (L.) J. Sm. R
Anchistea virginica (L.) Presl.

SALVINIACEAE

Salvinia minima Baker R
S. rotundifolia Willd.

AZOLLACEAE

Azolla caroliniana Willd. R

SPERMATOPHYTA

PINACEAE

22. Pinus elliottii Engelm. TC
P. palustris Mill. TC
P. serotina Dougl. TC
P. taeda L. TC

TAXODIACEAE

35. Taxodium ascendens Brongn. Tl

CUPRESSACEAE

45. Juniperus silicicola (Small) Bailey TC

TYPHACEAE

49. Typha domingensis Pers. C

POTAMOGETONACEAE

58. Potamogeton nodosus Poir. R
     P. illinoensis Morong. R

59. Ruppia maritima L. I

NAJADACEAE

64. Najas guadalupensis (Spreng.) Magnus I

SCHUCHZERIACEAE

66. Triglochin striata R. & P. R

ALISMATACEAE

78. Sagittaria graminea Michx. var. chapmanii J. G. Sm. I
     S. lancifolia L. I
     S. subulata (L.) Buch. I

HYDROCHARITACEAE

89. Vallisneria americana Michx. R

97. Limnobium spongia (Bosc) Steud. R

POACEAE

103. Tripsacum dactyloides (L.) L. R

112. Erianthus coarctatus Fern. I
     E. brevibarbus sensu auth., non Michx.
E. giganteus (Walt.) Muhl.  C

128. Coelorachis rugosa (Nutt.) Nash  R

Manisuris rugosa (Nutt.) Kuntze

134. Andropogon glomeratus (Walt.) B.S.P.  C

A. longiberbis Hack.  I

A. ternarius Michx.  C

A. virginicus L. var. virginicus  C

A. virginicus L. var. glaucopsis (Ell.) Hitchc.  I

134A. Schizachyrium stoloniferum Nash  I

Andropogon stolonifer (Nash) Hitchc.

134B. Sorghastrum elliottii (Mohr) Nash  C

S. secundum (Ell.) Nash  I

134C. Sorghum halepense (L.) Pers.  C

161. Paspalum boscianum Flugge  I

P. difforme LeConte  I

P. dilatatum Poir.  C

P. dissectum (L.) L.  I

P. distichum L.  C

P. floridanum Michx. var. floridanum  I

P. giganteum Baldw. ex Vasey  I

P. laeve Michx. var. laeve  I

P. laeve Michx. var. pilosum Schribn.  R

P. longipilum Nash

P. notatum Flugge var. saurae Parodi  C

P. praecox Walt.  I

P. lentiferum Lam.

P. setaceum Michx. var. ciliatifolium (Michx.) Vasey  C

P. setaceum Michx. var. longipedunculatum (LeConte) Wood  I
P. setaceum Michx. var. supinum (Bosc ex Poir.) Fern. I

P. urvillei Steud. C

P. vaginatum Sw. C

161A. Axonopus affinis Chase C

A. furcatus (Flugge) Hitchc. C

164. Eriochloa michauxii (Poir.) Hitchc. R

166. Panicum amarum Ell. var. amarum I

P. dichotomiflorum Michx. I

P. rhizomatum Hitchc. & Chase C

P. rigidulum Bosc ex Nees C

P. agrostoides Spreng.; P. longifolium Torr.

P. verrucosum Muhl. C

P. virgatum L. var. virgatum C

166A. Dichanthelium aciculare (Desv. ex Poir.) Gould & Clark C

Panicum fusiforme Hitchc.

D. acuminatum (Sw.) Gould & Clark var. acuminatum C

Panicum lanuginosum Ell

D. acuminatum (Sw.) Gould & Clark var. implicatum

(Schribn.) Gould & Clark R

Panicum leucothrix Nash

D. commutatum (Schult.) Gould C

Panicum commutatum Schult.; P. equilaterale Scribn.

D. consanguineum (Kunth) Gould & Clark I

Panicum consanguineum Kunth

D. dichotomum (L.) Gould var. ensifolium (Bald. ex Ell.)

Gould & Clark C

Panicum chamaelonche Trin.; P. ensifolium Bald. ex Ell.
D. laxiflorum (Lam.) Gould C

Panicum laxiflorum Lam.; P. xalapense H.B.K.

D. leucoblepharis (Trin.) Gould & Clark var. leucoblepharis I

Panicum ciliatum Ell.

D. oligosanthes (Schult.) Gould var. oligosanthes C

Panicum oligosanthes Schult.

D. ovale (Ell.) Gould & Clark var. ovale I

Panicum ovale Ell.

D. sabulorum (Lam.) Gould & Clark var. patulum (Scribn. & Merr.) Gould & Clark C

Panicum lancearium Trin.

D. sabulorum (Lam.) Gould & Clark var. thinium (Hitche. & Chase) Gould & Clark I

Panicum portoricense Desv. ex Hamilt.

D. scabriusculum (Ell.) Gould & Clark C

Panicum scabriusculum Ell.

D. scoparium (Lam.) Gould I

Panicum scoparium Lam.

166B. Sacciolepis striata (L.) Nash C

166C. Echinochloa walteri (Pursh) Heller C

166D. Digitaria sanguinalis (L.) Scop. C

D. serotina (Walt.) Michx. I

D. villosa (Walt.) Pers. C

169. Oplismenus hirtellus (L.) Beauv. ssp. setarius (Lam.) Mez ex Ekman R

171. Setaria corrugata (Ell.) Schult. C

S. geniculata (Lam.) Beauv. C
S. macrosperma (Scribn. & Merr.) K. Schum. R
S. magna Griseb. I

174. Cenchrus echinatus L. C
C. incertus M. A. Curtis C
C. pauciflorus Benth.
C. tribuloides L. C

180. Stenotaphrum secundatum (Walt.) Kuntze C

188. Luziola fluitans (Michx.) Terrel & H. Robins. R
Hydrochloa carolinensis Beauv.

204. Phalaris caroliniana Walt. R
205. Anthoxanthum odoratum L. C

208. Aristida lanosa Muhl. ex Ell. I
A. purpurascens Poir. C
A. spiciformis Ell. I
A. virgata Trin. C

209. Stipa avenacea L. C

215. Muhlenbergia filipes M. A. Curtis C

230. Sporobolus clandestinus (Biehler) Hitchc. C
S. indicus (L.) R. Br. C
S. virginicus (L.) Kunth C

233. Polypogon maritimus Willd. C
242. Agrostis scabra Willd. I

270A. Sphenopholis obtusata (Michx.) Scribn. var. obtusata C
282. Cynodon dactylon (L.) Pers. C

283. Spartina alterniflora Loisel. C
S. bakeri Merr. C
S. cynosuroides (L.) Roth R
S. patens (Ait.) Muhl. C
288A. Eustachys petraea (Sw.) Desv. C
   Chloris petraea Sw.
304. Eleusine indica (L.) Gaertn. C
335. Tridens flavus (L.) Hitchc. var. flavus C
335A. Triplasis purpurea (Walt.) Chapm. C
341. Eragrostis elliottii S. Wats. C
   E. refracta (Muhl.) Scribn. I
355. Melica mutica Walt. C
365. Uniola paniculata L. C
365A. Chasmanthium laxum (L.) Yates C
   Uniola laxa (L.) B.S.P.
   C. sessiliflorum (Poir.) Yates C
   Uniola sessiliflorum Poir.
366. Distichlis spicata (L.) Greene C
378. Poa annua L. C
385. Vulpina octoflora (Walt.) Rydb. C
   Festuca octoflora Walt.
411. Elymus virginicus L. I
414. Arundinaria gigantea (Walt.) Muhl. ssp. tecta (Walt.) McClure SR

CYPERACEAE

459. Cyperus brevifolius (Rotth.) Endl. ex Hassk. C
   C. filicinus Vahl C
   C. globulosus Aubl. C
   C. haspan L. C
C. odoratus L.  I
C. ovularis (Michx.) Torr.  I
C. polystachyos Rottb. var. texensis (Torr.) Fern.  C
C. pseudovegetus Steud.  I
C. retrorsus Chapm. var. retrorsus C
C. rotundus L.  C

467. Fuirena breviseta (Cov.) Cov.  C
468. Scirpus americanus Pers.  C
S. tabernaemontani K. C. Gmel.  I
S. validus Vahl.
469. Eleocharis albida Torr.  C
E. flavescens (Poir.) Urban var. flavescens  C
E. parvula (R. & S.) Link ex Buff. & Fingerh.  R
E. tricostata Torr.  I
E. tuberculosa (Michx.) R. & S.  R

471. Fimbristylis autumnalis (L.) R. & S.  I
F. caroliniana (Lam.) Fern.  C
F. harperi Britt.
F. castanea (Michx.) Vahl  C
471A. Bulbostylis barbata (Rottb.) Clarke  I
B. floridanus (Britt.) Fern.
B. stenophylla (Ell.) Clarke  I
473. Dichromena colorata (L.) Hitchc.  I
492. Rhynchospora caduca Ell.  R
R. cephalantha Gray var. cephalantha  R
R. corniculata (Lam.) Gray  C
R. fascicularis (Michx.) Vahl. var. fascicularis  C
R. filifolia Gray I
R. plumosa Ell. I
R. rariflora (Michx.) Ell. I

515. Scleria ciliata Michx. var. glabra (Chapm.) Fairey R
      S. brittonii Core
      S. reticularis Michx. var. reticularis I
      S. muhlenbergia Steud.
      S. triglomerata Michx. C

525. Carex cherokeensis Schwein. C
      C. glaucescens Ell. I
      C. longii Mack. I
      C. verrucosa Muhl. R
      C. walteriana Bailey I

ARECACEAE

547. Sabal minor (Jacq.) Pers. SC
      S. palmetto (Walt.) Lodd ex Schult. & Schult. TI

548. Serenoa repens (Bartr.) Small TC

LEMNACEAE

794. Spirodela polyrhiza (L.) Schleid. R
795. Lemna aequinoctialis Welwitsch I
      L. perpusilla auct. amer. non Torr.
      Lemna obscura (Austin) Daubs I
      Lemna valdiviana Phil. C

796. Wolffia columbiana Karst I
796A. Wolfiella gladiata (Hegehme.) Hegehme. R
      W. floridana (J. D. Smith ex Hegehme.) C. H. Thomp.
XYRIDACEAE

826. Xyris caroliniana Walt.  I
     X. flexuosa Muhl. ex Ell.

ERIOCAULACEAE

828. Eriocaulon compressum Lam.  R
     E. decangulare L.  R

BROMELIACEAE

890. Tillandsia usneoides (L.) L.  C

COMMELINACEAE

896. Commelina erecta L. var. angustifolia (Michx.) Fern.  C
     C. benghalensis L.  R

911. Tradescantia ohiensis Raf. var. ohiensis  C

PONTEDERIACEAE

922. Pontederia cordata L.  C
     P. lanceolata Nutt.

JUNCACEAE

936. Juncus effusus L. var. solutus Fern. & Wieg.  C
     J. marginatus Rostk.  C
     J. biflorus Ell.
     J. megacephalus M. A. Curtis  C
     J. polycephalus Michx.  R
     J. repens Michx.  I
     J. roemerianus Scheele  C
     J. scirpoides Lam.  I
     J. tenuis Willd.  C

LILIACEAE

1050. Nothoscordum bivalve (L.) Britt.  I
1103. **Yucca** - See AGAVACEAE

1113. **Asparagus officinalis** L. R

1151. **Smilax** - See SMILACEAE

1230. **Hypoxis juncea** Sm. R

**AGAVACEAE**

1103. **Yucca aloifolia** L. TI

**Y. flaccida** Haw. SI

**Y. filamentosa** sensu auth., non L.

**Y. gloriosa** L. TI

**SMILACACEAE**

1151. **Smilax auriculata** Walt. SC

**S. bona-nox** L. SI

**S. glauca** Walt. SC

**S. laurifolia** L. SC

**S. pumila** Walt. SC

**IRIDACEAE**

1264. **Iris virginica** L. I

1286. **Sisyrinchium albidum** Raf. I

**CANNACEAE**

1363. **Canna flaccida** Salisb. R

**ORCHIDACEAE**

1410. **Platanthera cristata** (Michx.) Lindl. R

**Habenaria cristata** (Michx.) R. Br.

1422. **Habenaria quinqueseta** (Michx.) A. A. Eaton R

**H. repens** Nutt

1490. **Spiranthes praecox** (Walt.) Wats. I

**S. tuberosa** Raf. I
S. grayi Ames
S. vernalis Engelm. & Gray

1502. Zeuxinestrateumatica (L.) Schltr. R
1548. Corallorzahawisteriana Conrad R
1629. Hexalectris spicata (Walt.) Barnh. R
1648. Pteroglossaspis ecristata (Fern.) Rolfe R

Eulophia ecristata (Fern.) Ames

SAURURACEAE
1856. Saururuscernuum L. C

SALICACEAE
1872. Populusalba L. TR
1873. Salix caroliniana Michx. TC

S. longipes Shuttlew.

MYRICACEAE
1874. Myrica cerifera L. TC

M. pusilla Raf.

JUGLANDACEAE
1882. Carya glabra (Mill.) Sweet TI

C. illinoensis (Wang.) K. Koch TR
C. ovalis (Wang.) Sarg. TR

BETULACEAE
1887. Betulanigra L. TR

FAGACEAE
1891. Castaneapumila (L.) Mill. var. ashei Sudw. TR
1893. Quercus chapmanii Sarg. TR
Q. geminata Small TC
Q. hemispherica Bartr. TC
Q. myrtifolia Willd. TR
Q. nigra L. TI
Q. stellata Wang. TR
Q. virginiana Mill. TC

ULMACEAE
1898. Celtis laevigata Willd. TI

MORACEAE
1913. Morus rubra L. TI
1918. Maclura pomifera (Raf. ex Sarg.) Schneid. TR
1942. Cudrania tricuspidata (Carr.) Bur. ex Lavallee TR

URTICACEAE
1990. Boehmeria cylindrica (L.) Sw. C

P. nummularia Small

LORANTHACEAE
2089. Phoradendron serotinum (Raf.) M. C. Jonst. SC

POLYGONACEAE
2195. Rumex hastatulus Baldw. ex Ell. C
2201. Polygonum glaucum Nutt. R

P. hydropiperoides Michx. var. hydropiperoides C
P. punctatum L. var. confertiflorum (Meisn.) Fassett I

P. punctatum Ell. var. leptostachyum (Meisn.) Small
P. scandens L. var. cristatum (Engelm. & Gray) Gl. C

CHENOPODIACEAE
2223. Chenopodium album L. C

C. ambrosioides L. C
2229. Atriplex pentandra (Jacq.) Standl. sensu lato C
2257. Salicornia europaea L. sensu lato  I  
   S. perennis Mill. – See Sarcocornia 
   S. virginica L.  C 
   S. bigelovii Torr. 

2257A. Sarcocornia perennis (Mill.) A. J. Scott  SC 
   Salicornia virginica sensu auth., non L. 

2261. Suaeda linearis (Ell.) Moq.  C 

2269. Salsola kali L.  C 

AMARANTHACEAE 

2299. Amaranthus gracilis Desf.  I 
   A. spinosus L.  C 

2332. Froelichia floridana (Nutt.) Moq.  R 

2339. Iresine rhizomatosa Standl.  I 

NYCTAGINACEAE 

2349. Boerhavia erecta L.  R 

BATACEAE 

2362. Batis maritima L.  SC 

PHYTOLACCACEAE 

2380. Phytolacca rigida Small  C 

MOLLUGINACEAE 

2387. Mollugo verticillata L.  C 

AIZOACEAE 

2394. Sesuvium maritimum (Walt.) B.S.P.  I 
   S. portulacastrum L.  I 

PORTULACACEAE 

2421. Portulaca oleracea L.  I 
   P. pilosa L.  I
**Caryophyllaceae**

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<th>No.</th>
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<tr>
<td>2429.</td>
<td>Stellaria media (L.) Vill.</td>
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<tr>
<td>2430.</td>
<td>Cerastium glomeratum Thuill.</td>
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<tr>
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<td>C. viscosum L.</td>
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<td>2433.</td>
<td>Sagina decumbens (Ell.) T. &amp; G. ssp. decumbens</td>
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<td>2443.</td>
<td>Arenaria lanuginosa (Michx.) Rohrb. ssp. lanuginosa</td>
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<td>A. serphyllifolia L.</td>
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<td>2473.</td>
<td>Paronychia baldwinii (T. &amp; G.) Chapm. ssp. baldwinii</td>
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<td>F. fastigiata (Raf.) Fern.</td>
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<td>2490.</td>
<td>Silene antirrhina L.</td>
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**Nymphaeaceae**

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<td>2513.</td>
<td>Nymphaea mexicana Zucc.</td>
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<td>N. odorata Ait. var. odorata</td>
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<td>N. odorata Ait. X N. mexicana Zucc.</td>
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**Ceratophyllaceae**

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**Menispermaceae**

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**Magnoliaceae**

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<td>Magnolia grandiflora L.</td>
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<td>M. virginiana L.</td>
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**Annonaceae**

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<td>Asimina parviflora (Michx.) Dunal</td>
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**Lauraceae**

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<td>2782.</td>
<td>Cinnamomum camphora (L.) Presl</td>
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<td>2783.</td>
<td>Persea borbonia (L.) Spreng. var. borbonia</td>
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<td>P. palustris (Raf.) Sarg.</td>
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2795. *Sassafras albidum* (Nutt.) Nees TI

**PAPAVERACEAE**

2852. *Argemone albiflora* Hornem. I

A. *alba* Lestib. f.

**BRASSICACEAE**

2883. *Lepidium virginicum* L. C

2884. *Coronopus didymus* (L.) Sm. I

2920. *Cakile edentula* (Bigel.) Hook. ssp. *harperi* (Small) Rodman C

2966. *Cardamine debilis* D. Don I

C. *pensylvanica* Muhl. ex Willd. I


2997. *Descurainia pinnata* (Walt.) Brit. ssp. *pinnata* C

Sophia *pinnata* (Walt.) Brit.

**DROSERACEAE**

3136. *Drosera brevifolia* Pursh C

D. *capillaris* Poir. R

**SAXIFRAGACEAE**

3231. *Itea virginica* L. SI

**HAMAMELIDACEAE**

3298. *Liquidambar styraciflua* L. TI

3309. *Hamamelis virginiana* L. TR

**ROSACEAE**

3338. *Aronia arbutifolia* (L.) Pers. SI

3353. *Rubus betulifolius* Small SI

Rubus *trivialis* Michx. SI

3389. *Rosa laevigata* Michx. SI

3396. *Prunus angustifolia* Marsh. TR

P. *serotina* Ehrh. var. *serotina* TC
3536. *Cassia asper* Muhl. ex Ell. C
   *C. fascilulata* Michx. var. *fasciculata* C
   *C. robusta* Pollard
   *C. nictitans* L. I
   *C. obtusifolia* L. I
   *C. tora* L.

3669. *Crotalaria brevidens* Benth. R
   *C. intermedia* Kotschy
   *C. rotundifolia* (Walt.) Poir. var. *vulgaris* Windler I
   *C. angulata* Mill.

3688. *Medicago arabica* (L.) Huds. C
   *M. lupulina* L. I
   *M. polymorpha* L. I
   *M. hispida* Gaertn.

3689. *Melilotus indica* (L.) All. I

3690. *Trifolium carolinianum* Michx. C
   *T. repens* L. I

3702. *Indigofera caroliniana* Mill. I

3707. *Amorpha glabra* Desf. ex Poir. SR

3722. *Wisteria chinensis* (Sims) Sweet SR

3747. *Sesbania macrocarpa* Muhl. I
   *S. exaltata* (Raf.) Rydb.
   *S. punica* (Cav.) Benth. SR
   *Daubentonia punicea* (Cav.) DC.
   *S. vesicarium* (Jacq.) Ell. C
   *Glottidium vesicarium* (Jacq.) Harper
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<td>3793</td>
<td>Aeschynomene indica L.</td>
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<td>A. viscidula Michx.</td>
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<td>Secula viscidula (Michx.) Small</td>
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<td>Desmodium ciliare (Muhl. ex Willd.) DC.</td>
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<td>D. paniculatum (L.) DC. var. paniculatum</td>
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<td>3820</td>
<td>Lespedeza hirta (L.) Hornem. ssp. hirta</td>
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<td>3820A</td>
<td>Kummerowa striata (Thunb.) Schindl.</td>
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<td>Lespedeza striata (Thunb.) Hook. &amp; Arn.</td>
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<td>Vicia acutifolia Ell.</td>
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<td>Clitoria mariana L.</td>
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<td>Centrosema virginianum (L.) Benth.</td>
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<td>3870</td>
<td>Erythrina herbacea L.</td>
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<td>3874</td>
<td>Apios americana Medic.</td>
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<td>Galactia elliottii Nutt.</td>
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<td>Rhynchosia difformis (Ell.) DC.</td>
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<td>R. minima (L.) DC.</td>
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<td>Strophostyles helvola (L.) Ell.</td>
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<td>S. umbellata (Muhl. ex Willd.) Britt.</td>
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<td><strong>GERANIACEAE</strong></td>
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<td>Geranium carolinianum L.</td>
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<td><strong>OXALIDACEAE</strong></td>
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<td>Oxalis corymbosa DC.</td>
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<td>O. dillenii Jacq. ssp. dillenii</td>
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<td>O. dillenii Jacq. ssp. filipes (Small) Eiten</td>
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<td>3945</td>
<td>Linum medium (Planch.) Britt. var. texanum (Planch.) Fern.</td>
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</table>
RUTACEAE

3990. Zanthoxylum clava-herculis L. TC

4100. Citrus aurantium L. TR

MELIACEAE

4175. Melia azedarach L. TR

POLYGALACEAE

4273. Polygala cymosa Walt. R

P. incarnata L. I

P. lutea L. R

EUPHORBIACEAE

4348. Croton glandulosus L. var. septentrionalis Muell.-Arg. C

C. punctatus Jacq. C

4407. Acalypha gracilens Gray ssp. gracilens C

A. ostryifolia Ridd. I

4416. Tragia urens L. I

4433. Cnidoscolus stimulosus (Michx.) Engelm. & Gray C

4498. Euphorbia cyathophora Murr. I

Poinsettia heterophylla sensu auth., non (L.) Small

4498A. Chamaesyce bombensis (Jacq.) Dug. I

Euphorbia ammannioides H. B. K.

C. hirta (L.) Millsp. I

C. nutans (Lag.) Small C

C. maculata sensu auth., non L.

C. ophthalmica (Pers.) Burch I

Euphorbia gemella Lag.

C. polygonifolia (L.) Small C
CALLITRICHACEAE

4530. *Callitriche peploides* Nutt. 1

ANACARDIACEAE

4594. *Rhus copallina* L. TI

4594A. *Toxicodendron radicans* (L.) Kuntze var. *radicans* SC

*Rhus radicans* L.

CYRILLACEAE

4611. *Cyrilla racemiflora* L. TR

AQUIFOLIACEAE

4614. *Ilex ambiguа* (Michx.) Torr. SR

* I. *cassine* L. TR

* I. *glabra* (L.) Gray SC

* I. *opaca* Ait. TC

* I. *vomitoria* Ait. TC

ACERACEAE

4720. *Acer rubrum* L. var. *rubrum* TI

*A. rubrum* L. var. *trilobum* (T. & G.) K. Koch TI

HIPPOCASTANACEAE

4721. *Aesculus pavia* L. TR

SAPINDACEAE

4739. *Sapindus marginatus* Willd. TR

RHAMNACEAE

4868. *Berchemia acandens* (Hill) K. Koch SI

4873. *Sageretia minutifolia* (Michx.) Trel. SR

4875. *Rhamnus caroliniana* Walt. TR

VITACEAE

4909. *Vitis aestivalis* Michx. SI
V. rotundifolia Michx. SC
V. vulpina L. SC

4915. Parthenocissus quinquefolia (L.) Planch. SC
4916. Ampelopsis arborea (L.) Koehne SC

MALVACEAE

4983. Abutilon theophrasti Medic. R
4987. Modiola caroliniana (L.) G. Don I
4998. Sida rhombifolia L. C

5013. Hibiscus grandiflorus Michx. R
   H. moscheutos L. I

5015. Kosteletzkya virginica (L.) Presl ex Gray R

STERCULIACEAE

5057. Melochia corchorifolia L. I

CLUSIACEAE

5168. Hypericum cistifolium Lam. R
   H. crux-andreae (L.) Crantz SR
   H. stans (Michx.) Adams & Robson
   H. gentianoides (L.) B.S.P. C
   H. hypericoides (L.) Crantz ssp. hypericoides SC
   H. mutilum L. C
   H. myrtifolium Lam. SR
   H. tetrapetalum Lam. SR

5168A. Triadenum virginicum (L.) Raf. I

CISTACEAE

5245. Helianthemum corymbosum Michx. SI
   H. georgianum Chapm. R
5248. Lechea pulchella Raf. var. pulchella I 60
    L. legettii Britt. & Hollick
    L. villosa Ell. C

VIOLACEAE

5274. Viola lanceolata L. ssp. vittata (Greene) Russell R
    V. floridana Brainerd R

PASSIFLORACEAE

5372. Passiflora incarnata L. R
    P. lutea L. R

CACTACEAE

5417. Opuntia ficus-indica (L.) Mill. SI
    O. humifusa (Raf.) Raf. var. humifusa SI
    O. compressa (Salisb.) Macbr.
    O. pusilla (Haw.) Haw. SI
    O. drummondii Graham; O. tracyi Britt.
    O. stricta (Haw.) Haw. var. stricta SI

LYTHRACEAE

5474. Ammannia latifolia L. I
    A. teres Raf.

5488. Decodon verticillatus (L.) Ell. SR

MELASTOMACEAE

5664. Rhexia cubensis Griseb. I
    R. nashii Small I
    R. virginica L. I

ONAGRACEAE

5793. Ludwigia leptocarpa (Nutt.) Hara I
    L. linearis Walt. C
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<td>5804. Oenothera humifusa Nutt. C</td>
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