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THE VASCULAR FLORA OF JAMESTOWN ISLAND
JAMES CITY COUNTY, VIRGINIA

A Thesis

Presented to

The Faculty of the Department of Biology

The College of William and Mary in Virginia

In Partial Fulfillment

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Master of Arts

By

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ABSTRACT

Jamestown Island is a 1559.5 acre island, one-half of which lies in brackish marsh and the greater proportion of the remainder in stages of old field succession. The Island is located southwest of Williamsburg in James City County, Virginia, at the mouth of Powhatan Creek on the James River.

Six vegetational areas (mixed deciduous woods, successional pine woods, roadsides and old fields, low areas, brackish marsh and sandy shores), are recognized. The effects of deer browsing and grazing, mowing, flooding and 300 years of human occupation on the diversity and abundance of the Island's vascular flora are discussed.

Collections of the vascular flora of Jamestown Island were made biweekly during the growing season, June 1969 - June 1970. Voucher specimens are deposited in the Herbarium of the College of William and Mary. A total of 491 taxa of 306 genera of 95 families are recorded. New county records, Peninsula records and state records are indicated on a checklist of the flora, and are discussed when they represent extensions in the species range. A key to the taxa represented has been prepared and data on relative abundance and habitat are included for each species.

INTRODUCTION

> The nineteenth day, my selfe and three or foure more walking into the Woods, by chance wee espied a pathway like to an Irish pace: wee were desirous to knowe whither it would bring vs. Wee traced along some foure miles, all the way as wee went, hauing the pleasantest Suckles, the ground all flowing ouer with faire flowers of sundry colours and kindes, as though it had beene in any Garden or Orchard in England. There be many Strawberries, and other fruits vnknowne. Wee saw the Woods full of Cedar and Cypresse trees, with other trees (out of) which issues our sweet Gummes like to Balsam. Wee kept on our way in this Paradise. (Smith 1895)

Such was the English settler George Percy's description on May 19, 1607, of Jamestown Island, site of the first permanent English settlement in North America. For most of its history from the time of colonization, the Island, though riddled with marsh, has been under cultivation and could not boast a rich flora. The natural vegetation is returning, but much of the high ground is still unmistakably in old field succession. Jamestown Island may be said to have been first studied botanically by Lawrence Bohun who collected herbs there for medicinal purposes in 1610. As a part of The Peninsula of Virginia, the Island may have been studied by John Banister who lived in the colony from 1678 and worked in Charles City County, or by Mark Catesby, whose first American field work was centered in Williamsburg from 1712-1719. In the eighteenth century, John Mitchell compiled lists of Virginia plants and John Clayton collected the specimens from which Gronovius compiled the Flora Virginica in 1739 (Davis 1964).

In the twentieth century, Professor and Mrs. E. J. Grimes, who

collected on The Peninsula in 1920-21, seem to have excluded Jamestown Island, which is understandable as it was at that time under private ownership. Recent collections on the Island were made by Robert C. Bruce and John Wesley Phillips, two naturalists with the Colonial National Historical Park, whose 50+ collections are deposited in the Herbarium at the Jamestown Island Information Center. More significantly, Bruce began a wildflower manuscript intended for the use of Island visitors which has not been completed.

Recognizing the significance of its history, the permanent preservation of its flora as part of a national park, as well as the interest inherent in its geography as an island, I selected Jamestown Island, James City County, Virginia, for this floristic study. This study of the Island adds to the floristic record of James City County, previously based on the work of Erlanson (1924), Harvill (1964) and most recently Barans (unpubl. M.A. thesis, 1969). Results of this survey may also provide a background for vegetation studies connected with a deer management program on the Island. The study also will make available to the tourist facility at Jamestown Island information which might lead to publication of a wildflower or nature guide.

The field work for the study was begun in June 1969 and biweekly collecting trips were made to the Island through June 1970. Voucher specimens have been deposited in the Herbarium of the College of William and Mary. Keys leading to the identification of the families, genera and species represented have been prepared and abundance and habitat information included. A checklist of the Island's vascular flora with information on new records is included.

CHAPTER I

THE ISLAND

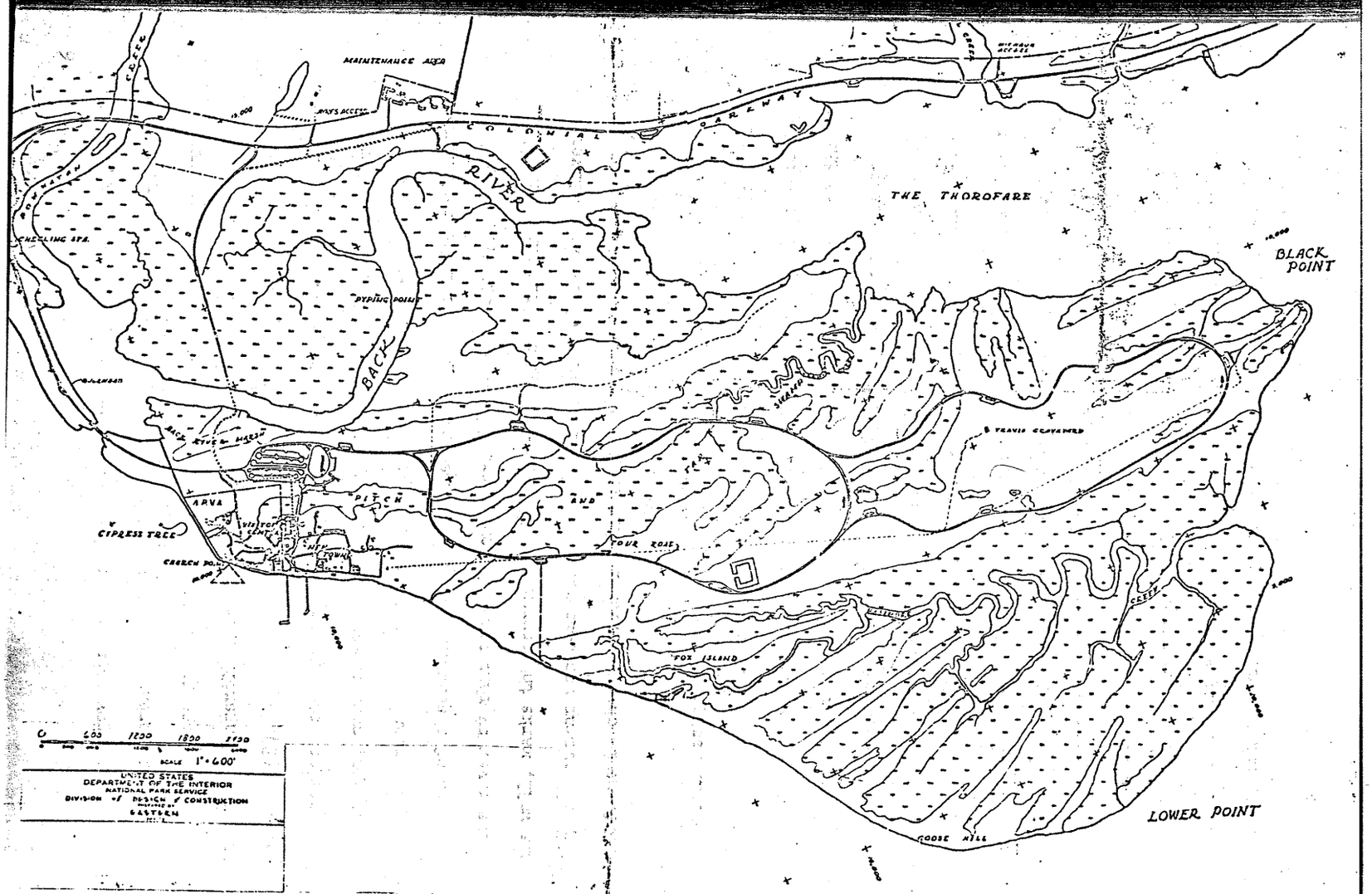
Description

Jamestown Island lies southwest of Williamsburg in James City County, Virginia, at the mouth of Powhatan Creek. Once completely an island, it is presently joined to the mainland by a bridge and a causeway called "the Isthmus" built in 1956. The Island's northern shore is separated from the mainland by Back River which flows from Powhatan Creek and by the Thorofare; the remaining three shores are open to the James River. The Island is based on more than 300 feet of fine sand and topped with a few feet of clay and silt merging into topsoil (Cotter 1958). Of the Island's 1,559.5 acres, 812 lie in brackish marsh and sluggish inlets; the remaining 747.5 acres are in low land (Waddell 1930), crossed by a few higher ridges providing a minimum relief. The maximum elevation is less than twenty feet above mean low tide. Water often collects in the low parts of the Island, maintaining them as swampy areas.

The Island is perhaps a few thousand years old, initially being a series of sandy bars or shoals formed with the rise of the sea level. With soil erosion from the mainland, the shoals became a peninsula with Powhatan Creek on the north and the James River on the south. South of the peninsula, deposits later built up Goose Hill, a series of sandbar formations extending like fingers from a sandy beach. Marshes were formed, those between the fingers constituting Passmore Creek, and

FIGURE I

Map of Jamestown Island


MAINTENANCE AREA
COLONIAL PARKWAY
RIVER
BACK
THE THOROFARE
BLACK POINT
PYPING POINT
CHECKING STA.
BACK RIVER MARSH
ARVA
PITCH
AND
TAR
FOUR ROAD
CYPRESS TREE
CHURCH POINT
FOX ISLAND
GOOSE HILL
LOWER POINT
0 600 1200 1800 2400
SCALE 1" = 600'
UNITED STATES
DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE
DIVISION of DESIGN & CONSTRUCTION
EASTERN

those on the Powhatan Creek side forming a border along winding Back River, which opens into the Thorofare. The marshes now extend into the area of the high ground, the largest one being the Pitch and Tar Swamp, drained by Kingsmill's Creek, where bog iron was once deposited (Cotter 1958).

Erosion, the very process that built the Island, supplemented by wave action, once threatened to destroy it. Erosion of the waterfront at the upstream end of the Island was checked in 1903 with the construction of a seawall, but an estimated 500 feet of land had been lost to the river by that time. A lone cypress, presently 400 feet from this wall, marks the approximate low tide-line along this shore in 1848. A granite riprap was constructed in 1935 along much of the James River waterfront to check erosion in that area.

Historical Background

From the 1607 description by George Percy of a lush vegetation, it may be speculated that the forests of the Island had a richer natural understory than at present. Archaeological evidence suggests that the Algonquians occupied the Island within one hundred years previous to 1607. The first English fort was built on a projection of the main island which in 1607 extended almost to the channel of the river. The settlement spread from "James Citty" along the shore of the James River to Orchard Run, the latter area constituting "New Towne". Although the seat of government, the Island's population was never large and declined following a 1698 fire which precipitated the removal of the capitol to Middle Plantation (Williamsburg). Through the eighteenth century, the Island was the estate of two families, the Amblers and the Travises, and the ruins of the mansion of the former stand today. The

Island's other obvious feature, the earthworks of a Civil War fort, one of four on the Island, attest to the role of the Island in the Confederate defense of Richmond.

From the 1880's until 1934, the Island was owned and farmed by the Edward E. Barneys. In 1893, 22.5 acres of the old townsite were given to the Association for the Preservation of Virginia Antiquities (APVA), while the remainder of the Island came under the supervision of the National Park Service in 1934 and was then included within the boundaries of the Colonial National Historical Park. [illegible] Park Service buildings, restored areas and currently maintained roads, including the Island Loop Roads, are indicated in Figure I. [illegible]

CHAPTER II

THE FLORA

Limitations

The diversity and abundance of the vascular flora of Jamestown Island have been limited by several factors, the most obvious being man's former agricultural activities. Significant, too, is the browsing and grazing of a population of white-tailed deer (*Odocoileus virginianus*), which in the past has so increased beyond the carrying capacity of the Island that deer have been removed from the Island to alleviate the situation. The present estimated population of 125 head knows no natural enemies except wood ticks, a severe infestation of which may be fatal to young deer. Deer browsing is not restricted to any one portion of the Island although the animals aggregate in one major "deer pen", an open-floored young elm stand in the area circled by the Long Loop Road. The deer seem to be the chief factor in maintaining various woodland clearings in a lawn-like condition through the spring. Only in late summer are these clearings filled in with the ubiquitous wing-stem, *Verbesina occidentalis*. Two deer exclosures have been constructed but superficial examination shows no vegetational differences with adjoining areas, probably because neither pen is in an area of frequent deer visitation. Deer browsing does appear to limit vegetative reproduction; for instance, it is a factor in the very limited success of young *Magnolia grandiflora* saplings, but the significance or even the actuality of deer-induced changes in the vegetational

composition has not been determined.

A controlling factor also is the flooding of the lowest parts of the Island following heavy rainfall, due to the poor runoff. Flooding during a period of heavy rains in the summer of 1969 was observed to effectively destroy all existing vegetation in several disturbed wooded areas. In several low areas of woods, swampy pools of shallow standing water are constantly present, except perhaps in the very driest part of the growing season. Additionally, mowing, although sporadic, of the grassy waysides along the Island's approximately six miles of road and of the single remaining old field, has limited the growth of weedy species. The human factor is presently insignificant, the healthy tick, deer fly, chigger and mosquito populations serving as effective deterrents to Island visitors, who with the exception of an occasional duck-hunter or fisherman, remain in their cars except in the town-site area.

It is interesting to note the effects of 300 years of human occupation on the vascular flora of Jamestown Island. Among those trees, shrubs and herbs commonly observed by the first settlers, as reported by Cotter (1958), some remain conspicuous in the Island's flora today. These plants, whether persistent through the centuries or reestablished, include:

pine	*Pinus virginiana*
cypress	*Taxodium distichum*
cedar	*Juniperus virginiana*
water flag	(?) *Typha* spp.
briar	*Smilax* spp., *Rubus* spp.
myrtle	*Myrica* spp.
walnut	*Carya* spp., *Juglans nigra*
alder	*Alnus* spp.
oak	*Quercus* spp.
elm	*Ulmus* spp.
red mulberry	*Morus rubra*, *M. alba*
maracocks, mayapples	*Podophyllum peltatum*
tulip poplar	*Liriodendron tulipifera*

sassafras	Sassafras albidum
blackberry, dewberry, black raspberry	Rubus spp.
cherry	Prunus serotina
locust	(?) Robinia pseudo-acacia Gleditsia triacanthos
sumac	Rhus spp.
holly	Ilex opaca
wild grape	Vitis spp.
dogwood	Cornus florida
whortleberry	Gaylussacia baccata
cranberry	Vaccinium spp.
persimmon	Diospyros virginiana
ash	Fraxinus spp.
honeysuckle	Lonicera spp.
snakeroot	Eupatorium rugosum, other genera

Conspicuous in their absence from the twentieth century flora of the Island are a few species said to be commonly observed in the seventeenth century. These absent species include:

balsam	Abies spp.
wild oats	Avena fatua, Uniola paniculata
maize	Zea mays
hazel	Corylus spp.
chestnut	Castanea dentata
chinquapin	Castanea pumila
live oak	Quercus virginiana
gooseberry	Ribes spp.
crab apple	Crataegus spp.
strawberry	Frageria spp.
beans	Phaseolus spp.
sugar maple	Acer saccharum
laurel	Kalmia latifolia
puccoon	Lithospermum spp.
Jimson weed	Datura stramonium
tobacco	Nicotiana rustica
muskmelons	(?) native
squashes, gourds, & pumpkins	Cucurbita spp.

Some of these species obviously were once cultivated on the Island; others may be listed erroneously due to misidentification or ambiguous common names. It seems unlikely, for example, that the species known commonly today as balsam fir and cranberry were native on the Island in historic times.

FIGURE II

U.S. DEPARTMENT OF THE INTERIOR—NATIONAL PARK SERVICE

FOREST TYPE MAP
JAMESTOWN ISLAND
COLONIAL NATIONAL MONUMENT

LEGEND

TYPES

- Loblolly Pine
- Mixed Pine & Hardwood
- Mixed Oak
- Hardwood
- Cultivated
- Grass
- Water
- Marsh

SYMBOLS

- Type Lines
- Scattered Hardwoods
- Scattered Conifers
- Scattered Reproduction
- Bayberry
- Sumach
- 1-20 — Even Age 1-20 Years
- All — All Ages
- Sand

SPECIES

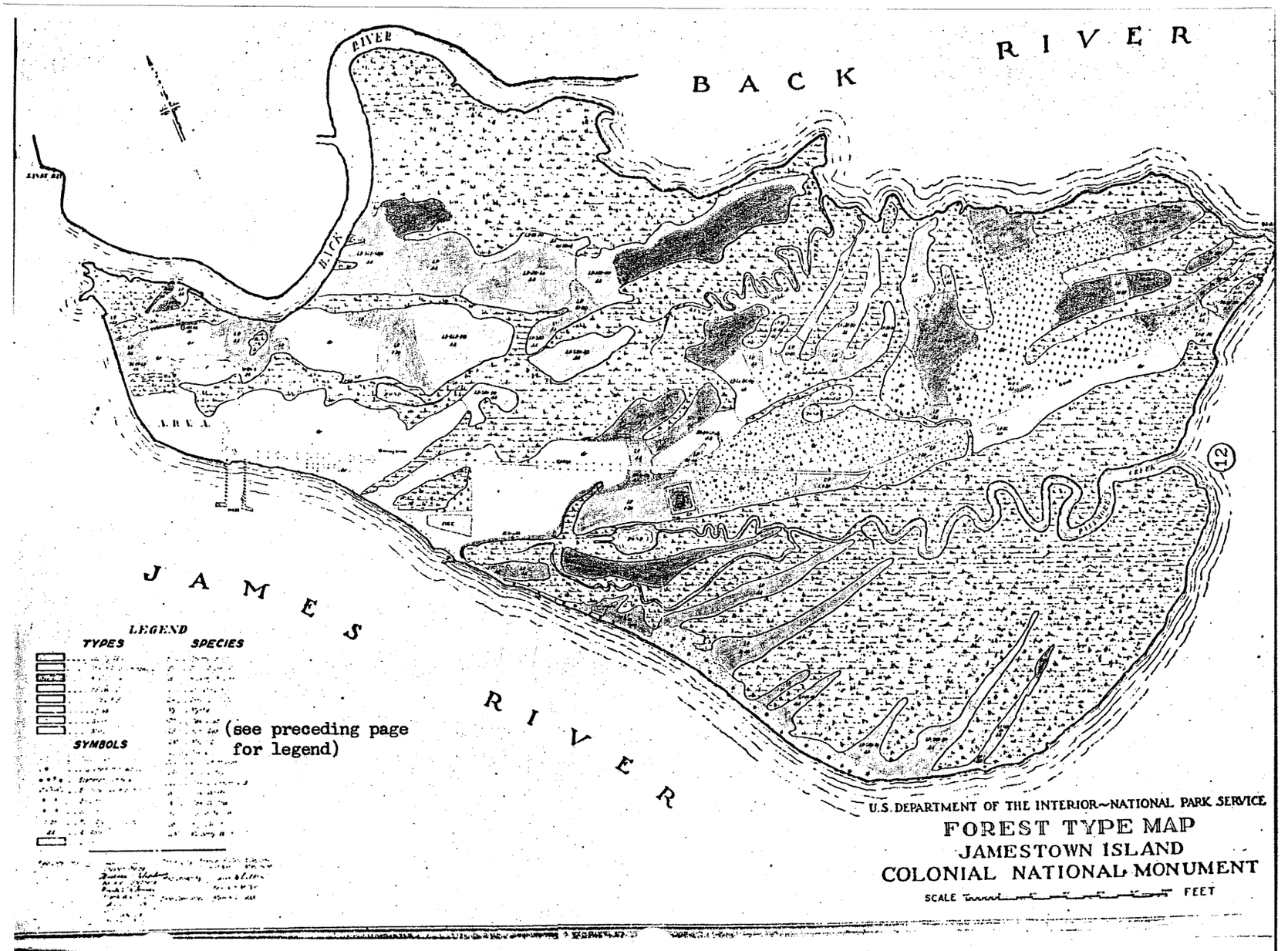
- B — Cherry Black
- E — Elm American
- H — Hickory Bitternut
- Lo — Locust Black
- LP — Pine Loblolly
- My — Myrtle
- PO — Oak Post
- RG — Gum Red
- RM — Maple Red
- RO — Oak Red
- SLP — Pine Short Leaf
- SP — Pine Scrub
- SRO — Oak Southern Red
- WO — Oak White
- WiO — Oak Willow
- YP — Poplar Yellow
- SB — Bay Sweet
- WM — Mulberry White

Field Data Compiled by: Chester Phelps, Wallace T. Stephens, Frank W. Robinson, Simon C. Curtis, Frank H. Miller

Tracing by: Branch of Plans & Designs, Colonial National Monument

Map Drawn by: Frank H. Miller

Date Completed: March 1, 1935


BACK RIVER
JAMES RIVER
LEGEND
TYPES
SPECIES
SYMBOLS
(see preceding page for legend)
12
U.S. DEPARTMENT OF THE INTERIOR—NATIONAL PARK SERVICE
FOREST TYPE MAP
JAMESTOWN ISLAND
COLONIAL NATIONAL MONUMENT
SCALE
FEET

Vegetation Patterns

The present vegetation of Jamestown Island can be arbitrarily divided into six groupings: (1) mixed deciduous woods, approximately 18%, (2) successional pine woods, 22%, (3) roadsides, old fields and waste places, 1%, (4) low ground where the water table is near the soil surface, 1%, (5) brackish marshes, 52% and (6) sandy shores, 2%. The remaining acreage, amounting to 4% of the total area, is in the tourist facility, including the property of the APVA.

The Island's mixed deciduous woods are variants of an oak-hickory climax characteristic of the Coastal Plain of Virginia north of the James River, an area included in the Oak-pine Region of Braun (1950). There is nothing suggestive of an uplands area nor of a ravine; relief is provided by banks above Back River, depressions of uprooted trees and rows of undulations of the floor, presumably from the time of early cultivation. The remains of the Confederate forts provide steep banks in some areas. Mixed deciduous woods include approximately 135 acres of mixed hardwoods and 150 acres of hardwoods with large relict canopy pines.

Dominating the canopy are Quercus falcata, Q. stellata, Q. alba, Carya spp., and Liquidambar styraciflua. Prunus serotina, Acer rubrum and Diospyros virginiana are occasional canopy species and Juglans nigra, Morus spp., Celtis occidentalis and Robinia pseudo-acacia are in the canopy of disturbed areas. Ilex opaca and Cornus florida are abundant in the understory; however, the shrub layer is not extensive except for Rhus radicans and Gaylussacia spp. Notably rare tree species include Fagus grandifolia, Carpinus caroliniana, Amelanchier canadensis and Oxydendrum arboreum, each found on the Island only as a

single individual, and Castanea pumila and Magnolia virginiana which are apparently absent.

Colonies of Athyrium filix-femina, Onoclea sensibilis, Dryopteris thelypteris and Dennstaedtia punctilobula are common in the herb layer as well as Luzula bulbosa, Oxalis violacea, Galium spp., Houstonia caerulea, Elephantopus tomentosus, Eupatorium spp., Antennaria spp. and Hieracium venosum. Conspicuous in their absence are the herbaceous species Adiantum pedatum, Smilacina racemosa, Asarum spp., Hepatica americana, Anemone virginiana, Geum spp., Osmorhiza longistylis and Erigeron pulchellus.

Successional pine woods in two stages of development occupy approximately 345 acres total. About 115 acres are in pine stands greater than 40 years old and 230 acres are in young even-aged stands developed on agricultural fields abandoned in 1934. Pinus taeda forms the canopy over a scattered understory of Juniperus virginiana, and the ubiquitous Ilex opaca and Cornus florida, the latter two found chiefly in openings in the canopy. A sparse sapling-shrub layer of Magnolia grandiflora, Myrica cerifera, Gaylussacia spp. and Rhus radicans is located chiefly along the road-cuts as are Smilax spp., Lonicera japonica and Campsis radicans. The chief species of an incomplete herbaceous layer are Lycopodium complanatum var. flabelliforme, Polystichum acrostichoides, Asplenium platyneuron, Cypripedium acaule, Liparis lilifolia, Goodyera pubescens, Chimaphila maculata, Galium spp., Mitchella repens and Verbesina occidentalis.

Roadsides, old fields and waste places only amount to an estimated twenty acres of land, but in number of species account for the greater proportion of the Island's flora. Vegetation consists of herbaceous

species which in most areas are sporadically mowed, with Smilax spp., Myrica cerifera, Rubus spp., Vitis spp., Campsis radicans, Lonicera japonica and the tree species Ailanthus altissima, Paulownia tomentosa and Diospyros virginiana at the margins of road-cuts or in waste places.

Prominent vernal weedy species include Poa pratensis, Holcus lanatus, Anthoxanthum odoratum, Carex spp., Juncus tenuis, Ranunculus spp., Cardamine hirsuta, Duchesnea indica, Geranium carolinianum, Veronica arvensis, Senecio aureus and Krigia spp. In the summer these are replaced by Triodia flava, Elymus virginicus, Paspalum dilatatum, Panicum spp., Andropogon virginicus, Cyperus spp., Rumex spp., Trifolium spp., Lespedeza spp., Hypericum spp., Daucus carota, Plantago spp., Diodia spp., Solidago spp., Erigeron spp., Verbesina occidentalis, Hypochoeris radicata and Pyrrhopappus caroliniana. Locally abundant near Williamsburg but absent from the Island's roadsides and fields are Phleum pratense, Bulbostylis capillaris, Datura stramonium and Veronica agrestis.

Sunken areas where the water table is near the soil surface amount to an estimated 15 acres and include low ground adjacent to the marshes, swampy areas of the woods and an often flooded meadow. Characteristic tree species include Taxodium distichum, Salix nigra, Quercus phellos, Ulmus spp., Persea borbonia, Acer rubrum, Nyssa sylvatica and Diospyros virginiana. Characteristic herbaceous species are Osmunda regalis, Dryopteris thelypteris, Sagittaria falcata, Carex spp., Peltandra virginica, Lemna minor, Boehmeria cylindrica, Ceratophyllum echinatum, Impatiens capensis, Hydrocotyle verticillata, Cicuta maculata, Mikania scandens and Cirsium horridulum.

Although the collections from this habitat include several

uncommon species which are new records, several species characteristic of this habitat elsewhere are absent or nearly so from the Island. These absent species include Alnus serrulata, Leersia oryzoides, Orontium aquaticum, Saururus cernuus, Nuphar advena, Nasturtium officinale and the submerged aquatics.

Over one-half of the Island lies in brackish marsh drained by sluggish meandering inlets. The marsh is uniform with respect to its flora, the greatest diversity being along the edges of inlets and at the margins where the marsh meets sunken areas or sandy shores. Dominant in the Jamestown Island marshes is Spartina cynosuroides. Common and characteristic species are Typha spp., Erianthus giganteus, Eleocharis ambigens, Scirpus americanus, S. rubricosus, Peltandra virginica, Pontederia cordata, Rumex verticillatus, Acnida cannabina, Rosa palustris, Kosteletzkya virginica and Hibiscus palustris forma peckii.

The sandy shores and low dunes above the James River comprise approximately 25 acres of the Island's total area. Vegetation is neither diverse nor extensive but includes Pinus taeda, Taxodium distichum and Nyssa sylvatica among tree species; Rhus copallina, Hudsonia tomentosa and Baccharis halimifolia among shrubs; and Spartina alterniflora, Panicum amarum, Cenchrus tribuloides, Tripsacum dactyloides, Chenopodium ambrosioides, Opuntia humifusa, Lilaeopsis chinensis, Aster tenuifolius, Xanthium strumarium and Bidens spp. as prominent herbs.

Floristic Records

Collections from Jamestown Island, James City County, Virginia, represent 485 species of 306 genera of 95 families. Six species are represented on the Island by two infraspecific taxa. Among 79 new James City County records, 56 taxa are newly reported for The Peninsula of Virginia and five taxa are reported as new from the state of Virginia. As the flora of Virginia is currently being investigated by several dozen active collectors, it is difficult to determine unequivocally which records, beyond those published by Massey (1961) and a few other works, are actually new for a given county or larger area. Species persisting or spreading from cultivation are not included as new records.

All of the possible new state records, Spiranthes odorata (S. cernua var. odorata), Polygonum opelousanum var. adenocalyx, Vicia dasycarpa, Myosotis stricta and Physalis heterophylla var. nyctaginea, are of taxa to be expected in Virginia according to the ranges given by Fernald (1950). Collections from Jamestown Island of Azolla caroliniana (previously recorded only from New Kent County), Ceratophyllum echinatum (Montgomery County), Cuscuta campestris (York County), Pycnanthemum tenuifolium (Warren County) and Solanum americanum (northern piedmont) apparently represent the second record of each for the state.

The Island collections of Hudsonia tomentosa, Hydrocotyle verticillata var. triradiata, Centella erecta and Pluchea foetida extend the known western limit of their Virginia ranges. Each species is known from swamps, shores and low ground of Virginia and the Carolinas; however, previous Virginia collections have been restricted

to the Outer Coastal Plain.

Eastward extensions of the Virginia range of Carex retroflexa, C. annectens, C. complanata, C. swanii, C. blanda, C. typhina, C. gravii var. hispidula, Iris prismatica, Quercus falcata var. pagodaefolia, Geranium molle, Polygala verticillata var. ambigua, Fraxinus americana var. biltmoreana, Gonolobus suberosus, Kickxia elatine, Veronica serpyllifolia, V. hederaefolia and Hieracium pratense are represented by the Island collections. The numerous Carex extensions are insignificant in their overall species ranges as all are recorded from the Coastal Plain of North Carolina; these collections merely supplement the scanty records of the genus in Virginia. The weedy species Geranium molle and Hieracium pratense have not previously been recorded from counties east of the Fall Belt in either Virginia or North Carolina.

The southern limit of Smilax tamnoides in Virginia has been extended from the northern Piedmont counties to Jamestown Island; however, this record merely fills a gap in the distribution as the species is overall southern (Texas to Virginia) in its range. The northern limits of Dryopteris celsa, Eleocharis ambigens, Ludwigia palustris var. nana, Asclepias lanceolata and Solidago microcephala, of sandy shores, brackish marshes and low ground, and of Hypericum gymnanthum, Rhexia ventricosa and Chaerophyllum tainturieri, of roadsides and grassy waysides, are extended north of the James River by the Jamestown Island collections.

CHAPTER III

THE KEYS AND THE CHECKLIST

Methods

The Key to Families and the Treatment of Families were adapted from Fernald (1950), Gleason (1952), Blomquist and Oosting (1959) and Radford, Ahles and Bell (1968). The sequence of plant taxa, scientific nomenclature and common names are those of Fernald (1950). Relative abundance is indicated by the categories rare, occasional, fairly common, common and abundant, an imprecise but usable hierarchy which suggests the frequency with which a species may be found on Jamestown Island. Habitat information applies to the Island alone. The author's collection numbers of the specimens are cited.

All of the taxa listed in the Checklist of the Vascular Plants of Jamestown Island were collected between 4 June 1969 and 4 June 1970. A voucher specimen of each of the entries has been deposited in the Herbarium of the College of William and Mary; duplicates of many will be distributed to other universities. One asterisk preceding the binomial name indicates that the species was not reported by Massey (1961), Erlanson (1924) or Harvill (1964) for James City County. Two asterisks indicate a record for The Peninsula (Hampton City and Warwick, York, James City, Charles City and New Kent Counties), while three asterisks indicate a new state record. The notation (a) following the asterisks indicates a previous but unpublished record of Barans (1969). Several species thought to be present on the Island but not collected have been

omitted from the checklist [Botrychium dissectum Spreng.; Pinus echinata Mill.; Phoradendron flavescens (Pursh) Nutt.].

Check List of the Vascular Plants of Jamestown Island
James City County, Virginia

Lycopodiaceae
Lycopodium complanatum L. var. *flabelliforme* Fern.

Ophioglossaceae
Botrychium virginianum (L.) Sw.
Ophioglossum vulgatum L. var. *pycnostichum* Fern.

Osmundaceae
Osmunda regalis L. var. *spectabilis* (Willd.) Gray
O. cinnamomea L.

Polypodiaceae
Onoclea sensibilis L.
Dryopteris thelypteris (L.) Gray var. *pubescens* (Lawson) Nakai
D. noveboracensis (L.) Gray
D. hexagonoptera (Michx.) Christens.
D. spinulosa (O.F. Muell.) Watt
** *D. celsa* (Wm. Palmer) Small
Polystichum acrostichoides (Michx.) Schott
Dennstaedtia punctilobula (Michx.) Moore
**a *Athyrium filix-femina* (L.) Roth
Asplenium platyneuron (L.) Oakes
Woodwardia virginica (L.) Sm.
W. areolata (L.) Moore
Pteridium aquilinum (L.) Kuhn var. *latiusculum* (Desv.) Underw.

Salviniaceae
* *Azolla caroliniana* Willd.

Pinaceae
Pinus taeda L.
P. virginiana Mill.
Taxodium distichum (L.) Richard
Juniperus virginiana L.

Typhaceae
Typha latifolia L.
T. angustifolia L.

Alismataceae
Sagittaria falcata Pursh

Gramineae

Arundinaria gigantea (Walt.) Chapm.
Bromus commutatus Schrad.
Festuca elatior L.
Vulpia myuros (L.) K.C. Gmel.
Poa annua L.
P. compressa L.
**a P. pratensis L.
Dactylis glomerata L.
**a Eragrostis spectabilis (Pursh) Steud.
Uniola laxa (L.) BSP.
ADD Triodia flava (L.) Smyth
Lolium perenne L. var. perenne
Hordeum pusillum Nutt.
Elymus virginicus L.
Holcus lanatus L.
Sphenopholis obtusata (Michx.) Scribn.
Aira elegans Willd.
Danthonia spicata (L.) Beauv. var. spicata
Agrostis hyemalis (Walt.) BSP.
A. perennans (Walt.) Tuckerm.
Cinna arundinacea L.
Spartina cynosuroides (L.) Roth
S. alterniflora Loisel.
Cynodon dactylon (L.) Pers.
Anthoxanthum odoratum L.
Zizania aquatica L.
Paspalum floridanum Michx.
P. dilatatum Poir.
Panicum amarum Ell.
P. anceps Michx.
P. laxiflorum Lam.
ADD P. microcarpon Muhl.
ADD P. nitidum Lam.
P. lanuginosum Ell.
ADD P. sphaerocarpon Ell.
ADD P. polyanthes Schultes
P. scoparium Lam.
ADD P. clandestinum L.
* Sacciolepis striata (L.) Nash
ADD Echinochloa pungens (Poir.) Rydb.
E. walteri (Pursh) Nash
Setaria glauca (L.) Beauv.
** S. viridis (L.) Beauv.
* Cenchrus tribuloides L.
Erianthus giganteus (Walt.) Muhl.
* Arthraxon hispidus (Thunb.) Makino var. cryptatherus (Hack.) Houda
see Andropogon Andropogon scoparius Michx.
A. virginicus L.
Tripsacum dactyloides L.

Cyperaceae

ADD **a Cyperus dipsaciformis Fern.

** Cyperus gravii Torr.
C. ovularis (Michx.) Torr.
C. retrorsus Chapm.
Eleocharis engelmanni Steud.
** E. ambigens Fern.
Scirpus americanus Pers.
S. validus Vahl var. creber Fern.
* S. robustus Pursh
S. rubricosus Fern.
* Rhynchospora corniculata (Lam.) Gray
** Carex retrofleka Muhl.
**a C. vulpinoidea Michx.
** C. annectens Bickn.
**a C. longii Mackenz.
C. alata T.& G.
** C. complanata Torr.& Hook.
** C. swanii (Fern.) Mackenz.
** C. blanda Dew.
** C. typhina Michx.
** C. lacustris Willd.
C. comosa Boott
C. lurida Wahlenb.
** C. gravii Carey var. hispidula Gray

Araceae
Arisaema triphyllum (L.) Schott
Peltandra virginica (L.) Schott & Endl.

Lemnaceae
Spirodela polyrhiza (L.) Schleid.
**a Lemna minor L.
**a Wolffia papulifera C.H. Thompson

Commelinaceae
**a Commelina communis L.
* Aneilema keisak Hassk.

Pontederiaceae
Pontederia cordata L.

Juncaceae
Juncus bufonius L.
J. tenuis Willd. var. tenuis
**a J. coriaceus Mackenz.
J. effusus L.
** J. biflorus Ell.
J. acuminatus Michx.
Luzula bulbosa (Wood) Rydb.

Liliaceae
Allium canadense L.
A. vineale L.
Nothoscordum bivalve (L.) Britt.
Ornithogalum umbellatum L.

Yucca filamentosa L.
Asparagus officinalis L.
Polygonatum biflorum (Walt.) Ell.
Smilax rotundifolia L.
S. bona-nox L.
** S. tamnoides L.

Dioscoreaceae
Dioscorea quaternata (Walt.) J.F. Gmel.

Amaryllidaceae
Narcissus pseudo-narcissus L.
Zephyranthes atamasco (L.) Herb.
Hypoxis hirsuta (L.) Coville

Iridaceae
Sisyrinchium angustifolium Mill.
** Iris prismatica Pursh
I. virginica L.

Orchidaceae
Cypripedium acaule Ait.
* Habenaria cristata (Michx.) R.Br.
*** Spiranthes odorata (Nutt.) Lindl.
Goodyera pubescens (Willd.) R.Br.
* Listera australis Lindl.
Malaxis unifolia Michx.
Liparis lilifolia (L.) Richard
Tipularia discolor (Pursh) Nutt.

Salicaceae
Salix nigra Marsh.

Myricaceae
Myrica cerifera L.

Juglandaceae
Juglans nigra L.
Carya illinoensis (Wang.) K.Koch
C. tomentosa Nutt.
**a C. glabra (Mill.) Sweet

Corylaceae
Carpinus caroliana Walt.
Alnus serrulata (Ait.) Willd.

Fagaceae
Fagus grandifolia Ehrh.
Quercus alba L.
Q. stellata Wang.
* Q. palustris Muenchh.
Q. velutina Lam.
**a Q. falcata Michx. var. falcata
* var. pagodaefolia Ell.

Quercus marilandica Muenchh.
* Q. laurifolia Michx.
Q. phellos L.

Ulmaceae
Ulmus rubra Muhl.
U. americana L.
U. alata Michx.
Celtis occidentalis L.

Moraceae
Morus rubra L.
M. alba L.

Urticaceae
Boehmeria cylindrica (L.) Sw.

Polygonaceae
Rumex verticillatus L.
R. crispus L.
R. conglomeratus Murr.
R. acetosella L.
Tovara virginiana (L.) Raf.
Polygonum pensylvanicum L.
P. punctatum Ell.
*** P. opelousanum Riddell var. adenocalyx Stanford
*a P. sagittatum L.
* P. arifolium L.

Chenopodiaceae
Chenopodium ambrosioides L.

Amaranthaceae
Acnida cannabina L.

Phytolaccaceae
Phytolacca americana L.

Portulacaceae
Claytonia virginica L.

Caryophyllaceae
Stellaria media (L.) Cyrillo var. media
Cerastium vulgatum L.
C. viscosum L.
*a Silene stellata (L.) Ait.f.
S. caroliniana Walt. var. pensylvanica (Michx.) Fern.
Saponaria officinalis L.
Dianthus armeria L.

Ceratophyllaceae
ADD** Ceratophyllum echinatum Gray

Ranunculaceae

* *Ranunculus pusillus* Poir.
R. sceleratus L.
R. abortivus L. var. *abortivus*
R. bulbosus L.
R. parviflorus L.
Clematis dioscoreifolia Levl.& Vaniot var. *robusta* (Carr.) Rehd.

Berberidaceae

Podophyllum peltatum L.
Berberis thunbergii DC.

Magnoliaceae

Magnolia grandiflora L.
Liriodendron tulipifera L.

Lauraceae

Persea borbonia (L.) Spreng.
Sassafras albidum (Nutt.) Nees
Lindera benzoin (L.) Blume

Papaveraceae

Sanguinaria canadensis L.
Fumaria officinalis L.

Cruciferae

Draba verna L.
Lepidium virginicum L.
Capsella rubella Reut.
Brassica napus L.
Arabidopsis thaliana (L.) Heynh.
Barbarea vulgaris R.Br. var. *vulgaris*
B. verna (Mill.) Aschers.
Cardamine hirsuta L.

Hamamelidaceae

Liquidambar styraciflua L.

Platanaceae

Platanus occidentalis L.

Rosaceae

Spiraea prunifolia Sieb.& Zucc.
Pyrus arbutifolia (L.) L.f.
Amelanchier canadensis (L.) Medic.
Duchesnea indica (Andr.) Focke
Potentilla canadensis L.
**a *Rubus phoenicolasius* Maxim.
Agrimonia rostellata Wallr.
**a *Rosa multiflora* Thunb.
R. wichuraiana Crepin
R. eglanteria L.
R. micrantha Sm.

Rosa palustris Marsh.
Prunus armeniaca L.
P. avium L.
P. serotina Ehrh.

Leguminosae
Albizzia julibrissin Durazzini
Gleditsia triacanthos L.
Cassia fasciculata Michx.
C. nictitans L.
Cercis canadensis L.
Baptisia tinctoria (L.) R.Br.
Cytisus scoparius (L.) Link
Trifolium arvense L.
T. pratense L.
T. repens L.
ADD T. procumbens L.
Melilotus alba Desr.
Medicago lupulina L.
ADD Tephrosia sp.
Robinia pseudo-acacia L.
Desmodium nudiflorum (L.) DC.
D. viridiflorum (L.) DC.
Lespedeza repens (L.) Bart.
*a L. cuneata (Dumont) G.Don
Stylosanthes biflora (L.) BSP.
**a Vicia lathyroides L.
ADD V. angustifolia Reichard var. uncinata (Desv.) Rouy
V. hirsuta (L.) S.F.Gray
*** V. dasycarpa Ten.
** Lathyrus hirsutus L.
Apios americana Medic.
Strophostyles umbellata (Muhl.) Britt.
**a Clitoria mariana L.
Centrosema virginianum (L.) Benth.
Amphicarpa bracteata (L.) Fern.

Oxalidaceae
Oxalis violacea L.
**a O. stricta L.
**a O. europaea Jord.

Geraniaceae
Geranium carolinianum L.
** G. molle L.

Simaroubaceae
Ailanthus altissima (Mill.) Swingle

Meliaceae
Melia azedarach L.

Polygalaceae
Polygala mariana Mill.

** Polygala verticillata L. var. ambigua (Nutt.) Wood

Euphorbiaceae
*a Acalypha gracilens Gray
Euphorbia corollata L.

Anacardiaceae
Rhus copallina L.
R. radicans L.

Aquifoliaceae
Ilex opaca Ait.
** I. decidua Walt.

Celastraceae
Euonymus americanus L.

Aceraceae
Acer platanoides L.
A. rubrum L.
A. saccharinum L.
A. negundo L.

Balsaminaceae
Impatiens capensis Meerb.

Rhamnaceae
* Berchemia scandens (Hill) K.Koch

Vitaceae
Parthenocissus quinquefolia (L.) Planch.
P. inserta (Kerner) K.Fritsch
Vitis aestivalis Michx.
V. vulpina L.

Malvaceae
Kosteletzkya virginica (L.) Presl
Hibiscus palustris L. forma Peckii House

Guttiferae
Ascyrum hypericoides L.
Hypericum punctatum Lam.
H. mutilum L.
** H. gymnanthum Engelm.& Gray

Cistaceae
** Hudsonia tomentosa Nutt.
Lechea racemulosa Michx.

Violcaeae
Viola papilionacea Pursh
V. affinis Le Conte
V. fimbriatula Sm.
V. triloba Schwein.

** Viola stoneana House
V. kitaibeliana R.& S. var. rafinesquii (Greene) Fern.

Passifloraceae
Passiflora lutea L.
P. incarnata L.

Cactaceae
* Opuntia humifusa Raf.

Lythraceae
Decodon verticillatus (L.) Ell.
Lagerstroemia indica L.
Lythrum lineare L.

Nyssaceae
Nyssa sylvatica Marsh.

Melastomataceae
** Rhexia ventricosa Fern.& Grisc.

Onagraceae
Ludwigia alternifolia L.
** L. palustris (L.) Ell. var. nana Fern.& Grisc.
Oenothera biennis L.
O. laciniata Hill
Circaea quadrisulcata (Maxim.) Franch.& Sav.
var. canadensis (L.) Hara

Araliaceae
Aralia spinosa L.
Hedera helix L.

Umbelliferae
* Hydrocotyle verticillata Thunb. var. verticillata
** var. triradiata
(A. Richard) Fern.
* Centella erecta (L.f.) Fern.
Sanicula canadensis L.
** Eryngium aquaticum L.
** Chaerophyllum tainturieri Hook.
Cicuta maculata L.
Sium suave Walt.
Ptilimnium capillaceum (Michx.) Raf.
Lilaeopsis chinensis (L.) Ktze.
Foeniculum vulgare Mill.
Daucus carota L.

Cornaceae
Cornus florida L.

Pyrolaceae
Chimaphila maculata (L.) Pursh
Monotropa uniflora L.

Ericaceae
- Oxydendrum arboreum (L.) DC.
- Epigaea repens L. var. repens
- Gaylussacia frondosa (L.) T.& G.
- G. baccata (Wang.) K.Koch
- Vaccinium stamineum L.
- ** V. caesariense Mackenz.
- APD V. atrococcum (Gray) Heller V. fuscatum

Primulaceae
- Lysimachia quadrifolia L.
- Anagallis arvensis L.
- Samolus parviflorus Raf.

Ebenaceae
- Diospyros virginiana L.

Oleaceae
- ** Fraxinus americana L. var. biltmoreana (Beadle) J.Wright
- F. pennsylvanica Marsh.
- Ligustrum vulgare L.
- L. sinense Lour.

Loganiaceae
- Polypremum procumbens L.

Centianaceae
- Sabatia angularis (L.) Pursh
- S. stellaris Pursh forma albiflora Britt.
- S. dodecandra (L.) BSP.

Apocynaceae
- Apocynum cannabinum L.

Asclepiadaceae
- Asclepias tuberosa L.
- ** A. lanceolata Walt.
- A. incarnata L.
- A. variegata L.
- ** Gonolobus suberosus (L.) R.Br.

Convolvulaceae
- Ipomoea hederacea (L.) Jacq.
- * Cuscuta campestris Yuncker

Boraginaceae
- Cynoglossum virginianum L.
- Myosotis verna Nutt.
- *** M. stricta Link
- Hackelia virginiana (L.) I.M. Johnston

Verbenaceae
- Verbena urticifolia L. var. urticifolia
- ** Lippia lanceolata Michx.

Callicarpa americana L.

Labiatae

Trichostema dichotomum L.
Teucrium canadense L.
Scutellaria elliptica Muhl.
S. integrifolia L.
Glechoma hederacea L. var. *micrantha* Moricand
Prunella vulgaris L.
Lamium amplexicaule L.
Salvia lyrata L.
Satureja calamintha (L.) Scheele var. *nepeta* (L.) Briq.
** *Pycnanthemum tenuifolium* Schrad.
Mentha arvensis L.

Solanaceae

** *Solanum americanum* Mill.
S. carolinense L.
*** *Physalis heterophylla* Nees var. *nyctaginea* (Dunal) Rydb.

Scrophulariaceae

Verbascum thapsus L.
**a *V. blattaria* L.
* *Kickxia elatine* (L.) Dumort.
Linaria canadensis (L.) Dumont var. *texana* (Scheele) Pennell
Paulownia tomentosa (Thunb.) Steud.
Bacopa acuminata (Walt.) Robins.
** *Veronica serpyllifolia* L.
V. arvensis L.
V. persica Poir.
** *V. hederaefolia* L.
Gerardia purpurea L. forma *purpurea*
forma *albiflora* Britt.
G. setacea (Walt.) J.F. Gmel
**a *G. virginica* (L.) BSP.

Bignoniaceae

Campsis radicans (L.) Seem.
Bignonia capreolata L.
Catalpa speciosa Warder

Acanthaceae

* *Justicia americana* (L.) Vahl
Ruellia caroliniensis (Walt.) Steud.

Plantaginaceae

Plantago rugelii Dcne.
P. lanceolata L.
P. aristata Michx.
P. virginica L.

Rubiaceae

Sherardia arvensis L.

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Aster pilosus Willd. var. pilosus forma pulchellus Benke
A. dumosus L.
A. tenuifolius L.
A. subulatus Michx. var. euroaster Fern.& Grisc.
Erigeron philadelphicus L.
E. annuus (L.) Pers.
**a E. strigosus Muhl.
**a E. canadensis L.
Baccharis halimifolia L.
** Pluchea foetida (L.) DC.
** P. purpurascens (Sw.) DC. var. purpurascens
P. camphorata (L.) DC.
Antennaria parlinii Fern.
A. plantaginifolia (L.) Hook.
Gnaphilium purpureum L.
Iva frutescens L.
Ambrosia artemisiifolia L.
** Xanthium strumarium L.
Polymnia uvedalia L.
Eclipta alba (L.) Hassk.
Verbesina occidentalis (L.) Walt.
Bidens laevis (L.) BSP.
B. frondosa L.
** B. discoidea (T.& G.) Britt.
B. coronata (L.) Britt.
**a B. bipinnata L.
Helenium autumnale L.
Achillea millefolium L.
Antheris arvensis L.
Chrysanthemum leucanthemum L. var. pinnatifidum Lecoq.& Lamotte
Arnica acaulis (Walt.) BSP.
Erechtites hieracifolia (L.) Raf.
Senecio tomentosus Michx.
S. smallii Britt.
S. aureus L.
Cirsium vulgare (Savi) Tenore
C. horridulum Michx.
C. discolor (Muhl.) Spreng. forma discolor
forma albiflorum (Britt.) House
Cichorium intybus L.
Krigia virginica (L.) Willd.
** K. dandelion (L.) Nutt.
Hypochoeris radicata L.
Taraxacum officinale Weber
Sonchus asper (L.) Hill
Lactuca canadensis L.
Pyrrhopappus carolinianus (Walt.) DC.
** Hieracium pratense Tausch
H. venosum L.
H. gronovii L.

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