

THE WETLAND VASCULAR FLORA OF
CROSS CREEKS NATIONAL WILDLIFE REFUGE,
STEWART COUNTY, TENNESSEE

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An Abstract
Presented to the
Graduate and Research Council of
Austin Peay State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science

by
James Mathew Joyner

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ABSTRACT

Cross Creeks National Wildlife Refuge is a 3588-ha (8862-acre) tract of primarily riparian wetland established in 1962 as a refuge for migratory waterfowl. It extends for 10 river miles (16.09 km) on both sides of the Cumberland River (Lake Barkley) between Dover and Cumberland City, Stewart County, Tennessee. Much of the refuge is bottomland that was formerly agricultural. Present management practices include some agricultural production (hay, corn, soybeans) and wildlife food crops (buckwheat, milo, wheat). A network of dams, levees, and floodgates allows for manipulation of water levels in 16 pools, providing habitat management regimes ranging from moist soil to standing water. Five major tributaries of the Cumberland River provide permanent, deep water. The goal of the project was to conduct a floristic survey of wetland areas. Specific objectives were to (1) delineate community types, (2) determine the floristic composition of each community type, and (3) determine the occurrence of listed rare taxa. A total of 78 collecting trips between July 1990 and July 1992 yielded 633 taxa representing 367 genera and 116 families. Seven of these taxa are state and/or federally listed.

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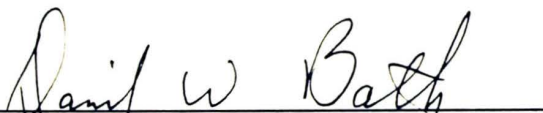
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To the Graduate and Research Council:

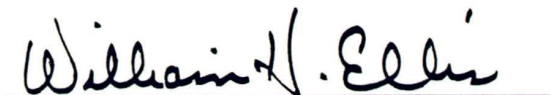
I am submitting herewith a Thesis written by James Mathew Joyner entitled "The Wetland Vascular Flora of Cross Creeks National Wildlife Refuge, Stewart County, Tennessee." I recommend that it be accepted in partial fulfillment of the requirements for the degree Master of Science, with a major in Biology.


Major Professor

We have read this thesis and
recommend its acceptance:


Second Committee Member
Third Committee Member

Accepted for the Graduate
and Research Council:


Dean of the Graduate School

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CHAPTER I

INTRODUCTION

Wetlands are those landscape features that (1) are permanently or periodically inundated, (2) have unique soils differing from those of adjacent uplands, and (3) support vegetation adapted to these conditions (Mitsch and Gosselink 1986). These important ecosystems often harbor diverse and unique genetic pools and play major roles in hydrologic, chemical, and biotic cycles. In addition, many wetlands have the potential for high productivity, pollution filtration, ground water recharge, flood control, storm buffering, sediment accretion, and a high level of energy conservation (Niering 1978). They also serve as the interface between totally aquatic and terrestrial habitats (Niering 1978, Odum 1978). Many wetlands are increasingly threatened and thus their protection is a major concern at all public and private levels.

Riparian wetlands, or inland areas periodically influenced by flooding of adjacent rivers or streams, have most or all of the characteristics of wetlands in general. However, riparian ecosystems are unique in that (1) they have a linear form as a consequence of their proximity to rivers and streams, (2) energy and materials from the surrounding landscape converge and pass through in much greater amounts than with any other ecosystem, and (3) they

are connected to upstream and downstream ecosystems (Brinson et al. 1981).

A typical riparian ecosystem contains several major geologic and hydrologic features, including the river channel, natural levees, meander scrolls, oxbows, point bars, sloughs, backswamp deposits, and terraces (Mitsch and Gosselink 1986). These in turn support such community types as vegetated and nonvegetated open water, bottomland hardwood forests, swamps, wet meadows, marshes, dewatered flats, and agricultural lands subject to flooding (Carter and Burbank 1978).

Wetlands associated with rivers and streams are particularly important in the southeastern United States because they occupy such vast areas and because of the alarming rate at which they are disappearing. Also, a significant, but difficult to quantify, percentage of these southeastern wetlands have been altered in some way, such as by the damming of river channels, channelization, and drain, fill and clear measures used to create pastures and croplands (Mitsch and Gosselink 1986).

Scattered wetlands occur within the floodplain and on terraces of the lower Cumberland River in Kentucky and Tennessee. Impoundment in 1966 by the U.S. Army Corps of Engineers at Barkley Dam in Lyon County, Kentucky (U.S. Dept. of the Army 1983), permanently inundated some of these, but others were accentuated. For example,

significant wetland acreage is found in the Cross Creeks National Wildlife Refuge (hereafter referred to as CCNWR or the refuge), Stewart County, northwestern Middle Tennessee (Riley and Riley 1979). These refuge wetlands are somewhat unique because of their diverse origins and maintenance, and include features resulting from (1) natural bottomland and terrace features, (2) impoundment of the river channel and subsequently of several large tributaries, (3) 16 man-made pools where water levels are controlled for waterfowl management by levees, dams, and floodgates, and (4) beaver activity.

The purpose of this study was to conduct a floristic survey of all lands within CCNWR except for upland areas along some refuge boundaries. Specific objectives were to (1) delineate community types present, (2) determine the floristic composition of each community type, (3) prepare an annotated account of the flora, denoting abundance within community types and the occurrence of exotic and/or invasive species, and (4) determine the occurrence of listed rare taxa. The resulting baseline data can be used in other biotic studies, will provide the U.S. Fish and Wildlife Service with a basic management tool, and will increase floristic knowledge of lower Cumberland River wetlands.

CHAPTER II

THE STUDY AREA

Cross Creeks National Wildlife Refuge was created in 1962 to replace the Kentucky Woodlands National Wildlife Refuge in Lyon and Trigg counties, Kentucky. Most of Kentucky Woodlands was to be encompassed by Land Between The Lakes while the rest would be inundated by Lake Barkley in 1966. CCNWR (Figure 1) includes 3588 ha (8862 acres) and extends for 10 river miles (16.09 km) on either side of the Cumberland River (Lake Barkley) between Dover and Cumberland City, Stewart County, Tennessee (Robinson 1991, U.S. Dept. of the Army 1983). The refuge is between river miles 91 and 101, southeast of the confluence of the Cumberland with the Ohio River. Its center, at river mile 96, is at 36°28'22" N latitude and 87°43'54" W longitude (U.S. Dept. of the Army 1983, U.S. Dept. of the Interior 1965).

The U.S. Department of the Interior, Fish and Wildlife Service, owns the refuge and manages it to provide food, water, and habitat for migrating, wintering, and resident waterfowl (Robinson 1991). Management techniques include traditional agricultural practices, e.g. row-cropping (corn, milo, soybeans), and broadcasting (buckwheat, wheat), supplemented by annual pool level manipulations for moist-soil plants (Robinson 1991). Some fields are harvested for hay or "bushhogged" to maintain an open condition, while

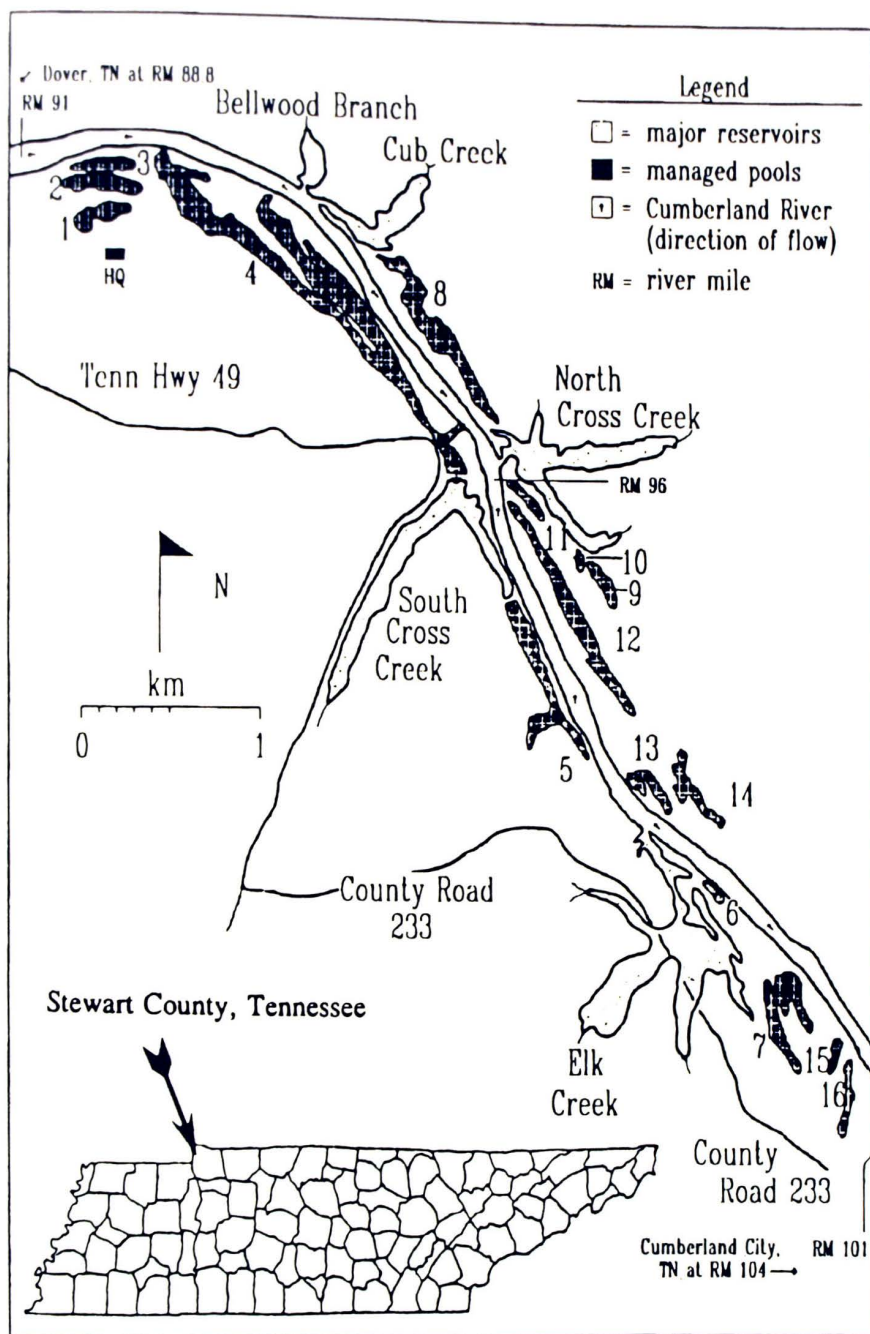


Figure 1. Map of Cross Creeks National Wildlife Refuge, Stewart County, Tennessee.

some remain fallow, and yet others are in various successional stages. Forests include a few small bottomland stands, successional stages mostly 30 years or less, and narrow strips along river and streambanks. Public usage includes fishing, hiking, bird-watching, and nature study from 1 March-31 October. The refuge is closed to the public, except for the headquarters, visitor center, and a short tour loop, from November-February.

Most of the refuge lies within the floodplain of the lower Cumberland River (Lake Barkley), which flows northwesterly through the area. Extensive flooding of bottomlands with long standing (1-3 weeks) backwater was a yearly or even multi-yearly feature before impoundment, but is now relatively rare since reservoir levels are controlled by Barkley Dam. Normal summer pool elevation is 109.45 m (359 ft) while draw-down or winter pool elevation is 107.93 m (354.1 ft) (Chester 1992).

Topographic features of the refuge include five permanent deep-water tributaries, which correspond to the river in pool level, and 16 managed pools that are independent of the river except during extensive flooding. These pools are drawn down in summer, creating a dewatered zone where mostly native "moist-soil" plants develop, or the dewatered areas may be planted in wildlife food crops. Pool levels are raised in fall and winter, partially covering vegetation and creating forage and cover for waterfowl. The

pools range in size from 4 to 147 ha and occupy approximately 405 ha (Robinson 1991). Several creeks are present and range from swiftly moving, shallow streams with rocky beds to meandering, partially impounded waterways with muddy bottoms. Sections of some creeks have been dammed by beavers, creating marshes and swamps. A few springs near the refuge periphery increase habitat and thus species diversity.

Elevations above sea level of the study area range from 107.93 m (354.1 ft) along the Cumberland River to approximately 121.92 m (400 ft) in upper bottoms, ravines, and terraces adjacent to upland topography. Peripheral ridges and bluffs (not included in the study area) reach heights of 183 m (600 ft) (U.S. Dept. of the Interior 1950, 1957a, 1957b, 1965).

The refuge is within the Interior Low Plateaus Province, Highland Rim Section, Western Highland Rim Subsection (Fenneman 1938). This subsection is a dissected upland plateau between the Central (Nashville) Basin Section on the east and the Coastal Plain Province on the west. Numerous stream valleys, ravines with steep slopes, narrow ridges, springs, perpendicular bluffs, and some karst features are characteristic. The Cumberland River provides primary drainage in the northern part of the subsection (Quarterman and Powell 1978).

Uplands of the subsection have developed primarily on St. Louis and Warsaw limestones with some Fort Payne cherty limestone, all of Mississippian age. Some ridges are capped with residual Cretaceous sediments. A few valleys have downcut into strata of Silurian and Ordovician ages, and Quaternary deposits occupy large stream valleys (Quarterman and Powell 1978). In CCNWR, the substrate is primarily alluvial deposits with some intrusion by St. Louis and Warsaw limestone along the boundary (Marcher et al. 1965, Marcher and Larson 1965, Tiedemann et al. 1968).

Soils in the lower Cumberland River floodplain are of the Arrington-Lindell-Egam-Armour series. These are well-drained to moderately well-drained loam, silt, and clay soils that are highly productive and historically have been intensively cultivated. The floodplain soils are bordered by chert, clay, and silt soils of the Baxter (Fullerton)-Mountview-Dickson series derived from limestone and thin loess (Springer and Elder 1980).

The area has a warm-temperate, humid mesothermal climate characterized by long warm summers and short mild winters (Thorntwaite 1948). The growing season averages 191 days and extends from 12 April to 20 October (Austin et al. 1953). The mean annual temperature is 14.5°C (Springer and Elder 1980). July is typically the hottest month, averaging 25.4°C, and January the coldest, averaging 2.6°C. The soil freezes to a depth of a few cm several times each

year, but rarely remains frozen for more than three days. Annual precipitation averages 126.8 cm; January and March are the wettest months. Several cm of snow usually occur each year (U.S. Dept. of Commerce 1931-1983). Gentle to moderately strong prevailing winds are from the west and southwest (Austin et al. 1953).

Vegetationally, the area is in the Western Mesophytic Forest Region, Mississippian Plateau Section of Braun (1950). This section is transitional between the Oak-Hickory Forest Region to the west and the floristically diverse Mixed Mesophytic Forest Region to the east. The plant cover is a mosaic of types determined by local topographic, climatic, and edaphic conditions. Oak and oak-hickory phases dominate but more mesophytic types occur on some slopes. Jensen et al. (1973) found that four genera (Acer, Carya, Quercus, and Ulmus) accounted for more than 50 percent of existing forest stems. Barrens, prairie remnants, upland flatwoods, and wetlands also contribute to area diversity (Chester and Ellis 1989). All present plant communities show strong anthropogenic influences and most of the area is in cultivation, pasture, or under concrete.

The first people in the area, possibly as much as 10,000 YBP, were nomadic and did not establish permanent settlements. However, later cultures established communities, especially along the Cumberland River where crops such as corn could be easily grown in rich bottomland

soils (Henry 1976). For unknown reasons, native populations declined and occupation ended by 1680. While several tribes used the area as a hunting grounds until 1820, the Chickasaws likely exercised control (McClain 1965). The effects of native Americans upon the plant cover is undocumented but was probably not extensive.

Settlement of Stewart County by Europeans began about 1795. Bottomlands were typically settled before other sites because the soils were rich and the timber was large, plentiful, and accessible. Vast canebrakes and bottomland forests lined the Cumberland River prior to European settlement (Goodspeed History Series 1886). Timber was used extensively for lumber, to make railroad ties and wooden barrels, as well as to fuel steamship engines and iron blast furnaces (The Stewart County Historical Society 1980). Thus, most bottomland forests had been removed by the late 1800s and the land converted to agriculture (Sudworth 1897). Prior to government purchase, the area CCNWR now occupies was privately owned and mostly planted in corn and soybeans (Austin et al. 1953).

CHAPTER III

METHODS

Seventy-eight trips were made to the refuge at weekly or bi-weekly intervals from 1 July-31 October 1990 (25 trips), 1 March-31 October 1991 (37), and 1 March-30 June 1992 (16). Objectives for each trip included (1) the collection of voucher specimens and (2) the accumulation of information on abundance and apparent habitat preference(s) for each species. Special attention was given to refuge areas with high species diversity but all sections were visited several times in one or more of the study years. Both native and non-native taxa were collected and listed rare elements especially sought.

Voucher specimens were prepared according to standard herbarium practices and deposited in the Austin Peay State University Herbarium (APSC); a significant number of duplicates were donated to the proposed refuge herbarium. Previously collected refuge specimens at APSC were assessed and included.

Specimens were identified with standard manuals, including Fernald (1950), Radford et al. (1968), and Gleason and Cronquist (1991), except in some cases where more recent or regional treatments were followed, e.g. Cronquist (1980) and Isely (1990). A few taxa were forwarded to experts for identification. Nomenclature follows Cronquist (1980) for composites, Isely (1990) for legumes, Lelong (1986) for

panic grasses, and Gleason and Cronquist (1991) for all others as well as for family arrangement. Designation of rare species follows the lists of Somers et al. (1989) for Tennessee, and of the U.S. Dept. Interior (1990) for the United States. Data on introduced and/or invasive species were taken from listed manuals.

Community types were designated according to the wetland classification system of Carter and Burbank (1978). Several refuge community types not included in that classification system were recognized, based on topographic features and floristic composition.

CHAPTER IV

RESULTS

A total of 1023 plant collections was made from lowland areas within Cross Creeks National Wildlife Refuge. The known vascular flora consists of 633 species and subspecific taxa within 367 genera and 116 families; 132 taxa (20.85%) are not native. A statistical summary is given in Table 1 and an annotated list in the Appendix.

Major families of the CCNWR flora are the Asteraceae (74 taxa), Poaceae (68), Cyperaceae (42), and Fabaceae (34). These four families represent 34.4% of the total flora while accounting for slightly less than 4% of all families. Other large families are the Lamiaceae (22 taxa), Brassicaceae (21), Rosaceae (20), and Polygonaceae (18).

The largest genus is Carex (19 taxa), followed by Polygonum and Cyperus (12 each), and Quercus (10). Other large genera include Panicum (9), Eupatorium and Juncus (7 each), Eragrostis and Ranunculus (6 each), and Aster, Cardamine, Carya, Scirpus, Setaria, Solidago, and Viola (5 each).

The flora includes 46 species of trees, 45 species of small trees and shrubs, and 19 species of woody vines. These 110 species of woody plants represent 17.4% of the flora. The largest woody genera are Quercus (10 species), Carya (5), and Acer and Prunus (4 each). Significant genera of woody vines are Smilax (3 species) and Vitis (2).

Table 1. Summary of the Cross Creeks National Wildlife
Refuge Wetland Flora.

	Families	Genera	Species
Pteridophytes	8	13	15
Gymnosperms	2	2	2
Angiosperms			
Monocots	19	73	157
Dicots	87	279	459
Totals	116	367	633

CHAPTER V

DISCUSSION

Communities

The lowland vegetation of CCNWR is influenced greatly by three factors: (1) the Cumberland River and five major tributaries, where pool levels and rates of flow are controlled by the U.S. Army Corps of Engineers at Barkley Dam, (2) refuge management practices, and (3) beaver activity. These factors have resulted in the formation of numerous community types at CCNWR. The following 14 broadly-defined communities are delineated to facilitate annotation of the checklist, but also to show the botanical and topographic diversity of the area. The first nine are classes or subclasses of the wetland classification system of Carter and Burbank (1978); others are subjectively defined and based on observations.

1. Vegetated Open Water- These are areas of permanent water with depths of at least two meters; impounded streams and larger managed pools comprise this class. Three plant groups are typically found: (1) rooted but floating-leaved species, e.g., Nelumbo lutea and Nuphar advena, (2) free-floating species, e.g., Azolla caroliniana and various taxa of Lemnaceae, and (3) submerged species, e.g., Najas minor and Potamogeton foliosus.

2. Bottomland Forests- These forests are on low terraces of the Cumberland River and are most like the

"upper bottomland hardwoods" described by Carter and Burbank (1978). Flooding from river overflow was greater in extent, duration, and frequency prior to impoundment in 1966; now flooding does not occur at all some years. However, the soil is saturated several months of the year (normally winter-spring) and since the topography is not level, water may stand in depressions until mid-summer.

As mechanized farming developed, most of this community type within the Cumberland River Basin was cleared and only a few remnant stands remain. The best example in the refuge is a 15-ha site studied by Chester and Schibig (1993). They found this site, which has not been disturbed since about 1960, to be dominated by Carya ovata, Fagus grandifolia, Liquidambar styraciflua, Quercus michauxii, Q. shumardii, and Ulmus rubra, with significant contributions by Acer saccharum, Celtis laevigata, Fraxinus pennsylvanica, and Quercus pagoda. Saplings and small trees include Acer saccharum, Asimina triloba, Carpinus caroliniana, Celtis laevigata, C. occidentalis, Ilex decidua, and Ulmus rubra. Dense stands of Arundinaria gigantea occur in a few places. Little herbaceous growth is present during spring and early summer due to inundation; Eupatorium rugosum often becomes conspicuous in fall.

3. Swamps- These are permanently or semipermanently flooded sites dominated by woody growth. Examples, though

not extensive in CCNWR, are scattered throughout and include three subclasses.

3A. Forested Swamp- The few forested swamps in the refuge frequently intergrade with shrub swamp, open water, or marsh. Only water-tolerant species occur at these sites, including Acer rubrum, A. saccharinum, Cephalanthus occidentalis, Fraxinus pennsylvanica, Ilex decidua, Quercus palustris, and Salix nigra. Herbaceous growth may include various emergents characteristic of marshes, or even floating-leaved, free-floating, and submerged species characteristic of open water.

3B. Dead Woody Swamp- Swamps where most trees are dead occur wherever woodlands have been inundated above and/or beyond the tolerance level of existing species. Succession then proceeds to open water, shrub swamp, or marsh types, depending upon the degree and duration of inundation.

3C. Shrub Swamp- Typically, these areas are permanently or semipermanently inundated, but water levels are shallow except during brief periods. Shrub swamps are commonplace at CCNWR, often forming a narrow but dense and impenetrable band between marshes and adjacent fields, as an ecotone between open water and forests, and at the heads of ravines. The dominant species by far is Cephalanthus occidentalis; other common species are Acer rubrum, Fraxinus pennsylvanica, Ilex decidua, Salix nigra, and S. sericea.

4. Marshes- These areas are permanently or seasonally inundated; herbaceous perennials dominate. Marshes may be surrounded by any of the other wetland classes or subclasses and are a significant landscape feature at CCNWR. Two subclasses are recognized.

4A. Emergent Marsh- Up to 30 percent of the vegetation may be woody, but emergent species dominate and persist throughout the year, although tops normally die during winter. These sites are usually covered by surface water but water levels often drop significantly during the summer as a result of evaporation or pool drawdowns. Soils are usually saturated even after surface drying.

Microtopographic variations cause considerable differences in soil saturation within an area of a few dm², leaving some areas relatively dry and others waterlogged. This microtopographic variation leads to diversity of microhabitats and species. While emergent marshes may intergrade with other community types, boundaries are generally evident since they mostly occupy depressions in bottomlands. These floristically rich areas include such species as Aster simplex, Alisma subcordatum, Carex frankii, C. lupulina, C. lurida, C. vulpinoidea, Cyperus erythrorhizos, C. pseudovegetus, C. strigosus, Echinodorus cordifolius, Juncus acuminatus, J. brachycarpus, J. coriaceus, J. effusus, J. marginatus, Hibiscus laevis, H. moscheutos, Leersia oryzoides, Lobelia cardinalis, Ludwigia

alternifolia, L. decurrens, Lycopus americanus, Mimulus alatus, Onoclea sensibilis, Polygonum amphibium, P. hydropiperoides, P. lapathifolium, P. pennsylvanicum, P. punctatum, Sagittaria brevirostra, Saururus cernuus, Scirpus atrovirens, S. validus, and Typha latifolia.

4B. Wet Meadow- These areas often adjoin emergent marshes and may serve as an ecotone between wetlands and adjacent agricultural fields. Soils are usually wet in winter, early spring, and even summers during wet years. However, these fields may be converted to row crops, wildlife food crops, or hay during drier years. The flora is obviously variable and may include numerous agricultural weeds; typical species in spring are Alopecurus carolinianus, Carex frankii, C. lupulina, C. lurida, C. squarrosa, C. vulpinoidea, Eleocharis erythropoda, E. ovata, Euphorbia maculata, Gratiola neglecta, Juncus acuminatus, J. coriaceus, J. effusus, J. marginatus, J. tenuis, Leucospora multifida, Myosurus minimus, Ranunculus abortivus, R. parviflorus, R. pusillus, R. sardous, and Senecio glabellus. Drying in late summer and fall results in a different flora, dominated by such taxa as Asclepias incarnata, Agrimonia parviflora, Bidens cernua, B. polylepis, B. tripartita, Cyperus strigosus, Diodia virginiana, Echinochloa crusgalli, Eupatorium coelestinum, E. perfoliatum, E. serotinum, Helenium flexuosum, Heliotropium indicum, Leptochloa panicoides, Lysimachia ciliata, Panicum dichotomiflorum, P.

rigidulum, Penthorum sedoides, Phyla lanceolata, Polygonum hydropiperoides, P. pennsylvanicum, P. punctatum, Pluchea camphorata, Sorghum halepense, and Xanthium strumarium.

5. Seasonally Dewatered Flats- These areas are adjacent to reservoirs and pools and are inundated for the majority of the year. Drought, evaporation, or more typically artificial drawdown, results in exposure and an ephemeral flora develops if exposure time before freezing is sufficient. Chester (1992) found this community along Lake Barkley, where drawdown normally begins around 1 August, to be made up of a narrow range of species capable of completing their life cycle in a short period. In CCNWR, where managed pools are controlled independently of Barkley Lake, dewatered zones may appear throughout the growing season and a wider range of species occur, including many taxa characteristic of wet meadows. Examples of this flora at CCNWR are Amaranthus tuberculatus, Ammannia coccinea, Cyperus erythrorhizos, C. esculentus, C. flavicomus, C. squarrosus, Diodia virginiana, Echinochloa crusgalli, Eleocharis acicularis, Eragrostis hypnoides, Fimbristylis autumnalis, F. vahlii, Lindernia dubia, Polygonum hydropiperoides, P. pennsylvanicum, Panicum rigidulum, Rotala ramosior, and Xanthium strumarium.

6. Agricultural Fields Subject to Flooding- These are low fields where soils dry enough for cultivation, although flooding may occur during the non-growing season.

Agricultural fields are prevalent at CCNWR, where such commercial crops as corn, soybeans, and hay are grown by area farmers, and wildlife crops such as millet, buckwheat, wheat, milo, and rye are grown by refuge personnel to attract waterfowl. The flora includes numerous, mostly weedy species (e.g. Allium vineale, Amaranthus hybridus, A. spinosus, Arabidopsis thaliana, Barbarea vulgaris, Brassica rapa, Capsella bursa-pastoris, Cardamine hirsuta, Cerastium brachypetalum, C. glomeratum, Digitaria ischaemum, D. sanguinalis, Draba verna, Ipomoea hederacea, Iva annua, Lamium amplexicaule, L. purpureum, Poa annua, Rumex acetosella, R. crispus, Trifolium repens, Vicia sativa, V. villosa, and Xanthium strumarium).

7. Streambanks- A narrow strip of woodlands and thickets parallels the Cumberland River and larger streams where disturbance by bank erosion and flooding is commonplace. Acer negundo, A. saccharinum, Celtis laevigata, Fraxinus pennsylvanica, Liquidambar styraciflua, Platanus occidentalis, Populus deltoides, Quercus pagoda, Q. shumardii, Salix nigra, and Ulmus rubra are common trees. Aristolochia tomentosa, Cocculus carolinus, and Smilax rotundifolia are frequent woody vines. Arundinaria gigantea sometimes forms dense stands; the herbaceous flora is scant due to flooding.

8. Low Woods- These woodlands are adjacent to smaller streams and in ravines where there is less flooding and

erosion. This community differs from bottomland forests in that floristic influences from adjacent slopes are common, standing water is rare, and soils are not always saturated. Low woods are significant floristically, especially where springs and limestone outcrops occur. In addition to the trees listed above (7), taxa more frequently found in mesic woods, such as Acer saccharum, Carya cordiformis, C. ovata, Fagus grandifolia, Juglans nigra, and Ulmus rubra are common. Frequent shrubs and small trees include Aesculus glabra, Asimina triloba, Carpinus caroliniana, Cercis canadensis, and Ostrya virginiana. Smilax rotundifolia is the most common woody vine. The herbaceous flora is often rich and includes such species as Arisaema dracontium, Asplenium rhizophyllum, Carex rosea, Delphinium tricornis, Erythronium americanum, Impatiens capensis, I. pallida, Mertensia virginica, Pachysandra procumbens, Phacelia bipinnatifida, Polygonatum biflorum, Saxifraga virginensis, and Woodsia obtusa.

9. Lowland Successional Fields- This community type includes agricultural fields in various stages of succession ranging from first-year-after-cultivation to young-forest stages. The vegetation is typically dense and includes a mixture of herbaceous perennials (Andropogon virginicus, Aster pilosus, Bidens spp., Solidago canadensis), shrubs and small trees (Cephalanthus occidentalis, Ilex decidua, Prunus americana, P. angustifolia, Rhus copallina, R. glabra, Rubus

argutus, R. flagellaris, Sambucus canadensis), and young trees (Acer saccharinum, Diospyros virginiana, Gleditsia triacanthos, Juniperus virginiana, Platanus occidentalis, Salix nigra, Ulmus alata).

10. Shallow Streams with Sand and Gravel Bars- This community type is limited in area but is often floristically diverse. A mixture of native and introduced species occurs on the sand-gravel banks and bars, which are frequently flooded for brief periods after rains. Species include Artemesia annua, Commelina communis, Equisetum arvense, Isanthus brachiatus, Mentha piperita, Polanisia dodecandra, Samolus floribundus, and Sparganium americanum. Aquatics in shallow streams include Elodea canadensis, Nasturtium officinale, Potamogeton foliosus, and Veronica anagallis-aquatica.

11. Disturbed Sites- These areas differ from successional fields in that disturbance is on-going. Sites include roadsides, boat ramp areas, gravel parking lots, and bank-fishing areas. The flora includes such weedy taxa as Cardamine hirsuta, Cerastium holosteoides, Draba brachycarpa, D. verna, Festuca elatior, Lamium amplexicaule, L. purpureum, Oxalis stricta, Plantago aristida, P. lanceolata, Rumex acetosella, R. crispus, Stellaria media, Taraxcum officinale, Trifolium campestre, T. repens, and Veronica arvensis.

Rare Taxa

Seven species of CCNWR vascular plants are endangered, threatened, or of special concern in Tennessee (Somers et al. 1989). One of these is federally listed as a Category 2 (under review) species (U.S. Dept. Interior 1990). Another species, narrowly endemic and formerly state-listed, also occurs and is included in this account to further indicate the significance of the flora. Each taxon is given below with a brief discussion of total range and listed status, as well as location, habitat, and common associates within CCNWR.

Heracleum lanatum Michx. (cow parsnip) ranges from Labrador to Alaska and Siberia, south to Georgia and Arizona (Gleason and Cronquist 1991). It is of special concern in Tennessee and was found at only one location in CCNWR, just south of South Cross Creeks Reservoir. The one observed plant was in low woods in a dry streambed where the substrate consists of rich alluvial soil and coarse gravel. Canopy trees at the site are Acer saccharum, Celtis laevigata, Fagus grandifolia, Platanus occidentalis, and Ulmus rubra. Associates include Osmorhiza longistylis, Parthenocissus quinquefolia, Polymnia canadensis, Polystichum acrostichoides, and Sanicula canadensis.

Juglans cinerea L. (white walnut or butternut) is distributed primarily north of Tennessee (Rink 1990) and is a Category 2 species under review for federal listing (U.S.

Dept. Interior 1990). It occurs rarely along banks of shallow streams within CCNWR, specifically South Cross Creek and Cub Creek. Associates include typical streambank taxa such as Acer negundo, A. saccharinum, Celtis laevigata, Platanus occidentalis, and Ulmus rubra.

Liparis loeselii (L.) Rich. (fen orchid) is found mostly north of Tennessee and favors cool, moist, alkaline ravines, bogs, and sandy meadows (Luer 1975). It is endangered in Tennessee and was found at one location in CCNWR, just southwest of Elk Creek Reservoir. About 10 plants were observed on small hummocks in an emergent marsh created by beaver dams on a small stream fed by several freshwater springs. Scattered woody taxa in this section of the marsh include Cephalanthus occidentalis, Salix nigra, and S. sericea. Associated herbs include Carex laevivaginata, C. lurida, Chelone glabra, Epilobium coloratum, Pedicularis lanceolata, Scirpus polyphyllus, S. validus, and Typha latifolia.

Pedicularis lanceolata Michx. (lanceolate-leaved lousewort) is found in calcareous swales and shores, primarily north of Tennessee (Pennell 1935). It is threatened in Tennessee and known only from one site in CCNWR (see Liparis). Hundreds of plants grow in the marsh and heavily flower and fruit, although often browsed by deer. Associates are the same as previously mentioned for Liparis.

Phacelia ranunculacea (Nutt.) Constance (waterleaf) has two cytotypes, one with populations in Maryland, North Carolina, and at the confluence of the Ohio and Mississippi rivers; the other is centered at the confluence of the Ohio and Mississippi rivers with scattered populations in Middle Tennessee and Arkansas (Chuang and Constance 1978). It is a species of special concern in Tennessee. The only known location in CCNWR is southwest of Pool 8, where numerous plants grow in streambank woods along the Cumberland River. Canopy species are Acer negundo, A. saccharinum, Celtis laevigata, Crataegus mollis, Morus rubra, Quercus shumardii, and Ulmus rubra. Arundinaria gigantea, Smilax rotundifolia, and Toxicodendron radicans are other woody taxa of importance. The herbaceous layer is scant due to flooding, but includes Eupatorium rugosum, Poa sylvestris, and Stellaria media.

Sagittaria brevirostra Mackenzie & Bush (midwestern arrow-head), typically found northwest of Tennessee, is sporadically distributed throughout the central mid-western states, perhaps as a result of seed distribution by birds. It favors basic eutrophic lakes with exposed mudflats (Beal et al. 1982). This species is threatened in Tennessee and is known from several locations within CCNWR, usually in emergent marsh/wet meadow communities. Typical associates include various members of the Alismataceae, Cyperaceae,

Juncaceae, Polygonaceae, and others listed in the description of emergent marshes.

Spiranthes ovalis Lindl. (oval ladies'-tresses) is scattered in rich mesic woods of the southeastern U.S. (Luer 1975). It is of special concern in Tennessee and the only known location in CCNWR is just southwest of Pool 5. Only a few individuals were found in low woods dominated by Acer saccharinum, A. saccharum, Celtis laevigata, Ostrya virginiana and Platanus occidentalis. Herbaceous associates are Leersia virginica, Melica mutica, and Microstegium vimineum; the latter species, an exotic, poses a threat to Spiranthes in CCNWR.

Lesquerella lescurii (Gray) Watson. The Nashville bladderpod is a narrow endemic reported from only nine counties in Tennessee and one in Kentucky (Chester 1982). It has been considered threatened in Tennessee (Committee for Tennessee Rare Plants 1978), but was recently removed from the state list because of the extensiveness of populations. It is a springtime component of agricultural fields adjacent to the Cumberland River and is known from several CCNWR locations, often in large stands. Common associates are Arabidopsis thaliana, Barbarea vulgaris, Brassica rapa, Capsella bursa-pastoris, Cerastium brachypetalum, C. glomeratum, Myosurus minimus, Ranunculus abortivus, R. parviflorus, R. pusillus, Senecio glabellus, Valerianella locusta, and V. radiata.

CHAPTER VI

CONCLUSIONS

Cross Creeks National Wildlife Refuge in Stewart County, Tennessee, includes 3588 ha of predominately wetland habitat on either side of the Cumberland River. Floristic studies from 1 July 1990-30 June 1992 (involving 78 collecting trips) showed that (1) the vascular flora consists of 116 families, 367 genera, and 633 species and sub-specific taxa, (2) 20.85% of the flora is introduced, (3) 17.4% of the flora is represented by woody taxa, (4) the vascular flora includes seven listed rare taxa, one of which is federally listed as a Category 2 plant, and (5) there are 14 distinct community types. Nine of these types fall into the wetland classification system of Carter and Burbank (1978) and include: vegetated open water, bottomland forests, forested swamps, dead tree swamps, shrub swamps, emergent marshes, wet meadows, seasonally dewatered flats, and agricultural fields. The other five types were subjectively delineated and include streambanks, low woods, lowland successional fields, shallow streams with sand and gravel bars, and disturbed sites.

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APPENDIX

LIST OF VASCULAR PLANTS KNOWN FROM
CROSS CREEKS NATIONAL WILDLIFE REFUGE

The floristic list is divided into major groups: pteridophyta (ferns and fern allies), Gymnospermae (non-flowering seed plants), and Angiospermae (flowering plants), which are subdivided into the Monocotyledonae and the Dicotyledonae. Within each group, families, genera, and species are arranged alphabetically. Nomenclature follows references listed previously and synonymy is given in some cases. The community type(s) where the species predominately occur(s) is/are given next, followed by subjective observations of abundance within the communities. Categories of abundance are modified from the scheme of Murrell and Wofford (1987) and include:

- infrequent - not always in the stated community
type(s), usually in small numbers;
- occasional - often in the community type(s), but rarely
in large numbers;
- frequent - usually encountered in the community
type(s), but not always in large numbers;
- abundant - expected in the type, usually in large
numbers.

In addition, two categories refer to distribution within the entire refuge:

very rare - known from only a single locale with few individuals;

rare - known from more than one locale, generally with small populations or one locale with numerous individuals.

Collection number(s) are those of the author unless preceded by EWC, which represent collections by Edward W. Chester.

PTERIDOPHYTA

ADIANTACEAE

Adiantum pedatum L. Base of limestone outcrops along streams; infrequent. 1114.

ASPLENIACEAE

Asplenium platyneuron (L.) Oakes. Bottomland forests, successional fields; rare. 637, 1111.

Asplenium rhizophyllum L. [Camptosorus rhizophyllum (L.) Link]. Limestone outcrops along streambanks and in low woods; rare. 1019.

Cystopteris protrusa (Weatherby) Blasdel [C. fragalis (L.) Bernh. var. protrusa Weath.]. Streambanks, low woods; rare. 1018.

Polystichum acrostichoides (Michx.) Schott. Bottomland forests, low woods, successional fields; frequent. 636.

Thelypteris hexagonoptera (Michx.) Weatherby. Low woods, especially around rock outcrops; occasional. 793, 959.

Woodsia obtusa (Spreng.) Torr. Bottomland forests, low woods; frequent. 642, 674.

EQUISETACEAE

Equisetum arvense L. Streambanks, sand and gravel bars; rare. 1024.

ONOCLEACEAE

Onoclea sensibilis L. Streambanks, low woods, swamps, emergent marshes; frequent. 743, 1077.

OPHIOGLOSSACEAE

Botrychium biternatum (Sav.) Underwood [B. tenuifolium Underw., B. dissectum Spreng. var. tenuifolium (Underw.) Fern.]. Bottomland forests; occasional. 552, 611, 1152, EWC 85-952.

Botrychium virginianum (L.) Swartz. Bottomland forests; occasional. 689, 765.

Ophioglossum vulgatum L. var. pycnostichum Fern. [O. pycnostichum (Fern.) Love & Love]. Bottomland forests; infrequent. 1153.

POLYPODIACEAE

Polypodium polypodioides (L.) Watt. On trees in bottomlands; infrequent. EWC 85-953.

SALVINIACEAE

Azolla caroliniana Willd. Reservoirs, managed pools; abundant. 207.

SELAGINELLACEAE

Selaginella apoda (L.) Spring. Wooded springbrook banks; rare. 1100.

SPERMATOPHYTA: GYMNOSPERMAE

CUPRESSACEAE

Juniperus virginiana L. Streambanks, successional fields; frequent. 506, 1081.

PINACEAE

*Pinus taeda L. Planted, sometimes in plantations; rare. 652.

SPERMATOPHYTA: ANGIOSPERMAE

MONOCOTYLEDONEAE

AGAVACEAE

*Yucca filamentosa L. Moist disturbed sites; very rare.
967.

ALISMATACEAE

Alisma subcordatum Raf. Emergent marshes, wet meadows;
occasional. 201.

Echinodorus cordifolius (L.) Griseb. Emergent marshes, wet
meadows; occasional. 200, 315.

Sagittaria brevirostra Mackenzie & Bush. Emergent marshes,
wet meadows; frequent. 344, 585, 990, 1014, EWC 90-
447, 91-108.

ARACEAE

Arisaema dracontium (L.) Schott. Streambanks, low woods,
bottomland forests; infrequent. 675, 752.

Arisaema triphyllum (L.) Schott. Streambanks, low woods,
bottomland forests; rare. 1124.

COMMELINACEAE

*Commelina communis L. Moist disturbed sites, streambanks,
gravel and sand bars; frequent. 395, 1026.

Commelina virginica L. Moist disturbed sites, low woods;
occasional. 250, EWC-12796.

Tradescantia subaspera Ker. Streambanks; occasional. 727.

CYPERACEAE

Carex annectens Bickn. Streambanks, wet meadows;
occasional. 1162.

Carex blanda Dewey. Bottomland forests; frequent. 691.

Carex cephalophora Muhl. Disturbed open areas; occasional.
1173, EWC 12617.

Carex complanata Torr. & Hook. [C. hirsutella Mackenzie].
Successional fields; infrequent. EWC 12618.

- Carex crinita Lam. Low woods, marshes; infrequent. 750.
- Carex crus-corvi Shuttlw. Wet successional fields; occasional. 737.
- Carex festucacea Schkuhr. Moist disturbed sites, wet meadows; occasional. 717, 776.
- Carex frankii Kunth. Emergent marshes, wet meadows; occasional. 231, 306.
- Carex grayi Carey. Bottomland forests, streambanks; frequent. 309, 775.
- Carex intumescens Rudge. Low woods; occasional. 1159.
- Carex jamesii Schwein. Bottomland forests; occasional. 1156.
- Carex laxiflora Lam. Streambanks, bottomland forests; infrequent. 1146, 1157.
- Carex laevivaginata (Kukenthal) Mackenzie. Low woods, wet meadows, emergent marshes; frequent. 1168, 1169, 1170, 1188.
- Carex lupulina Muhl. Wet meadows, emergent marshes; frequent. 208, 230, 850, 925.
- Carex lurida Wahlenb. Open streambanks, emergent marshes, wet meadows; frequent. 899.
- Carex rosea Schkuhr. Bottomland forests, streambanks, low woods; occasional. 738, 744, 1167, EWC 12616.
- Carex squarrosa L. Low woods, wet meadows; frequent. 773, 835.
- Carex tribuloides Wahlenb. Wet meadows, marshy thickets, moist disturbed sites; frequent. 205, 235, 244, 824, 890.
- Carex vulpinoidea Michx. Wet meadows, marshy thickets, successional fields; abundant. 206, 233, 246, 701, 704, 1196.
- Cyperus acuminatus Torr. & Hook. Agricultural fields, wet meadows, wet successional fields; occasional. 363.
- Cyperus echinatus (L.) Wood [C. ovularis (Michx.) Torr.]. Streambanks, wet successional fields, wet meadows; infrequent. 907.

- Cyperus erythrorhizos Muhl. Emergent marshes, wet meadows, mudflats; abundant. 370, 588, 600, 1089, EWC 85-951.
- Cyperus esculentus L. Mudflats, wet meadows; frequent. 451.
- Cyperus flavescens L. Gravel and sand bars; occasional. 1049.
- Cyperus flavicomus Michx. [C. albomarginatus Mart. & Schrad ex Nees]. Mudflats, wet meadows, wet successional fields; frequent. 397, 601, EWC 85-950, EWC 90-449.
- *Cyperus iria L. Wet meadows, wet successional fields; rare. EWC 85-1050.
- Cyperus lancastricensis Porter. Wet successional fields, wet meadows; infrequent. 317.
- Cyperus pseudovegetus Steud. Emergent marshes, wet meadows; frequent. 891.
- Cyperus refractus Engelm. Streambanks; rare. 908.
- Cyperus squarrosus L. [C. aristatus Rottb.]. Wet meadows, mudflats; occasional. 422.
- Cyperus strigosus L. Emergent marshes, wet meadows, moist disturbed sites; frequent. 568, EWC 85-955.
- Eleocharis acicularis (L.) Roemer & Schultes. Mudflats, pool margins; frequent. 262.
- Eleocharis erythropoda Steudel. Emergent marshes, reservoir margins, wet meadows; infrequent. 880.
- Eleocharis ovata (Roth) Roemer & Schultes [E. obtusa (Willd.) Schultes]. Wet meadows, emergent marshes; abundant. 204.
- Fimbristylis autumnalis (L.) Roemer & Schultes. Mudflats; frequent. 1016.
- *Fimbristylis miliacea (L.) Vahl. Mudflats; rare. 567, 583.
- Fimbristylis vahliae (Lam.) Link. Mudflats; frequent. 419.
- Scirpus atrovirens Willd. Emergent marshes, wet meadows; frequent. 203, 816, 831, 887.

Scirpus cyperinus (L.) Kunth [S. rubricosus Fern.].
Emergent marshes; rare. EWC 91-126.

Scirpus pendulus Muhl. Emergent marshes, wet meadows;
frequent. 364, 921.

Scirpus polyphyllus Vahl. Streambanks, emergent marshes;
infrequent. 859, 897, 1001.

Scirpus validus Vahl. Emergent marshes; rare. 974.

DIOSCOREACEAE

*Dioscorea batatas Decne. Disturbed sites; infrequent.
920.

Dioscorea quaternata J. F. Gmelin [D. villosa L.].
Bottomland forests; occasional. 461.

HYDROCHARITACEAE

Elodea canadensis Michx. Calm sections of shallow streams;
rare. 1202.

IRIDACEAE

Iris cristata Aiton. Limestone outcrops along streams;
rare. 940.

Sisyrinchium angustifolium Miller. Streambanks, bottomland
forests; occasional. 713.

JUNCACEAE

Juncus acuminatus Michx. Wet meadows, streambanks, emergent
marshes; occasional. 234, 892.

Juncus brachycarpus Engelm. Wet meadows, emergent marshes;
infrequent. 889.

Juncus coriaceus Mackenzie. Wet meadows, emergent marshes;
frequent. 823, 865, 884.

Juncus diffusissimus Buckley. Wet meadows; infrequent.
787, 875.

Juncus effusus L. Wet meadows, emergent marshes,
streambanks; abundant. 232, 278, 898.

Juncus marginatus Rostk. Wet meadows, emergent marshes;
frequent. 885.

Juncus tenuis Willd. Wet meadows, disturbed sites, successional fields; frequent. 227, 287, 442, 751, 836.

Luzula echinata (Small) Herm. Streambanks, low woods; occasional. 1093, 1112.

LEMNACEAE

Lemna minor L. Pools, swamps; abundant. 367.

Spirodela polyrhiza (L.) Schleiden. Pools, swamps; abundant. 279.

Wolffia papulifera Thompson. Pools, swamps; occasional. 367.

LILIACEAE

Allium canadense L. Bottomland forests, wet meadows, successional fields; frequent. 1155.

*Allium vineale L. Disturbed sites, wet meadows, successional fields, agricultural fields; abundant. 242, 256, 593, 723, 755.

Erythronium albidum Nutt. Bottomland forests; rare. 646.

Erythronium americanum Ker Gawler. Bottomland forests, low woods; occasional. 1095.

*Hemerocallis fulva L. Disturbed sites, especially roadsides; infrequent. 784.

Hymenocallis caroliniana (L.) Herbert [H. occidentalis (Le Conte) Kunth]. Bottomland forests; occasional. 551, 1035, 1203.

*Muscari botryoides (L.) Miller. Streambanks; very rare. 1104.

*Narcissus poeticus L. Open low woods; rare. 658.

*Narcissus pseudonarcissus L. Disturbed areas such as roadsides; occasional. 1101.

Polygonatum biflorum (Walter) Elliott. Bottomland forests adjacent to mesic slopes, low woods; occasional. 672.

Smilacina racemosa (L.) Desf. Bottomland forests adjacent to mesic slopes; rare. 844.

Trillium recurvatum Beck. Bottomland forests, streambanks, low woods; occasional. 643, 687, 1118, 1121.

NAJADACEAE

*Najas minor All. Open water; abundant. 294.

ORCHIDACEAE

Liparis loeselii (L.) Rich. On hummocks in an emergent marsh and wet meadow; very rare. 1193, EWC 91-107.

Spiranthes ovalis Lindl. var. erostellata Catling. Low woods; very rare. 1060, 1071.

POACEAE

Agrostis perennans (Walter) Tuckerman. Streambanks, low woods; occasional. 1050, 1066.

*Agrostis stolonifera L. Streambanks, low woods; occasional. 894.

Alopecurus carolinianus Walter. Agricultural fields, wet meadows; frequent. 667.

Andropogon virginicus L. Successional fields, wet meadows; abundant. 1046, 1079.

*Arthraxon hispidus (Thunb.) Makino. Successional fields, bottomland forests, disturbed sites; frequent. 589, 603, EWC 90-448.

Arundinaria gigantea (Walter) Chapman [A. tecta (Walter) Muhl.]. Bottomland forests, swamps, streambanks; abundant. 251.

*Bromus commutatus Schrader. Successional fields, disturbed sites such as roadsides; frequent. 822.

*Bromus japonicus Thunb. Successional fields, disturbed sites such as roadsides; frequent. 243.

Bromus pubescens Muhl. [B. purgans L.]. Bottomland forests, streambanks, low woods; occasional. 872.

Chasmanthium latifolium (Michx.) Yates [Uniola latifolia Michx.]. Bottomland forests, streambanks, low woods; frequent. 369.

Cinna arundinacea L. Bottomland forests, streambanks; occasional. 368.

*Cynodon dactylon (L.) Pers. Disturbed sites; frequent. 266.

*Dactylis glomerata L. Successional fields, disturbed sites; frequent. 801, 882, 1181.

*Digitaria ischaemum (Schreber) Muhl. Disturbed sites, agricultural fields; frequent. 1045.

*Digitaria sanguinalis (L.) Scop. Disturbed sites, agricultural fields; frequent. 375.

*Echinochloa crusgalli (L.) P. Beauv. var. crusgalli. Wet meadows, disturbed sites, pool margins; frequent. 288, 886.

*Echinochloa crusgalli (L.) P. Beauv. var. frumentacea (Roxb.) W. F. Wight [E. frumentacea (Roxb.) Link]. Planted and self-seeding; frequent. 502.

*Eleusine indica (L.) Gaertn. Disturbed sites; frequent. 358.

Elymus hystrix L. [Hystrix patula Moench.]. Bottomland forests, streambanks, low woods; infrequent. 856.

Elymus virginicus L. Bottomland forests, successional fields, streambanks, low woods; abundant. 268, 304, 305, 313, 955.

Eragrostis capillaris (L.) Nees. Successional fields, disturbed sites; occasional. 749, 779.

*Eragrostis cilianensis (All.) Janchen [E. megastachya (Koel.) Link]. Disturbed sites, especially roadsides, wet meadows; frequent. 371.

Eragrostis frankii C. A. Meyer. Disturbed sites, especially roadsides, streambanks; infrequent. EW 91-122.

Eragrostis hypnoides (Lam.) BSP. Mudflats, wet meadows; abundant. 424, 478.

*Eragrostis pilosa (L.) P. Beauv. Mudflats, wet disturbed sites; frequent. 372, 520.

Eragrostis spectabilis (Pursh) Steudel. Successional fields, disturbed sites; occasional. 557.

*Festuca elatior L. [F. arundinacea Schreber]. Disturbed sites, successional fields; frequent. 599, 883.

- Festuca subverticillata (Pers.) E. Alexeev. [F. obtusa Biehler]. Bottomland forests, streambanks, low woods; frequent. 1139.
- Glyceria striata (Lam.) A. Hitchc. Bottomland forests, streambanks, swamps, emergent marshes; frequent. 809, 957.
- Hordeum pusillum L. Disturbed sites, successional fields, agricultural fields; frequent. 296, 731.
- Leersia oryzoides (L.) Swartz. Swamps, wet meadows, emergent marshes; frequent. 569.
- Leersia virginica Willd. Bottomland forests, streambanks, low woods, disturbed sites such as roadsides; occasional. 553, 560, 1061.
- Leptochloa filiformis P. (Lam.) Beauv. Disturbed sites, agricultural fields; infrequent. 491.
- Leptochloa panicoides (C. Presl.) A. Hitchc. & Chase. Mudflats, wet meadows; frequent, sometimes in dense stands. 396, 1090.
- *Lolium perenne L. Agricultural fields, disturbed sites; planted and persisting. 264.
- Melica mutica Walter. Bottomland forests, low woods; occasional. 1160.
- *Microstegium vimineum (Trin.) A. Camus [Eulalia viminea (Trin.) Ktze.]. Bottomland forests, wet meadows, streambanks, low woods; frequent. 1074.
- Muhlenbergia frondosa (Poir.) Fern. Streambanks; infrequent. 1058.
- Muhlenbergia schreberi J. F. Gmelin. Streambanks, low woods, disturbed sites; occasional. 1051.
- Muhlenbergia sylvatica (Torr.) Torr. Streambanks, low woods; occasional. 1075.
- Muhlenbergia tenuiflora (Willd.) BSP. Streambanks, low woods, disturbed sites; occasional. 582, 1020.
- Panicum acuminatum Swartz. var. acuminatum [P. lanuginosum Ell.]. Emergent marshes, wet meadows, successional fields, disturbed sites; frequent. 326, 421, 797, 834.

- Panicum anceps Michx. Successional fields, disturbed sites, especially roadsides; frequent. 979.
- Panicum boscii Poir. Base of limestone outcrops along streams; infrequent. 1183, 1197.
- Panicum capillare L. var. capillare. Successional fields, disturbed sites; occasional. 1065, EWC 85-954.
- Panicum clandestinum L. Bottomland forests, streambanks, low woods, successional fields; frequent. 760, 874, 1191.
- Panicum dichotomiflorum Michx. Wet meadows, mudflats, disturbed sites; frequent. 527.
- *Panicum miliaceum L. [listed by Robinson (1991) as P. ramosum?]. Commonly cultivated. No collections.
- Panicum rigidulum Bosc ex Nees var. rigidulum [P. agrostoides Spreng.]. Wet meadows, successional fields, mudflats, disturbed sites; frequent. 280, 459, 580.
- Panicum scoparium Lam. Wet meadows, bottomland forests, streambanks, low woods; occasional. 1048.
- Paspalum fluitans (Elliott) Kunth. [P. repens Berg.]. Bottomland forests, streambanks, low woods, wet meadows; frequent. 460, EWC 91-121.
- Paspalum laeve Michx. Wet meadows, successional fields, disturbed sites; frequent. 479.
- *Phleum pratense L. Successional fields, disturbed sites, especially roadsides; occasional. 895, 1194.
- *Poa annua L. Successional fields, agricultural fields, disturbed sites; frequent. 668.
- *Poa pratensis L. Successional fields, disturbed sites; occasional. 1161.
- Poa sylvestris A. Gray. Bottomland forests, streambanks; abundant. 699, 1145, EWC 12619.
- *Setaria faberi R. Herrm. Successional fields, disturbed sites; frequent. 282.
- Setaria geniculata (Lam.) P. Beauv. Successional fields, disturbed sites; frequent. 318, 374.

- Setaria glauca (L.) P. Beauv. [S. lutescens (Wigel.) Hubb.].
Successional fields, disturbed sites; frequent. 480.
- *Setaria italica (L.) P. Beauv. Commonly cultivated,
escaping into disturbed sites. 498.
- *Setaria viridis (L.) P. Beauv. Successional fields,
disturbed sites; frequent. 454.
- *Sorghum bicolor (L.) Moench. Milo (and perhaps other kinds
of grain sorghum) is often planted and rarely self-
seeds. No collections.
- *Sorghum halepense (L.) Pers. Successional fields,
disturbed sites, open streambanks, low woods, wet
meadows; frequent. 430.
- Sphenopholis obtusata (Michx.) Scribn. Bottomland forests,
streambanks, low woods, wet meadows; infrequent. 1171,
1172.
- Tridens flavus (L.) A. Hitchc. [Triodia flava (L.) Smyth].
Successional fields, disturbed sites, wet meadows;
frequent. 598.
- *Triticum aestivum L. Commonly planted, sometimes escaping
to disturbed sites. 724.
- Vulpia octoflora (Walter) Rydb. [Festuca octoflora Walter].
Disturbed sites, successional fields, occasional. 729.
- *Zea mays L. Agricultural fields; frequent. 1200.

PONTEDERIACEAE

- Heteranthera reniformis Ruiz & Pavon. Shallow pools, mud;
rare. 870.

POTAMOGETONACEAE

- Potamogeton foliosus Raf. Shallow streams, pools;
infrequent. 982, 1015.

SMILACACEAE

- Smilax bona-nox L. Bottomland forests, streambanks, low
woods, successional fields, disturbed sites; frequent.
866.
- Smilax hispida Muhl. [S. tamnoides L.]. Bottomland forests,
streambanks, low woods, disturbed sites; frequent.
820.

Smilax rotundifolia L. Bottomland forests, streambanks, low woods, disturbed sites; abundant. 613.

SPARGANIACEAE

Sparganium americanum Nutt. Shallow, sluggish streams, emergent marshes, swamps; rare. 978.

TYPHACEAE

Typha latifolia L. Emergent marshes, swamps, pool margins; frequent. 365.

SPERMATOPHYTA: ANGIOSPERMAE

DICOTYLEDONAE

ACANTHACEAE

Dicliptera brachiata (Pursh.) Sprengel. Bottomland forests, wet meadows, disturbed areas; infrequent. 501.

Justicia americana (L.) M. Vahl. Streams with sand and gravel bars, shallow pools and reservoirs; frequent, often in dense stands. 914.

Ruellia strepens L. Bottomland forests, streambanks, low woods, disturbed sites; occasional. 390, 475, 757, 991.

ACERACEAE

Acer negundo L. Bottomland forests, streambanks, low woods, forested swamps; frequent. 487, 504, 756.

Acer rubrum L. Bottomland forests, streambanks, low woods, forested swamps, shrub swamps; occasional. 805.

Acer saccharinum L. Bottomland forests, streambanks, low woods, forested swamps, successional fields; frequent. 489.

Acer saccharum Marshall. Bottomland forests, streambanks, low woods; frequent. 544, 789.

AMARANTHACEAE

*Amaranthus hybridus L. Agricultural fields, disturbed sites, successional fields; frequent. 357, 573.

*Amaranthus spinosus L. Agricultural fields, disturbed sites, successional fields; frequent. 359.

Amaranthus tuberculatus (Moq.) Sauer [Acnida altissima Ridd.]. Streambanks, mudflats, streams with sand and gravel bars, agricultural fields; frequent. 408.

Iresine rhizomatosa Standley. Bottomland forests, wet successional fields; rare. 519, 1039.

ANACARDIACEAE

Rhus copallina L. Successional fields, disturbed sites; frequent. 324.

Rhus glabra L. Successional fields, disturbed sites; frequent. 517.

Toxicodendron radicans (L.) Kuntze [Rhus radicans L.]. Bottomland forests, streambanks, low woods, successional fields, disturbed sites; abundant. No collections.

ANNONACEAE

Asimina triloba (L.) Dunal. Bottomland forests, streambanks, low woods; frequent. 529, 647.

APIACEAE

Chaerophyllum tainturieri Hook. Agricultural fields, disturbed sites; occasional. 664.

Cicuta maculata L. Wet meadows, borders of swamps and marshes; infrequent. 253.

Cryptotaenia canadensis (L.) DC. Bottomland forests, streambanks, low woods, disturbed sites; occasional. 759, 849.

*Daucus carota L. Disturbed sites, successional fields; abundant. 216, 777.

Erigenia bulbosa (Michx.) Nutt. Bottomland forests, streambanks, low woods; occasional. 641, 1099.

Eryngium prostratum Nutt. Wet meadows, pool margins, mudflats; occasional. 404.

Heracleum lanatum Michx. Low woods; very rare. 1176.

Osmorhiza longistylis (Torr.) DC. Bottomland forests, streambanks, low woods; occasional. 693.

Sanicula canadensis L. Bottomland forests, streambanks, low woods; frequent. 493.

Thaspium trifoliatum (L.) A. Gray. Streambanks, low woods; infrequent. 1123, 1185.

*Torillia arvensis (Hudson) Link. Disturbed sites, successional fields; frequent. 795, 993, 1195.

APOCYNACEAE

Amsonia tabernaemontana Walter. Bottomland forests, streambanks, low woods; infrequent. 686.

Apocynum cannabinum L. Disturbed sites, successional fields; occasional. 927.

AQUIFOLIACEAE

Ilex decidua Walter. Streambanks, low woods, bottomland forests, swamps, successional fields; occasional. 798, 902.

ARISTOLOCHIACEAE

Aristolochia tomentosa Sims. Streambanks, bottomland forests; occasional. 533.

Asarum canadense L. Bottomland forests, streambanks, low woods; occasional. 635, 688.

ASCLEPIADACEAE

Ampelamus albidus (Nutt.) Britton [Cynanchum laeve (Michx.) Pers.]. Bottomland forests, streambanks, low woods, successional fields; occasional. 291, 964.

Asclepias incarnata L. Wet meadows, shrub swamps, dead woody swamps, emergent marshes; frequent. 314, 446.

Asclepias syriaca L. Successional fields, disturbed sites, wet meadows; frequent. 289.

Asclepias tuberosa L. Successional fields, disturbed sites, wet meadows; frequent. 300.

Matelea gonocarpa (Walter) Shinnars [Gonolobus gonocarpos (Walter) Perry]. Bottomland forests, streambanks, low woods; infrequent. EW 90-460.

ASTERACEAE

- *Achillea millefolium L. Disturbed sites, successional fields; occasional. 807, 1023.
- Ambrosia artemisiifolia L. Disturbed sites, successional fields; abundant. 320, 348.
- Ambrosia trifida L. Disturbed sites, successional fields, wet meadows; abundant. 388.
- Antennaria solitaria Rydb. Limestone outcrops along streams and in low woods; rare. 1128.
- *Artemisia annua L. Disturbed sites, successional fields, sand and gravel bars, open streambanks; occasional. 983, EWC 91-125.
- Aster cordifolius L. Streambanks, low woods; infrequent. 1068.
- Aster dumosus L. Successional fields, disturbed sites; occasional. 999.
- Aster oblongifolius Nutt. Riverbanks; very rare. EWC 90-459.
- Aster pilosus Willd. Successional fields, disturbed sites, wet meadows, open streambanks; frequent. 566, 592, 1036, 1076.
- Aster simplex Willd. Successional fields, mudflats, low woods, streambanks, bottomland forests, wet meadows, marshes; frequent. 576, 602, 1073, 1084, 1085.
- Astranthium integrifolium (Michx.) Nutt. Low woods, streambanks; infrequent. 1142, 1184.
- Bidens aristosa (Michx.) Britton. Successional fields, wet meadows; rare. 445.
- Bidens cernua L. Successional fields, wet meadows, mudflats; occasional. 570.
- Bidens polylepis S. F. Blake. Successional fields, wet meadows, mudflats, disturbed sites; abundant. 240, 275, 322, 389, 578, 829, 903, EWC 90-428.
- *Bidens tripartita L. [B. comosa (A. Gray) Wieg.]. Successional fields, wet meadows, mudflats; frequent. 555, 572.

Boltonia diffusa Elliott. Wet meadows, mudflats, wet successional fields; occasional. 525, 909, 1062.

Cacalia muhlenbergii (Schulz-Bip.) Fern. Streambanks, low woods; rare. 1165.

*Carduus nutans L. Successional fields, disturbed sites; rare. 830.

*Chrysanthemum leucanthemum L. Successional fields, disturbed sites, agricultural fields; occasional. 783.

Cirsium altissimum (L.) Sprengel. Low woods, streambanks, successional fields; occasional. 984.

Cirsium discolor (Muhl.) Sprengel. Successional fields, disturbed sites; frequent. 986.

*Cirsium vulgare (Savi) Tenore. Successional fields, disturbed sites; infrequent. 356.

Conyza canadensis (L.) Cronq. [Erigeron canadensis L.]. Successional fields, disturbed sites, wet meadows; abundant. 345, 418, 441.

*Coreopsis tinctoria Nutt. Disturbed sites, successional fields; infrequent. 852.

Eclipta alba (L.) Hassk. Wet meadows, wet disturbed sites; infrequent. 338, 420.

Elephantopus carolinianus Willd. Low woods, disturbed sites; occasional. 800, 948.

Erechtites hieracifolia (L.) Raf. ex DC. Successional fields, disturbed sites, streambanks; occasional. 386, 531.

Erigeron annuus (L.) Pers. Successional fields, disturbed sites; abundant. 212, 450, 833.

Erigeron philadelphicus L. Successional fields, disturbed sites, streambanks, low woods, agricultural fields; occasional. 656, 708, 1131, 1148.

Erigeron strigosus Muhl. ex Willd. Successional fields, disturbed sites, streambanks; frequent. 577, 848, 968.

Eupatorium coelestinum L. Wet meadows, bottomland forests, low woods, streambanks, wet disturbed sites; abundant. 343.

- Eupatorium fistulosum Barratt. Successional fields, streambanks; occasional. 497.
- Eupatorium incarnatum Walter. Wet disturbed sites, wet meadows, wet successional fields; infrequent. 473, EWC 91-119.
- Eupatorium perfoliatum L. Wet meadows, wet successional fields; infrequent. 1052.
- Eupatorium purpureum L. Low woods, streambanks, bottomland forests, wet successional fields, wet meadows; occasional. 843.
- Eupatorium rugosum Houttuyn. Bottomland forests, streambanks, low woods; abundant. 1040, 1057.
- Eupatorium serotinum Michx. Successional fields, disturbed sites, wet meadows, streambanks; frequent. 332, 398, 562, 994.
- *Galinsoga quadriradiata Ruiz & Pavon [G. ciliata (Raf.) Blake]. Disturbed sites; infrequent. 229, 1177.
- Gnaphalium obtusifolium L. Successional fields, disturbed sites; occasional. 402.
- Gnaphalium purpureum L. Successional fields, disturbed sites, wet meadows; occasional. 753, 772.
- Helenium amarum (Raf.) H. Rock [H. tenuifolium Nutt.]. Successional fields, disturbed sites; occasional. 295.
- Helenium autumnale L. Wet meadows, wet successional fields; infrequent. 1053.
- Helenium flexuosum Raf. Wet meadows, wet successional fields; frequent. 342, 901.
- Helianthus tuberosus L. Streambanks, weedy roadsides; occasional. 366.
- Heliopsis helianthoides (L.) Sweet. Streambanks, low woods; occasional. 912.
- *Iva annua L. [I. ciliata Willd.]. Successional fields, disturbed sites, agricultural fields; frequent. 590.
- Krigia oppositifolia Raf. [Serinia oppositifolia (Raf.) Ktze.]. Agricultural fields, disturbed sites, open streambanks; frequent. 665, 1141.

- Lactuca canadensis L. Successional fields, disturbed sites; frequent. 312.
- Lactuca floridana (L.) Gaertner. Successional fields, disturbed sites, low woods, bottomland forests; occasional. 474, 1041.
- *Lactuca serriola L. [L. scariola L.]. Successional fields, disturbed sites; infrequent. 247.
- Mikania scandens (L.) Willd. Margins of larger pools; very rare. EW 90-450.
- Pluchea camphorata (L.) DC. Wet meadows, wet successional fields; occasional. 336.
- Polymnia canadensis L. Low woods, streambanks; infrequent. 878.
- Polymnia uvedalia L. Low woods, streambanks; occasional. 954.
- Prenanthes altissima L. Low woods, streambanks; rare. 1063, 1070.
- Pyrrhopappus carolinianus (Walter) DC. Successional fields, disturbed sites, wet meadows, streambanks; frequent. 274, 832.
- Rudbeckia hirta L. Successional fields, disturbed sites; frequent. 283.
- Rudbeckia laciniata L. Low woods, wet meadows, wet successional fields; occasional. 939, 981.
- Rudbeckia triloba L. Successional fields, disturbed sites, streambanks; frequent. 393, 904.
- Senecio aureus L. Low woods, streambanks; occasional. 742.
- Senecio glabellus Poir. Successional fields, disturbed sites, agricultural fields, wet meadows; abundant. 630.
- Silphium integrifolium Michx. Disturbed sites, especially weedy roadsides; infrequent. 1204.
- Silphium perfoliatum L. Wet successional fields, disturbed sites; infrequent. 937, 1201.
- Solidago caesia L. Low woods, streambanks, bottomland forests; occasional. 942, 960, 1069.

Solidago canadensis L. [S. altissima L.]. Successional fields, disturbed sites, wet meadows, streambanks; abundant. 526, 1029.

Solidago gigantea Aiton. Successional fields, disturbed sites, wet meadows, streambanks, emergent marshes; frequent. 499, 973, 1042.

Solidago patula Muhl. Low woods; rare. EWC 91-109.

Solidago ulmifolia Muhl. ex Willd. Low woods, streambanks; infrequent. 1047.

*Sonchus asper (L.) Hill. Disturbed sites; rare. 740.

*Taraxacum officinale Weber. Disturbed sites; occasional. 1113.

Verbesina alternifolia (L.) Britton. [Actinomeris alternifolia (L.) DC.]. Bottomland forests, low woods, streambanks; frequent. 606, 1006.

Verbesina virginica L. Successional fields, disturbed sites, open streambanks; frequent. 425, 1007.

Vernonia gigantea (Walter) Trel. Successional fields, disturbed sites; frequent. 333.

*Xanthium strumarium L. Successional fields, wet meadows, agricultural fields, mudflats; abundant. 528.

BALSAMINACEAE

Impatiens capensis Meerb. Streambanks, low woods; frequent, sometimes in dense stands. 337, 518.

Impatiens pallida Nutt. Streambanks, low woods; infrequent. 857, 945.

BERBERIDACEAE

Podophyllum peltatum L. Low woods; occasional. 657.

BETULACEAE

Betula nigra L. Streambanks, forested swamps, pool margins; infrequent. 919.

Carpinus caroliniana Walter. Bottomland forests, streambanks, low woods; frequent. 464, 747.

Corylus americana Walter. Low woods, shrub swamp;
infrequent. 862.

Ostrya virginiana (Miller) K. Koch. Bottomland forests,
streambanks, low woods; frequent. 943.

BIGNONIACEAE

Bignonia capreolata L. Bottomland forests, streambanks;
occasional. 462.

Campsis radicans (L.) Seemann. Streambanks, disturbed
sites, successional fields; abundant. 215, 596.

*Catalpa speciosa Warder. Roadsides; rare. 1044.

*Paulownia tomentosa (Thunb.) Steudel. Roadsides,
streambanks; infrequent. 1000.

BORAGINACEAE

*Heliotropium indicum L. Successional fields, disturbed
sites, wet meadows, mudflats, pool margins; frequent.
335, 440.

Mertensia virginica (L.) Pers. Low woods, bottomland
forests; occasional. 746, 1133.

Myosotis macrosperma Engelm. Low woods, streambanks;
frequent. 1130, 1143.

Myosotis verna Nutt. Low woods, wet meadows, disturbed
sites, agricultural fields; frequent. 679, 771.

BRASSICACEAE

*Arabidopsis thaliana (L.) Heynh. Agricultural fields,
disturbed sites; occasional. 627, 684.

Arabis laevigata (Muhl.) Poiret. Streambanks, low woods;
infrequent. 678.

*Barbarea vulgaris R. Br. Agricultural fields, disturbed
sites, wet meadows; frequent. 682.

*Brassica rapa L. Agricultural fields, disturbed sites, wet
meadows; frequent. 618.

*Capsella bursa-pastoris (L.) Medikus. Agricultural fields,
disturbed sites, wet meadows; frequent. 621.

Cardamine concatenata (Michx.) O. Schwarz [Dentaria laciniata Muhl.]. Bottomland forests, low woods; frequent. 644.

Cardamine diphylla (Michx.) A. Wood [Dentaria diphylla Michx.]. Low woods, bottomland forests; rare. 1097.

*Cardamine hirsuta L. Agricultural fields, disturbed sites, wet meadows; frequent. 620.

Cardamine pensylvanica Muhl. Low woods, agricultural fields, disturbed sites, wet meadows; infrequent. 680.

Cardamine rhomboidea (Pers.) DC. [C. bulbosa (Schreb.) BSP.]. Bottomland forests, low woods, streambanks, wet meadows; frequent. 645, 690, 1105.

Draba brachycarpa Nutt. Disturbed sites, agricultural fields; frequent. 1103.

*Draba verna L. Disturbed sites, agricultural fields; frequent. 1102.

Iodanthus pinnatifidus (Michx.) Steudel. Bottomland forests, streambanks, low woods; occasional. 703, 714, 764, 1140.

*Lepidium campestre (L.) R. Br. Disturbed sites, successional fields; rare. 1151.

Lepidium virginicum L. Disturbed sites, successional fields; frequent. 319, 426.

Lesquerella lescurii (Gray) Watson. Agricultural fields, wet meadows, disturbed sites; infrequent, but often in large numbers. 626, 655.

*Nasturtium officinale R. Br. Shallow streams; infrequent. 860, 1072, 1186.

Rorippa sessiliflora (Nutt.) A. S. Hitchc. Wet meadows, mudflats; occasional. 1163.

Sibara virginica (L.) Rollins. Agricultural fields, disturbed sites; frequent. 616.

*Sisymbrium officinale (L.) Scop. Successional fields, disturbed sites; rare. 1189.

*Thlaspi arvense L. Disturbed sites, streambanks; infrequent. 1135.

BUXACEAE

Pachysandra procumbens Michx. Low woods, streambanks; rare.
1092, 1129.

CALLITRICHACEAE

Callitriche heterophylla Pursh. Shallow streams;
occasional. 877.

CAMPANULACEAE

Campanula americana L. Low woods, streambanks, bottomland
forests, disturbed sites; frequent. 855.

Lobelia cardinalis L. Bottomland forests, low woods,
streambanks, emergent marshes, wet meadows; frequent.
341, 452.

Lobelia inflata L. Low woods, streambanks, disturbed sites;
occasional. 929.

Lobelia siphilitica L. Low woods, disturbed sites,
streambanks, wet meadows, successional fields;
infrequent. 564, 1028.

Triodanis perfoliata (L.) Nieuwl. Successional fields,
disturbed sites; frequent. 728.

CAPPARACEAE

*Cleome hassleriana Chodat. [C. spinosa Jacq.]. Disturbed
sites; very rare. 1087.

Polanisia dodecandra (L.) DC. Sand or gravel bars; rare.
977.

CAPRIFOLIACEAE

*Lonicera japonica Thunb. Successional fields, disturbed
sites, streambanks; abundant. 301, 509.

Sambucus canadensis L. Successional fields, disturbed
sites, streambanks; frequent. 387, 827.

Symphoricarpos orbiculatus Moench. Streambanks, disturbed
sites, successional fields; frequent. 609, 653.

Viburnum rufidulum Raf. Streambanks; rare. EWC 12615.

CARYOPHYLLACEAE

- *Cerastium brachypetalum Pers. Agricultural fields, disturbed sites; frequent. 683.
- *Cerastium glomeratum Thuillier [C. viscosum L.]. Agricultural fields, successional fields, disturbed sites; frequent. 782.
- *Cerastium holosteoides Fries var. vulgare (Hart.) Hylander [C. vulgatum L.]. Disturbed sites, wet meadows, low woods; frequent. 681a, 739.
- Cerastium nutans Raf. Agricultural fields, disturbed sites, wet meadows, low woods; frequent. 669, 745, 1166.
- *Dianthus armeria L. Disturbed sites; infrequent. 796.
- *Saponaria officinalis L. Successional fields, disturbed sites, streambanks; occasional. 249, 414.
- Silene antirrhina L. Disturbed sites; infrequent. 741.
- Silene virginica L. Low woods; rare. 659.
- *Stellaria media (L.) Villars. Successional fields, disturbed sites, streambanks, bottomland forests, low woods; frequent. 619, 1109, 1144.
- Stellaria pubera Michx. Low woods; occasional. 695.

CELASTRACEAE

- Euonymus americanus L. Bottomland forests, low woods, streambanks; occasional. 546, 591, 780.
- Euonymus atropurpureus Jacq. Bottomland forests, low woods, streambanks; occasional. 463, 508, 802, 1190.

CHENOPODIACEAE

- *Chenopodium album L. Disturbed sites, wet successional fields, pool and reservoir margins; occasional. 331.
- *Chenopodium ambrosioides L. Disturbed sites, wet successional fields, sand and gravel bars, pool and reservoir margins; occasional. EW 91-124.

CLUSIACEAE

- Hypericum drummondii (Grev. & Hook.) T. & G. Disturbed sites, successional fields; rare. 992.

Hypericum frondosum Michx. Streambanks; infrequent. 854.

Hypericum mutilum L. Emergent marshes, wet meadows, wet successional fields, pool margins; frequent. 285, 310, 321, 447.

Hypericum punctatum Lam. Wet meadows, successional fields, agricultural fields, disturbed sites, streambanks; frequent. 815, 853.

CONVOLVULACEAE

Calystegia sepium (L.) R. Br. [Convolvulus sepium L.]. Successional fields, disturbed sites; frequent. 293, 818.

*Ipomoea coccinea L. Disturbed sites, reservoir margins; infrequent. 505, EWC 90-385.

*Ipomoea hederacea L. Successional fields, disturbed sites, agricultural fields; frequent. 353, 401, 423, 484.

Ipomoea lacunosa L. Wet successional fields, wet meadows, disturbed sites, mudflats, streambanks; frequent. 377, 417, 1032.

Ipomoea pandurata (L.) G. Meyer. Successional fields, disturbed sites, wet meadows, streambanks, agricultural fields; frequent. 199, 277, 325, 409.

CORNACEAE

Cornus amomum Miller. Streambanks, shrub swamps, pool and reservoir margins; frequent. 766.

Cornus drummondii C. A. Meyer. Streambanks, low woods; infrequent. 394.

Cornus florida L. Bottomland forests, streambanks, low woods; frequent. 514.

CRASSULACEAE

Sedum pulchellum Michx. Rock outcrops along streams; rare. 1125.

Sedum ternatum Michx. Streambanks, rock outcrops along streams, low woods; infrequent. 944.

CUCURBITACEAE

Sicyos angulatus L. Disturbed sites, successional fields; frequent. 485, 500.

CUSCUTACEAE

Cuscuta campestris Yuncker [C. pentagona Engelm.]. Successional fields, streambanks, wet meadows; frequent. 604.

Cuscuta compacta A. L. Juss. Successional fields, streambanks, wet meadows, bottomland forests; frequent. 469, 980.

EBENACEAE

Diospyros virginiana L. Successional fields, streambanks, low woods, bottomland forests; frequent. 522, 575, 788.

EUPHORBIACEAE

Acalypha ostryaefolia Riddell. Successional fields, agricultural fields, disturbed sites; occasional. 360, 437.

Acalypha rhomboidea Raf. Successional fields, agricultural fields, streambanks, bottomland forests, disturbed sites; frequent. 428, 470, 997, 998, 1021.

Acalypha virginica L. Disturbed sites, successional fields; occasional. 330.

Croton glandulosus L. var. septentrionalis Muell. Arg. Successional fields, disturbed sites; occasional. 427.

Croton monanthogynus Michx. Successional fields, disturbed sites; frequent. 329.

Euphorbia corollata L. Successional fields, disturbed sites; frequent. 971.

Euphorbia dentata Michx. Successional fields, disturbed sites, wet meadows; infrequent. 346.

Euphorbia humistrata Engelm. Mudflats, pool margins; occasional. 405.

Euphorbia maculata L. Successional fields, disturbed sites, wet meadows; frequent. 376, 382, 444.

Phyllanthus caroliniensis Walter. Mudflats, disturbed sites, pool and reservoir margins; occasional. 1064.

FABACEAE

Amorpha fruticosa L. Streambanks; occasional. 716, 1017.

Amphicarpaea bracteata (L.) Fern. Streambanks, low woods; frequent. 1025.

Apios americana Medikus. Streambanks; infrequent. 1027.

Baptisia alba (L.) Vent. var. macrophylla (Lairsey) Isely [B. leucantha T. & G.; B. lactea (Raf.) Thieret]. Successional fields, disturbed sites, wet meadows; infrequent. 767, 900.

Cercis canadensis L. Bottomland forests, low woods, streambanks; frequent. 523, 574.

Chamaecrista fasciculata (Michx.) Greene [Cassia fasciculata Michx.]. Successional fields, wet meadows, disturbed sites; frequent. 412.

Chamaecrista nictitans (L.) Moench [Cassia nictitans L.]. Successional fields, wet meadows, disturbed sites; infrequent. 448.

*Coronilla varia L. Roadsides; frequent. 778.

Desmanthus illinoensis (Michx.) MacM. ex Robins. & Fern. Successional fields; rare. 989.

Desmodium canescens (L.) DC. Bottomland forests, low woods successional fields; occasional. 1005.

Desmodium paniculatum (L.) DC. Successional fields, disturbed sites; occasional. 472, 481, 565.

Desmodium pauciflorum (Nutt.) DC. Bottomland forests, low woods; occasional. 888.

Desmodium perplexum Schub. [D. paniculatum (L.) DC. var. dillenii (Darl.) Isely]. Successional fields, disturbed sites, low woods, streambanks, wet meadows, bottomland forests; frequent. 431, 453, 503, 515, 1003, 1010, 1031, 1037.

Gleditsia triacanthos L. Streambanks, bottomland forests, low woods, successional fields; occasional. 434.

- *Glycine max (L.) Merrill. Agricultural fields; frequent.
No collections.
- *Kummerowia striata (Thunb.) Schind. [Lespedeza striata (Thunb.) H. & A.]. Disturbed sites, successional fields; frequent. 361.
- *Lathyrus hirsutus L. Successional fields, disturbed sites; infrequent. 736.
- *Lathyrus latifolius L. Successional fields, disturbed sites; frequent. 433.
- *Lespedeza cuneata (Dum. Cours.) G. Don. Successional fields, disturbed sites; abundant. 265, 379.
- Lespedeza virginica (L.) Britton. Successional fields, disturbed sites; occasional. FWC 91-117.
- *Melilotus alba Medikus. Successional fields, disturbed sites, wet meadows; frequent. 429.
- *Melilotus officinalis (L.) Pallas. Successional fields, disturbed sites; infrequent. 768.
- *Pueraria lobata (Willd.) Ohwi. Roadsides; infrequent. 946.
- Robinia pseudoacacia L. Riverbanks; frequent. 697.
- Senna marilandica (L.) Link [Cassia marilandica L.]. Successional fields, disturbed sites, riverbanks; infrequent. 411, 466.
- Senna obtusifolia (L.) Irwin & Barneby [Cassia obtusifolia L.; C. tora L.]. Agricultural fields, disturbed sites; occasional. 378, 391.
- Strophostyles helvola (L.) Ell. Successional fields, disturbed sites, streambanks; frequent. 449, 482, 995, 1011.
- *Trifolium campestre Schreber [T. procumbens L.]. Disturbed sites, successional fields; frequent. 711.
- *Trifolium hybridum L. Disturbed sites, agricultural fields; rare. 719.
- *Trifolium pratense L. Successional fields, disturbed sites; frequent. 257.

*Trifolium repens L. Successional fields, disturbed sites, agricultural fields; abundant. 706.

*Vicia sativa L. ssp. nigra (L.) Ehrhart [V. angustifolia (Bauhin) L.]. Successional fields, agricultural fields, disturbed sites; occasional. 712, 733.

*Vicia villosa Roth. ssp. varia (Host) Corbiere [V. dasycarpa Tenore]. Successional fields, disturbed sites, agricultural fields; abundant. 263, 270, 700.

Wisteria frutescens (L.) Poiret. In thickets along pool margins and roadsides; occasional. 354, 702.

FAGACEAE

Fagus grandifolia Ehrh. Bottomland forests, low woods; abundant. 545, 615, 790, 838.

Quercus alba L. Low woods; occasional. 988.

Quercus falcata Michx. Low woods; occasional. 934.

Quercus imbricaria Michx. Bottomland forests, streambanks; occasional. 806.

Quercus macrocarpa Michx. Bottomland forests; very rare. 1178.

Quercus michauxii Nutt. Bottomland forests, streambanks; frequent. 495, 549, 1059.

Quercus muehlenbergii Engelm. Low woods near exposed limestone; rare. 507, 933.

Quercus pagoda Raf. [Q. falcata Michx. var. pagodaefolia Ell.]. Bottomland forests, streambanks; frequent. 781.

Quercus palustris Muenchh. Bottomland forests, forested swamps; rare. 468.

Quercus shumardii Buckley. Bottomland forests, streambanks, low woods; abundant. 494, 543.

Quercus velutina L. Riverbanks; rare. 513.

FUMARIACEAE

Corydalis flavula (Raf.) DC. Streambanks, low woods; occasional. 1096.

GENTIANACEAE

Sabatia angularis (L.) Pursh. Disturbed sites, successional fields; occasional. 932.

GERANIACEAE

Geranium carolinianum L. Disturbed sites, successional fields, agricultural fields; frequent. 709.

HAMAMELIDACEAE

Liquidambar styraciflua L. Bottomland forests, streambanks, low woods; frequent. 492.

HIPPOCASTANACEAE

Aesculus glabra Willd. Streambanks, low woods; infrequent. 817, 958.

HYDRANGACEAE

Hydrangea arborescens L. Streambanks, low woods; occasional. 828.

HYDROPHYLLACEAE

Phacelia bipinnatifida Michx. Low woods, streambanks; frequent. 754, 1132.

Phacelia ranunculacea (Nutt.) Constance. Riverbank woods; very rare. 1175.

JUGLANDACEAE

Carya cordiformis (Wangenh.) K. Koch. Streambanks, bottomland forests, low woods; frequent. 530.

Carya illinoensis (Wangenh.) K. Koch. Riverbanks; rare. 985.

Carya laciniosa (Michx. f.) Loud. Bottomland forests; occasional. 550.

Carya ovata (Miller) K. Koch. Bottomland forests, streambanks, low woods; frequent. 548.

Carya tomentosa Nutt. Riverbanks; rare. 511.

Juglans cinerea L. Streambanks, low woods; rare. 873, 966, 1022.

Juglans nigra L. Low woods, streambanks, bottomland forests; occasional. 534, 1033.

LAMIACEAE

Agastache nepetoides (L.) Kuntze. Streambanks, low woods; infrequent. 976, 1030.

Blephilia ciliata (L.) Benth. Low woods; occasional. 842.

Blephilia hirsuta (Pursh) Benth. Low woods; occasional. 879.

Collinsonia canadensis L. Streambanks, low woods; occasional. 1088, EWC 91-118.

*Glechoma hederacea L. Low woods; infrequent. 1120.

Isanthus brachiatus (L.) BSP. [Trichostema brachiatum L.]. Sand and gravel bars; infrequent. 1043.

*Lamium amplexicaule L. Disturbed sites, successional fields, agricultural fields; frequent. 625.

*Lamium purpureum L. Disturbed sites, successional fields, agricultural fields; frequent. 617.

Lycopus americanus Muhl. Wet meadows, streambanks, low woods, bottomland forests, edges of swamps and marshes; occasional. 383, 972.

Lycopus virginicus L. Streambanks, low woods, bottomland forests, wet meadows; occasional. 1013.

*Mentha piperita L. Streams with sand and gravel bars; frequent. 868, 1055.

Monarda fistulosa L. Successional fields, disturbed sites, low woods; occasional. 413, 916.

*Perilla frutescens (L.) Britton. Disturbed sites, successional fields; frequent. 763.

*Prunella vulgaris L. Successional fields, disturbed sites, wet meadows; frequent. 316, 1082.

Pycnanthemum incanum (L.) Michx. Roadsides; infrequent. 970.

Pycnanthemum tenuifolium Schrader. Roadsides; infrequent. 1078.

Salvia lyrata L. Low woods, successional fields, wet meadows; occasional. 696, 1137.

Scutellaria elliptica Muhl. Low woods, disturbed sites; infrequent. 794.

Scutellaria lateriflora L. Successional fields, wet meadows, disturbed sites, streambanks; frequent. 457, 586, 996, 1091.

Scutellaria nervosa Pursh. Low woods; infrequent. 1158.

Stachys tenuifolia Willd. Bottomland forests, streambanks, wet meadows, wet successional fields; occasional. 219, 328.

Teucrium canadense L. Wet successional fields, disturbed sites, wet meadows; frequent. 210, 303, 841.

LAURACEAE

Lindera benzoin (L.) Blume. Streambanks, low woods; frequent. 748.

Sassafras albidum (Nutt.) Nees. Streambanks, low woods, bottomland forests; frequent. 512, 649.

LINACEAE

Linum virginianum L. Wet meadows; infrequent. 863.

LOGANIACEAE

Spigelia marilandica L. Bottomland forests, low woods; frequent. 761, 1008.

LYTHRACEAE

Ammannia coccinea Rottb. Mudflats, wet meadows; frequent. 222.

Rotala ramosior (L.) Koehne. Mudflats, wet meadows; frequent. 456.

MAGNOLIACEAE

Liriodendron tulipifera L. Low woods, bottomland forests; occasional. 931.

MALVACEAE

- *Abutilon theophrasti Medikus. Disturbed sites, successional fields; infrequent. 825.
- *Anoda cristata (L.) Schlechtendahl. Disturbed sites, agricultural fields; infrequent. 579, 610.
- Hibiscus laevis All. [H. militaris Cav.]. Shrub swamps, emergent marshes, wet meadows, pool and reservoir margins; abundant. 198.
- Hibiscus moscheutos L. Shrub swamps, emergent marshes, wet meadows, pool and reservoir margins; frequent. 351.
- *Sida spinosa L. Disturbed sites, successional fields, agricultural fields, mudflats; frequent. 381, 415.

MENISPERMACEAE

- Calyccarpum lyoni (Pursh) A. Gray. Streambanks, bottomland forests, low woods; infrequent. 538, 608.
- Cocculus carolinus (L.) DC. Streambanks, bottomland forests, low woods; infrequent. 924.
- Menispermum canadense L. Streambanks, bottomland forests, low woods; infrequent. 539.

MOLLUGINACEAE

- *Mollugo verticillata L. Disturbed sites, mudflats, agricultural fields; frequent. 380.

MORACEAE

- *Maclura pomifera (Raf.) C. K. Schneider. Streambanks, low woods; occasional. 477.
- *Morus alba L. Riverbanks; infrequent. 918.
- Morus rubra L. Streambanks, bottomland forests, low woods; frequent. 521, 698, 786.

NELUMBONACEAE

- Nelumbo lutea (Willd.) Pers. Pools and reservoirs; occasional. 221, 236, EWC 85-956.

NYMPHAEACEAE

Nuphar advena (Aiton) Aiton f. Pools and reservoirs; abundant in the south end of pool 4, infrequent elsewhere. 217, EWC 85-957.

NYSSACEAE

Nyssa sylvatica Marshall. Low woods, streambanks, bottomland forests; infrequent. 812.

OLEACEAE

Fraxinus americana L. Streambanks, low woods; occasional. 813.

Fraxinus pennsylvanica Marshall. Bottomland forests, streambanks, low woods, forested swamps, shrub swamps; abundant. 209.

*Ligustrum vulgare L. [L. sinense Lour.]. Roadsides; infrequent. 541, 762.

ONAGRACEAE

Circaea lutetiana ssp. canadensis (L.) Asch. & Mag. [C. quadrisulcata (Max.) Franch. & Sav. var. canadensis (L.) Hara]. Streambanks; very rare. 1199.

Epilobium coloratum Biehler. Wet meadows, emergent marshes, streams with sand and gravel bars; occasional. 1054, 1080.

Ludwigia alternifolia L. Streambanks, emergent marshes, wet meadows; frequent. 858.

Ludwigia decurrens Walter [Jussiaea decurrens (Walter) DC.]. Emergent marshes, wet meadows, pool margins, mudflats; frequent. 224, 407, 410, 455.

Ludwigia palustris (L.) Elliott. Shallow water of pools, emergent marshes, swamps; frequent. 218.

Ludwigia peploides (HBK.) Raven [Jussiaea repens L.]. Emergent marshes, swamps, pools; frequent. 228.

Oenothera biennis L. Successional fields, disturbed sites; frequent. 281, 906, 1067.

Oenothera laciniata Hill. Successional fields, disturbed sites; frequent. 272, 692.

OXALIDACEAE

Oxalis grandis Small. Low woods; very rare. 864.

Oxalis stricta L. Disturbed sites, wet meadows, successional fields, agricultural fields; abundant. 254, 399.

Oxalis violacea L. Streambanks; rare. 1136.

PAPAVERACEAE

Sanguinaria canadensis L. Limestone outcrops in low woods; infrequent. 705.

PASSIFLORACEAE

Passiflora incarnata L. Disturbed sites, successional fields; frequent. 297.

Passiflora lutea L. Low woods; infrequent. EWC 91-123.

PHYTOLACCACEAE

Phytolacca americana L. Successional fields, disturbed sites, streambanks; frequent. 308.

PLANTAGINACEAE

Plantago aristata Michx. Disturbed sites, successional fields; abundant. 284, 327.

*Plantago lanceolata L. Disturbed sites, successional fields; abundant. 214, 734.

Plantago pusilla Nutt. Agricultural fields, disturbed sites, low wet woods; frequent. 681B.

Plantago rugelii Decne. Disturbed sites, successional fields; abundant. 226.

PLATANACEAE

Platanus occidentalis L. Streambanks, bottomland forests, low woods, successional fields; abundant. 510.

POLEMONIACEAE

Phlox divaricata L. Bottomland forests, low woods, streambanks; frequent. 634, 1106.

Phlox paniculata L. Bottomland forests, low woods, streambanks; frequent. 458, 905, 910, 1009.

Polemonium reptans L. Streambanks, low woods; occasional. 623.

POLYGONACEAE

Brunnichia cirrhosa Gaertner. Wooded margins of pools and reservoirs; occasional. 347.

*Fagopyrum esculentum Moench. [including F. tartaricum (L.) Gaertner listed by Robinson (1991)]. Agricultural fields; frequent. 524, 597, 770.

Polygonum amphibium L. Emergent marshes, wet meadows; rare. 225.

*Polygonum aviculare L. Disturbed sites, successional fields; frequent. 373.

*Polygonum cespitosum Blume var. longisetum (DeBry.) Stewart. Wet meadows, wet successional fields, disturbed sites, bottomland forests; abundant. 220, 436, 837.

Polygonum erectum L. Wet meadows, wet successional fields, disturbed sites; occasional. 350, 571.

Polygonum hydropiper L. Wet meadows, wet successional fields, disturbed sites; occasional. 406.

Polygonum hydropiperoides Michx. Emergent marshes, wet meadows, wet successional fields, swamps, mudflats; frequent. 851, 861.

Polygonum lapathifolium L. Wet meadows, wet successional fields, disturbed sites, emergent marshes; occasional. 542.

Polygonum pensylvanicum L. Wet meadows, wet successional fields, disturbed sites, emergent marshes, mudflats; abundant. 273, 311, 435.

Polygonum punctatum Elliott. Bottomland forests, wet meadows, wet successional fields, emergent marshes, swamps; occasional. 846.

Polygonum sagittatum L. Streambanks, wet meadows, wet successional fields, emergent marshes; occasional. 871.

Polygonum scandens L. Disturbed sites, streambanks, wooded margins of pools and reservoirs; frequent. 540, 561.

Polygonum virginianum L. [Tovara virginiana (L.) Raf.]. Bottomland forests, low woods, streambanks; frequent. 547, 563, 950.

*Rumex acetosella L. Successional fields, disturbed sites, agricultural fields; abundant. 685.

*Rumex crispus L. Successional fields, disturbed sites, agricultural fields; abundant. 241, 936.

*Rumex obtusifolius L. Low woods, streambanks, swamps; rare. 911, 953.

Rumex verticillatus L. Swamps, emergent marshes, streambanks; occasional. 923.

PORTULACACEAE

Claytonia virginica L. Bottomland forests, low woods, streambanks; abundant. 622, 1138.

PRIMULACEAE

Dodecatheon meadia L. Rock outcrops in low woods, streambanks; infrequent. 1126.

Lysimachia ciliata L. Wet meadows, wet successional fields, emergent marshes; occasional. 302, 839.

*Lysimachia nummularia L. Wet meadows, wet successional fields; rare. 340.

Samolus floribundus HBK. [S. parviflorus Raf.]. Shallow streams with sand and gravel bars, springs, low woods; occasional. 814, 876, 1086.

RANUNCULACEAE

Anemone virginiana L. Low woods, streambanks, disturbed sites; rare. 961.

Anemonella thalictroides (L.) Spach. [Thalictrum thalictroides (L.) Eames & Boivin]. Streambanks, low woods; occasional. 1108.

Clematis viorna L. Edges of bottomland forests, successional fields, disturbed sites; rare. 614, 785.

Clematis virginiana L. Streambanks, low woods, successional fields; occasional. 516, EWC 91-127.

Delphinium tricornis Michx. Low woods, streambanks; occasional. 673, 1127.

Hepatica acutiloba DC. [H. nobilis Miller var. acuta (Pursh) Steyerl.]. Rock outcrops along streams; frequent. 1094, 1122.

Isopyrum biternatum (Raf.) T. & G. [Enemion biternatum Raf.]. Low woods, streambanks; occasional. 1098, 1134.

Myosurus minimus L. Agricultural fields, wet meadows; frequent. 670.

Ranunculus abortivus L. Agricultural fields, disturbed sites, low woods, wet meadows; abundant. 629, 1110.

Ranunculus hispidus Michx. var. nitidus (Elliott) T. Duncan [R. carolinianus DC.]. Bottomland forests, low woods, disturbed sites; occasional. 624, 638, 720.

*Ranunculus parviflorus L. Agricultural fields, successional fields, disturbed sites, wet meadows; frequent. 735.

Ranunculus pusillus Poiret. Agricultural fields, disturbed sites, wet meadows; frequent. 722.

Ranunculus recurvatus Poiret. Bottomland forests, streambanks, low woods; infrequent. 1154.

*Ranunculus sardous Crantz. Agricultural fields, successional fields, disturbed sites, wet meadows; abundant. 269, 290, 334, 707.

Thalictrum dioicum L. Rock outcrops along streams; very rare. 1115.

Thalictrum revolutum DC. Successional fields, low woods; infrequent. 869.

ROSACEAE

Agrimonia parviflora Aiton. Low woods, wet successional fields, wet meadows; occasional. 938, 949.

Agrimonia pubescens Wallr. Low woods; occasional. 1004.

Agrimonia rostellata Wallr. Low woods; infrequent. 963.

- Crataegus mollis (T. & G.) Scheele. Streambanks, wooded margins of reservoirs; infrequent. 769, 1038, 1174.
- Crataegus viridis L. Low woods, swamp margins; rare. 926.
- Geum canadense Jacq. Bottomland forests, wet meadows, wet successional fields, streambanks, low woods; frequent. 467, 581, 840, 847.
- Geum vernum (Raf.) T. & G. Low woods, successional fields, disturbed sites; occasional. 676.
- Physocarpus opulifolius (L.) Maxim. Low rocky woods; very rare. 935.
- Potentilla norvegica L. Disturbed sites, successional fields; frequent. 211, 252.
- Potentilla simplex Michx. Disturbed sites, successional fields; frequent. 661.
- Prunus americana Marshall. Low woods, successional fields; occasional. 662.
- Prunus angustifolia Marshall. Low woods, successional fields; occasional. 632.
- *Prunus persica (L.) Batsch. Successional fields; rare. 631.
- *Prunus serotina Ehrh. Low woods, successional fields; occasional. 811.
- *Rosa multiflora Thunb. Streambanks, pool and reservoir margins, successional fields; frequent. 715, 1149.
- Rosa palustris Marshall. Shrub swamps, emergent marshes, pool margins; infrequent. 867.
- Rosa setigera Michx. Successional fields, disturbed sites; frequent. 792.
- Rubus argutus L. Successional fields, disturbed sites; frequent. 710, 726.
- Rubus flagellaris Willd. Successional fields, disturbed sites, low woods; frequent. 677.
- *Rubus occidentalis L. Successional fields, disturbed sites, low woods; occasional. 947.

RUBIACEAE

- Cephalanthus occidentalis L. Swamps, pool and reservoir margins, emergent marshes, wet successional fields; abundant. 245.
- Diodia teres L. Successional fields, disturbed sites; frequent. 483.
- Diodia virginiana L. Successional fields, wet meadows, disturbed sites, mudflats; frequent. 238, 403, 438.
- Galium aparine L. Successional fields, disturbed sites; frequent. 774.
- Galium circaezans Michx. Bottomland forests, low woods, successional fields; occasional. 799.
- Galium tinctorium L. Wet meadows, emergent marshes, wet successional fields; frequent. 202, 286.
- Galium triflorum Michx. Low woods, streambanks, wet successional fields; occasional. 969, 1083.
- Hedyotis caerulea (L.) Hook [Houstonia caerulea L.]. Disturbed sites; frequent. 654.
- Hedyotis purpurea (L.) T. & G. [Houstonia purpurea L.]. Disturbed sites, low woods; occasional. 1182.
- Spermacoce glabra Michx. Pool and reservoir margins, wet successional fields, wet meadows; rare. 930.

SALICACEAE

- Populus deltoides Marshall. Bottomland forests, streambanks, pool and reservoir margins; frequent. 258, 384.
- Salix caroliniana Michx. Pool and reservoir margins, wet successional fields, streambanks; infrequent. 587.
- Salix nigra Marshall. Swamps, streambanks, wet successional fields, pool and reservoir margins, emergent marshes; abundant. 259, 292.
- Salix sericea Marshall. Swamps, wet successional fields, emergent marshes; occasional. 1164.

SAPINDACEAE

- *Cardiospermum halicacabum L. Successional fields, disturbed sites, pool and reservoir margins; frequent. 416, 486.

SAPOTACEAE

- Bumelia lycioides (L.) Pers. Low woods, streambanks; infrequent. 476.

SAURURACEAE

- Saururus cernuus L. Swamps, emergent marshes; occasional. 922.

SAXIFRAGACEAE

- Heuchera americana L. Rock outcrops along streams; rare. 1180.

- Penthorum sedoides L. Wet meadows, wet successional fields, swamps, wet disturbed sites; occasional. 349.

- Saxifraga virginensis Michx. Rock outcrops in low woods and streambanks; rare. 671.

SCROPHULARIACEAE

- Agalinis tenuifolia (M. Vahl.) Raf. [Gerardia tenuifolia Vahl.]. Successional fields, disturbed sites; frequent. 584, 607.

- Chelone glabra L. Emergent marshes, wet meadows; occasional. EWC 91-106.

- Dasistoma macrophylla (Nutt.) Raf. [Seymeria macrophylla Nutt.]. Low woods, streambanks; frequent. 298, 392.

- Gratiola neglecta Torr. Wet meadows, mudflats, pool margins; frequent. 721.

- Leucospora multifida (Michx.) Nutt. [Conobea multifida (Michx.) Benth.]. Agricultural fields, mudflats, pool and reservoir margins, wet meadows; frequent. 893.

- Lindernia dubia (L.) Pennell. Wet successional fields, mudflats, wet disturbed sites, pool margins; frequent. 223, 255.

Mimulus alatus Aiton. Wet meadows, wet successional fields, wet disturbed sites, low woods, streambanks, emergent marshes; frequent. 339.

Pedicularis lanceolata Michx. Emergent marsh and wet meadow; rare. 1056.

Penstemon laevigatus Aiton. Wet meadows, bottomland forests, wet successional fields; frequent. 276, 725, 758, 1179.

Scrophularia marilandica L. Streambanks, low woods; frequent. 913.

*Verbascum blattaria L. Successional fields, disturbed sites; frequent. 732, 896.

*Verbascum thapsis L. Successional fields, disturbed sites, streambanks; frequent. 299.

Veronica anagallis-aquatica L. Shallow, slow-moving streams; rare. 1187.

*Veronica arvensis L. Successional fields, disturbed sites; abundant. 650.

Veronica peregrina L. Successional fields, agricultural fields, disturbed sites, wet meadows; abundant. 666, 1147.

Veronica serpyllifolia L. Agricultural fields, disturbed sites; rare. 718.

SIMAROUBACEAE

*Ailanthus altissima (Miller) Swingle. Roadsides; infrequent. 819.

SOLANACEAE

*Datura stramonium L. Successional fields, disturbed streambanks; rare. 975.

Physalis angulata L. Successional fields, disturbed sites, agricultural fields; occasional. 917.

Physalis heterophylla Nees. Successional fields, disturbed sites; occasional. 808.

Physalis longifolia Nutt. var. subglabrata (Mack. & Bush) Cronq. [P. subglabrata Mack. & Bush; P. virginiana var. subglabrata (Mack. & Bush) Waterfall]. Successional

fields, disturbed sites; frequent. 355, 432, 536, 1002.

Solanum carolinense L. Agricultural fields, disturbed sites, successional fields; frequent. 237, 881.

*Solanum nigrum L. [S. americanum Miller]. Agricultural fields, successional fields, disturbed sites; frequent. 556, 559, 962.

STAPHYLEACEAE

staphylea trifolia L. Low woods, streambanks; infrequent. 465, 633.

ULMACEAE

Celtis laevigata Willd. Streambanks, low woods, bottomland forests; frequent. 537.

Celtis occidentalis L. Streambanks, bottomland forests; occasional. 362, 535.

Ulmus alata Michx. Successional fields, low woods, bottomland forests, streambanks; frequent. 554, 612.

Ulmus americana L. Bottomland forests, streambanks, low woods; occasional. 810.

Ulmus rubra Muhl. Bottomland forests, streambanks, low woods; frequent. 488.

URTICACEAE

Boehmeria cylindrica (L.) Swartz. Bottomland forests, low woods, streambanks, swamps; frequent. 605, 952.

Laportea canadensis (L.) Wedd. Bottomland forests, streambanks, low woods; frequent. 928.

Pilea pumila (L.) Gray. Low woods, bottomland forests, swamp margins; occasional. 471.

VALERIANACEAE

*Valerianella locusta (L.) Betcke. [V. olitoria (L.) Poll.]. Agricultural fields, successional fields; infrequent. 651.

Valerianella radiata (L.) Dufr. Agricultural fields, successional fields, disturbed sites; frequent. 663.

Valerianella umbilicata (Sulliv.) A. Wood. Agricultural fields, successional fields; occasional. 730.

VERBENACEAE

Phryma leptostachya L. Low woods; infrequent. 941.

Phyla lanceolata (Michx.) Greene [Lippia lanceolata Michx.]. Wet successional fields, wet meadows, pool and reservoir margins; frequent. 213, 239.

Verbena simplex Lehm. Successional fields, disturbed sites, low woods, streambanks; frequent. 791.

Verbena urticifolia L. Low woods, streambanks, bottomland forests, successional fields; frequent. 352, 845, 915.

VIOLACEAE

Viola palmata L. var. palmata [V. triloba Schweintz]. Low woods; rare. 660.

Viola pubescens Aiton [V. pensylvanica Michx.; V. eriocarpa Schweintz]. Low woods; occasional. 640, 1117.

*Viola rafinesquii Greene. Disturbed sites, agricultural fields, low woods, successional fields; frequent. 628, 1119.

Viola sororia Willd. [V. papilionacea Pursh]. Bottomland forests, low woods, streambanks, successional fields, disturbed sites; frequent. 639, 648, 1107.

Viola striata Aiton. Low woods, streambanks; occasional. 694, 1116.

VISCACEAE

Phoradendron serotinum (Raf.) M. C. Johnston [P. flavescens (Pursh) Nutt.]. Parasitic on various hardwood species; infrequent. No collections.

VITACEAE

Ampelopsis cordata Michx. Wooded margins of reservoirs and pools, streambanks; frequent. 271, 385, 821.

Parthenocissus quinquefolia (L.) Planchon. Bottomland forests, streambanks, low woods; abundant. 532.

Vitis aestivalis Michx. Streambanks, low woods, bottomland forests; frequent. 803.

Vitis vulpina L. Streambanks, low woods, bottomland
forests; frequent. 804, 1150.