Survey of Understory Plant Diversity in Mature Bottomland Hardwood Tracts in the Mississippi Delta

Diane De Steven[1] and Steven C. Hughes

U.S. Forest Service Southern Research Station
Center for Bottomland Hardwoods Research
P.O. Box 227
Stoneville, MS 38776

Report

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[**corrections to Appendix 1; 10 October 2014**]

[1] Research Ecologist; phone: 662-686-3602; e-mail: ddesteven@fs.fed.us

CC:

Mike Rich, Project Leader, Theodore Roosevelt NWR Complex (mike_rich@fws.gov)
Eva Kristofik, Manager, North Mississippi NWR Complex (eva_kristofik@fws.gov)
Becky Rosamond, Wildlife Biologist, North MS NWR Complex (becky_rosamond@fws.gov)
Ralph Pearce, Forester, Delta NF (rpearce@fs.fed.us)
Brad Holder, Biologist, MDWFP (bradh@mdwfp.state.ms.us)
Jackie Fleeman, Biologist, MDWFP (jackief@mdwfp.state.ms.us)

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Diane De Steven (Research Ecologist; 662-686-3602; ddesteven@fs.fed.us)
Steven C. Hughes (Biological Science Technician)

U.S. Forest Service Southern Research Station, Center for Bottomland Hardwoods Research,
P.O. Box 227, Stoneville, MS 38776

05 December 2012 [**Appendix 1 corrected 10/20/14**]

Background:

The landscape of the Lower Mississippi Alluvial Valley (LMAV) has been altered drastically by flood-control levees and conversion of ~74% of the former bottomland forests to agricultural croplands, with significant loss of important ecosystem services. In the past few decades, large-scale efforts have sought to restore bottomland hardwood forest on marginal croplands across the LMAV. Previous research has evaluated reforestation methods with respect to tree-planting success, rate of forest overstory development, and natural colonization by non-planted tree species. However, the extent to which restoration approaches have recovered ecosystem functions more broadly has not been well studied.

As part of the Natural Resources Conservation Service's "Conservation Effects Assessment Project" (CEAP)[1], a recent study by the U.S. Geological Survey (USGS) evaluated Wetlands Reserve Program (WRP) sites in comparison to cropland sites and natural bottomland forest sites in Arkansas and Louisiana to determine if the conservation program is achieving gains in ecosystem services such as sediment and nutrient retention, carbon storage, wildlife habitat, and tree biodiversity[2]. Additional work will continue these analyses to focus on understory plant communities. As part of a collaborative study with the USGS, a 2012 study of MS forest sites was conducted to augment the existing datasets and allow for comparisons of understory plant composition between WRP sites and remnant bottomland hardwood forests across a multi-state area.

Purpose of Survey:

This research was designed to collect data on the understory plant composition of remnant bottomland hardwood forest tracts on accessible public lands in the LMAV region of Mississippi. Data from this survey will be analyzed with other existing data to achieve a regional comparison of understory vegetation in restored WRP sites and remnant bottomland forests of the LMAV.

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[1] CEAP is an ongoing, multi-component national assessment of environmental benefits of Farm Bill conservation programs. www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/ceap

[2] Faulkner, S. et al. 2010. *Regional Estimates of Ecological Services Derived from U.S. Department of Agriculture Conservation Programs in the Mississippi Alluvial Valley*. Final Report. US Geological Survey, National Wetlands Research Center, Lafayette, LA. 97 pp. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs143_013599.pdf

Methods:

Potential remnant forest sites across the MS Delta were screened for accessibility, size (>40 ha (100 ac)), stand age (≥60-70 yrs), and being relatively intact with no large-scale or recent disturbance. Ten sites on public lands within the National Forest, National Wildlife Refuges (NWR), and State Wildlife Management Areas (WMA) were selected based on these criteria (Table 1 and Appendix 1).

Table 1. Sampled Sites (County), by Delta Area

North Delta area	South Delta area
Dahomey NWR (Bolivar) [2 sites]	Morgan Brake NWR (Holmes)
O'Keefe WMA (Quitman)	Yazoo NWR (Washington)
Malmaison WMA (Grenada)	Delta Natl. Forest (Sharkey) [2 sites]
	LeRoy Percy WMA (Washington)
	Mahannah WMA (Issaquena)

Sites were surveyed during July-August 2012. Vegetation sampling was conducted along two 300-m transects per site (except for 1 site where 3 transects [300-m plus two 150-m] were used). Understory plant composition was sampled at points spaced 30 m apart on each transect, up to a total of 20 points per site. At each point, two 1-m^2 quadrats were placed at random directions and distances from the transect line, giving a total of 40 quadrats per site. All herbaceous species, ground-layer woody vines, and woody shrub/tree stems < 30 cm tall were recorded in each quadrat, along with their respective cover-classes (Daubenmire scale).

For consistency with AR and LA data, overstory and midstory vegetation was sampled at 5 points per MS site, with 2 or 3 points per transect and a distance of $\geq$ 90 m between points. Overstory tree species (dbh ≥ 10 cm) were tallied in a 400-m^2 circular plot at each point. Mid-story trees and shrubs (dbh 2.5–10 cm) were tallied in two 20-m^2 circular subplots nested within each large plot. Any occurrences of rivercane (*Arundinaria gigantea*) and palmetto (*Sabal minor*) were also tallied in the midstory subplots.

Species lists were developed for each site and are included as Appendix 1 (pp. 6–15). A combined species list with common names is in Appendix 2 (pp. 16–18).

Preliminary Findings:

The MS surveys of understory vegetation yielded a total of 107 plant species, consisting of 60 herbaceous species and 47 woody species. This probably underestimated understory diversity in these forests, since the late-summer survey likely missed some early-spring herbaceous flora. Of the total species, there were 42% forbs, 18% graminoids (grasses and sedges), 18% woody vines, and 27% tree and shrub species. In AR and LA, an average of 72 understory species per state had been recorded (from 8 sites per state), with a similar compositional profile of 31% forbs, 14% graminoids, 19% vines, 35% tree and shrub species, plus 1% aquatic species.

The MS surveys detected a total of 30 tree species in the overstory and midstory; 90% of these also occurred in the previously sampled AR/LA forest sites (Table 2). On average, the tree species similarity (based on Coefficient of Community) between MS vs. AR/LA samples was 72%. This verifies that the surveyed MS bottomland forest tracts are generally comparable to the AR/LA sites sampled previously.

Future Analyses:

The previous LMAV dataset encompassed natural bottomland forests in AR and LA, plus WRP sites in all three states (AR, LA, MS). The present study of MS forests has successfully augmented the LMAV dataset to allow a comprehensive analysis across the 3-state area. Forest sites and WRP sites will be compared to determine if the restorations are developing toward an understory composition similar to that of natural bottomland sites. Species will be classed by wetland indicator category (wetland, facultative, upland), growth forms (forb, graminoid, woody vine, etc.), or other traits. Quantitative vegetation descriptors for each site (e.g., species richness, percentages and relative abundances of hydrophytic species, wetland species, and growth forms) will be analyzed for effects of treatment (restored vs. natural) as well as river basin (state). Floristic data (species-by-site matrix) will be further analyzed using multivariate techniques (e.g., ordination, indicator species analysis) to test for more detailed compositional differences between restored and natural sites. The study findings will support the national goals of NRCS-CEAP to assess the ecological outcomes of Farm Bill conservation programs.

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Table 2. Tree species found in the overstory and midstory of natural bottomland forest sites in AR, LA, and MS.

Species	Overstory Stratum			Midstory Stratum		
	AR	LA	MS	AR	LA	MS
Acer negundo	x	x	x	x	x	
Acer rubrum	x	x	x	x	x	x
Acer saccharum	x			x		
Asimina triloba				x		x
Betula nigra	x			x		
Carpinus caroliniana	x			x		
Carya aquatica	x	x	x	x	x	x
Carya cordiformis				x		
Carya illinoinensis	x		x	x		
Carya laciniosa	x			x		
Carya ovata	x		x	x		x
Celtis laevigata	x	x	x	x	x	x
Cercis canadensis			x			
Cornus drummondii		x			x	
Cornus foemina (*C. stricta*)		x	x	x	x	x
Crataegus spp. (*viridis, marshallii*, sp.)	x	x	x	x	x	
Diospyros virginiana	x	x	x	x	x	x
Forestiera acuminata	x	x	x	x	x	x
Fraxinus pennsylvanica	x	x	x	x	x	x
Fraxinus profunda	x	x		x	x	
Gleditsia aquatica	x	x		x	x	
Gleditsia tricanthos	x	x		x	x	
Ilex decidua	x	x	x	x	x	x
Ligustrum sinense				x		
Liquidambar styraciflua	x	x	x	x	x	x
Morus rubra	x	x	x	x	x	x
Nyssa aquatica	x		x	x		x
Planera aquatica	x		x	x		
Platanus occidentalis	x	x	x	x	x	
Populus deltoides			x			
Prunus serotina				x		
Quercus falcata	x	x		x	x	
Quercus laurifolia	x	x		x	x	
Quercus lyrata	x	x	x	x	x	x
Quercus michauxii			x	x		x
Quercus nigra	x	x	x	x	x	x
Quercus pagoda		x	x		x	
Quercus phellos	x	x	x	x	x	
Quercus shumardii		x			x	
Quercus texana (Q. nuttallii)	x	x	x	x	x	
Quercus velutina		x			x	
Salix nigra			x			
Sassafras albidum	x	x		x	x	
Taxodium distichum	x	x	x	x	x	
Tilia americana		x			x	
Ulmus alata				x		
Ulmus americana	x	x	x	x	x	x
Ulmus crassifolia	x	x	x	x	x	x

Note: Nine shrub species are not included. AR/LA data are from Faulkner et al. 2010 (see footnote 2).

Appendix 1

Site-specific location, sampling information, and plant species encountered during survey

[**corrections on pp. 5–7, 9, 11**]

* labels corrected

Site: **Dahomey National Wildlife Refuge (NW) [corrected]**

Location Sampled: Compartment 1 Surveyed: 20 August 2012

Locations of transect starting points (Easting, Northing) {WGS84 UTM15N} and directions traveled:

1- 690004E 3736866N 180°
2- 689956E 3736495N 90°

Understory species found:

Asimina triloba
Bignonia capreolata
Boehmeria cylindrica
Campsis radicans
Carex frankii
Carex tribuloides
Celtis laevigata
Diospyros virginiana
Erechtites hieracifolia
Fraxinus pennsylvanica
Geum canadense
Gleditsia tricanthos
Justicia ovata
Lactuca floridana
Leersia virginica
Lonicera japonica
Ludwigia glandulosa
Parthenocissus quinquefolia
Polygonum virginianum
Quercus michauxii
Quercus nuttallii (Q. texana)
Quercus phellos
Rubus trivialis
Ruellia strepens
Smilax rotundifolia
Teucrium canadense
Toxicodendron radicans
Trachelospermum difforme
Ulmus americana
Ulmus crassifolia
Unknown Poaceae species

Overstory and midstory species [corrected]:

Arundinaria gigantea
Asimina triloba
Carya illinoinensis
Celtis laevigata
Cornus foemina (stricta)
Fraxinus pennsylvanica
Liquidambar styraciflua
Quercus lyrata
Quercus michauxii
Quercus nigra
Quercus nuttallii (Q. texana)
Quercus pagoda
Quercus phellos
Ulmus americana
Ulmus crassifolia

Site: **Dahomey National Wildlife Refuge (N) [corrected]**

Location sampled: Compartment 3 Surveyed: 17 July 2012

Locations of transect starting points (Easting, Northing) {WGS84 UTM15N} and directions traveled:

1- 693585E 3733506N 270°
2- 693452E 3733798N 270°

Understory species found:

Ambrosia trifida
Ampelopsis arborea
Aristolochia serpentaria
Berchemia scandens
Bignonia capreolata
Brunnichia ovata
Campsis radicans
Carex cherokeensis
Carex crus-corvi
Carex frankii
Carex tribuloides
Celtis laevigata
Cocculus carolinus
Dichanthelium commutatum
Elymus virginicus
Erechtites hieracifolia
Ilex decidua
Justicia ovata
Leersia lenticularis
Lonicera japonica
Morus rubra
Parthenocissus quinquefolia
Polygonum virginianum
Quercus phellos
Sanicula canadensis
Smilax bona-nox
Smilax rotundifolia
Toxicodendron radicans
Trachelospermum difforme
Ulmus crassifolia
Unknown moss species 2
Unknown herb species
Unknown Poaceae species
Vernonia gigantea
Viola species
Vitis rotundifolia

Overstory and midstory species [corrected]:

Carya aquatica
Celtis laevigata
Cercis canadensis
Cornus foemina (stricta)
Crataegus viridis
Fraxinus pennsylvanica
Ilex decidua
Quercus lyrata
Quercus nigra
Quercus nuttallii (Q. texana)
Quercus pagoda
Quercus phellos
Ulmus americana
Ulmus crassifolia

Site: **Delta National Forest (N)**

Location sampled: Compartment 11, Green Ash Natural Area Surveyed: 28 August 2012

Locations of transect starting points (Easting, Northing) {WGS84 UTM15N} and directions traveled:

1- 709571E 3640316N 90°
2- 709549E 3640726N 90°

Understory species found:

Acer negundo
Acer rubrum
Ampelopsis arborea
Aristolochia serpentaria
Berchemia scandens
Brunnichia ovata
Campsis radicans
Carex frankii
Celtis laevigata
Cocculus carolinus
Cornus foemina (stricta)
Ilex decidua
Leersia lenticularis
Quercus nuttallii (Q. texana)
Rubus trivialis
Smilax bona-nox
Smilax rotundifolia
Smilax tamnoides (hispida)
Styrax americanus
Toxicodendron radicans
Trachelospermum difforme
Ulmus americana
Vitis cinerea
Wisteria frutescens

Overstory and midstory species:

Acer negundo
Carya aquatica
Celtis laevigata
Crataegus viridis
Diospyros virginiana
Fraxinus pennsylvanica
Ilex decidua
Quercus nuttallii (Q. texana)
Taxodium distichum
Ulmus americana

Site: **Delta National Forest (S)**

Location sampled: Compartment 36 Surveyed: 14 August 2012

Locations of transect starting points (Easting, Northing) {WGS84 UTM15N} and directions traveled:

1- 706103E 3623718N 270° [corrected]
2- 706677E 3623282N 270° [corrected]

Understory species found:

Acalypha sp. *(virginica)*
Ampelopsis arborea
Aristolochia serpentaria
Berchemia scandens
Boehmeria cylindrica
Brunnichia ovata
Campsis radicans
Carex species2
Celtis laevigata
Clematis crispa
Cocculus carolinus
Crataegus viridis
Desmodium species 2
Dioclea multiflora
Diospyros virginiana
Galium species 2
Ilex decidua
Leersia lenticularis
Ludwigia glandulosa
Penthorum sedoides
Plantago rugelii
Polygonum cespitoum
Polygonum hydropiperoides
Quercus nuttallii (Q. texana)
Rubus trivialis
Smilax bona-nox
Smilax rotundifolia
Smilax tamnoides (hispida)
Spermacoce glabra
Styrax americanus
Toxicodendron radicans
Trachelospermum difforme
Trepocarpus aethusae
Ulmus americana
Unknown lactuca-like herb
Vitis cinerea

Overstory and midstory species:

Celtis laevigata
Crataegus viridis
Diospyros virginiana
Forestiera acuminata
Fraxinus pennsylvanica
Ilex decidua
Planera aquatica
Quercus lyrata
Quercus nuttallii (Q. texana)
Taxodium distichum
Ulmus americana

Site: **Leroy Percy Wildlife Management Area**

Locations sampled: South of MS Hwy 12 Surveyed: 25 July 2012

Locations of transect starting points (Easting, Northing) {WGS84 UTM15N} and directions traveled:

1- 691778E 3669995N 90°
2- 692525E 3670585N 180°

Understory species found:

Ampelopsis arborea
Amsonia tabernaemontana
Berchemia scandens
Bignonia capreolata
Brunnichia ovata
Campsis radicans
Carex tribuloides
Celtis laevigata
Dichanthelium commutatum
Diospyros virginiana
Elymus virginicus
Fraxinus pennsylvanica
Ilex decidua
Justicia ovata
Lactuca floridana
Leersia lenticularis
Oxalis florida (dillenii)
Quercus nuttallii (Q. texana)
Rubus argutus
Rubus trivialis
Sanicula canadensis
Smilax rotundifolia
Styrax americanus
Toxicodendron radicans
Trachelospermum difforme
Viola species
Vitis rotundifolia

Overstory and midstory species:

Carya aquatica
Celtis laevigata
Cornus foemina (stricta)
Diospyros virginiana
Fraxinus pennsylvanica
Ilex decidua
Liquidambar styraciflua
Morus rubra
Quercus lyrata
Quercus nuttallii (Q. texana)
Quercus phellos
Ulmus americana
Ulmus crassifolia

Site: **Mahannah Wildlife Management Area**

Locations sampled: West refuge north and south of Anderson Tully Road. Surveyed: 15 August 2012

Locations of transect starting points (Easting, Northing) {WGS84 UTM15N} and directions traveled:

1- 693346E 3603256N 0° [corrected]
2- 692971E 3602563N 90° [corrected]

Understory species found:

Brunnichia ovata
Campsis radicans
Carex species
Carya aquatica
Celtis laevigata
Clematis crispa
Diospyros virginiana
Forestiera acuminata
Fraxinus pennsylvanica
Gleditsia aquatica
Ilex decidua
Leersia lenticularis
Polygonum punctatum
Quercus lyrata
Quercus nuttallii (Q. texana)
Rhynchospora corniculata
Toxicodendron radicans
Trachelospermum difforme
Vitis palmate

Overstory and midstory species:

Carya aquatica
Celtis laevigata
Diospyros virginiana
Forestiera acuminata
Quercus lyrata
Quercus nuttallii (Q. texana)

Site: **Malmaison Wildlife Management Area**

Locations sampled: Compartments 2 and 4 Surveyed: 1 & 7 August 2012

Locations of transect starting points (Easting, Northing) {WGS84 UTM15N} and directions traveled:

1- 768787E 3732183N 90°
2- 771406E 3733585N 0°

Understory species found:

Arisaema dracontium
Bignonia capreolata
Boehmeria cylindrica
Brunnichia ovata
Campsis radicans
Carex cherokeensis
Carex crus-corvi
Carex intumescens
Carex tribuloides
Celtis laevigata
Cersis canadensis
Chasmanthium latifolium
Commelina virginica
Dioclea multiflora
Diospyros virginiana
Elymus virginicus
Erechtites hieracifolia
Fraxinus pennsylvanica
Ilex decidua
Justicia ovata
Leersia lenticularis
Lysimachia radicans
Onoclea sensibilis
Phanopyrum gymnocarpon
Polygonum virginianum
Quercus michauxii
Quercus nigra
Quercus phellos
Rubus argutus
Rubus trivialis
Sambucus canadensis
Sanicula canadensis
Saururus cernuus
Smilax bona-nox
Smilax rotundifolia
Smilax tamnoides (hispida)
Taxodium distichum
Toxicodendron radicans
Trachelospermum difforme
Ulmus americana
Unknown Poaceae species2
Viola species
Vitis rotundifolia

Overstory and midstory species:

Acer negundo
Acer rubrum
Carya aquatica
Celtis laevigata
Forestiera acuminata
Fraxinus pennsylvanica
Ilex decidua
Liquidambar styraciflua
Nyssa aquatica
Planera aquatica
Platanus occidentalis
Quercus lyrata
Quercus phellos
Taxodium distichum
Ulmus americana
Ulmus crassifolia

Site: **Morgan Brake National Wildlife Refuge**

Location sampled: North refuge east of US Hwy 49 Surveyed: 24 July 2012

Locations of transect starting points (Easting, Northing) {WGS84 UTM15N} and directions traveled :

1- 758497E 3682645N 90°
2- 758600E 3681228N 50°

Understory species found:

Arisaema dracontium
Berchemia scandens
Bignonia capreolata
Boehmeria cylindrica
Botrychium biternatum
Brunnichia ovata
Campsis radicans
Carex frankii
Carex tribuloides
Cephalanthus occidentalis
Cocculus carolinus
Dichanthelium commutatum
Dioclea multiflora
Erechtites hieracifolia
Fraxinus pennsylvanica
Ilex decidua
Ipomea species
Quercus phellos
Rubus argutus
Sanicula canadensis
Smilax rotundifolia
Styrax americanus
Toxicodendron radicans
Trachelospermum difforme
Ulmus americana
Ulmus crassifolia
Viola species
Vitis rotundifolia

Overstory and midstory species:

Acer rubrum
Fraxinus pennsylvanica
Ilex decidua
Liquidambar styraciflua
Morus rubra
Nyssa aquatica
Quercus lyrata
Quercus nuttallii (Q. texana)
Quercus phellos
Taxodium distichum
Ulmus americana
Ulmus crassifolia

Site: **O'Keefe Wildlife Management Area**

Location sampled: Compartment 2 Surveyed: 31 July 2012

Locations of transect starting points (Easting, Northing) {WGS84 UTM15N} and directions traveled:

1- 749970E 3780317N 180°
2- 750427E 3779085N 270°

Understory species found:

Acer rubrum
Bignonia capreolata
Campsis radicans
Carex crus-corvi
Carex intumescens
Carex tribuloides
Celtis laevigata
Diospyros virginiana
Justicia ovata
Leersia lenticularis
Polygonum virginianum
Quercus nuttallii (Q. texana)
Quercus phellos
Smilax rotundifolia
Styrax americanus
Toxicodendron radicans
Trachelospermum difforme
Ulmus crassifolia
Viola species
Vitis palmata

Overstory and midstory species:

Acer rubrum
Carya aquatica
Carya ovata
Celtis laevigata
Fraxinus pennsylvanica
Liquidambar styraciflua
Populus deltoides
Quercus lyrata
Quercus nigra
Quercus nuttallii (Q. texana)
Quercus phellos
Ulmus americana
Ulmus crassifolia

Site: **Yazoo National Wildlife Refuge**

Location sampled: Lizard Lake Surveyed: 8 August 2012

Locations of transect starting points (Easting, Northing) {WGS84 UTM15N} and directions traveled:

1- 688683E 3661270N 335°
2- 688882E 3662119N 320°
3- 689028E 3662100N 55°

Understory species found:

Acalypha virginica
Acer negundo
Ampelopsis arborea
Aristolochia serpentaria
Bignonia capreolata
Boehmeria cylindrica
Brunnichia ovata
Carex crus-corvi
Carex frankii
Carex tribuloides
Carya aquatica
Celtis laevigata
Cocculus carolinus
Diospyros virginiana
Forestiera acuminata
Geum canadense
Gleditsia aquatica
Ilex decidua
Justicia ovata
Leersia lenticularis
Liquidambar styraciflua
Lycopus virginicus
Microstegium vimineum
Morus rubra
Parthenocissus quinquefolia
Phytolacca americana
Pilea pumila
Polygonum setaceum
Polygonum virginianum
Quercus nuttallii (Q. texana)
Quercus phellos
Rubus argutus
Sanicula canadensis
Sassafras albidum
Smilax bona-nox
Smilax rotundifolia
Styrax americanus
Toxicodendron radicans
Ulmus americana
Ulmus crassifolia
Vitis aestivalis
Vitis rotundifolia

Overstory and midstory species:

Acer negundo
Carya aquatica
Celtis laevigata
Diospyros virginiana
Forestiera acuminata
Fraxinus pennsylvanica
Liquidambar styraciflua
Quercus nuttallii (Q. texana)
Salix nigra
Styrax americanus
Taxodium distichum
Ulmus americana
Ulmus crassifolia

Appendix 2
Scientific and Common Names of Plants Found in Survey. (E) = exotic species

Species Name	Common Name	Reg. 2 Wetland Indicator
Acalypha sp.	Threeseed Mercury	FACU-
Acer negundo	Box Elder	FACW
Acer rubrum	Red Maple	OBL
Ambrosia trifida	Great Ragweed	FAC
Ampelopsis arborea	Pepper Vine	FAC+
Amsonia tabernaemontana	Eastern Bluestar	FACW
Arisaema dracontium	Green Dragon	FACW
Aristolochia serpentaria	Virginia Snakeroot	FACU
Arundinaria gigantea	Rivercane	FACW
Asimina triloba	Pawpaw	FAC
Berchemia scandens	Alabama Supplejack	FACW
Bignonia capreolata	Crossvine	FAC
Boehmeria cylindrica	Smallspike False Nettle	FACW+
Botrychium biternatum	Grape Fern	FAC
Brunnichia ovata	Red Vine	FACW
Campsis radicans	Trumpet Creeper	FAC
Carex cherokeensis	Cherokee Sedge	FACW-
Carex crus-corvi	Ravenfoot Sedge	OBL
Carex frankii	Frank's Sedge	OBL
Carex intumescens	Greater Bladder Sedge	FACW
Carex sp.	Sedge	.
Carex tribuloides	Blunt Broomsedge	FACW+
Carya aquatica	Bitternut Hickory	OBL
Carya illinoinensis	Sweet Pecan	FAC+
Carya ovata	Shagbark Hickory	FACU
Celtis laevigata	Sugarberry	FACW
Cephalanthus occidentalis	Buttonbush	OBL
Cercis canadensis	Redbud	FACU
Chasmanthium latifolium	Indian Woodoats	FAC-
Clematis crispa	Swamp Leather Flower	FACW+
Cocculus carolinus	Carolina Coralbead	FAC
Commelina virginica	Virginia Dayflower	FACW
Cornus foemina (C. stricta)	Swamp Dogwood	FACW-
Crataegus viridis	Green Hawthorn	FACW
Desmodium sp.	Ticktrefoil	FACU
Dichanthelium commutatum	Variable Panicgrass	FAC
Dioclea multiflora	Hog Peanut	FAC+
Diospyros virginiana	Common Persimmon	FAC
Elymus virginicus	Virginia Wildrye	FAC

Appendix 2 (cont.)

Species Name	Common Name	Reg. 2 Wetland Indicator
Erechtites hieracifolia	American Burnweed	FAC-
Forestiera acuminata	Swamp Privet	OBL
Fraxinus pennsylvanica	Green Ash	FACW
Galium sp.	Bedstraw	.
Geum canadense	White Avens	FAC
Gleditsia aquatica	Water Locust	OBL
Gleditsia tricanthos	Honey Locust	FAC
Ilex decidua	Decidous Holly	FACW-
Ipomoea sp.	Morning-glory	.
Justicia ovata	Looseflower Water-Willow	OBL
Lactuca floridana	Woodland lettuce	FACU
Leersia lenticularis	Catchfly Grass	OBL
Leersia virginica	Whitegrass	FACW
Liquidambar styraciflua	Sweetgum	FAC+
Lonicera japonica (**E**)	Honeysuckle	FAC-
Ludwigia glandulosa	Cylindricfruit Primrose-willow	OBL
Lycopus virginicus	Virginia Water Horehound	OBL
Lysimachia radicans	Trailing Yellow Loosestrife	OBL
Microstegium vimineum (**E**)	Nepalese Browntop	FAC+
Morus rubra	Red Mulberry	FAC
Nyssa aquatica	Water Tupelo	OBL
Onoclea sensibilis	Sensitive Fern	FACW
Oxalis florida (O. dillenii)	Slender Yellow Woodsorrel	FACU
Parthenocissus quinquefolia	Virginia Creeper	FAC
Penthorum sedoides	Ditch Stonecrop	OBL
Phanopyrum gymnocarpon	Savannah Panicgrass	OBL
Phytolacca americana	Polk Weed	FACU+
Pilea pumila	Canadian Clearweed	FACW
Planera aquatica	Water Elm	OBL
Plantago rugelii	Blackseed Plantain	FAC
Platanus occidentalis	Sycamore	FACW-
Polygonum cespitosum	Oriental Lady's Thumb	FACW-
Polygonum hydropiperoides	Swamp Smartweed	OBL
Polygonum punctatum	Dotted Smartweed	FACW+
Polygonum setaceum	Bog Smartweed	FACW
Polygonum virginianum	Jumpseed	FAC
Populus deltoides	Eastern Cottonwood	FAC+
Quercus lyrata	Overcup Oak	OBL
Quercus michauxii	Swamp Chestnut Oak	FACW-
Quercus nigra	Water Oak	FAC

Appendix 2 (cont.)

Species Name	Common Name	Reg. 2 Wetland Indicator
Quercus nuttallii (Q. texana)	Nuttall Oak	OBL
Quercus pagoda	Cherrybark Oak	FAC+
Quercus phellos	Willow Oak	FACW-
Rhynchospora corniculata	Shortbristle Horned Beaksedge	OBL
Rubus argutus	Blackberry	FAC
Rubus trivialis	Dewberry	FAC
Ruellia strepens	Limestone Wild Petunia	FAC-
Salix nigra	Blackwillow	OBL
Sambucus canadensis	Elderberry	FACW-
Sanicula canadensis	Canadian Blacksnakeroot	FACU
Sassafras albidum	Sassafras	FACU
Saururus cernuus	Lizard Tail	OBL
Smilax bona-nox	Saw Greenbrier	FAC
Smilax rotundifolia	Roundleaf Greenbrier	FAC
Smilax tamnoides (S. hispida)	Bristly Greenbrier	FAC+
Spermacoce glabra	Smooth False Buttonweed	FACW
Styrax americanus	American Snowbell	FACW
Taxodium distichum	Bald Cypress	OBL
Teucrium canadense	Canada Germander	FACW-
Toxicodendron radicans	Poison Ivy	FAC
Trachelospermum difforme	Climbing Dogbane	FACW
Trepocarpus aethusae	Whitenymph	FACW
Ulmus americana	American Elm	FACW
Ulmus crassifolia	Cedar Elm	FAC
Vernonia gigantea	Giant Ironweed	FAC+
Viola sp.	Violet	.
Vitis aestivalis	Summer Grape	FAC-
Vitis cinerea	Graybark Grape	FAC+
Vitis palmata	Catbird Grape	FACW-
Vitis rotundifolia	Muscadine	FAC
Wisteria frutescens	American Wisteria	FACW