
Vascular Flora of Oologah Wildlife Management Area in Nowata County, Oklahoma

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This article reports the results of an inventory of the vascular plants from the Nowata County portion of the Oologah Wildlife Management Area in northeastern Oklahoma. Four hundred and seventy species of vascular plants in 305 genera and 95 families were collected. The most species were collected from the families Poaceae (59), Asteraceae (59), and Fabaceae (33). One hundred forty species were annuals, and 320 were perennials. Seventy-five species of woody plants were present. Thirty-nine exotic species were collected representing 9% of the flora. Six species tracked by the Oklahoma Natural Heritage Inventory were found. This study reports 364 species previously not documented in Nowata County. © 2003 Oklahoma Academy of Science

INTRODUCTION

North American botany has had a long tradition of floristic exploration and inventory (Ertter 2000a). Nevertheless, floristic inventories continue to be valuable for research, conservation, and management (Palmer et al 1995). For example, it has been recently documented that new taxa are discovered and described at a rate of 60 per year (Ertter 2000b). Inventories also play a crucial role in biogeographic research by filling in gaps in the geographic distribution of taxa at all levels. Floristic inventories play an invaluable role in plant species conservation, both in locating populations of rare and/or undescribed species and in bringing their presence to the attention of conservation organizations (Radford et al 1980, Stuessy and Sohmer 1996). The lack of accurate floristic data can jeopardize the long-term persistence of sensitive species (Ertter 2000b). Finally, floristic inventories aid resource managers in locating populations of sensitive species and noting the arrival of exotic and nuisance species (Barkley 2000). Ignorance of the presence of exotic species can be detrimental to

sensitive species and/or exert adverse economic impacts (Ertter 2000b).

The objective of this study was to fill a gap in floristic data for northeast Oklahoma. Based on the Atlas of the Flora of Oklahoma database (AFO)(Hoagland 2003), Nowata County is a floristically under-documented county. Prior to 2000, the year collecting began for this study, only 183 species were reported from Nowata County. The first collection gathered from there was a specimen of *Aster subulatus* by A. J. Van Vleet on 22 August 1903. The peak years for plant collecting in this county were 1913 (9 specimens) and 1952 (14 specimens)(Hoagland 2003). This was followed by collections initiated by the first author and colleagues in the years 1997 (21 specimens), 1998 (16 specimens), and 1999 (37 specimens) to resolve gaps in distribution of woody plant species. The intent of this study was to increase the number of species known from Nowata County by collecting specimens in the Oologah Wildlife Management Area (OWMA).

STUDY AREA

The OWMA encompasses 5,226 hectares in Nowata County (Fig. 1; Pennington 2003). It is located along the margin of Oologah Lake, which impounds the Verdigris River. Construction of the Oologah Dam began in 1963 and was completed in 1974 (Oklahoma Water Resources Board 1990). The OWMA was established in 1961 and is one of 64 wildlife management areas maintained by the Oklahoma Department of Wildlife Conservation. Latitudinal extent ranges from 36.60°N to 36.78°N and longitudinal extent from 95.62°W to 95.49°W.

The OWMA is located within the subtropical humid (Cf) climate zone (Trewartha 1968). Summers are warm (mean July temperature = 27.7°C) and humid, whereas winters are relatively short and mild (mean January temperature = 1.9°C). Mean annual precipitation is 105.6 cm, with periodic severe droughts (Oklahoma Climatological Survey 2003). Physiographically, the study area is located in the Osage Plains section of the Central Lowlands province (Hunt 1974) and within the Claremore

Cuesta Plains province of Oklahoma (Curtis and Ham 1979). Elevation in the study area ranges from 192 m to 258 m. The surface geology consists of Pennsylvanian marine shales interbedded with sandstone, limestone, and coal (Branson and Johnson 1979). The soils at OWMA are loam and clay. The Radley-Mynona-Mason, a deep, nearly level loamy to clay unit, is the predominant bottomland soil. The primary upland soil units include the Dennis-Parsons-Okemah and Apperson-Catoosa-Summit, both of which are gently sloped, moderately well drained, loams (Polone 1979). The predominant potential vegetation types are *Quercus stellata*-*Q. marilandica* forest and woodlands, bottomland forests, and tallgrass prairies (Duck and Fletcher 1943). In addition to inundation of bottomland forests by Lake Oologah, much of the bottomland forests have been cleared for agriculture and pasturage. Old-fields predominate throughout the area. Upland forests and grasslands have been converted to pasturage. Some tallgrass prairie remnants are scattered throughout the study area and are hayed annually.

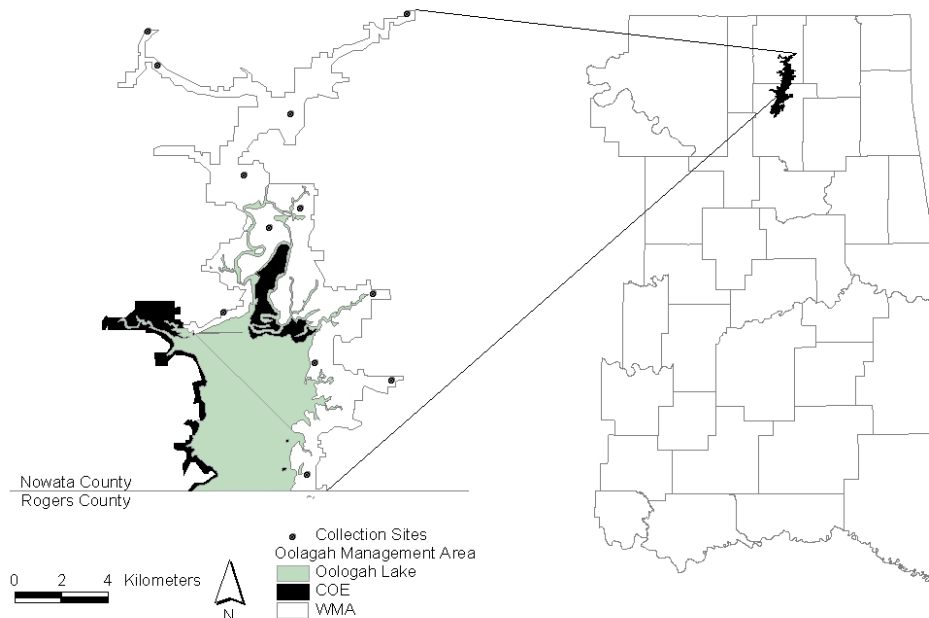


Figure 1: Location of Oologah Wildlife Management Area. COE = property of the Army Corp of Engineers, Tulsa District. WMA = Oologah Wildlife Management Area lands.

METHODS

Twelve collection sites were established at OWMA for intensive floristic sampling. Sites were selected following a review of US Geological Survey 1:24,000 topographic maps and field reconnaissance. The predominant vegetation association at these sites was classified according to Hoagland (2000). Collections also were made randomly throughout the OWMA from March through October 2002. Vouchers for species exotic to North America were made from naturalized populations only, thus excluding cultivated and ornamental plants. Specimens were processed at the Robert Bebb Herbarium of the University of Oklahoma (OKL) following standard procedures. Manuals used for specimen identification included Waterfall (1969), Great Plains Flora Association (1986), Diggs et al. (1999), and Yatsievych (1999). Origin, either native or introduced, was determined by using Taylor and Taylor (1991) and USDA-NRCS (2003). Nomenclature follows the US Department of Agriculture-Natural Resources Conservation Service (USDA-NRCS 2003). Voucher specimens were deposited at OKL.

RESULTS and DISCUSSION

Four hundred and seventy species of vascular plants in 95 families and 305 genera were collected in the Nowata County portion of the OWMA. Among the angiosperms, 118 were monocots, and 346 were dicots. In addition, there were six species of ferns. The Asteraceae (59), Poaceae (59), Fabaceae (33), and Cyperaceae (31) had the greatest number of species. The genera *Carex*(19) and *Polygonum*(12) included the greatest number of species. One hundred forty-one species of annuals, 9 biennials, and 320 perennials were in the OWMA flora. Seventy-five species of woody plants were collected: 59 trees, 16 shrubs, and 19 woody vines.

Thirty-nine species (9%) from 16 families were exotic. The families with the greatest number of introduced species were Poaceae (10) and Fabaceae (6). In com-

parison, the Chickasaw National Recreation Area, located in south-central Oklahoma, 12% of the flora was composed of exotic species (Hoagland and Johnson 2001). Twenty-nine of the introduced species were annuals or biennials, and 11 were perennials. No federally listed threatened or endangered species were encountered at OWMA. However, six species tracked by the Oklahoma Natural Heritage Inventory (2003) were present: *Arabis shortii* (G5, S1S2), *Brasenia schreberi* (G5, S1), *Desmodium pauciflorum* (G5, S1), *Dicentra cucullaria* (G5, S1S3), *Urtica chamaedryoides* (G4G5, S?), and *Vernonia missurica* (G4G5, S3) (species conservation ranks are presented parenthetically). Species are ranked according to level of imperilment at the state (S) and global (G) levels on a scale of 1-5; with 1 representing a species that is imperiled and 5 a species that is secure (Groves et al 1995).

As a result of this study, 547 species are now known to occur in Nowata County. Of the 470 species reported in this study, 106 had been previously collected in Nowata County (Hoagland 2003). However, 76 species reported in the AFO database were not collected in this study. This study documented 364 species not previously reported from Nowata County.

The 12 collection sites occurred within six vegetation associations. A brief description of each follows:

Quercus stellata-Quercus marilandica-Carya texana forest association:

This association occurred on sandstone derived soils on uplands and south-facing slopes. Associated species include *Antennaria parlinii*, *Cercis canadensis*, *Danthonia spicata*, *Helianthus hirsutus*, *Lespedeza procumbens*, *Monarda fistulosa*, *Prunus mexicana*, *Symphoricarpos orbiculatus*, *Viburnum rufidulum*, and *Schizachyrium scoparium*.

Quercus palustris-Carya illinoensis/Ilex decidua forest association:

This association was most common in seasonally flooded bottomlands along the Verdigris River. Common associates include *Ampelopsis cordata*, *Celtis laevigata*, *Cinna arundinacea*, *Crataegus viridis*, *Gleditsia*

triacanthos, *Impatiens capensis*, *Morus rubra*, *Packera glabella*, and *Ulmus rubra*.

Quercus muehlenbergii-*Quercus shumardii* forest association:

This association was found on lowlands and north-facing slopes. Associated species include *Apios americana*, *Carya cordiformis*, *C. illinoensis*, *Crataegus viridis*, *Desmodium glutinosum*, *Myosotis verna*, *Podophyllum peltatum*, and *Quercus macrocarpa*. Five species tracked by the Oklahoma Natural Heritage Inventory were found in this habitat type: *Arabis shortii*, *Brasenia schreberi*, *Desmodium pauciflorum*, *Dicentra cucullaria*, and *Urtica chamae-dryoides*.

Andropogon gerardii-*Schizachyrium scoparium*-*Sorghastrum nutans* herbaceous association:

This association represents two haymeadows in OWMA, both of which are cut and baled for hay around July 4 of each year. Common associated species include *Amorpha canescens*, *Arnoglossum plantagineum*, *Dichantherium oligosanthes*, *Echinacea pallida*, *Helianthus mollis*, *Panicum virgatum*, *Solidago canadensis*, *Sorghastrum nutans*, and *Symphotrichum ericoides*. *Vernonia missurica*, which is tracked by the Oklahoma Natural Heritage Inventory, occurred in this vegetation association.

Wetland and aquatic vegetation:

Extensive areas of herbaceous wetland vegetation occur throughout the OWMA. Several wetland vegetation associations are present in OWMA, many of which are small or of limited extent. Therefore, all wetland habitats have been assigned to this category. The most common wetland vegetation type is the *Typha latifolia* herbaceous association. It occurs primarily in sloughs at OWMA. Associated species include *Amorpha fruticosa*, *Carex crus-crovi*, *Cicuta maculata*, *Nelumbo lutea*, *Pluchea odorata*, *Polygonum amphibium*, *P. lapathifolium*, and *Salix nigra*.

Disturbed areas and old-field vegetation

Sites used by OWMA visitors, mowed lawns, roadsides, and other areas exhibiting signs of physical disruption. Common plants in disturbed areas include *Bothrio-*

chloa laguroides, *Daucus carota*, *Digitaria sanguinalis*, *Lespedeza cuneata*, *Kummerowia stipulacea*, *Melilotus officinalis*, *Rhus glabra*, and *Trifolium dubium*. Old-fields were characterized by *Ambrosia artemisiifolia*, *A. trifida*, *Amaranthus rudis*, *Andropogon virginicus*, *Aristida oligantha*, and *Conyza canadensis*. *Sorghum halepense* covers extensive areas of retired crop land, roadsides, and drainage ditches.

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APPENDIX 1

Annotated species list for Oologah Wildlife Management Area. The first entry is the collection number, followed by life history (A=annual, B=biennial, P=perennial), origin (N=native, I=introduced), and habitat (QSCT = *Quercus stellata* – *Quercus marilandica* – *Carya texana* forest association, QPCI = *Quercus palustris* – *Carya illinoensis/Ilex decidua* forest association, QMQS = *Quercus muehlenbergii* – *Quercus shumardii* forest association, AGSS = *Andropogon gerardii* – *Schizachyrium scoparium* - *Sorghastrum nutans* herbaceous association, WETL = wetland and aquatic vegetation, DAOF = disturbed areas and old-field vegetation). Voucher specimens were deposited at the Robert Bebb Herbarium at the University of Oklahoma (OKL).

PTERIDOPHYTA

ASPLENIACEAE

Asplenium platyneuron (L.) B.S.P. - OOL017; P; N; QSCT

A. rhizophyllum L. - OOL021; P; N; QMQS

OPHIOGLOSSACEAE

Botrychium virginianum (L.) Sw. - OOL136; P; N; QMQS

Ophioglossum vulgatum L. - OOL099; P; N; QMQS

PTERIDACEAE

Argyrochosma dealbata (Pursh) Windham - OOL019; P; N; QMQS

Pellaea atropurpurea (L.) Link - OOL018; P; N; QMQS, QSCT

DICOTYLEDONAE

ACANTHACEAE

Justicia americana (L.) Vahl - OOL337; P; N; WETL

Ruellia humilis Nutt. - OOL439; P; N; AGSS, DAOF

R. strepens L. - OOL692 P; N; QMQS

ACERACEAE

Acer negundo L. - OOL334; P; N; QPCI

A. saccharinum L. - OOL310; P; N; QPCI

AMARANTHACEAE

Amaranthus arenicola I.M. Johnston - OOL569; A; N; DAOF

A. rudis Sauer - OOL656; A; N; DAOF

Iresine rhizomatosa Standl. - OOL512; P; N; DAOF

ANACARDIACEAE

Rhus copallinum L. - OOL496; P; N; DAOF

R. glabra L. - OOL208; P; N; DAOF

Toxicodendron radicans (L.) Kuntze - OOL562; P; N; DAOF, QMQS, QSCT

ANNONACEAE

Asimina triloba (L.) Dunal - OOL241; P; N; QMQS

APIACEAE

Chaerophyllum tainturieri Hook. - OOL107; A; N; DAOF

Conium maculatum L. - OOL427; B; I; DAOF, WETL

Cryptotaenia canadensis (L.) DC. - OOL283; P; N; AGSS, DAOF

Daucus carota L. - OOL304; B; I; DAOF

Eryngium leavenworthii Torr. & Gray - OOL577; A; N; AGSS, DAOF

Limnoscadium pinnatum (DC.) Mathias & Constance - OOL239; A; N;

WETL

Pastinaca sativa L. - OOL185; A; I; DAOF

Polytaenia nuttallii DC. - OOL113; P; N; AGSS

Ptilimnium nuttallii (DC.) Britt. - OOL345; A; N; AGSS

Sanicula canadensis L. - OOL134; B; N; QMQS

Taenidia integerrima (L.) Drude - OOL379; P; N; AGSS, DAOF

Zizia aurea (L.) W.D.J. Koch - OOL132; P; N; QMQS, QPCI

APOCYNACEAE

Apocynum cannabinum L. - OOL235; P; N; AGSS, DAOF

AQUIFOLIACEAE

Ilex decidua Walt. - OOL084; P; N; QPCI

ARISTOLOCHIACEAE

Aristolochia tomentosa Sims - OOL175; P; N; QSCT, DAOF

ASCLEPIADACEAE

Asclepias asperula (Dcne.) Woods. - OOL613; P; N; AGSS, DAOF

A. sullivantii Engelm. ex Gray - OOL166; P; N; AGSS, DAOF

A. tuberosa L. - OOL192; P; N; AGSS, DAOF

A. viridiflora Raf. - OOL317; P; N; AGSS, DAOF

Matelea gonocarpos (Walt.) Shinnery - OOL259; P; N; QMQS

ASTERACEAE

Achillea millefolium L. - OOL303; P; N; AGSS, DAOF

Ageratina altissima (L.) King & H.E. Robins. - OOL511; P; N; AGSS, DAOF

Ambrosia artemisiifolia L. - OOL538; A; N; DAOF

A. trifida L. - OOL506; A; N; DAOF

Amphiachyris dracunculoides (DC.) Nutt. - OOL492; A; N; DAOF

Antennaria parlinii Fern. ssp. *fallax* (Greene) Bayer & Stebbins - OOL030; P; N; QMQS, QSCT

Arnoglossum plantagineum Raf. - OOL207; P; N; AGSS

Artemisia ludoviciana Nutt. - OOL622; P; N; AGSS, DAOF

Bidens aristosa (Michx.) Britt. - OOL560; A; N; WETL

B. frondosa L. - OOL571; A; N; WETL

Carduus nutans L. - OOL195; B; I; DAOF

Centaurea americana Nutt. - OOL452; A; N; AGSS, DAOF

Conyza canadensis (L.) Cronq. - OOL644; A; N; DAOF

Coreopsis tinctoria Nutt. - OOL408; A; N; DAOF, WETL

Dracopis amplexicaulis (Vahl) Cass. - OOL308; A; N; DAOF, WETL

Echinacea pallida (Nutt.) Nutt. - OOL197; P; N; AGSS

Eclipta prostrata (L.) L. - OOL648; A; N; WETL

Elephantopus carolinianus Raeusch. - OOL532; P; N; QMQS

Erigeron philadelphicus L. - OOL118; P; N; AGSS, DAOF

E. strigosus Muhl. ex Willd. - OOL459; A; N; AGSS, DAOF

Eupatorium serotinum Michx. - OOL585; P; N; DAOF

Euthamia gymnospermoides Greene - OOL592; P; N; AGSS, DAOF

Gaillardia pulchella Foug. - OOL305; A; N; AGSS, DAOF

Gamochaeta purpurea (L.) Cabrera - OOL245; P; N; DAOF

Grindelia papposa Nesom & Suh - OOL503; A; N; AGSS, DAOF

Helenium amarum (Raf.) H. Rock - OOL500; A; N; DAOF

Helianthus annuus L. - OOL596; A; N; DAOF

H. hirsutus Raf. - OOL516; P; N; QSCT

H. maximiliani Schrad. - OOL556; P; N; AGSS, DAOF

H. mollis Lam. - OOL544; P; N; AGSS

H. salicifolius A. Dietr. - OOL586; P; N; AGSS, DAOF

Hymenopappus scabiosaeus L'Hér. - OOL112; P; N; AGSS, DAOF

Iva annua L. - OOL507; A; N; DAOF, WETL

Krigia caespitosa (Raf.) Chambers - OOL094; A; N; DAOF, WETL

Lactuca serriola L. - OOL369; B; I; DAOF

Leucanthemum vulgare Lam. - OOL210; P; I; DAOF

Liatris aspera Michx. - OOL533; P; N; AGSS

L. punctata Hook. - OOL616; P; N; AGSS

L. squarrosa (L.) Michx. - OOL371; P; N; AGSS

Oligoneuron rigidum (L.) Small - OOL576; P; N; AGSS

Packera glabella (Poir) C. Jeffrey - OOL110; P; N; QPCI

P. obovata (Muhl. ex Willd.) W.A. Weber & A. Löve - OOL006; P; N; QPCI

Pluchea camphorata (L.) DC. - OOL680; P; N; DAOF, WETL

Pyrrhopappus carolinianus (Walt.) DC. - OOL206; P; N; DAOF

Ratibida columnifera (Nutt.) Woot. & Standl. - OOL194; P; N; AGSS, DAOF

Rudbeckia hirta L. - OOL255; P; N; AGSS, DAOF

R. triloba L. - OOL520; P; N; QPCI, WETL

Silphium laciniatum L. - OOL428; P; N; AGSS, DAOF

- Solidago canadensis* L. - OOL611; P; N; AGSS, DAOF
S. ulmifolia Muhl. ex Willd. - OOL652; P; N; QSCT
Symphotrichum dumosum (L.) Nesom - OOL642; P; N; QMQS
S. ericoides (L.) Nesom - OOL667; P; N; AGSS, DAOF
S. lanceolatum (Willd.) Nesom - OOL666; P; N; QPCI
S. praealtum (Poir.) Nesom - OOL670; P; N; AGSS, QMQS
Taraxacum officinale G.H. Weber ex Wiggers - OOL041; P; I; DAOF
Verbesina alternifolia (L.) Britt. ex Kearney - OOL568; P; N; DAOF, QMQS
Vernonia baldwinii Torr. - OOL410; P; N; AGSS, DAOF
V. missurica Raf. - OOL550; P; N; AGSS, DAOF
Xanthium strumarium L. - OOL564; A; N; WETL
- BALSAMINACEAE**
- Impatiens capensis* Meerb. - OOL360; A; N; QMQS, QPCI
- BERBERIDACEAE**
- Podophyllum peltatum* L. - OOL147; P; N; QMQS
- BIGNONIACEAE**
- Campsis radicans* (L.) Seem. ex Bureau - OOL171; P; N; QPCI
Catalpa bignonioides Walt. - OOL291; P; N; QPCI
- BORAGINACEAE**
- Heliotropium indicum* L. - OOL570; A; I; WETL
Myosotis verna Nutt. - OOL095; A; N; QMQS
Onosmodium molle Michx. - OOL374; P; N; AGSS, DAOF
- BRASSICACEAE**
- Arabis canadensis* L. - OOL172; B; N; QMQS, QSCT
A. shortii (Fern.) Gleason - OOL045; B; N; QMQS, QSCT
Capsella bursa-pastoris (L.) Medik. - OOL037; A; I; DAOF
Cardamine concatenata (Michx.) Sw. - OOL009; P; N; QMQS
C. pennsylvanica Muhl. ex Willd. - OOL051; A; N; DAOF
Draba brachycarpa Nutt. ex Torr. & Gray - OOL001; A; N; DAOF
Rorippa palustris (L.) Bess. - OOL133; A; N; WETL
R. sessiliflora (Nutt.) A.S. Hitchc. - OOL123; A; N; WETL
Sibara virginica (L.) Rollins - OOL005; A; N; DAOF
- CABOMBACEAE**
- Brasenia schreberi* J.F. Gmel. - OOL580; P; N; WETL
- CALLITRICHACEAE**
- Callitriche heterophylla* Pursh - OOL015; A; N; WETL
- CAMPANULACEAE**
- Campanulastrum americanum* (L.) Small - OOL464; P; N; QMQS
Lobelia spicata Lam. - OOL399; P; N; AGSS
Triodanis lamprosperma McVaugh - OOL242; A; N; AGSS, DAOF
T. leptocarpa (Nutt.) Nieuwl. - OOL351; A; N; AGSS, DAOF
T. perfoliata (L.) Nieuwl. - OOL354; A; N; AGSS, DAOF
- CAPRIFOLIACEAE**
- Symphoricarpos orbiculatus* Moench - OOL138; P; N; QMQS, QSCT
Triosteum perfoliatum L. - OOL184; P; N; QMQS
Viburnum rufidulum Raf. - OOL150; P; N; QSCT
- CARYOPHYLLACEAE**
- Arenaria serpyllifolia* L. - OOL098; A; I; DAOF
Dianthus armeria L. - OOL180; A; I; AGSS, DAOF
Paronychia fastigiata (Raf.) Fern. - OOL702; A; N; DAOF
Silene antirrhina L. - OOL300; A; N; DAOF, QSCT
S. stellata (L.) Ait. f. - OOL394; P; N; DAOF, QSCT
Stellaria media (L.) Vill. - OOL040; A; I; DAOF
- CELASTRACEAE**
- Celastrus scandens* L. - OOL265; P; N; DAOF, QSCT
- CERATOPHYLLACEAE**
- Ceratophyllum demersum* L. - OOL168; P; N; WETL

CHENOPODIACEAE

Chenopodium album L. - OOL657; A; N; DAOF

CLUSIACEAE

Hypericum sphaerocarpum Michx. - OOL199; P; N; AGSS, DAOF

CONVOLVULACEAE

Ipomoea lacunosa L. - OOL665; A; N; AGSS, DAOF

I. pandurata (L.) G.F.W. Mey. - OOL397; P; N; AGSS, DAOF

CORNACEAE

Cornus drummondii C.A. Mey. - OOL292; P; N; AGSS, DAOF

CRASSULACEAE

Penthorum sedoides L. - OOL624; P; N; DAOF

Sedum nuttallianum Raf. - OOL329; A; N; AGSS

CUCURBITACEAE

Sicyos angulatus L. - OOL583; A; N; DAOF

CUSCUTACEAE

Cuscuta cuspidata Engelm. - OOL555; A; N; AGSS, DAOF

C. indecora Choisy - OOL700; A; N; AGSS, DAOF

C. obtusiflora Kunth - OOL701; A; N; AGSS, DAOF

DIOSCOREACEAE

Dioscorea villosa L. - OOL267; P; N; QMQS

EBENACEAE

Diospyros virginiana L. - OOL604; P; N; DAOF

ELAEAGNACEAE

Elaeagnus angustifolia L. - OOL026; P; I; DAOF

EUPHORBIACEAE

Acalypha rhomboidea Raf. - OOL684; A; N; AGSS, DAOF

A. virginica L. - OOL658; A; N; AGSS, DAOF

Chamaesyce maculata (L.) Small - OOL664; A; N; DAOF

C. nutans (Lag.) Small - OOL479; A; N; DAOF

C. serpens (Kunth) Small - OOL677; A; N; DAOF

Croton capitatus Michx. - OOL619; A; N; DAOF

C. glandulosus L. - OOL384; A; N; DAOF

C. monanthogynus Michx. - OOL366; A; N; AGSS, DAOF

Euphorbia corollata L. - OOL597; P; N; AGSS, DAOF

E. dentata Michx. - OOL174; A; N; DAOF

Tragia betonicifolia Nutt. - OOL191; P; N; AGSS, DAOF

FABACEAE

Acacia angustissima (P. Mill.) Kuntze - OOL405; P; N; AGSS, DAOF

Amorpha canescens Pursh - OOL309; P; N; AGSS

A. fruticosa L. - OOL296; P; N; WETL

Apios americana Medik. - OOL474; P; N; WETL

Baptisia australis (L.) R. Br. ex Ait. f. - OOL140; P; N; AGSS

B. bracteata Muhl. ex Ell. - OOL068; P; N; AGSS, DAOF, QSCT

Cercis canadensis L. - OOL232; P; N; DAOF, QSCT

Chamaecrista fasciculata (Michx.) Greene - OOL362; A; N; AGSS, DAOF

Dalea candida Michx. ex Willd. - OOL438; P; N; AGSS

D. purpurea Vent. - OOL430; P; N; AGSS

Desmanthus illinoensis (Michx.) MacM. ex B.L. Robins. & Fern. - OOL541;
P; N; AGSS, DAOF

Desmodium glutinosum (Muhl. ex Willd.) Wood - OOL228; P; N; QMQS

D. paniculatum (L.) DC. - OOL673; P; N; AGSS

D. pauciflorum (Nutt.) DC. - OOL381; P; N; AGSS, QSCT

Gleditsia triacanthos L. - OOL567; P; N; WETL

Gymnocladus dioicus (L.) K. Koch - OOL229; P; N; QMQS

Lespedeza cuneata (Dum.-Cours.) G. Don - OOL488; P; I; DAOF

L. repens (L.) W. Bart. - OOL530; P; N; QSCT

L. violacea (L.) Pers. - OOL401; P; N; DAOF

L. virginica (L.) Britt. - OOL549; P; N; AGSS, DAOF

Medicago minima (L.) L. - OOL126; A; I; DAOF

Melilotus officinalis (L.) Lam. - OOL234; B; I; DAOF
Mimosa nuttallii (DC.) B.L. Turner - OOL263; P; N; AGSS, DAOF
Pediomelum linearifolium (Torr. & Gray) J. Grimes - OOL286; P; N; AGSS
Robinia pseudoacacia L. - OOL595; P; N; DAOF
Senna marilandica (L.) Link - OOL493; P; N; DAOF
Sesbania herbacea (P. Mill.) McVaugh - OOL687; A; N; WETL
Strophostyles leiosperma (Torr. & Gray) Piper - OOL629; P; N; DAOF
Trifolium dubium Sibthorp - OOL288; A; I; DAOF
T. hybridum L. - OOL456; P; I; DAOF
Vicia ludoviciana Nutt. - OOL085; A; N; AGSS, DAOF
V. minutiflora F.G. Dietr. - OOL069; A; N; DAOF
V. villosa Roth - OOL339; A; I; DAOF

FAGACEAE

Quercus macrocarpa Michx. - OOL460; P; N; QMQS
Q. marilandica Muenchh. - OOL393; P; N; QSCT
Q. muehlenbergii Engelm. - OOL146; P; N; QMQS
Q. palustris Muenchh. - OOL419; P; N; QPCI
Q. shumardii Buckl. - OOL378; P; N; QMQS
Q. stellata Wangenh. - OOL403; P; N; QSCT
Q. velutina Lam. - OOL627; P; N; QSCT

FUMARIACEAE

Corydalis crystallina Engelm. - OOL062; A; N; DAOF
Corydalis flavula (Raf.) DC. - OOL029; A; N; DAOF
Dicentra cucullaria (L.) Bernh. - OOL016; P; N; QMQS

GENTIANACEAE

Sabatia campestris Nutt. - OOL364; A; N; AGSS, DAOF

GERANIACEAE

Geranium carolinianum L. - OOL082; Annual; N; DAOF

HYDROPHYLLACEAE

Phacelia hirsuta Nutt. - OOL050; A; N; DAOF, QMQS

JUGLANDACEAE

Carya alba (L.) Nutt. ex Ell. - OOL382; P; N; QMQS
C. cordiformis (Wangenh.) K. Koch - OOL467; P; N; QMQS
C. illinoensis (Wangenh.) K. Koch - OOL612; P; N; QPCI
C. laciniosa (Michx. f.) G. Don - OOL626; P; N; QMQS
C. texana Buckl. - OOL693; P; N; QSCT
Juglans nigra L. - OOL635; P; N; QMQS

LAMIACEAE

Agastache nepetoides (L.) Kuntze - OOL510; P; N; DAOF
Lamium amplexicaule L. - OOL044; A; I; DAOF
L. purpureum L. - OOL106; A; I; DAOF
Leonurus cardiaca L. - OOL587; P; I; DAOF
Monarda citriodora Cerv. ex Lag. - OOL196; A; N; AGSS, DAOF
M. fistulosa L. - OOL434; P; N; AGSS, DAOF
Prunella vulgaris L. - OOL268; P; N; QPCI, QMQS
Pycnanthemum tenuifolium Schrad. - OOL590; P; N; AGSS, DAOF
Scutellaria lateriflora L. - OOL525; P; N; WETL
S. parvula Michx. - OOL155; P; N; AGSS
Teucrium canadense L. - OOL411; P; N; DAOF, QPCI

LENTIBULARIACEAE

Utricularia gibba L. - OOL689; P; N; WETL
U. macrorhiza Le Conte - OOL508; P; N; WETL

LINACEAE

Linum rigidum Pursh - OOL217; A; N; AGSS, DAOF

LYTHRACEAE

Ammannia auriculata Willd. - OOL519; A; N; WETL
A. coccinea Rottb. - OOL606; A; N; WETL
Cuphea viscosissima Jacq. - OOL443; A; N; WETL

MALVACEAE

Callirhoe alcaeoides (Michx.) Gray - OOL117; P; N; AGSS, DAOF

Hibiscus laevis All. - OOL484; P; N; WETL

Sida spinosa L. - OOL535; A; N; DAOF

MENISPERMACEAE

Cocculus carolinus (L.) DC. - OOL478; P; N; DAOF

Menispermum canadense L. - OOL282; P; N; QMQS

MOLLUGINACEAE

Glinus lotoides L. - OOL691; A; I; WETL

MORACEAE

Maclura pomifera (Raf.) Schneid. - OOL341; P; N; DAOF

Morus alba L. - OOL205; P; I; DAOF

M. rubra L. - OOL574; P; N; QMQS

NELUMBONACEAE

Nelumbo lutea Willd. - OOL582; P; N; WETL

NYCTAGINACEAE

Mirabilis nyctaginea (Michx.) MacM. - OOL674; P; N; DAOF

OLEACEAE

Fraxinus pennsylvanica Marsh. - OOL226; P; N; QMQS

ONAGRACEAE

Gaura longiflora Spach - OOL639; A; N; AGSS, DAOF

Ludwigia palustris (L.) Ell. - OOL319; P; N; WETL

L. peploides (Kunth) Raven - OOL524; P; N; WETL

L. repens J.R. Forst. - OOL221; P; N; WETL

Oenothera biennis L. - OOL528; B; N; DAOF

O. laciniata Hill - OOL090; P; N; DAOF

O. speciosa Nutt. - OOL482; P; N; AGSS, DAOF

O. triloba Nutt. - OOL338; P; N; AGSS, DAOF

OXALIDACEAE

Oxalis stricta L. - OOL096; P; N; DAOF

O. violacea L. - OOL055; P; N; QSCT

PASSIFLORACEAE

Passiflora incarnata L. - OOL495; P; N; AGSS, DAOF

P. lutea L. - OOL186; P; N; QMQS, QSCT

PHYTOLACCACEAE

Phytolacca americana L. - OOL231; P; N; DAOF

PLANTAGINACEAE

Plantago aristata Michx. - OOL249; A; N; DAOF

P. rugelii Dcne. - OOL517; P; N; QPCI

POLEMONIACEAE

Phlox pilosa L. - OOL049; P; N; AGSS, QSCT

POLYGALACEAE

Polygala incarnata L. - OOL476; A; N; AGSS

POLYGONACEAE

Polygonum amphibium L. - OOL609; P; N; WETL

P. aviculare L. - OOL480; A; I; DAOF

P. convolvulus L. - OOL176; A; I; DAOF

P. hydropiperoides Michx. - OOL518; P; N; WETL

P. lapathifolium L. - OOL601; A; N; WETL

P. pennsylvanicum L. - OOL578; A; N; WETL

P. persicaria L. - OOL685; A; N; WETL

P. punctatum Ell. - OOL425; A; N; WETL

P. ramosissimum Michx. - OOL566; A; N; DAOF

P. scandens L. - OOL594; P; N; DAOF

P. setaceum Baldw. - OOL406; P; N; WETL

P. virginianum L. - OOL465; P; N; QMQS, QPCI

Rumex altissimus Wood - OOL325; P; N; DAOF

R. crispus L. - OOL327; P; I; DAOF

PORTULACACEAE

Claytonia virginica L. - OOL004; P; N; DAOF, QSCT

Portulaca oleracea L. - OOL654; A; N; DAOF

RANUNCULACEAE

Anemone virginiana L. - OOL372; P; N; DAOF

Aquilegia canadensis L. - OOL142; P; N; QMQS

Delphinium tricorne Michx. - OOL145; P; N; QMQS

Enemion biternatum Raf. - OOL048; P; N; QMQS

Myosurus minimus L. - OOL042; A; N; WETL

Ranunculus abortivus L. - OOL698; P; N; WETL

R. sceleratus L. - OOL125; A; N; WETL

Thalictrum dioicum L. - OOL182; P; N; QMQS

T. thalictroides (L.) Eames & Boivin - OOL010; P; N; QMQS

ROSACEAE

Agrimonia pubescens Wallr. - OOL377; P; N; QMQS, QSCT

Amelanchier arborea (Michx. f.) Fern. - OOL008; P; N; QSCT

Crataegus crus-galli L. - OOL129; P; N; DAOF, QSCT

C. mollis Scheele - OOL061; P; N; QMQS

C. reverchonii Sarg. - OOL688; P; N; DAOF, QSCT

C. viridis L. - OOL120; P; N; DAOF, QMQS

Geum canadense Jacq. - OOL233; P; N; QMQS

G. vernum (Raf.) Torr. & Gray - OOL151; P; N; QMQS

Potentilla simplex Michx. - OOL156; P; N; QMQS

Prunus americana Marsh. - OOL243; P; N; DAOF

P. munsoniana W. Wight & Hedrick - OOL025; P; N; DAOF

P. serotina Ehrh. - OOL251; P; N; QMQS, QSCT

Rosa carolina L. - OOL161; P; N; AGSS, DAOF, QMQS

R. foliolosa Nutt. ex Torr. & Gray - OOL311; P; N; AGSS, DAOF

R. multiflora Thunb. ex Murr. - OOL347; P; N; DAOF

R. setigera Michx. - OOL299; P; N; AGSS, DAOF

Rubus allegheniensis Porter - OOL357; P; N; DAOF

R. flagellaris Willd. - OOL053; P; N; DAOF, QMQS

RUBIACEAE

Cephalanthus occidentalis L. - OOL398; P; N; WETL

Galium pilosum Ait. - OOL262; P; N; QMQS

G. tinctorium L. - OOL632; P; N; QMQS, QSCT

G. triflorum Michx. - OOL373; P; N; QMQS

Houstonia pusilla Schoepf - OOL031; A; N; DAOF

Spermacoce glabra Michx. - OOL395; P; N; WETL

RUTACEAE

Zanthoxylum americanum P. Mill. - OOL153; P; N; QSCT

SALICACEAE

Populus deltoides Bartr. ex Marsh. - OOL494; P; N; QPCI

Salix nigra Marsh. - OOL103; P; N; WETL

SAPINDACEAE

Cardiospermum halicacabum L. - OOL565; A; N; DAOF, WETL

Sapindus saponaria L. - OOL209; P; N; DAOF, QMQS

SAPOTACEAE

Sideroxylon lanuginosum Michx. - OOL306; P; N; QSCT

SCROPHULARIACEAE

Agalinis heterophylla (Nutt.) Small ex Britt. - OOL617; A; N; AGSS, DAOF

Buchnera americana L. - OOL634; A; N; AGSS

Collinsia violacea Nutt. - OOL162; A; N; AGSS

Gratiola neglecta Torr. - OOL598; A; N; WETL

G. pilosa Michx. - OOL285; P; N; WETL

Leucospora multifida (Michx.) Nutt. - OOL429; A; N; WETL

Lindernia dubia (L.) Pennell - OOL453; A; N; WETL

Mimulus alatus Ait. - OOL545; P; N; WETL

Nuttallanthus texanus (Scheele) D.A. Sutton - OOL054; A; N; DAOF

- Penstemon tubiflorus* Nutt. - OOL237; P; N; AGSS, DAOF
Scrophularia marilandica L. - OOL380; P; N; QMQS
Veronica peregrina L. - OOL079; A; N; DAOF
- SOLANACEAE**
Physalis angulata L. - OOL396; A; N; DAOF
P. longifolia Nutt. - OOL671; P; N; DAOF
Solanum carolinense L. - OOL313; P; N; DAOF
S. elaeagnifolium Cav. - OOL302; P; N; DAOF
S. physalifolium Rusby - OOL694; A; N; DAOF
S. rostratum Dunal - OOL407; P; N; DAOF
- STAPHYLEACEAE**
Staphylea trifolia L. - OOL022; P; N; QMQS
- TAMARICACEAE**
Tamarix chinensis Lour. - OOL618; P; I; WETL
- ULMACEAE**
Celtis laevigata Willd. - OOL620; P; N; QMQS, QSCT
Ulmus americana L. - OOL563; P; N; QMQS
U. rubra Muhl. - OOL225; P; N; QMQS
- URTICACEAE**
Boehmeria cylindrica (L.) Sw. - OOL504; P; N; QMQS, QPCI
Parietaria pensylvanica Muhl. ex Willd. - OOL318; A; N; DAOF, QMQS
Urtica chamaedryoides Pursh - OOL036; A; N; QMQS
- VALERIANACEAE**
Valerianella radiata (L.) Dufr. - OOL075; A; N; DAOF
- VERBENACEAE**
Glandularia bipinnatifida (Nutt.) Nutt. - OOL159; A; N; DAOF
G. canadensis (L.) Nutt. - OOL546; P; N; AGSS, DAOF
G. pumila (Rydb.) Umber - OOL087; A; N; DAOF
Phryma leptostachya L. - OOL463; P; N; QMQS
Phyla lanceolata (Michx.) Greene - OOL279; P; N; WETL
Verbena hastata L. - OOL491; P; N; DAOF, QMQS
V. simplex Lehm. - OOL275; P; N; DAOF, QMQS
V. urticifolia L. - OOL400; P; N; DAOF, QMQS
- VIOLACEAE**
Viola affinis Le Conte - OOL047; P; N; QMQS
V. bicolor Pursh - OOL033; A; N; DAOF
V. pubescens Ait. - OOL046; P; N; QMQS
- VISCACEAE**
Phoradendron leucarpum (Raf.) Reveal & M.C. Johnston - OOL007; P; N;
QMQS, QSCT
- VITACEAE**
Ampelopsis cordata Michx. - OOL436; P; N; DAOF, WETL
Cissus incisa auct. non Des Moulins - OOL074; P; N; QSCT
Vitis cinerea (Engelm.) Millard - OOL179; P; N; DAOF, QMQS, QSCT
V. riparia Michx. - OOL358; P; N; DAOF, QMQS
- ZYGOPHYLLACEAE**
Tribulus terrestris L. - OOL370; A; I; DAOF

MONOCOTYLEDONAE**ALISMATACEAE**

- Alisma subcordatum* Raf. - OOL501; P; N; WETL
Echinodorus cordifolius (L.) Griseb. - OOL588; P; N; WETL
Sagittaria brevirostra Mackenzie & Bush - OOL238; P; N; WETL
S. latifolia Willd. - OOL607; P; N; WETL

ARACEAE

- Arisaema dracontium* (L.) Schott - OOL128; P; N; QMQS

COMMELINACEAE

- Commelina diffusa* Burm. f. - OOL605; P; N; QMQS, QPCI

C. erecta L. - OOL466; P; N; QMQS, QPCI
Tradescantia ohiensis Raf. - OOL189; P; N; AGSS, DAOF

CYPERACEAE

Carex albicans Willd. ex Spreng. - OOL011; P; N; QSCT
C. albolutescens Schwein. - OOL058; P; N; QSCI
C. amphibola Steud. - OOL097; P; N; QSCI
C. blanda Dewey - OOL056; P; N; QSCI
C. brevior (Dewey) Mackenzie - OOL057; P; N; QSCI
C. bushii Mackenzie - OOL348; P; N; AGSS
C. caroliniana Schwein. - OOL109; P; N; QSCI, QMQS
C. conjuncta Boott - OOL130; P; N; QMQS
C. crawei Dewey - OOL154; P; N; AGSS
C. crus-corvi Shuttlw. ex Kunze - OOL276; P; N; WETL
C. davisii Schwein. & Torr. - OOL124; P; N; QMQS, QPCI
C. frankii Kunth - OOL441; P; N; WETL
C. grayi Carey - OOL253; P; N; WETL, QMQS
C. hirsutella Mackenzie - OOL475; P; N; QSCI
C. hyalinolepis Steud. - OOL093; P; N; WETL, QSCI
C. microdonta Torr. & Hook. - OOL116; P; N; QSCI, QMQS
C. normalis Mackenzie - OOL092; P; N; QSCI
C. tribuloides Wahlenb. - OOL230; P; N; QSCI
C. vulpinoidea Michx. - OOL115; P; N; QSCI, WETL
Cyperus acuminatus Torr. & Hook. ex Torr. - OOL320; P; N; DAOF
C. echinatus (L.) Wood - OOL324; P; N; AGSS
C. esculentus L. - OOL703; P; N; DAOF
C. odoratus L. - OOL599; A; N; DAOF
C. setigerus Torr. & Hook. - OOL200; P; N; DAOF
Eleocharis obtusa (Willd.) J.A. Schultes - OOL321; P; N; WETL
E. ovata (Roth) Roemer & J.A. Schultes - OOL458; A; N; WETL
E. palustris (L.) Roemer & J.A. Schultes - OOL333; P; N; WETL
Fimbristylis vahlii (Lam.) Link - OOL600; A; N; WETL
Isolepis carinata Hook. & Arn. ex Torr. - OOL294; A; N; DAOF
Scirpus pendulus Muhl. - OOL298; P; N; WETL

IRIDACEAE

Nemastylis geminiflora Nutt. - OOL064; P; N; AGSS
Sisyrinchium angustifolium P. Mill. - OOL063; P; N; DAOF

JUNCACEAE

Juncus brachycarpus Engelm. - OOL167; P; N; WETL
J. bufonius L. - OOL277; A; N; WETL
J. interior Wieg. - OOL353; P; N; AGSS
J. tenuis Willd. - OOL386; P; N; DAOF
J. torreyi Coville - OOL421; P; N; WETL

LILIACEAE

Allium canadense L. var. *mobile* (Regel) Ownbey - OOL105; P; N; DAOF, AGSS
Camassia scilloides (Raf.) Cory - OOL144; P; N; AGSS
Erythronium albidum Nutt. - OOL027; P; N; QMQS
Nothoscordum bivalve (L.) Britt. - OOL356; P; N; DAOF, AGSS
Polygonatum biflorum (Walt.) Eil. - OOL181; P; N; QMQS

NAJADACEAE

Najas guadalupensis (Spreng.) Magnus - OOL522; A; N; WETL

ORCHIDACEAE

Spiranthes cernua (L.) L.C. Rich. - OOL473; P; N; AGSS

POACEAE

Alopecurus carolinianus Walt. - OOL080; A; N; WETL
Andropogon gerardii Vitman - OOL638; P; N; AGSS, DAOF
A. virginicus L. - OOL633; P; N; DAOF
Aristida oligantha Michx. - OOL614; A; N; DAOF
Arundinaria gigantea (Walt.) Muhl. - OOL023; P; N; QSCI

- Bothriochloa laguroides* (DC.) Herter - OOL481; P; N; DAOF
Bouteloua curtipendula (Michx.) Torr. - OOL447; P; N; AGSS
Bromus pubescens Muhl. ex Willd. - OOL278; P; N; AGSS, DAOF, QMQS, QSCT
B. secalinus L. - OOL448; A; I; DAOF
B. tectorum L. - OOL220; A; I; AGSS, DAOF, QMQS, QSCT
Buchloe dactyloides (Nutt.) Engelm. - OOL223; P; N; DAOF
Chasmanthium latifolium (Michx.) Yates - OOL392; P; N; QPCI
Chloris verticillata Nutt. - OOL432; P; N; DAOF
Cinna arundinacea L. - OOL683; P; N; QPCI, QMQS
Dichantherium acuminatum (Sw.) Gould & C.A. Clark - OOL349; P; N; QMQS
D. commutatum (J.A. Schultes) Gould - OOL264; P; N; QMQS
D. oligosanthes (J.A. Schultes) Gould - OOL071; P; N; AGSS, DAOF, QSCT
D. ravenelii (Scribn. & Merr.) Gould - OOL258; P; N; QMQS
Digitaria ciliaris (Retz.) Koel. - OOL368; A; N; DAOF
D. ischaemum (Schreb.) Schreb. ex Muhl. - OOL655; A; I; DAOF
Echinochloa crus-galli (L.) Beauv. - OOL446; A; I; WETL
Eleusine indica (L.) Gaertn. - OOL539; A; I; DAOF
Elymus virginicus L. - OOL335; P; N; QMQS
Eragrostis frankii C.A. Mey. ex Steud. - OOL662; A; N; DAOF
E. hirsuta (Michx.) Nees - OOL359; P; N; DAOF
E. hypnoides (Lam.) B.S.P. - OOL679; A; N; WETL
E. pectinacea (Michx.) Nees ex Steud. - OOL661; A; N; AGSS, DAOF
E. pilosa (L.) Beauv. - OOL672; A; N; DAOF
Eriochloa contracta A.S. Hitchc. - OOL625; A; N; DAOF
Festuca paradoxa Desv. - OOL141; P; N; DAOF
Hordeum pusillum Nutt. - OOL273; A; N; DAOF
Leersia lenticularis Michx. - OOL558; P; N; WETL
L. oryzoides (L.) Sw. - OOL581; P; N; WETL
L. virginica Willd. - OOL675; P; N; QPCI
Leptochloa fusca (L.) Kunth ssp. *fascicularis* (Lam.) N. Snow - OOL663; A; N;
 DAOF
L. panicea (Retz.) Ohwi - OOL651; A; N; DAOF
Melica nitens (Scribn.) Nutt. ex Piper - OOL119; P; N; QMQS, QPCI
Muhlenbergia sobolifera (Muhl. ex Willd.) Trin. - OOL462; P; N; QSCT
Neeragrostis reptans (Michx.) Nicora - OOL608; A; N; WETL
Panicum anceps Michx. - OOL365; P; N; DAOF, QMQS
P. capillare L. - OOL649; A; N; DAOF
P. dichotomiflorum Michx. - OOL457; A; N; QMQS
P. virgatum L. - OOL640; P; N; AGSS, DAO
Paspalum dilatatum Poir. - OOL412; P; I; DAOF
P. floridanum Michx. - OOL418; P; N; AGSS, DAOF
P. fluitans (Ell.) Kunth - OOL678; A; N; WETL
P. setaceum Michx. - OOL350; P; N; WETL
Pennisetum glaucum (L.) R. Br. - OOL422; A; I; DAOF
Poa pratensis L. - OOL121; P; N; DAOF
Schedonnardus paniculatus (Nutt.) Trel. - OOL449; P; N; DAOF
Schizachyrium scoparium (Michx.) Nash - OOL682; P; N; AGSS
Setaria parviflora (Poir.) Kerguelen - OOL367; P; N; DAOF
S. pumila (Poir.) Roemer & J.A. Schultes - OOL529; A; I; DAOF
S. viridis (L.) Beauv. - OOL415; A; I; DAOF
Sorghastrum nutans (L.) Nash - OOL591; P; N; AGSS
Sorghum halepense (L.) Pers. - OOL257; P; I; DAOF
Spartina pectinata Bosc ex Link - OOL527; P; N; AGSS
Sporobolus cryptandrus (Torr.) Gray - OOL696; P; N; AGSS, DAOF
Tridens strictus (Nutt.) Nash - OOL623; P; N; AGSS, QSCT
 POTAMOGETONACEAE
Potamogeton diversifolius Raf. - OOL222; P; N; WETL

SMILACACEAE

Smilax bona-nox L. - OOL630; P; N; QMQS, QSCT

S. glauca Walt. - OOL690; P; N; QMQS, QSCT

S. rotundifolia L. - OOL340; P; N; QMQS, QSCT

S. tamnoides L. - OOL404; P; N; QMQS, QSCT

TYPHACEAE

Typha latifolia L. - OOL593; P; N; WETL