Native Plants and Communities and Exotic Plants within the Hoosier-Shawnee Ecological Assessment Area

Steven D. Olson, Michael A. Homoya, and Elizabeth L. Shimp

ABSTRACT

The diverse natural communities in the Hoosier-Shawnee Ecological Assessment Area include forests, barrens, cliffs, wetlands, and streams. Communities are described based on their dominant and characteristic canopy and understory species as well as abiotic factors. An assessment of the global and state status of plant species is presented; the viability of over 360 species is threatened in the region. A review of 26 exotic plant species in the region is also presented.

The Hoosier-Shawnee Ecological Assessment Area is floristically diverse. Although centered in the Interior Low Plateau, Shawnee Hills (hereafter Shawnee Hills) Section, parts of this region are within the Upper Gulf Coastal Plain, Ozark Highlands and the Interior Low Plateau, Highland Rim (hereafter Highland Rim) Sections. The viability of over 360 plant species is a concern in the assessment area (table 1). Some of these species occur in each of the natural communities within the region. Among the species with viability concerns, 53 are a global concern (table 2) and 21 of those are documented as occurring on National Forest System (NFS) lands (table 3). State heritage ranks are from the States' natural heritage databases and global ranks are from NatureServe (2004). State heritage and global status ranks are a measure of concern for a species' viability and range from critically imperiled (G1/S1) to secure (G5/S5) (tables 1-3). The species with viability concerns are also presented according to the percent occurring within identified habitats (table 4) and land ownership categories (table 5).

The following community classification is a modified version of the Community Classification Hierarchy for the Illinois Natural Areas Inventory (White and Madany 1978). Communities are described based on their dominant and characteristic canopy and understory species, as well as on abiotic factors derived from the authors' and others' field experience, herbaria data, and information obtained from NatureServe (2004). Nomenclature of vascular plants follows the National PLANTS Database (USDA, NRCS 2004) except where noted. Ecological section and subsection names are based on Keys et al. (1995) and are also listed in Ponder (this volume). The community classification used is found in table 6.

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Table 1. Plant species within the Hoosier-Shawnee Ecological Assessment Area, which have a viability concern (state rank = S1, S2, or S3 in Illinois, Indiana or Kentucky, global and state ranks as of January 23, 2004) and known habitats.

Scientific name	Common name	Global rank	State rank			Habitat
			IL	IN	KY	
Acalypha deamii	Deam's threeseed mercury	G5T4?	S2S3	S2	S5?	BL
Aconitum uncinatum	Southern blue monkshood	G4	S1	S1	S2	MF, RO
Adiantum capillus-veneris	Common southern maidenhair	G5	-	-	S2	RO
Aesculus pavia	Red buckeye	G5	S?	-	S2S3	BLH, MF
Agalinis skinneriana	Skinner's false foxglove	G3	S2	S1	S1S2	BA
Agrimonia gryposepala	Tall hairy agrimony	G5	S2	S1	S1S2	MF
Amianthium muscitoxicum	Flypoison	G4G5	-	-	S1S2	W
Amorpha nitens	Shining false indigo	G3?	S1	-	S3?	BLH
Amsonia tabernaemontana var. *gattingeri*	Eastern bluestar	G5T2T3?	-	-	S2S3	ME
Apios priceana	Traveler's delight	G2	SX	-	S1	RO
Arabis patens	Spreading rockcress	G3	-	S1	-	RO
**Aristolochia serpentaria* var. *hastata*	Narrow-leaved snakeroot	G4T?	S2	S?	S?	BLH
Neobeckia aquatica	Lakecress	G4?	S3	S1	S1S2	SW, ME
Asclepias meadii	Mead's milkweed	G2	S2	SX	-	BA
Asplenium bradleyi	Bradley's spleenwort	G4	S1	S1	S3S4	RO
Asplenium montanum	Mountain spleenwort	G5	-	S1	S4S5	RO
Asplenium resiliens	Blackstem spleenwort	G5	S1	S1	S4	RO
Asplenium ruta-muraria	Wallrue	G5	SH	S2	S4	RO
Aster drummondii var. *texanus*	Drummond's aster	G5T?	-	-	SH	W, EH
Aureolaria patula	Spreading yellow false foxglove	G3	-	-	S3	RO
Azolla caroliniana	Carolina mosquitofern	G5	S1	S2	S4	AQ
Bacopa rotundifolia	Disk waterhyssop	G5	S?	S1	S3S4	ME
Baptisia australis	Wild blue indigo	G5	S?	S2	S3	SS
Baptisia australis var. *minor*	Blue wild indigo	G5T4T5	S?	-	S2S3	BA
Baptisia tinctoria	Horseflyweed	G5	SX	S3	S1S2	W
Berberis canadensis	American barberry	G3	S1	S1	S1	RO
Berchemia scandens	Alabama Supplejack	G5	S1	-	S1S2	BLH, MF
Boltonia decurrens	Claspingleaf doll's daisy	G2	S2	-	-	ME
Botrychium biternatum	Sparselobe grapefern	G5	S1	S3	S4	BLH, BA
Buchnera americana	American bluehearts	G5?	S3	S1	S3S4	BA
Cabomba caroliniana	Carolina fanwort	G3G5	S1S2	SX	S2	AQ
Calamagrostis canadensis var. *macouniana*	Macoun's reedgrass	G5T5?	S1	SR	SH	ME
Calamagrostis porteri ssp. *insperata*	Porter's reedgrass	G4T3	S1	S1	S1S2	W, RO
Calycocarpum lyonii	Cupseed	G5	S1S2	S2	S4?	BLH, SS
Carex alata	Broadwing sedge	G5	S1	S3	S1S2	SW
Carex atlantica ssp. *atlantica*	Prickly bog sedge	G5T4	SR	S2	S4?	SS
Carex atlantica ssp. *capillacea*	Prickly bog sedge	G5T5?	-	S1	S1S2	SS
Carex bushii	Bush's sedge	G4	S4?	S1	S4?	W
Carex communis	Fibrousroot sedge	G5	S1	SR	S5	MF
Carex crawei	Crawe's sedge	G5	S2	S2	S2S3	BA
Carex decomposita	Cypressknee sedge	G3	S1	S2	S2	SW
Carex eburnea	Bristleleaf sedge	G5	S3?	S2	S4	RO, BA
Carex gigantea	Large sedge	G4	S1	S1	S2	SW
Carex intumescens	Greater bladder sedge	G5	S1	SR	S5	BLH
Carex pellita	Woolly sedge	G5	S3S4	SR	SH	ME
Carex lupuliformis	False hop sedge	G4	S3	S2	S4S5	BLH

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(table 1 continued)

Scientific name	Common name	Global rank	State rank			Habitat
			IL	IN	KY	
Carex nigromarginata	Blackedge sedge	G5	S1	-	S4?	MF
Carex oxylepis	Sharpscale sedge	G5?	S1	-	S4?	BLH
Carex pedunculata	Longstalk sedge	G5	S1S2	S2	S4?	MF
Carex albicans var. *australis*	Stellate sedge	G5	SR	SR	S5?	DF
Carex prasina	Drooping sedge	G4	S1	SR	S5	SS
Carex reniformis	Kidneyshape sedge	G4?	S1	-	S1?	SW
Carex socialis	Low woodland sedge	G4	S3	S2	S3S4	BLH
Carex cephaloidea	Thinleaf sedge	G5	S3?	SR	S5	MF
Carex stipata var. *maxima*	Stalkgrain sedge	G5T5	S2S3	SR	SH	SW, BLH
Carex straminea	Eastern straw sedge	G5	SR	S2	S2?	BA, SW
Carex willdenowii	Willdenow's sedge	G5	S1	SR	S4S5	W
Carya aquatica	Water hickory	G5	S1	SR	S2S3	SW
Carya pallida	Sand hickory	G5	S1	S2	S4	W
Castilleja coccinea	Scarlet indian paintbrush	G5	S?	SR	S1	BA
Catalpa speciosa	Northern catalpa	G3G4	S?	S2	S3S4	BLH
Chamaelirium luteum	Fairywand	G5	S1	S1	S4	MF, BLH
Cheilanthes alabamensis	Alabama lipfern	G4G5	-	-	S1	RO
Cheilanthes lanosa	Hairy lipfern	G5	S3	S2	S5	RO
Chimaphila maculata	Striped prince's pine	G5	S1	S3	S5	W, MF
Cimicifuga rubifolia	Appalachian bugbane	G3	S2	S1	S2	MF, RO
Cirsium carolinianum	Soft thistle	G5	S2	S2	S3S4	W
Cladrastis lutea	Kentucky yellowwood	G4	S1	S2	S3S4	MF
Clematis crispa	Swamp leather flower	G5	S1	S2	-	BLH
Clematis pitcheri	Bluebill	G4G5	S3S4	S2	S3S4	BLH
Clematis viorna	Vasevine	G5	S1	SR	S4S5	W
Conyza canadensis var. *pusilla*	Canadian horseweed	G5T5	-	SX	S?	BA
Cornus amomum	Silky dogwood	G5T5	SR	S1/R	S?	RIP
Corydalis micrantha ssp.*australis*	Smallflower fumewort	G5T5?	S1?	-	-	BA
Crataegus chrysocarpa	Fireberry hawthorn	G5	SR	S1	-	DF, RO
Crataegus intricata	Copenhagen hawthorn	G5	S?	S2	S5	DF, BA
Crataegus prona	Illinois hawthorn	G4G5	-	S1	-	DF, RO
Crataegus succulenta	Fleshy hawthorn	G5	S?	S2	-	EH
Crataegus viridis	Green hawthorn	G5	S?	S2	S5?	BLH
Crotonopsis willdenowii	Willdenow's croton	G5	S?	S1	S3S4	BA
Cyperus lancastriensis	Mayflower flatsedge	G5	S1	-	S3?	DIS, ME
Cyperus pseudovegetus	Marsh flatsedge	G5	S3S4	S2	S5?	SS
Cypripedium candidum	White lady's slipper	G4	S2	S2	S1	BA
Cypripedium parviflorum	Lesser yellow lady's slipper	G5	S1	S2	S2	MF
Delphinium carolinianum	Carolina larkspur	G5	S?	-	S1S2	BA, W
Dennstaedtia punctilobula	Eastern hayscented fern	G5	S2	S3	S4?	RO
Desmodium humifusum	Eastern trailing ticktrefoil	G1G2?	-	S1	-	W
Dichanthelium boreale	Northern panic-grass	G5	S1	S2	S2S3	DF
**Dichanthelium joori*	Panic grass	G?	S1	-	-	SW
**Dichanthelium mattamuskeetense*	A panic-grass	G?	S2S3	SX	S?	BLH
Dichanthelium ravenelii	Ravenel's rossette grass	G5	S1	-	SR	W, DF
Dichanthelium scoparium	Velvet panicum	G5	S1	S1	S?	ME, EH
**Dichanthelium yadkinense*	Yadkin's panic-grass	G?	S1	-	-	MF

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(table 1 continued)

Scientific name	Common name	Global rank	State rank			Habitat
			IL	IN	KY	
Dicliptera brachiata	Branched foldwing	G5	S?	S1	S3S4	BLH
Didiplis diandra	Waterpurslane	G5	S?	S2	S2S3	AQ
Diervilla lonicera	Northern bush honeysuckle	G5	S?	S2	-	MF
Diodia virginiana	Virginia buttonweed	G5	S?	S2	S5	BLH, SS
Dodecatheon frenchii	French's shootingstar	G3	S3	S2	S3	RO
Draba cuneifolia	Wedgeleaf draba	G5	S1	-	S1	BA
Dryopteris celsa	Log fern	G4	S1	S1	SR	MF
Echinodorus berteroi	Upright burrhead	G5	S?	SX	S2	SW, BLH
Echinodorus tenellus	Mudbabies	G5?	S1	SR	SR	ME
Eleocharis wolfii	Wolf's spikerush	G3?	S1	S2	-	BLH
Epilobium ciliatum	Fringed willowherb	G5	S2	S1	S1?	SS
Eryngium prostratum	Creeping eryngo	G5	S1	-	S4?	ME, DIS
Erysimum capitatum	Sanddune wallflower	G5	S?	S2	-	EH
Euonymus americana	Strawberry bush	G5	S1	SR	S5	BLH, MF
Eupatorium album	White thoroughwort	G5	-	S1	S5	BA
Eupatorium incarnatum	Pink thoroughwort	G5	S1	S2	S5	W, RO
Euphorbia serpens	Matted broomspurge	G5	S?	SX	-	RIP
Euphorbia spathulata	Warty spurge	G5	S1	SR	S2?	RO
Festuca paradoxa	Clustered fescue	G5	S3S4	S1	SE	BLH, W
Fimbristylis annua	Annual fimbry	G5	SX	S1	S1?	ME
Fimbristylis puberula	Hairy fimbry	G5	S?	S1	S2	BA
Forestiera ligustrina	Upland swamp privet	G4G5	-	-	S2S3	RO
Dioclea multiflora	Boykin's clusterpea	G4	S1	-	S4	BLH
Galium virgatum	Southwestern bedstraw	G5	S1	-	-	BA
Gaura filipes	Slenderstalk beeblossom	G5	S?	S2	S5	BA
Gentiana alba	Plain gentian	G4	S?	S2	S1S2	BA
Gentiana puberulenta	Downy gentian	G4G5	S?	S2	S1	BA
Gentiana villosa	Striped gentian	G4	-	S1	S4?	BA, W
Glandularia canadensis	Rose mock vervain	G5	S?	SR	S2S3	BA
Glyceria acutiflora	Creeping mannagrass	G5	S4	S1	S2	SW
Glyceria arkansana	Arkansas mannagrass	G5	S1	-	S4?	SW
Gymnopogon ambiguus	Bearded skeletongrass	G4	SX	SX	S2S3	BA
Halesia tetraptera	Mountain silverbell	G5	SR	SR	S1S2	MF
Hedyotis nigricans var. *nigricans*	Diamond flowers	G5	S?	S2	S5	BA
Helianthemum bicknellii	Hoary frostweed	G5	S?	SR	S2?	BA
Helianthus angustifolius	Swamp sunflower	G5	S1	S1	S4	BA
Helianthus eggertii	Eggert's sunflower	G3	-	-	S2	BA, W
Heliotropium tenellum	Pasture heliotrope	G5	S1	S2	S5	BA
Heteranthera limosa	Blue mudplantain	G5	S2S3	-	S2S3	ME, SW
Heteranthera reniformis	Kidneyleaf mudplantain	G5	S1	SR	S4?	ME, SW
Heterotheca subaxillaris	Camphorweed	G5T5	S?	SR	S2?	RIP
Hexalectris spicata	Spiked coralroot orchid	G5	S1	S2	S4	RO, W
Hieracium longipilum	Hairy hawkweed	G4G5	S?	SR	S2	BA
Hottonia inflata	American featherfoil	G4	S2S3	S2	S4?	AQ, SW
Hydrolea ovata	Ovate false fiddleleaf	G5	-	-	SH	SW
Hydrolea uniflora	Oneflower false fiddleleaf	G5	S1	SR	SH	SW
Hypericum adpressum	Creeping St. John'swort	G3	S1	S1	SH	SW

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(table 1 continued)

Scientific name	Common name	Global rank	State rank			Habitat
			IL	IN	KY	
Hypericum denticulatum	Coppery St. John'swort	G5	S?	S2	S5	W, BA
Hypericum dolabriforme	Straggling St. John'swort	G4	-	S2	S4	BA
Hypericum pyramidatum	Great St. John'swort	G4	S1	S1	SR	SS, BLH
Iresine rhizomatosa	Juda's bush	G5	S1	S2	S?	BLH
Isoetes butleri	Limestone quillwort	G4	S1	-	S1	BA, RO
Isoetes engelmannii	Appalachian quillwort	G4	S1S2	S1	S?	AQ, RIP
Isoetes melanopoda	Blackfoot quillwort	G5	S4S5	S1	S1	BA,RO,BLH
Isotria medeoloides	Green fiveleaf orchid	G2	S1	-	-	MF
Isotria verticillata	Purple fiveleaf orchid	G5	S1	S3	S?	MF
Itea virginica	Virginia sweetspire	G4	S?	S1	S?	SW, BLH
Juglans cinerea	Butternut	G3G4	S2	S3	S3	MF
Juncus filipendulus	Ringseed rush	G5	-	-	S2?	BA
Juncus secundus	Lopsided rush	G5?	S1S2	S1	S?	BA
Justicia ovata	Looseflower waterwillow	G5	S1	-	S3	SW
Koeleria macrantha	Prairie junegrass	G5	S3S4	SR	S1	W
*Krigia caespitos*a	Weedy Dwarfdandelion	G?	S?	SR	S?	EH
**Lactuca hirsuta* var. *sanguinea*	Hairy lettuce	G4?	S1	SR	S?	DF
Lathyrus palustris	Marsh pea	G5	S?	SR	S2	RIP
Lathyrus venosus	Veiny pea	G5	S?	S2	S2S3	DF, W
Leavenworthia torulosa	Necklace gladecress	G4	-	-	S2	BA, RO
Lechea racemulosa	Illinois pinweed	G5	-	S1	S?	DF,W,BA
Lemna minuta	Least duckweed	G4	S2?	S1	-	AQ
Lesquerella globosa	Globe bladderpod	G2	-	S1	S2	DIS
Liatris cylindracea	Ontario blazing star	G5	S?	SR	S2S3	BA
Liatris pycnostachya	Prairie blazing star	G5	S?	S2	-	W
Ligusticum canadense	Canadian licorice-root	G4	-	S1	S?	BA
Lilium canadense	Canada lily	G5	-	S2	S?	MF
Lilium superbum	Turk's-cap lily	G5	S2	S3	S1S2	MF
Limnobium spongia	American spongeplant	G4	S1S2	SR	S2S3	AQ, SW
Linum sulcatum	Grooved flax	G5	S?	S2	S3S4	BA
Lithospermum incisum	Narrowleaf stoneseed	G5	S?	S1	-	BA
Lonicera dioica var. *glaucescens*	Red honeysuckle	G5	S1?	SR	S?	RO
Lonicera flava	Yellow honeysuckle	G5?	S1	-	S?	RO
Lonicera reticulata	Grape honeysuckle	G5	SR	SE	S1	RO
Ludwigia decurrens	Wingleaf primrose-willow	G5	S?	S2	S?	SW, RIP
Ludwigia glandulosa	Cylindricfruit primrose-willow	G5	S?	S2	S?	SW
Ludwigia hirtella	Spindleroot	G5	-	-	S1	BLH, SW
Lycopodium dendroideum	Tree groundpine	G5	S1	S1	-	RO
Lysimachia fraseri	Fraser's yellow loosestrife	G2	S1	-	S1	MF
Lysimachia radicans	Trailing yellow loosestrife	G4G5	S1	-	SH	SW, BLH
Lysimachia terrestris	Earth loosestrife	G5	S?	SR	S1	ME
Magnolia acuminata	Cucumber-tree	G5	S?	S1	S?	MF
Magnolia tripetala	Umbrella magnolia	G5	-	S1	S?	MF
Maianthemum stellatum	Starry false lily of the valley	G5	S3?	SR	S1	MF
Malaxis unifolia	Green adder's-mouth	G5	S1	S1	S?	DF
Malus angustifolia	Southern crabapple	G5?	S1	-	S3	BLH
Malvastrum hispidum	Hispid false mallow	G5	S1	-	S2?	BA

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(table 1 continued)

Scientific name	Common name	Global rank	State rank			Habitat
			IL	IN	KY	
Matelea carolinensis	Maroon Carolina milkvine	G4	-	-	S1?	EH
Matelea decipiens	Oldfield milkvine	G5	S1	SR	S?	BLH
Matelea obliqua	Climbing milkvine	G4?	S1	S2	S? -	BA, RO
Matteuccia struthiopteris	Ostrich fern	G5	S2S3	S2	-	BLH, MF
Melanthera nivea	Snow squarestem	G5	S1	-	S3?	BLH
Melanthium woodii	Wood's bunchflower	G5	S3	S3	S2	MF
Melica mutica	Twoflower melicgrass	G5	S1	S3	S?	DF
Melica nitens	Threeflower melicgrass	G5	S3S4	S2	S3S4	DF, RO
Melothria pendula	Guadeloupe cucumber	G5	S1	S1	S?	EH, DIS
Mirabilis albida	White four o'clock	G5	SE	SE	S1	RIP
Monarda bradburiana	Eastern beebalm	G5	S?	S1	S?	DF
Muhlenbergia bushii	Nodding muhly	G5	S3	SR	S1S2	ME
Muhlenbergia capillaris	Hairawn muhly	G5	S2S3	S1	S3S4	BA, RO
Muhlenbergia cuspidata	Plains muhly	G4	S2	S1	S2	RO
Muhlenbergia glabriflora	Inland muhly	G4?	S3S4	SR	S2S3	ME, BLH
Najas gracillima	Slender waternymph	G5?	S2	S1	S2S3	AQ
Nemophila aphylla	Smallflower baby blue eyes	G5	-	-	S2?	MF
Nothoscordum bivalve	Crowpoison	G4	S4?	S2	S?	DF, BA
Oenothera linifolia	Threadleaf evening-primrose	G5	S?	-	S1S2	BA, RO
Oenothera perennis	Little evening-primrose	G5	S1	S2	S1S2	ME
Oenothera triloba	Stemless evening-primrose	G4	S?	SX	S1S2	RO, BA
Oldenlandia uniflora	Clustered mille graines	G5	-	-	S1	ME, AQ
Onosmodium molle ssp. *hispidissimum*	Soft hair marbleseed	G4G5T4	S?	S1	S1	BA, W, RO
Onosmodium molle ssp. *molle*	Soft hair marbleseed	G4G5T3	SR	-	S1	BA, W, RO
Onosmodium molle ssp. *occidentale*	Soft hair marbleseed	G4G5T4?	S?	-	S1	BA, W
Ophioglossum engelmannii	Limestone adder'stongue	G5	S2	S2	S?	BA, RO
Orobanche ludoviciana	Louisiana broomrape	G5	S1	S2	SH	BLH, EH
Oxalis illinoensis	Illinois woodsorrel	G2G3?	S1	S2	S?	MF
Oxydendrum arboreum	Sourwood	G5	SE	S2	S?	DF, RO
Pachysandra procumbens	Allegheny-spurge	G4G5	-	S1	S?	MF
Panicum verrucosum	Warty panicgrass	G4	SR	S2	S?	ME
Paspalum boscianum	Bull crowngrass	G5	-	-	S2S3	RIP
Paspalum dissectum	Mudbank crowngrass	G4?	S1	-	S?	ME, EH
Passiflora incarnata	Purple passionflower	G5	S?	S2	S?	EH
Penstemon brevisepalus	Pale beardtongue	G5	S1	SR	S?	DF
Penstemon canescens	Eastern gray beardtongue	G4	S1	S2	S?	DF
Penstemon deamii	Deam's beardtongue	G1	-	S1	-	DF, W, EH
Perideridia americana	Eastern yampah	G4	S?	S1	S2	BLH
Phacelia ranunculacea	Oceanblue phacelia	G4	S?	S1	S3	MF
Phaeophyscia leana	Wreath lichen	G2	S1	S?	S1?	BLH
Philadelphus pubescens	Hoary mock orange	G5?	-	-	S1	RO
Phlox amplifolia	Largeleaf phlox	G3G5	-	S2	S?	MF
Phlox bifida ssp. *stellaria*	Cleft phlox	G5?T3	SH	S1	S2	RO
Pinus echinata	Shortleaf pine	G5	S1	-	S?	DF, RO
Pinus strobus	Eastern white pine	G5	S3	S2	S?	MF
Piptatherum racemosum	Blackseed-ricegrass	G5	S1	S2	S3?	RO, MF
Planera aquatica	Planertree	G5	S2	-	S3?	SW, RIP

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Scientific name	Common name	Global rank	State rank			Habitat
			IL	IN	KY	
Plantago cordata	Heartleaf plantain	G4	S1	S1	SH	RIP
Platanthera clavellata	Small green wood orchid	G5	S1	S3	S?	SS
Platanthera flava var. *flava*	Palegreen orchid	G4T4?	S1	S1	S?	BLH
Platanthera psycodes	Lesser purple-fringed orchid	G5	S1	S2	S1	SS
Pleopeltis polypodioides ssp. *polypodiodes*	Resurrection fern	G5	S?	S2	S?	RO
Poa alsodes	Grove bluegrass	G4G5	S1	S2	S?	MF
Poa paludigena	Bog bluegrass	G3	SX	S3	-	SS
Poa saltuensis	Old pasture bluegrass	G5	SR	SR	S1S2	BA, MF
Poa wolfii	Wolf's bluegrass	G4	S1	S2	-	DF, RO
Polygala cruciata	Drumheads	G5	S?	SR	S1	ME
Polygala incarnata	Procession flower	G5	S1	S1	S?	BA
Polymnia laevigata	Tennessee leafcup	G3	-	-	S1S2	MF
Polytaenia nuttallii	Nuttal's prairie parsley	G5	S?	S1	SX	W, BA
Pontederia cordata	Pickerelweed	G5	S3S4	SR	S1S2	ME
Potamogeton illinoensis	Illinois pondweed	G5	S2S3	SR	S2	AQ
Potamogeton pulcher	Spotted pondweed	G5	S1	S1	S1S2	AQ
Prenanthes aspera	Rough rattlesnakeroot	G4?	S?	S2	S1	W, BA
Psoralidium tenuiflorum	Slimflower scurfpea	G5	S?	SX	S1	BA
Pteridium aquilinum var. *pseudocaudatum*	Western bracken fern	G5T5	S1	SX	S?	W, BA
Ptilimnium capillaceum	Herbwilliam	G5	SR	-	S1S2	ME
Ptilimnium costatum	Ribbed mock bishopweed	G3G4	S3	-	S3?	ME
Ptilimnium nuttallii	Laceflower	G5?	S1	S3	S1S2	ME
Pycnanthemum albescens	Whiteleaf mountainmint	G5	S1	-	S1	DF
Pycnanthemum muticum	Clustered mountainmint	G5	S?	-	S2?	DF
Pycnanthemum torrei	Torrey's mountainmint	G2	S1	-	SR	BA, W
Quercus prinus	Chestnut oak	G5	S2	S5	S?	DF
Quercus texana	Texas red oak	G4G5	S1?	-	-	BLH
Quercus phellos	Willow oak	G5	S2	-	S?	BLH
Ranunculus laxicaulis	Mississippi buttercup	G5?	S4?	S1	S?	BLH, SW
Ranunculus pusillus	Low spearwort	G5	S3	S1	S?	BLH, SW
Rhexia mariana var. *mariana*	Maryland meadowbeauty	G5T5	Sr	S1	S?	ME
Rhynchospora corniculata	Shortbristle horned beaksedge	G5T?	-	S2	S?	ME, SW
Rhynchospora glomerata	Clustered beaksedge	G5	S1	-	S?	ME
Rhynchospora macrostachya	Tall horned beaksedge	G4	-	S2	S1	ME
Rubus alumnus	Oldfield blackberry	G5	S?	SX	S?	DF, W
Rubus centralis	Illinois dewberry	G2G4?	-	S1	-	DF, W
Rubus deamii	Deam's dewberry	G4?	-	SX	S?	DF, W
**Rubus enslenii*	Arching dewberry	G4G5?	S?	S1	-	DF, W
Rubus odoratus	Purpleflowering raspberry	G5	S1	S2	S?	RO
Rudbeckia fulgida var. *fulgida*	Orange coneflower	G5T?	SR	S2	S?	BA
Rudbeckia fulgida var. *umbrosa*	Orange coneflower	G5T?	-	S1	S?	BA
Rudbeckia missouriensis	Missouri orange coneflower	G4G5	S1	-	SR	BA
Rudbeckia subtomentosa	Sweet coneflower	G5	S?	SR	S1	BA, BLH
Saggtitaria latifolia	Longbeak arrowhead	G?	S1	S2	-	ME
Sagittaria australis	Longbeak arrowhead	G5	SR	S2	S?	ME
Sagittaria graminea	Grassy arrowhead	G5	S3	SR	S1S2	ME
Sagittaria rigida	Sessilefruit arrowhead	G5	S4	SR	S1	SW

(table continued on next page)

(table 1 continued)

Scientific name	Common name	Global rank	State rank			Habitat
			IL	IN	KY	
Salvia azurea ssp. *pitcheri*	Pitcher sage	G4G5T?	S2?	SR	S?	BA
Salvia urticifolia	Nettleleaf sage	G5	-	-	S1	DF
Sanicula smallii	Small's black snakeroot	G5	-	S2	S?	DF, MF
Saxifraga virginiensis	Early saxifrage	G5	S1	S2	S?	RO, MF
Schoenoplectus hallii	Hall's bulrush	G2	S1	S1	S1	ME
Scirpus fluviatilis	River bulrush	G5	S3S4	SR	S1S2	ME
Scirpus heterochaetus	Slender bulrush	G5	S3?	-	S1	ME
Scirpus polyphyllus	Leafy bulrush	G5	S2	SR	S?	SS
Scirpus verecundus	Bashful bulrush	G4G5	S1	-	S1?	DF, W
Scleria ciliata var. *ciliata*	Fringed nutrush	G5T?	-	-	S1?	RIP
Scutellaria parvula var. *australis*	Southern skullcap	G4T?	S?	S2	S?	BA, DF
Scutellaria parvula var. *parvula*	Southern skullcap	G4T?	SR	SX	S?	DF
Scutellaria saxatilis	Smooth rock skullcap	G3	-	S1	S2S3	RO
Sedum telephioides	Allegheny stonecrop	G4	S?	S2	S2	RO
Selaginella apoda	Meadow spikemoss	G5	S3	S1	S?	RO,BLH,EH
Setaria geniculata	Marsh bristlegrass	G5	S3	S1	S?	BA
Sideroxylon lanuginosum	Gum bully	G4G5	S1	-	SR	RO, BA, DF
Sideroxylon lycioides	Buckthorn bully	G5	S?	S1	S?	RO
Silene ovata	Blue ridge catchfly	G2G3	S1	S1	S1S2	MF, DF
Silene regia	Royal catchfly	G3	S1	S2	S1	BA
Silphium laciniatum var. *laciniatum*	Compassplant	G5T?	SR	SR	S1S2	BA
Silphium laciniatum var. *robinsonii*	Robinson's compassplant	G5T?	-	SR	S2	BA
Silphium pinnatifidum	Tansy rosinweed	G3?	-	SR	S3	BA
Silphium trifoliatum	Whorled rosinweed	G4?	S1	SR	S?	BA
Solidago buckleyi	Buckley's goldenrod	G4	S?	S1	S2S3	W, DF
Solidago puberula	Downy goldenrod	G5	-	-	S2	RO, W
Solidago shortii	Short's goldenrod	G1	-	SH	S1	RIP, RO
Sparganium androcladum	Branched bur-reed	G4G5	S3S4	S2	S?	SW, ME, SS
Sparganium eurycarpum	Broadfoot bur-reed	G5	S4	SR	S1?	SW, ME
Spigelia marilandica	Woodland pinkroot	G5	S?	S1	S?	BLH, MF
Spiraea alba	White meadowsweet	G5	S?	SR	S1	ME
Spiranthes magnicamporum	Great plains ladies'-tresses	G4	S3S4	S1	S2	BA
Spiranthes ochroleuca	Yellow nodding ladies'-tresses	G4	-	S2	-	BA, W
Spiranthes vernalis	Spring ladies'-tresses	G5	S1	S2	S?	BA
Sporobolus clandestinus	Rough dropseed	G5	S3	SR	S2S3	BA
Sporobolus heterolepis	Prairie dropseed	G5	S2S3	SR	S1	BA
Stachys clingmanii	Clingman's hedgenettle	G2?	-	S1	-	MF, BLH
Stachys eplingii	Epling's hedgenettle	G5	-	-	S1	BA
Stellaria longifolia	Longleaf starwort	G5	S3S4	SR	S2S3	ME
Stellaria pubera	Star chickweed	G5	S1	SR	S?	MF
Stenanthium gramineum	Eastern featherbells	G4G5	S1	S1	S2S3	MF
Strophostyles leiosperma	Slickseed fuzzybean	G5	S?	S2	S?	BA, EH
Stryax grandifolius	Bigleaf snowbell	G5	S1	S1	SR	MF
Styrax americanus	American snowbell	G5	S2	S3	S?	SW
Symphyotrichum oblongifolium	Aromatic aster	G5	S?	S2	S5	RO
Symphyotrichum priceae	Lavender old field aster	G5	-	-	S2	BA
Synandra hispidula	Guyandotte beauty	G4	S1	S3	S4	MF

(table continued on next page)

(table 1 continued)

Scientific name	Common name	Global rank	State rank			Habitat
			IL	IN	KY	
Talinum calcaricum	Limestone fameflower	G3	-	-	S1	BA, RO
Talinum calycinum	Largeflower fameflower	G5	S1	-	-	BA, RO
Taxodium distichum	Bald cypress	G5	S4	S2	S?	SW
Thalictrum pubescens	King of the meadow	G5	SR	S2	S?	MF
Thaspium pinnatifidum	Cutleaf meadowparsnip	G2G3	-	-	S2S3	BA
Thelypteris noveboracensis	New York fern	G5	S1	SR	S?	MF
Tilia heterophylla	American basswood	G5	S1	SR	S?	MF
Torreyochloa pallida	Pale false mannagrass	G5?	S1	SR	S1	SW
Trachelospermum difforme	Climbing dogbane	G4G5	S?	S2	S?	BLH, SW
Tradescantia bracteata	Longbract spiderwort	G5	S1	SR	S?	BA
Tragia cordata	Heartleaf noseburn	G4	S?	S2	S?	BA, RO
Trepocarpus aethusae	Whitenymph	G4G5	-	-	S3	RIP, BLH
Trichomanes boschianum	Appalachian bristle fern	G4	S2	S1	S3S4	RO
Trichostema dichotomum	Forked bluecurls	G5	S?	S2	S?	BA
Trifolium reflexum	Buffalo clover	G5	S1	S?	S1S2	BA, DF, W
Trillium nivale	Dwarf white wakerobin	G4	S3?	SR	S1	MF
Trillium pusillum	Dwarf wakerobin	G3	-	-	S1	BLH
Trillium viride	Wood wakerobin	G4G5	S2	-	-	W, BA
Urtica chamaedryoides	Heartleaf nettle	G4G5	S1	-	S?	BLH
Uvularia perfoliata	Perfoliate bellwort	G5	-	S1	S?	DF
Vallisneria americana	American eelgrass	G5	S3	SR	S2S3	AQ
Verbesina virginica	White crownbeard	G5	S?	S1	S?	EH
Viburnum molle	Softleaf arrowwood	G5	S1	S2	S3?	MF
Viburnum nudum	Possumhaw	G5	SR	SR	S1	SS, MF
Viola egglestonii	Glade violet	G4	-	S1	S3	BA
Viola walteri	Prostrate blue violet	G4G5	-	-	S2	RO, BA, DF
Vitis palmata	Catbird grape	G4	S?	S2	S?	SW, BLH
Vitis rupestris	Sand grape	G3	S2?	S1	S2	RIP
Vittaria appalachiana	Appalachian shoestring fern	G4	-	S2	S?	RO
Waldsteinia fragarioides	Barren strawberry	G5	S1	S2	S3?	RO, DF
Wisteria frutescens	American wisteria	G5	S2	S2?	S?	RIP, BLH,
Woodwardia areolata	Netted chainfern	G5	S2	S2	S?	BLH, RO
Zizaniopsis miliacea	Giant cutgrass	G5	S1	-	S1S2	ME
Zizia aptera	Meadow zizia	G5	S?	S2	S?	BA

Key to habitat: AQ=deep pond, lake, stream pool, submergent and/or floating vegetation; BA=barrens, prairie, glade; BLH=bottomland hardwood forest, wet flatwoods; DF=dry forest, dry flatwoods; DIS=disturbed site, early successional; EH=edge, thicket; ME=wet meadow, marsh, open and shallow pool, ditch, emergent vegetation; MF=mesic forest, dry-mesic forest; RIP=riparian border, bank, bar; RO=rocky slope, cliff, overhang; SS=seep, fen; SW=swamp; W=sparse woodland.

Key to global and state ranks: G1/S1=critically imperiled—because of extreme rarity or because of some factor(s) making it especially vulnerable to extirpation from the State. Typically 5 or fewer occurrences or very few remaining individuals (<1,000); G2/S2=imperiled—because of rarity or because of some factor(s) making it very vulnerable to extirpation from the Nation, State. Typically 6 to 20 occurrences or few remaining individuals (1,000 to 3,000); G3/S3=vulnerable—either because rare and uncommon, or found only in a restricted range (even if abundant in some locations), or because of other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals; G4/S4=apparently secure—uncommon but not rare and usually widespread. Possible cause of long-term concern. Usually more than 100 occurrences and more than 10,000 individuals; G5/S5=secure—common, widespread, and abundant. Essentially ineradicable under present conditions. Typically with considerably more than 100 occurrences and more than 10,000 individuals; G?=questionable; SH=possibly extirpated; SR=reported; SX=presumed extirpated; S?=unranked.

*Nomenclature follows Mohlenbrock (1986).

Table 2. Hoosier-Shawnee Ecological Assessment Area plant species with global viability concerns (G1, G2, or G3 and T1, T2, and T3) and known habitats. The T ranks refer to the global status of the trinomial.

Scientific name	Common name	Global rank	Habitat
Agalinis skinneriana	Skinner's false foxglove	G3	BA
Amorpha nitens	Shining false indigo	G3?	BLH
Amsonia tabernaemontana var. *gattingeri*	Eastern bluestar	G5T2T3?	ME
Apios priceana	Traveler's delight	G2	RO
Arabis patens	Spreading rockcress	G3	RO
Asclepias meadii	Mead's milkweed	G2	BA
Aureolaria patula	Spreading yellow false foxglove	G3	RO
Berberis canadensis	American barberry	G3	RO
Boltonia decurrens	Claspingleaf doll's daisy	G2	ME
Calamagrostis porteri ssp. *insperata*	Porter's reed grass	G4T3	W
Carex decomposita	Cypressknee sedge	G3	SW
Catalpa speciosa	Northern catalpa	G4	BLH
Cimicifuga rubifolia	Appalachian bugbane	G3	MF
Corydalis micrantha ssp. *australis*	Smallflower fumewort	GG5T5?	BA
Desmodium humifusum	Eastern trailing ticktrefoil	G1G2?	W
Dichanthelium boreale	Northern panic-grass	G5	DF
**Dichanthelium joori*	Panic grass	G?	SW
**Dichanthelium mattamuskeetense*	A panic-grass	G?	BLH
**Dichanthelium yadkinense*	Panic grass	G?	MF
Dodecatheon frenchii	French's shootingstar	G3	RO
Echinodorus tenellus	Mudbabies	G5?	ME
Eleocharis wolfii	Wolf's spikerush	G3?	BLH
Helianthus eggertii	Eggert's sunflower	G3	BA, W
Hypericum adpressum	Creeping St. John'swort	G3	SW
Isotria medeoloides	Green fiveleaf orchid	G2	MF
Juglans cinerea	Butternut	G3G4	MF
Krigia caespitosa	Weedy dwarfdandelion	G5	EH
Lemna minuta	Least duckweed	G4	AQ
Lesquerella globosa	Globe bladderpod	G2	DIS
Lysimachia fraseri	Fraser's yellowloosestrife	G2	MF
Onosmodium molle ssp *molle*	Soft hair marbleseed	G4G5T3	BA, W, RO
Oxalis illinoensis	Illinois woodsorrel	G2G3?	MF
Penstemon deamii	Deam's beardtongue	G1	DF, W, EH
Phacelia ranunculacea	Oceanblue phacelia	G4	MF
Phaeophyscia leana	Wreath bog lichen	G2	BLH
Poa paludigena	Bog bluegrass	G3	SS
Polymnia laevigata	Tennessee leafcup	G3	MF
Ptilimnium costatum	Ribbed mock bishopweed	G3G4	ME
Pycnanthemum torrei	Torrey's mountainmint	G2	BA, W
Rubus centralis	Illinois dewberry	G2G4?	DF, W
Sagittaria australis	Longbeak arrowhead	G?	ME
Schoenoplectus hallii	Hall's bulrush	G2	ME
Scutellaria saxatilis	Smooth rock skullcap	G3	RO

(table continued on next page)

COMMUNITY TYPE—FOREST

Forests are the most widespread and diverse natural communities in the Hoosier-Shawnee Assessment Area. This community type is dominated by trees, with an average canopy cover of 80 percent or greater and has an understory of saplings and shrubs. Forests are subdivided into three subtypes, two of which are defined by their topographic position: upland forest and bottomland (floodplain) forest. Upland and bottomland forests are easily distinguishable because upland forest does not normally flood. Bottomland forests are separated out from upland forest community types because the periodic flooding they receive affects the biotic and abiotic features of their community types. Upland and bottomland forests are divided into natural communities based upon the soil-moisture gradients. The third subtype is flatwoods, which is dependent upon special soil structure.

Community Subtype: Upland Forest

Natural Community—Xeric Upland Forest

Xeric upland forests occur within the Ozark Highlands and Shawnee Hills Sections and are limited to sites of extremely dry exposures, commonly of south and southwest aspects, on shallow or extremely tight soils. This natural community is never extensive and intergrades with barrens and dry forest. This community is characterized by stunted and gnarled trees and a depauperate herbaceous layer.

Xeric upland forests generally form impenetrable thickets of post, blackjack, and scarlet oaks (*Quercus stellata, Q. marilandica,* and *Q. coccinea*), farkleberry (*Vaccinium arboreum*), and eastern redcedar (*Juniperus virginiana*) with a herbaceous layer dominated by little bluestem (*Schizachyrium scoparium*), poverty oat grass (*Danthonia spicata*), and forbs belonging to the aster family. Farkleberry is the only conspicuous shrub. Herbaceous vegetation covers only about 30 percent of the ground; the remainder is rock and gravel. Other characteristic species include

prairie wedge scale (*Sphenopholis obtusata*), black hickory (*Carya texana*), twoflower dwarf-dandelion (*Krigia biflora*), common serviceberry (*Amelanchier arborea*), blunt-lobe cliff fern (*Woodsia obtusa*), and Blue Ridge blueberry (*Vaccinium pallidum*). Other associated plants are woman's tobacco (*Antennaria plantaginifolia*), Virginia tephrosia (*Tephrosia virginiana*), elm-leaf goldenrod (*Solidago ulmifolia*), and creeping bush-clover (*Lespedeza repens*).

Natural Community—Dry Upland Forest

Dry upland forests occur within the Shawnee Hills, Ozark Highlands, and Highland Rim Sections. This natural community is limited to sites on dry, excessively drained soils that are poorly developed because of steep, exposed slopes, or because of bedrock or gravels at or near the surface. Trees and shrubs grow slowly but are not as stunted as those species encountered in xeric upland forests. Generally, there are well developed herbaceous and understory layers. These communities are most often on ridgetops or high on south- to west-facing slopes. Dry upland forests grade imperceptibly into barrens and xeric forest on more extreme sites and into dry-mesic forests under moderated moisture conditions.

A variety of oaks typically dominate dry upland forests including post oak, blackjack oak, scarlet oak, black oak (*Quercus velutina*), and white oak (*Quercus alba*). Other characteristic trees are mockernut hickory (*Carya tomentosa*), shagbark hickory (*C. ovata*), pignut hickory (*C. glabra*), black hickory, and black gum (*Nyssa sylvatica*). Common serviceberry, farkleberry, and Blue Ridge blueberry are frequent in this habitat. Characteristic herbs include little bluestem, poverty oatgrass, prairie wedgescale, rosy sedge (*Carex rosea*), cypress panic-grass (*Dichanthelium dichotomum*), common dittany (*Cunila origanoides*), creeping bush-clover (*Lespedeza repens*), woodland sunflower (*Helianthus divaricatus*), early blue violet (*Viola palmata*), and twoflower dwarfdandelion.

(table 2 continued)

Scientific name	Common name	Global rank	Habitat
Silene ovata	Blue ridge catchfly	G2G3	MF, DF
Silene regia	Royal catchfly	G3	BA
Silphium pinnatifidum	Tansey rosinweed	G3?	BA
Solidago shortii	Short's goldenrod	G1	RIP, RO
Stachys clingmanii	Clingman's hedgenettle	G2?	MF, BLH
Talinum calcaricum	Limestone fameflower	G3	BA, RO
Thaspium pinnatifidum	Cutleaf meadowparsnip	G2G3	BA
Trifolium reflexum	Buffalo clover	G5T2T4?	BA, DF, W
Trillium pusillum	Dwarf wakerobin	G3	BLH
Vitis rupestris	Sand grape	G3	RIP

Key to Habitat: AQ=deep pond, lake, stream pool, submergent and/or floating vegetation; BA=barrens, prairie, glade; BLH=bottomland hardwood forest, wet flatwoods; DF=dry forest, dry flatwoods; DIS=disturbed site, early successional; EH=edge, thicket; ME=wet meadow, marsh, open and shallow pool, ditch, emergent vegetation; MF=mesic forest, dry-mesic forest; RIP=riparian border, bank, bar; RO=rocky slope, cliff, overhang; SS=seep, fen; SW=swamp; W=sparse woodland.

*Nomenclature follows Mohlenbrock (1986).

Boott's sedge (*Carex picta*) is abundant in the Brown County Hills.

Chestnut oak (*Quercus prinus*) stands almost invariably occur on strongly acidic sites with thin soils, particularly in the Brown County Hills and the Crawford Uplands Subsections of the Shawnee Hills. This species is rare in southern Illinois. It often forms solid stands, but black oak or white oak may occupy part of the canopy. The most abundant understory trees are red maple (*Acer rubrum*), common serviceberry, and flowering dogwood (*Cornus florida*). Blue Ridge blueberry can be abundant, and mountain laurel (*Kalmia latifolia*) may form dense stands in the Crawford Uplands. Roundleaf greenbrier and cat greenbrier (*Smilax rotundifolia* and *S. glauca*) form dense mats. Poverty oatgrass is the most abundant grass, but it shares dominance with Boott's sedge (*Carex picta*) in the Brown County Hills. Characteristic herbs are common dittany, violet lespedeza (*Lespedeza violacea*), and queendevil (*Hieracium gronovii*).

On sites with calcareous substrates, chinkapin oak (*Quercus muehlenbergii*) is often common in the canopy. A number of calciphilic herbs are also present in these areas, including American

Table 3. Hoosier and Shawnee National Forests plant species that are critically imperiled or imperiled at the state level and their global heritage ranking.

Scientific name	Common name	Global rank
Barrens, prairie, glade		
Asclepias meadii	Mead's milkweed	G2
Onosmodium molle ssp. *molle*	Soft hair marbleseed	G4G5T3
Pycnanthemum torrei	Mountainmint	G2
Trifolium reflexum	Buffalo clover	G5
Bottomland hardwood forest, wet flatwoods		
Phaeophyscia leana	Wreath lichen	G2
Stachys clingmanii	Clingman's hedgenettle	G2?
Dry forest, dry flatwoods		
Penstemon deamii	Deam's beardtongue	G1
Silene ovata	Blue ridge catchfly	G2G3
Trifolium reflexum	Buffalo clover	G5
Disturbed site, early successional		
Lesquerella globosa	Globe bladderpod	G2
Edge, thicket		
Penstemon deamii	Deam's beardtongue	G1
Wet meadow, marsh, open and shallow pool, ditch, emergent vegetation		
Amsonia tabernaemontana var. *gattingeri*	Eastern bluestar	G5T2T3?
Boltonia decurrens	Claspingleaf doll's daisy	G2
Schoenoplectus hallii	Hall's bulrush	G2
Mesic forest, dry-mesic forest		
Isotria medeoloides	Green fiveleaf orchid	G2
Lysimachia fraseri	Fraser's yellow loosestrife	G2
Oxalis illinoensis	Illinois woodsorrel	G2G3?
Silene ovata	Blue ridge catchfly	G2G3
Stachys clingmanii	Clingman's hedgenettle	G2?
Riparian border, bank, bar		
Solidago shortii	Short's goldenrod	G1
Rocky slope, cliff, overhang		
Apios priceana	Traveler's delight	G2
Aureolaria patula	Spreading false foxglove	G3
Onosmodium molle ssp. *molle*	Soft hair marbleseed	G4G5T3
Solidago shortii	Short's goldenrod	G1
Swamp		
Hypericum adpressum	Creeping St. John's-wort	G2G3
Sparse woodland		
Calamagrostis porteri ssp. *insperata*	Porter's reed grass	G4T3
Desmodium humifusum	Eastern trailing ticktrefoil	G1G2?
Onosmodium molle ssp. *molle*	Soft hair marbleseed	G4G5T3
Penstemon deamii	Deam's beardtongue	G1
Pycnanthemum torrei	Torrey's mountainmint	G2
Trifolium reflexum	Buffalo clover	G5

columbo (*Frasera caroliniensis*), sicklepod (*Arabis canadensis*), and heartleaf noseburn (*Tragia cordata*).

Natural Community—Dry-mesic Upland Forest

Dry-mesic upland forests occur throughout the assessment area and are probably the most widespread forest type there. Trees and shrubs grow well because they are less inhibited by poor site conditions associated with xeric and dry upland forest communities. As with the dry upland forest, there are well developed herbaceous and understory layers, but species diversity is greater. These forests are usually found on south- to west-facing slopes, but may also occur in a band high on north- to east-facing slopes, and on ridges. Dry-mesic upland forests grade into dry upland forests higher on slopes and into mesic forests below.

Dry-mesic upland forests can generally be regarded as oak-hickory forests because they are usually dominated by oaks and hickories. Characteristic species include black oak, white oak, northern red oak (*Quercus rubra*), shagbark hickory, and pignut hickory. Additional common trees in this community are bitternut hickory (*Carya cordiformis*), mockernut hickory, American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), and tuliptree (*Liriodendron tulipifera*). Within the Cretaceous Hills, southern red oak (*Quercus falcata*) becomes frequent, and on calcareous sites in the assessment area chinkapin oak and Shumard's oak (*Q. shumardii*) are common. The subcanopy layer has several common small trees and shrubs such as flowering dogwood, eastern redbud (*Cercis canadensis*), rusty blackhaw (*Viburnum rufidulum*), and hophornbeam (*Ostrya virginiana*). Although there is not a complete cover of ground vegetation, there is a fairly diverse list of common herbs. Among these are cutleaf toothwort (*Cardamine concatenata*), rue anemone (*Anemonella thalictroides*), pointed leaf tick-trefoil (*Desmodium glutinosum*), elmleaf

goldenrod (*Solidago ulmifolia*), common blue violet (*Viola sororia*), and on calcareous sites, wild comfrey (*Cynoglossum virginianum*). Common graminoids are Bosc's panic-grass (*Panicum boscii*), bearded shorthusk (*Brachyelytrum erectum*), rosy sedge, and James' sedge (*Carex jamesii*).

Natural Community—Mesic Upland Forest

Mesic upland forests are common throughout the assessment area. Trees are tall, straight trunked, and have few low branches. The canopy is essentially complete, but stands have a well-developed vertical structure of shade-tolerant tree, shrub, and herbaceous species. Under optimal conditions these forests are quite open below the canopy. Herbs are very abundant and diverse, especially early in the growing season. The richest sites tend to be in deep ravines. Mesic upland forests are usually developed in colluvial materials in valleys and ravines or less frequently in deep loess on broad ridges. They are also found low on north- to east-facing slopes and on narrow creek bottoms. These forests grade into mesic floodplain forests where creek bottoms widen and into dry-mesic upland forests higher on the slopes.

The canopy composition of mesic upland forests is variable depending on local relief and depth of soil. In deep ravines surrounded by cliffs, common trees include American beech, sugar maple, northern red oak, white oak, tuliptree, bitternut hickory, white ash (*Fraxinus americana*), and black cherry (*Prunus serotina*). Near intermittent and ephemeral streams, beech and sugar maple are codominant and American sycamore (*Platanus occidentalis*) is found near the streambanks. In areas with limestone bedrock near the surface, black maple (*Acer nigrum*), chinkapin oak, and Shumard's oak are present. Common understory trees in this habitat are American hornbeam (*Carpinus caroliniana*), pawpaw (*Asimina triloba*), flowering dogwood, and on calcareous sites, Ohio buckeye (*Aesculus glabra*). Two common thicket-forming shrubs are northern spicebush (*Lindera benzoin*) and American bladdernut (*Staphylea trifolia*). Eastern leatherwood (*Dirca palustris*) is an infrequent species found associated with limestone.

Table 4. Number and percent of species with viability concerns in selected habitat associations of the Hoosier and Shawnee National Forests[1]

Habitat Association	# Plant Species	*Percent*
Barrens, prairie, glade	91	25%
Rocky slope, cliff, overhang	62	17%
Mesic forest, dry-mesic forest	54	15%
Bottomland hardwood forest, wet flatwoods	54	15%
Sparse woodland	41	11%
Wet meadow, marsh, open and shallow pool, ditch, emergent vegetation	40	11%
Dry forest, dry flatwoods	38	11%
Swamp	37	10%
Riparian border, bank, bar	15	4%
Edge, thicket	15	4%
Seep, fen	14	4%
Deep pond, lake, stream, pool, submergent and/or floating vegetation	12	3%
Disturbed site, early successional	4	1%

[1] Total number of species and percentages reflect occurrence of some species in more than one habitat type.

The herbaceous layer can be remarkably diverse, particularly before leaves of canopy trees expand in the spring. Among the more familiar spring ephemerals are shining bedstraw (*Galium concinnum*), white baneberry (*Actaea pachypoda*), dwarf larkspur (*Delphinium tricorne*), Dutchman's breeches (*Dicentra cucullaria*), goldenseal (*Hydrastis canadensis*), Greek valerian (*Polemonium reptans*), and bloodroot (*Sanguinaria canadensis*). Virginia bluebells (*Mertensia virginica*) can form extensive colonies on intermittent stream terraces. Where limestone bedrock is near the surface, twinleaf (*Jeffersonia diphylla*) may be abundant. Ferns are also diverse in this community. Northern maidenhair fern (*Adiantum pedatum*), silver false spleenwort (*Deparia acrostichoides*), glade fern (*Diplazium pycnocarpon*), and Christmas fern (*Polystichum acrostichoides*) are widespread and

Table 5. Number of plant species with viability concerns in the Hoosier and Shawnee National Forests found within various landownership categories.

Ownership Category	Viability Concern Species	Percent of such species
		Percent
Hoosier National Forest	60	17%
Shawnee National Forest	77	21%
National Forests Combined	137	38%
Other Federal Lands	26	7%
All Federal Lands	149	41%
Illinois State Lands	48	13%
Indiana State Lands	94	26%
Kentucky State Lands	35	10%
All State Lands	174	48%
All Public Lands	251	69%
Private Lands	286	79%
Private Lands Exclusively	111	31%

common. Lowland bladderfern (*Cystopteris protrusa*) forms large colonies on stream terraces. Common graminoids include Indian woodoats (*Chasmanthium latifolium*), sweet wood-reed (*Cinna arundinacea*), hedgehog woodrush (*Luzula echinata*), and white bear sedge (*Carex albursina*). On stream terraces, eastern bottlebrush grass (*Elymus hystrix*) and eastern woodland sedge (*Carex blanda*) are common.

Community Subtype: Floodplain Forest

Natural Community— Mesic Floodplain Forest

Mesic floodplain forests occur along the floodplains of major streams in the assessment area. This forest community occurs on landforms of relatively higher local relief, thereby subject to only short and infrequent flooding. The separation of this natural community from the mesic upland forest is a subtle one; many of the woody overstory and subcanopy species are common to both communities and the differences lie in herbaceous species composition.

Dominant trees of the mesic floodplain forest are white oak, sugar maple, and American beech. Other species characteristically encountered in this habitat include American elm (*Ulmus americana*), black walnut (*Juglans nigra*), white ash, bur oak (*Quercus macrocarpa*), and shellbark hickory (*Carya laciniosa*). American hornbeam is the most frequent understory tree. Spicebush and bladdernut are the most widely seen shrubs. Common herbs are bottomland aster (*Aster ontarione*), golden ragwort (*Senecio aureus*), Virginia spring beauty (*Claytonia virginica*), common blue violet, and smallspike false nettle (*Boehmeria cylindrica*). Other characteristic herbs are Indian woodoats, limestone wild petunia (*Ruellia strepens*), smooth hedgenettle (*Stachys tenuifolia*), sweet wood-reed, groundnut (*Apios americana*), and Canada germander (*Teucrium canadense*).

Natural Community— Wet-mesic Floodplain Forest

Wet-mesic floodplain forests occur along major streams in the assessment area. Canopy trees are well formed, but generally shorter than those on better-drained sites. There are only scattered shrubs, but the herbaceous layer may be quite thick. Flooding is frequent, but does not last long enough to seriously inhibit tree growth. This community intergrades with other floodplain forests delineated by soil type, average soil moisture, and flooding regime.

This natural community contains the greatest biotic diversity of the floodplain natural community types. The canopy may have several species including American elm, sweetgum (*Liquidambar styraciflua*), honeylocust (*Gleditsia triacanthos*), and black walnut. Giant cane (*Arundinaria gigantea*) occasionally forms dense stands in this community. Bristly greenbrier (*Smilax hispida*) is usually present. Herbaceous species such as groundnut, Gray's sedge (*Carex grayi*), ditch stonecrop (*Penthorum sedoides*), and cutleaf coneflower (*Rudbeckia laciniata*) are indicators of wet-mesic floodplain forest. Poison ivy (*Toxicodendron radicans*) is frequently a dominant ground cover, tree-climbing vine, and occasional shrub.

Natural Community—Wet Floodplain Forest

Wet floodplain forest occurs along major streams in the assessment area. Diversity and abundance of tree and herbaceous species are low due to prolonged or frequent flooding. The understory is open and frequently the canopy contains numerous gaps. Wet floodplain forest is found in association with swamp and wet-mesic floodplain forest.

River birch (*Betula nigra*), green ash (*Fraxinus pennsylvanica*), silver maple (*Acer saccharinum*), or red maple may form nearly pure even-aged stands. Sometimes these species intermingle with each other and with eastern cottonwood (*Populus deltoides*) and American sycamore. Canadian woodnettle (*Laportea canadensis*) often forms large monotypic colonies. Sweet wood-reed and whitegrass (*Leersia virginica*) are the most common grasses, but a wide variety of sedges such as Gray's sedge (*Carex grayi*), hop sedge (*C. lupulina*), shallow sedge (*C. lurida*), Davis' sedge (*C. davisii*), Muskingum sedge (*C. muskingumensis*), and ravenfoot sedge (*C. crus-corvi*) also occur in this habitat.

Community Subtype—Flatwoods

Flatwoods is a distinctive forest type found on level terrain. They are vernally wet from cool season precipitation. Internal drainage is very poor because of claypans in the soil. Water stands on these sites for prolonged periods, but the ground is very dry during the summer. There are only scattered understory trees or shrubs. Overall diversity is rather low.

The canopy is often pin oak (*Quercus palustris*) or post oak. Spicebush may occasionally be found. An extensive ground cover of sedges, including Gray's sedge and Muskingum sedge, is often intermixed with little bluestem, white wild indigo (*Baptisia alba*), and rough blazingstar (*Liatris aspera*).

Table 6. Natural community classification for the Hoosier-Shawnee Ecological Assessment Area.

Community type	Community subtype	Natural community
Forest	Upland forest	Xeric upland forest Dry upland forest Dry-mesic upland forest Mesic upland forest
	Floodplain (bottomland) forest	Mesic floodplain forest Wet-mesic floodplain forest Wet floodplain forest
	Flatwoods	Flatwoods
Savannah	Barrens	Barrens
Primary	Cliffs	Sandstone cliff Sandstone overhang Limestone cliff
Wetlands (Aquatic)	Seep and spring	Acid seep
	Swamp	Swamp Shrub swamp
	Open water	Pond Perennial stream

COMMUNITY TYPE—SAVANNAH

Community Subtype and Natural Community—Barrens

Barrens are characterized by species of canopy trees tolerant of xeric conditions, which have a stunted, open-grown appearance. They are also characterized by the dominance of native warm-season grasses and prairie forbs, and, in glades, significant exposures of bedrock. The mix of plants and animals inhabiting these sites varies with the canopy openness, internal structure of the stands, slope, aspect, and other less tangible variables. Barrens are currently recognized at sites within the Brown County Hills, Crawford Escarpment, Crawford Uplands, Cretaceous Hills, Greater Shawnee Hills, and Lesser Shawnee Hills Subsections; the Illinois Ozarks Subsection has more and larger communities.

Sandstone barrens in the Shawnee Hills are dominated by white oak, post oak and black-jack oak, but scarlet oak, pignut hickory, and in Illinois, black hickory are common. Where the soil is deeper, white oak and post oak domi-nate. Canopy closure is about 60 percent. There are few shrubs, but oak saplings are common.

The only common shrub is farkleberry, which often associates with tangles of cat greenbriar. The ground is well covered by little bluestem, arrowfeather threeawn (*Aristida purpurascens*), cypress panic-grass, and Indiangrass (*Sorghastrum nutans*). Where the canopy is more closed, poverty oatgrass is dominant. Common forbs include clasping Venus' looking-glass (*Triodanis perfoliata*), woodland sunflower, gravelweed (*Verbesina helianthoides*), slender bush-clover (*Lespedeza virginica*), waxyleaf aster (*Symphyotrichum undulatum*), common dittany, showy goldenrod (*Solidago speciosa* var. *erecta*), panicled leaf ticktrefoil (*Desmodium paniculatum*), Virginia tephrosia, woman's tobacco, St. Andrew's cross (*Hypericum hypericoides*), and early blue violet (*Viola palmata*).

Nearby sites with less soil development may be dominated by chestnut oak in Indiana or by post and blackjack oaks throughout the assessment area. Roundleaf greenbrier is usually common in these areas. The shrub layer has Blue Ridge blueberry, sassafras (*Sassafras albidum*), and oak shrubs. There are few herbs, mostly poverty oats, with some white edge sedge (*Carex debilis*), Virginia tephrosia, and cypress panic-grass.

Sandstone glades in Illinois are barrens with little more than exposed bedrock and have a variety of lichens and mosses such as reindeer lichen (*Cladina subtenuis*), cup lichens (*Cladonia cristatella* and *C. squamosa*), Dicranum moss (*Dicranum scoparium*), and Leucobryum moss (*Leucobryum glaucum*) covering much of the rock. Vascular plants are poverty oatgrass, orangegrass (*Hypericum gentianoides*), and devil's-tongue (*Opuntia humifusa*). The few trees are mostly blackjack oak, post oak, black hickory, and eastern redcedar.

Limestone barrens are very open, often with less than 20 percent canopy of post oak and chinkapin oak, with a few eastern redcedar trees. Dominant vegetation in the opening consists of Indiangrass, big bluestem (*Andropogon gerardii*), and little bluestem. Flowering dogwood, rusty blackhaw, and New Jersey tea (*Ceanothus americanus*) are present as shrubs. Purple cliffbrake (*Pellaea atropurpurea*) and hairy lipfern (*Cheilanthes lanosa*) occur in fractures of exposed bedrock. Other common herbs include late purple aster (*Symphyotrichum patens* var. *patens*), Virginia wildrye (*Elymus virginicus*), false boneset (*Brickellia eupatorioides* var. *eupatorioides*), eastern purple coneflower (*Echinacea purpurea*), prairie rosinweed (*Silphium terebinthinaceum*), tall blazingstar, pinnate prairie coneflower (*Ratibida pinnata*), false aloe (*Agave virginica*), purpletop tridens (*Tridens flavus*), button eryngo (*Eryngium yuccifolium*), green comet milkweed (*Asclepias viridiflorum*), Mead's sedge (*Carex meadii*), hoary puccoon (*Lithospermum canescens*), and trailing lespedeza (*Lespedeza procumbens*).

The barrens in the Cretaceous Hills Subsection are on the upper slope of gravel knobs. There is a 70-percent canopy of large black oak and southern red oak, with smaller blackjack oak. Post oak is frequently present as a shrub. Farkleberry, flameleaf sumac (*Rhus copallinum*), and flowering dogwood are also found around the barrens. Common herbs include poverty oatgrass, white edge sedge, cypress panic-grass, Virginia tephrosia, St. Andrew's cross, western bracken fern (*Pteridium aquilinum*), little bluestem, hairy lespedeza (*Lespedeza hirta*), Carolina sedge (*Carex caroliniana*), cat greenbrier, and hairy pinweed (*Lechea mucronata*).

Barrens formed on Peoria loess in the Greater Shawnee Hills are dominated by little bluestem and big bluestem. Canopy closure is about 25 percent provided by post oak. Prairie June grass (*Koeleria macrantha*) and prairie dropseed (*Sporobolus heterolepis*) are also common. Conspicuous, but not necessarily common, forbs are woodland sunflower, slender lespedeza, Nuttall's prairie parsley (*Polytaenia nuttallii*), and tall blazingstar.

The bedrock of the Brown County Hills Subsection is mostly acidic siltstones. A few small areas have a barrens-like appearance and species composition. However, many ridges in these hills lack only the prairie species. The siltstone barrens are dominated by chestnut oak trees that with black oak, white oak, and scarlet oak form an 80-percent canopy. The dominant shrubs are Blue Ridge blueberry, northern dewberry (*Rubus flagellaris*), and roundleaf greenbrier. There are also scattered black oak and American beech as shrubs. The ground flora is dominated by Boott's sedge, white edge sedge, poverty oatgrass, and cypress panic-grass. Common forbs include twoflower dwarfdandelion, woman's tobacco, common dittany, violet lespedeza, hairy lespedeza, tall blazingstar, woodland sunflower, nodding ladies'-tresses (*Spiranthes cernua*), Short's aster (*Aster shortii*), elmleaf goldenrod, showy goldenrod, Sampson's snakeroot (*Orbexilum pedunculatum*), and nakedflower ticktrefoil (*Desmodium nudiflorum*). Grasses include Bosc's panic-grass, upland bentgrass (*Agrostis perennans*), and little bluestem.

COMMUNITY TYPE: PRIMARY

Community Subtype—Cliffs

Cliff communities are on vertical rock faces and are locally distributed across the assessment area. They have practically no soil, although sand may be deposited at their bases and on small ledges. Most cliffs in this region are composed of sandstone, but there are some of limestone as well. They can be moist to dry depending on their aspect and the surrounding natural communities. The associated plant communities are, for the most part, uniform across the region.

Natural Community—Sandstone Cliff

Dry Sandstone Cliff

Lichens are found scattered and locally abundant on dry sandstone cliffs, especially *Lepraria finkii*, which give many cliffs a distinct greenish-blue color. Cracks and ledges are often occupied by littleflower alumroot (*Heuchera parviflora*), lobed spleenwort (*Asplenium pinnatifidum*), maidenhair spleenwort (*Asplenium trichomanes*), and common woodsia. In the sand at the base of these cliffs are Standley's goosefoot (*Chenopodium standleyanum*) and Pennsylvania pellitory (*Parietaria pensylvanica*).

Moist Sandstone Cliff

Shaded sandstone cliffs retain more moisture and have greater species diversity than drier cliffs. Upland bentgrass, walking fern (*Asplenium rhizophyllum*), shining clubmoss (*Huperzia lucidulum*), rock clubmoss (*H. porophila*), and intermediate woodfern (*Dryopteris intermedia*) occur at scattered locations throughout the assessment area. Wild hydrangea (*Hydrangea arborescens*), marginal woodfern (*Dryopteris marginalis*), littleflower alumroot, and partridgeberry (*Mitchella repens*) are common in the region. Eastern hemlock (*Tsuga canadensis*) is found at a few sites in the Crawford Uplands Subsection.

Natural Community—Sandstone Overhang

Sandstone overhang communities have greater moisture and less light than moist sandstone cliffs creating conditions that only a few species can tolerate. At the drip line, a narrow strip (1 to 3 feet wide) where water drips across a shelter entrance is a special ecosystem for certain unique plants. Among these are French's shootingstar (*Dodecatheon frenchii*), Appalachian bristle fern (*Trichomanes boschianum*), and thalloid liverworts (*Conocephalum conicum*).

Natural Community—Limestone Cliff

Limestone cliffs occur in the Illinois Ozarks Subsection along the Mississippi River and in the Shawnee Hills Subsection along the Ohio River and its tributaries. These cliffs have a more diverse flora than sandstone cliffs. Frequent species in this community are walking

fern, red columbine (*Aquilegia canadensis*), sharplobe hepatica (*Hepatica nobilis* var. *acuta*), bulblet bladderfern (*Cystopteris bulbifera*), and sicklepod.

COMMUNITY TYPE—WETLANDS (AQUATIC)

Only a few wetland natural areas are known to exist in the bottomlands of the Ohio and Cache River Alluvial Plain and the Mississippi River Alluvial Plain Subsections, and scattered along tributary streams elsewhere in the assessment area. Acid seeps occur within portions of the Cretaceous Hills and Crawford Uplands Subsections.

Community Subtype—Seep and Spring

Natural Community—Acid Seep

Acid seeps are restricted to a small area of the Cretaceous Hills Subsection in Illinois and one site in the Crawford Uplands Subsection in Indiana. These seeps have shallow deposits of peat moss (*Sphagnum* spp.) and exhibit an acidic pH.

The vegetation of seeps in the Cretaceous Hills Subsection is dominated by river birch, red maple or tuliptree; the herbaceous layer is dominated by sedges and ferns including leafy bulrush (*Scirpus polyphyllus*), prickly bog sedge (*Carex atlantica* var. *atlantica*), subarctic lady fern (*Athyrium filix-femina* var. *angustum*), cinnamon fern (*Osmunda cinnamomea*), royal fern (*Osmunda regalis*), and netted chainfern (*Woodwardia areolata*). Several uncommon orchids are also known to occur in association with this rare natural community. The Crawford Uplands Subsection site has a canopy of white oak, sweetgum, American sycamore, American beech, and shagbark hickory, with American hornbeam and red maple in the understory. Herbs present include cinnamon fern, royal fern, Virginia wildrye, (*Elymus virginicus*), wood-reed, bottomland aster, smallspike false nettle, and roundleaf goldenrod (*Solidago patula*).

Community Subtype—Swamp

Natural Community—Swamp

Swamps are freshwater, woody communities with surface water throughout most or all of the year. The water level can vary from several feet in winter to an inch or less in summer; however, it is not unusual for swamps to be up to 5 feet deep in summer. In this natural community type the forest canopy covers at least 50 percent of the water.

Trees characteristic of swamps in southern Illinois are bald cypress (*Taxodium distichum*), water tupelo (*Nyssa aquatica*), water hickory (*Carya aquatica*), pumpkin ash (*Fraxinus tomentosa*), water locust (*Gleditsia aquatica*), and red maple. The shrubby layer consists of Virginia sweetspire (*Itea virginica*), swamp rose (*Rosa palustris*), and common buttonbush (*Cephalanthus occidentalis*). Common herbaceous species include pondweed (*Potamogeton* spp.), naiad (*Najas* spp.), duckweeds (*Lemna* spp.), watermeal (*Wolffia* spp.), and sedges (*Carex* spp.).

Natural Community—Shrub Swamp

Shrub swamps are often found in association with ponds in the vegetation mosaic of the floodplain forest in southern Illinois. There is only one small shrub swamp on the Hoosier National Forest. An open canopy of trees may be present, but the shrub layer is clearly dominant. There are aquatic herbaceous plants in these areas.

Tree species include those associated with forested swamps such as bald cypress, pumpkin ash, and red maple. Shrub species include crimsoneyed rosemallow (*Hibiscus moscheutos*), commonbuttonbush, swamp rose, and Virginia sweetspire. The known shrub swamp on the Hoosier is dominated by crimsoneyed

rosemallow and common buttonbush. Herbaceous species are similar to those encountered in a forested swamp.

Community Subtype—Open Water

Natural Community—Pond

Ponds are limited to abandoned river meanders (sloughs) in the southern section of the Mississippi River Alluvial Plain. Water must be permanent or semi-permanent, and the community is open. Vegetation is characterized by floating aquatics, submergents, and emergents.

Aquatic species characteristically found in ponds includes watermeal, duckweeds, pondweeds, Mexican mosquito fern (*Azolla mexicana*), American spongeplant (*Limnobium spongia*), naiads, and coon's tail (*Ceratophyllum demersum*). A variety of emergent plants are found in the shallows at the edges of ponds including American lotus (*Nelumbo lutea*), yellow pond-lily (*Nuphar lutea* var. *advena*), green arrow arum (*Peltandra virginica*), pickerelweed (*Pontederia cordata*), and broadleaf arrowhead (*Sagittaria latifolia*).

Natural Community—Perennial Streams

Streams are bodies of flowing water in a clearly defined channel. Their character is determined by the amount of water they carry as well as by the bedrock and terrestrial communities through which they flow.

High Gradient Creek

Twisted sedge (*Carex torta*), is regularly found along clear streams in Illinois, while fringed sedge (*Carex crinita*) is more common in Indiana. Heartleaf plantain (*Plantago cordata*) is a rare species also found in these areas in southern Illinois.

EXOTIC PLANTS

Exotic plants pose a serious threat to natural communities by displacing native vegetation and wildlife. Among the native plants and animals that are negatively impacted by exotics are rare and endangered species that already have a precarious existence and may not be able to compete with more aggressive invasive species for space and resources. Thousands of dollars are spent annually to control exotic species. Early treatment and control of invasive species is clearly the ideal and most cost effective approach.

The following is a list of 26 of the most common or problematic nonnative invasive plant species in the assessment area. It is not intended to be a comprehensive list of all invasive plant species found in the assessment area or of all treatment methods. Many publications exist pertaining to identification and control of nonnative invasive plant species. However, two publications are especially helpful summaries with additional specifics on nonnative invasive plants and control methods pertaining to the assessment area: *Invasive Plants of the Southern Tier* (Mortensen 2003) and *Nonnative Invasive Plants of Southern Forests* (Miller 2003).

Garlic Mustard *(Alliaria petiolata)* is a biennial mustard that invades riparian and upland mesic forests, particularly those on calcareous soils. If left unchecked, the species threatens more pristine, undisturbed forest communities by forming large colonies and shading out spring wildflowers. As with most exotics, the best control is eradicating plants while populations are small. While plants are flowering in spring, minor infestations may be controlled by pulling the plants or by cutting second-year stems. Prescription fire and herbicide treatment are other methods employed for control.

Purple Loosestrife (*Lythrum salicaria*) is a perennial plant that grows 3 to 7 feet tall and sends up several spikes of purple flowers in summer. Although it is a popular ornamental,

this species aggressively invades various wetland habitats, displacing native vegetation by forming pure stands. In many States, it is now illegal to buy, sell, or plant this pest species. In this region, it is a problem in many wetlands, especially those bordering the Ohio River. Treatments have included hand pulling of individual plants before seed set or herbicide treatment of large populations. Recently developed biocontrol methods using several insect species that feed on the flowers, foliage, and roots are promising.

Purple Crownvetch (*Coronilla varia)* is a sprawling perennial legume that has been widely used in landscaping and roadside erosion control. Forming dense mats of vegetation, this species invades open natural areas, especially barrens communities and stream corridors, smothering native herbaceous plants and climbing over woody species. Herbicide treatment is the primary method of control.

Cinnamon Vine (*Dioscorea oppositifolia)* is a twining, perennial vine that climbs over native vegetation including trees and shrubs. Although it favors sunny openings, it can also invade and persist in partial shade. It reproduces asexually by small potato-like structures. These structures, called bulbils, take root and form new plants. Control measures include herbicide treatment.

Japanese Honeysuckle (*Lonicera japonica)* is a woody evergreen vine that is most threatening to open, sunny areas although it may impact forest communities. It forms large patches that shade out woody and herbaceous species. Capable of succeeding in almost any soil types, this species may girdle small saplings, climb shrubs and trees, and smother herbaceous plants on the forest floor. Herbicide treatment when most other native species are dormant, typically after the first hard frost in autumn, is recommended.

Amur Honeysuckle (*Lonicera maackii)*, Tatarian Honeysuckle (*L. tatarica),* and Morrow's Honeysuckle (*L. morrowii)* escape into a variety of habitats from open, sunny sites to forest communities. Although they are most prolific in open communities, they invade upland and bottomland forest communities, particularly more disturbed forests. They compete with and shade out native vegetation, and some species release chemicals into the soil that prohibit plant growth. Berry production may be prolific and seeds are readily dispersed by birds. Minor infestations of young seedlings may be hand pulled. Older shrubs are most effectively controlled by cutting and herbicide treatment of stems as well as by fire (in appropriate woodland habitats).

Yellow Sweet Clover *(Melilotus officinalis)* and White Sweet Clover *(M. alba)* are used as forage crops and are particularly invasive in open roadsides and natural areas including prairies, barrens, and glades. Control methods include prescribed burning in late spring, hand pulling, and herbicide treatment.

Nepalese browntop *(Microstegium vimineum)* is a low-growing Asian grass that invades disturbed sites including roadsides, trails, woodland edges, and streamsides where it forms large colonies and competes with native herbaceous species. It prefers at least partial shade. Suggested controls include hand pulling and cutting or mowing if done late in the growing season before seed production, and selective use of a grass-specific herbicide.

Reed Canarygrass (*Phalaris arundinacea)* forms large, dense, monotypic stands. This aggressive grass colonizes various wetland types competing with and shading out native species. It spreads vegetatively by underground stems. Controls include herbicide treatment.

Tree of Heaven (*Ailanthus altissima)* is a tree that spreads through root sprout and seed production. It is particularly invasive in openings and clearings and along rock cliffs, but can also occur along streams and in disturbed forest communities. Control methods include basal bark herbicide application or girdling of trees

followed by herbicide treatment. Stem cutting followed immediately by herbicide application is another means of control. Cutting alone, however, will result only in resprouting.

Autumn Olive (*Elaeagnus umbellata*) is a small tree or large shrub that was once a popular wildlife planting. Individual plants are prolific berry producers, and the seeds are widely spread by birds. It is particularly invasive in open habitats including prairies, but can also spread into forest communities displacing native species. Suggested controls include cutting immediately followed by herbicide application.

Tall Fescue (*Lolium arundinaceum*) is a coarse, cool season grass that has been widely used for erosion control and as forage. It forms dense monotypic stands in open areas and threatens native vegetation in prairies and glades as well as stream corridors. Prescription burning and herbicide applications are some of the recommended controls.

Ground Ivy (*Glechoma hederacea*) is a creeping mint that invades open areas, roadsides, and floodplain and mesic upland forests. It forms large mats that can outcompete native vegetation, especially the smaller, low growing species. Suggested treatments include herbicide application when other native herbs are dormant.

Lespedezas (*Lespedeza* spp.) include several nonnative lespedezas that have been planted in wildlife openings and for erosion control along roadsides. Sericea lespedeza is particularly aggressive and can form large colonies, competing for space with native plants. It poses a serious threat to barrens, glades, and other open communities. Control measures include late spring burning and herbicide application.

Creeping Jenny (*Lysimachia nummularia*) is a creeping plant that competes with native vegetation, often forming large carpets in low ground. It has spread widely in floodplain forest communities. Hand pulling of small patches of this plant can be effective. Control of large areas of infestation requires herbicide treatment.

Fuller's Teasel (*Dipsacus fullonum*) is a biennial plant often confused with thistles (*Cirsium* spp.). It is an invasive weed of open, sunny areas including roadsides, fields, cemeteries, streambanks, and open woods. This plant is a concern in prairies and open forest communities. Controls include cutting, prescribed burning, and herbicide application.

Common Periwinkle (*Vinca minor*), a trailing evergreen, is a popular ornamental that threatens forest communities. It spreads vegetatively and can cover large areas, crowding out all native herbaceous plants and tree seedlings. Controls include herbicide treatment when native forest herbs are dormant.

Multiflora Rose (*Rosa multiflora*) is a thorny shrub long used as a wildlife planting, promoted as a hedge, and used for erosion control. This species is now widely recognized as one of our most pernicious, invasive exotics and is listed as a noxious weed in many States. Pasture land and open natural areas are most vulnerable to invasion. Plants can form dense, impenetrable thickets, and landowners have used various methods to control the plant including bush-hogging, grubbing, bulldozing, and application of herbicides. In addition to these measures, several biocontrol agents have been effective controls. The virus rose rosette and a chalcid wasp have shown the greatest potential in controlling this pest.

Japanese Hop (*Humulus japonicus*) is a twining, herbaceous vine commercially popular with gardeners. It is an annual or weak perennial found along roadsides and forest edges, but poses a threat to riparian communities. Suggested controls include pulling of plants and removal from the site and herbicide application.

Johnsongrass (*Sorghum halepense*) has been used as a pasture or forage plant and has been described as one of the 10 worst weeds in the

world. This tall, showy species invades disturbed soils, spreading prolifically by rhizomes and seed production. It is very competitive and invasive and threatens floodplain and bottomland communities, particularly those that have been disturbed. Control methods include mowing, tilling, and herbicide treatment.

Nodding Musk Thistle *(Carduus nutans)* is a herbaceous biennial or winter annual that reproduces by seed. It is found in fields, rangelands, open woodlands, bottomlands, and on roadsides and stream or ditch banks. It spreads aggressively and may form dense stands that crowd out desirable plant species. Control measures include close mowing or cutting at intervals to prevent seed production, burning crowns with a propane torch, or spraying with herbicide.

Phragmites or Common Reed *(Phragmites australis)* is a large, upright, warm-season perennial grass that spreads mainly by rhizomes but also by seeds. Although native to North America and elsewhere, aggressive colonies may result when native and European strains cross. It is most successful in freshwater areas, marshes, backwaters, pond and lake edges, streambanks, and ditches. Management includes chemical control, annual cutting in late July, grazing, dredging, draining, flooding, or combinations of burning and other methods.

Kudzu (*Pueraria montana* var. *lobata*) is a perennial, woody, leguminous trailing vine that can reproduce vegetatively and by seeds. Known as the "vine that ate the South," vines can grow a foot a day, smothering or breaking trees and other vegetation. It infests forest edges, roadsides, old fields, abandoned homesteads, fence rows, and other sunny disturbed areas. Small young patches may be controlled by persistent weeding, mowing, or grazing for 3 to 4 years. Monthly close mowing for two growing seasons or repeated cultivation may work. For heavy infestations, burning, cutting, and herbicide applications may be needed and may take 5 years or more.

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