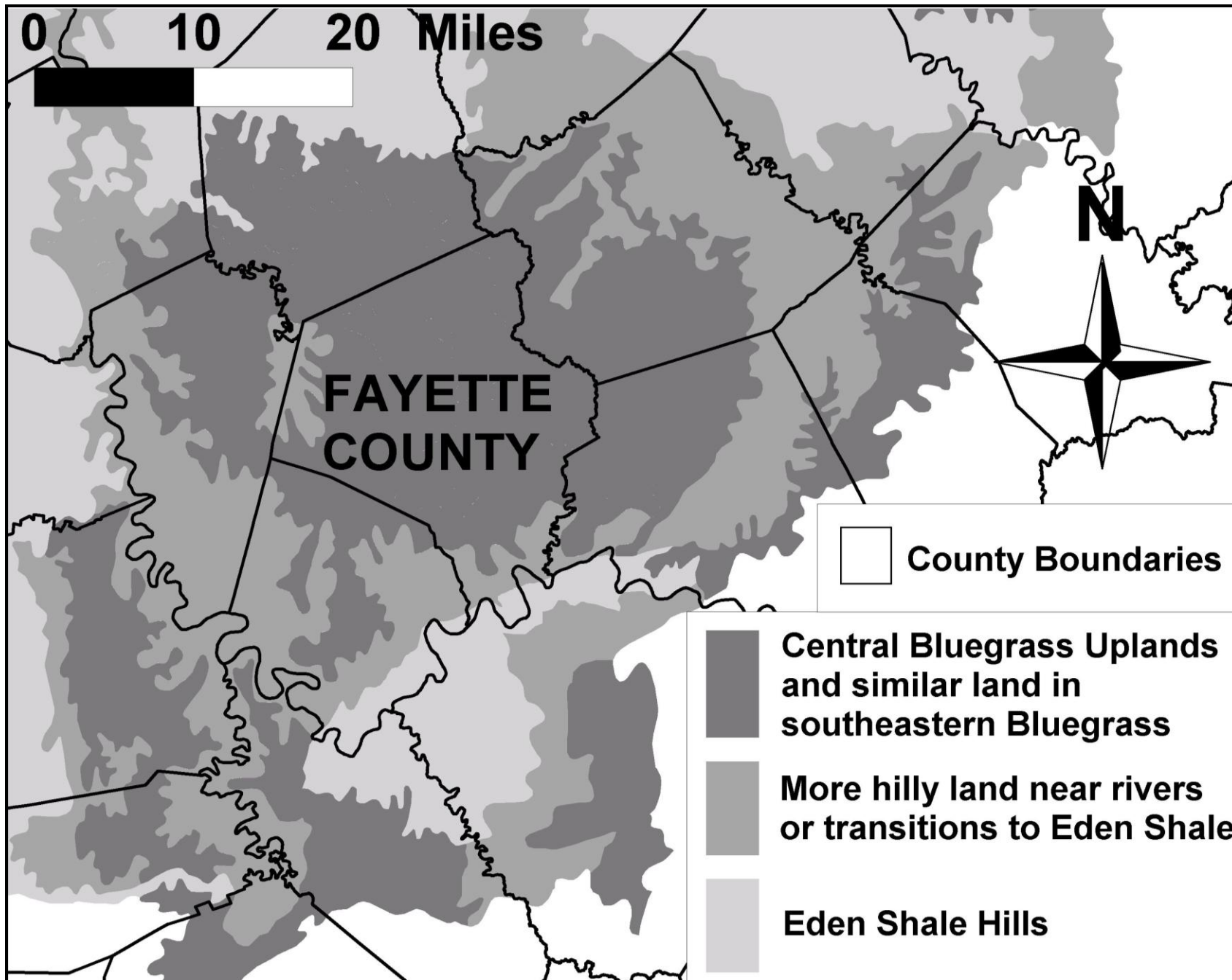


**A Guide
to Plants
of the
Central
Bluegrass**
Notes by
Julian Campbell



LISTS OF TYPICAL NATIVE PLANT SPECIES

These lists cover seven intergrading habitat classes:

(A) Riparian Zones; (B) Wetlands; (C) Deeper Upland Woods; (D) Intermediate Upland Woods; (E) Open Uplands; (F) Mesic Rocky Ravines; and (G) Subxeric-Xeric sites.

Assignment of each species is based on the habitat where it is most common, but many species often occur in other habitats and some assignments remain arbitrary. A few species that often occur in transitions from uplands to riparian or wetland habitats are listed in two habitats. The purpose of these lists is to form a basis for selection of species in restored areas. More comprehensive listings of species (with taxonomic refinements) and descriptions of habitats can be found elsewhere (see Bluegrass page of bluegrasswoodland.com). Some weedy species are excluded here, especially small annuals, since they generally disperse by themselves into restored areas. Also, several rare species are excluded, because their original status remains uncertain, or because further research and special efforts will be needed for recovery.

Numbers after names indicate typical degree of opening:
1= deeper shade; 2= average woods; 3= thin woods (e.g. trails);
4= edges of woods, brushy old-fields; 5= full sun in grass or forb;
6= full sun on bare ground, rock or water.
a = acid/infertile/sandy soils; h = subhydryc transitions;
m = mesic trans.; r = riparian trans.; x = subxeric trans.
[...]: broader genus concept, outmoded in most cases.
Underlined: most common species in modern landscape.
Bolded: among most common species before settlement.

Glossary of descriptors for habitat and vegetation

Hydric: soil wet enough to be anaerobic for much of the year.
Mesic: neither hydric nor xeric tendencies (with little oak).
Riparian: much influenced by strong floods & fresh alluvium.
Subhydryc: intermediate between hydric & mesic (some oak).
Submesic: somewhat mesic but more stressed or disturbed.
Subxeric: intermediate between xeric and mesic (much oak).
Xeric: rocky soil dry enough to maintain much red cedar.

Further notes on each habitat class and species list

(A) Riparian Zones. Listed species are largely concentrated in zones subject to forceful flooding by streams and active alluvial deposition. Those confined to larger streams are excluded. Many species of other habitats also occur here, especially in transitions. Hydric conditions are largely absent on typical streambanks, but are often present along slower moving channels.

(B) Wetlands. Listed species are typical of more or less poorly drained (hydric) soils, from ponds and swamps to seeping streamheads, on alluvial or residual soils. Some of these species are also common in riparian sites, especially where less well drained.

(C) Deeper Upland Woods (generally submesic to mesic). Listed species exclude those that are largely restricted to rocky soils in ravines along the Palisades (see 6), but they include some typical of more acid soils on old terraces, chert or shale. There is also much intermixing with 'intermediate upland woods' (see D).

(D) Intermediate Upland Woods (generally submesic). Such woods were about as common as deeper woods before settlement, with much disturbance from herbivores and perhaps occasional droughts; but fires appear to have had little influence. There is much intermixing with species of deeper woods and open uplands. Canebrakes formed transitions to open uplands.

(E) Open Uplands. Hydrology ranges from submesic to subhydryc or subxeric, often with much seasonal fluctuation. These are species that are much less common in shade than sun. Note that true grasslands, other than canebrakes, were not extensive before settlement, but openings were probably scattered in strips along trails, or in glades maintained by larger animals and human activities. Some of the listed species may have spread into this region after settlement, and their original status remains uncertain.

(F) Woods of Mesic Rocky Ravines. Species listed here are largely restricted to this habitat within the region. These species are generally

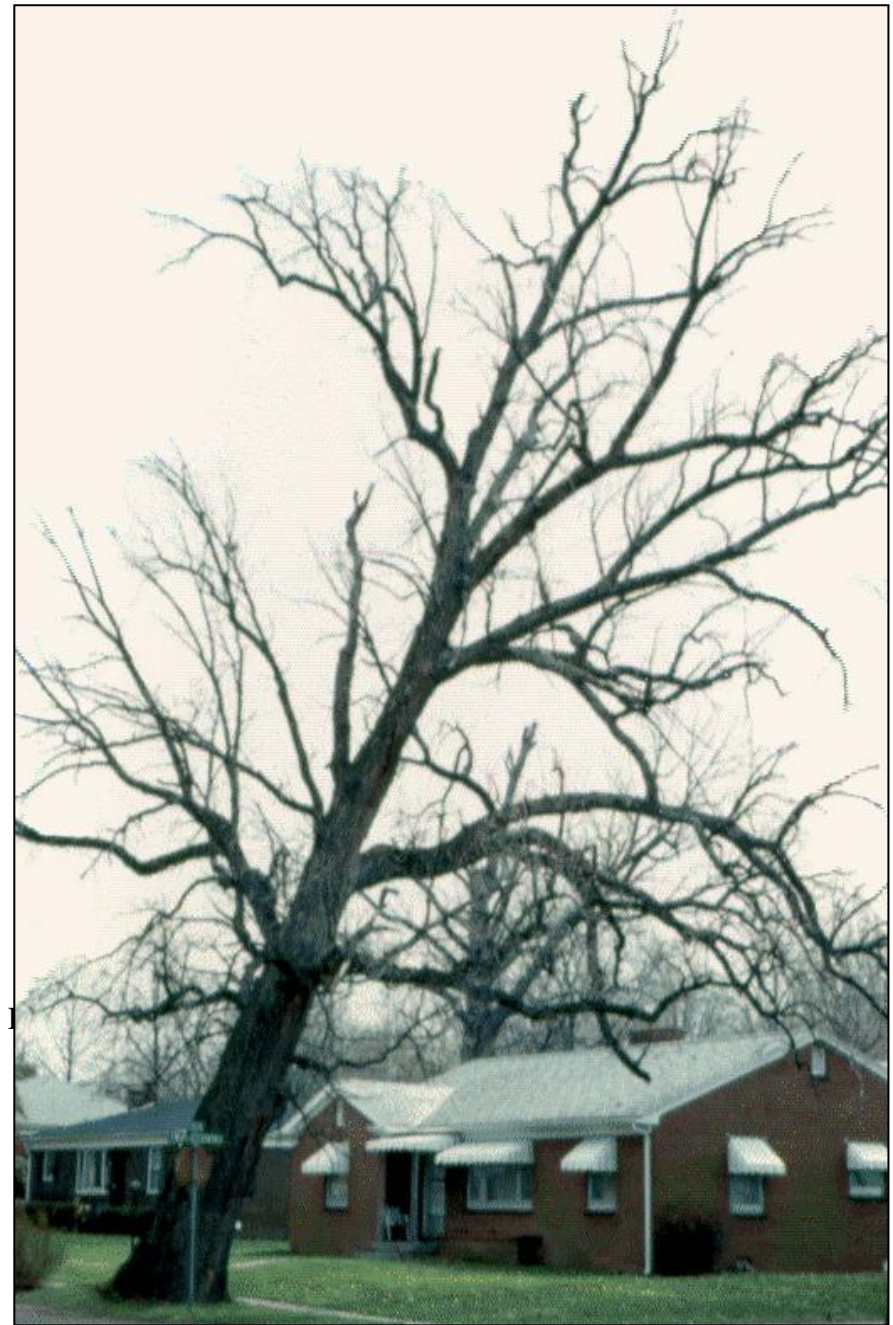
much mixed with the more widely distributed species of ‘deeper woods’ (C). The separation between these two groups is somewhat arbitrary and provisional.

(G) Woods of Subxeric to Xeric Rocky Slopes, Bluffs and Ridges. Diverse habitats are combined here. Open clifftops are included, forming a distinct but minor segregate. Species coded “A” are highly concentrated on more acid, infertile soils of old siliceous terraces, chert or shale. The woods on those soils were originally quite distinct in places, especially on Eden Shale (much dominated by white oak).

What do we mean by “native” plants and why should we care about putting them back into the landscape?

Nativity means nothing without reference to a region of interest—in this case the Bluegrass region. Such interest presumes that ecological restoration should pay some attention to the historical details of original vegetation, rather than just its overall function. If our regional definition is loosened to include the whole of Kentucky or to other parts of eastern North America, then we will lose the potential for local genetic characteristics in plant populations. Many so-called species are actually composed of several distinct subspecific populations that are each adapted to particular ecological conditions. Because our understanding of such local variants is still quite limited, it is good to take a conservative approach and focus on local sources. But the number of potentially “native” species is often overwhelming, even with a narrow local definition of the word. Moreover, the complex history of nomenclature for some plants can add to the difficulties. Also, there are radically different human interests in the use of so-called native plants: botanical, with focus on native diversity; horticultural, with focus on aesthetic and practical aspects; and restorationist, with focus on ecological function. Thus, it is not surprising that confusion often reigns in the process of selection.

Specific examples of issues in “nativity” include the following. *Allium*: our truly native *canadense* is much less robust and showy than the midwestern *lanceolatum*, which is now widely cultivated across eastern states outside its original range.



Leaning bur oak, Lafayette Parkway, a remnant of thin woods (D, E)

Baptisia: many cultivated white plants are typical *alba*, which occurs to the SE, but our natives are *alba* var. *macrophylla* (= *B. leucantha*).
Cornus: for several decades the mostly widely propagated species for so-called native plantings in Kentucky have included *racemosa* (gray dogwood) and *stolonifera* (often dubiously named “*sericea*” or red-twig dogwood), but these occur mostly to the north and are rare to absent in most of Kentucky. Also, *ammomum* and *obliqua* are widely on uplands but their native habitats are wetlands and riverbanks. But the most typical upland species, *drummondii*, has only become popular within the past decade, due in part to efforts of this author.
Rhus: within *aromatica*, broadly defined, a cultivar named “Gro-Low” is widely grown in urban and residential landscapes since it mostly remains less than 3 feet tall; this cultivar appear to be derived from *aromatica* var. *serotina*, a distinct plant from SW of Kentucky.

Lists of species can guide restoration at sites where some degree of historical accuracy is desired. But the primary problem is that most species are not available from nurseries. And even if a species is available, identification on label can sometimes be erroneous. And there may be significant differences between varieties or between provenances of a species that are not dealt with in the nursery trade. There is an urgent need to develop small model projects using desired native plant material. Together with real botanical gardens, arboreta and discriminating nurseries, such projects should become local sources for plant material. Most importantly, they can allow essential ‘research and development’ to improve methods for restoration.

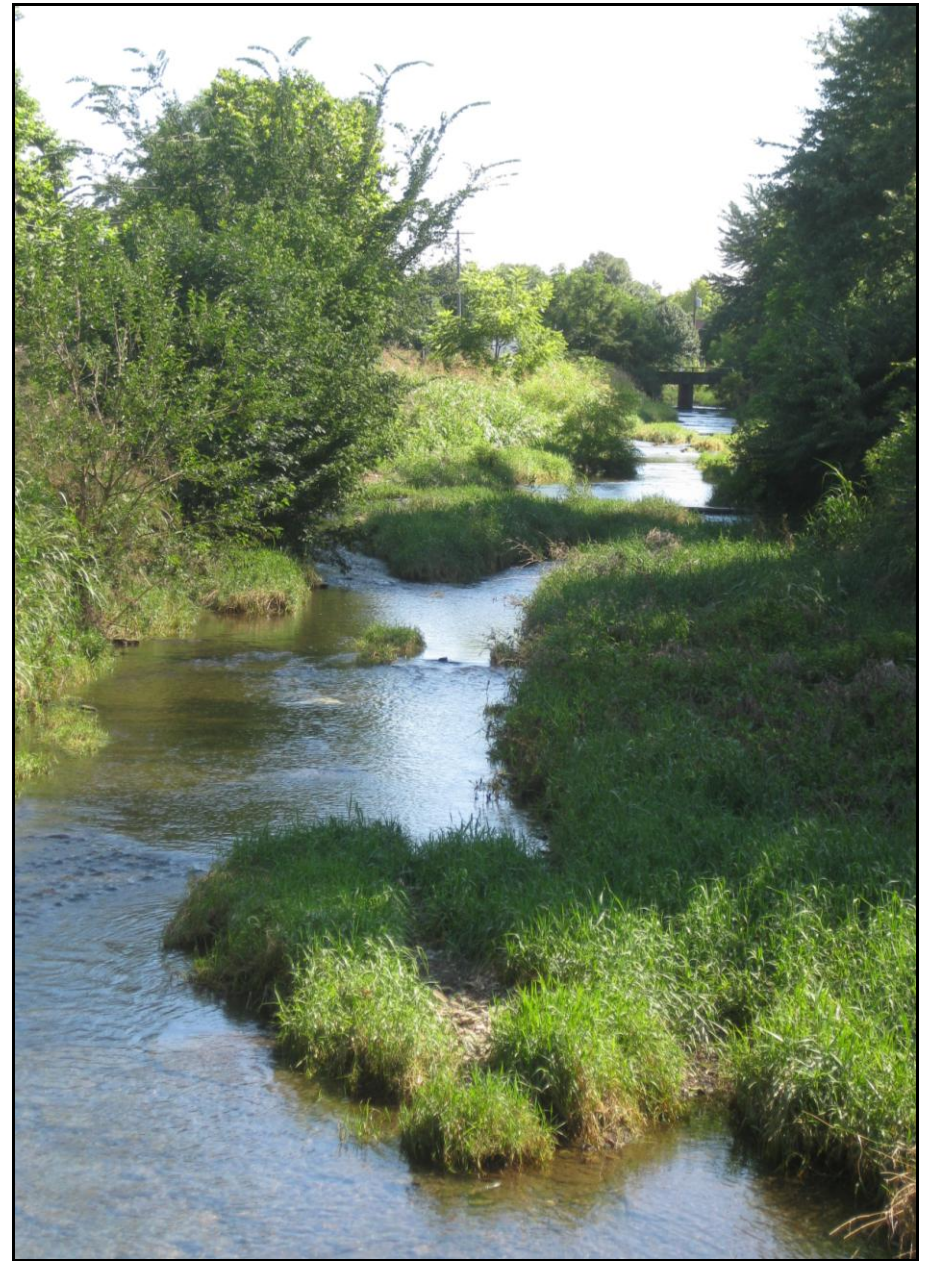
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Yellow highlighted species in following lists appear to be the most desirable in general for new plantings, based on following reasons.
1. These true natives are absent from most of the modern landscape.
2. They are aesthetically attractive in foliage, flower or fruit.
3. They are relatively “well-behaved” in cultivated situations, although some taller species (esp. in riparian and wetland habitats) and get too large and flop over along mowed edges.
4. They are relatively easy to propagate and naturalize in cultivation, with more or less robust form; however, some are still not available from local nurseries—contact this author for potential local sources.



Marsh-marigold (*Caltha palustris*) planted in Lexington wetland; this northern species has disappeared from Ky. and may succeed.



Wolf Run: riparian woods with boxelder, plus roughleaf dogwood in front. This vegetation has grown up by itself for decades.



Wolf Run: thin riparian woods plus much reed grass and tall dock. This view is adjacent to previous, looking upstream.

**GENERAL CONCEPT OF GRADIENTS
IN HYDROLOGY AND VEGETATION**
A-G: indicate the listed groups of species

**G: XERIC WOODS,
OPEN CLIFFTOPS**

F: MOST MESIC ROCKY WOODS	G: SUBXERIC ROCKY WOODS	E: XERIC-TEND- ING OPENINGS
C: DEEPER MESIC- SUBMESIC WOODS	D: INTERMEDIATE SUBMESIC WOODS	E: TYPICAL OPENINGS +CANE
A: RIPARIAN WOODS (alluvial soil)	B: SUBHYDRIC WOODS (varied soil)	B: HYDRIC-TEND- ING OPENINGS
A: THIN RIPARIAN WOODS +SHRUBS	B: THIN HYDRIC WOODS +SHRUBS	B: STAGNANT WATER +AQUATICS

(A) NATIVE RIPARIAN PLANTS OF THE CENTRAL BLUEGRASS REGION

Larger trees (also spreading onto uplands)

Acer negundo 2: boxelder

Acer saccharinum 2: silver maple; restricted in wild to larger streams

Platanus occidentalis 3: sycamore

Populus deltoides 4: cottonwood; restricted in wild to larger streams

Ulmus americana 2r: white (or American) elm

Small trees, shrubs and vines

Cornus drummondii 4r: roughleaf dogwood; also on uplands

Cornus obliqua 4: western silky dogwood

Salix caroliniana 5: southeastern willow, rocky river banks; uncomm.

Salix eriocephala 5: midwestern willow, rocky stream banks; rare

Salix interior 4: sandbar willow; varies on small versus large streams

Sambucus canadensis 4r: elderberry; especially ditches

Smilax hispida 3r: bristly greenbrier

Vitis vulpina 3r: fox grape

Ferns or allies

Equisetum arvense 5a: branched horsetail, uncommon

Aquatic and subaquatic herbs

Elodea canadensis, nuttallii 6: waterweeds; endangered

Justicia americana 6: water willow; riffles

Potamogeton foliosus, nodosus 6: pondweeds

Ranunculus longirostris 6: white water-buttercup; rare

Dicot herbs: not legumes or composites

Cryptotaenia canadensis 2: honewort

Epilobium coloratum 5: riparian willowherb

Fallopia scandens [*Polygonum*] 4: climbing buckwheat

Gaura biennis 5: biennial beeblossom; uncommon

Impatiens capensis 4: orange jewelweed; esp. seeps

Impatiens pallida 3r: yellow jewelweed; deeper woods

Laportea canadensis 2r: wood nettle; deeper woods

Lobelia siphilitica 5: great blue lobelia; and upl. transitions

Lysimachia ciliata 4: riparian loosetrife; uncommon

Mertensia virginica 2r: bluebells; uncommon

Monarda "serotina" 2r: lowland beebalm; rare

Phlox paniculata 3: tall phlox; larger streams

Phyla lanceolata 6: fogfruit

Persicaria lapathifolia, pensylvanica, punctata 6: knotweeds

Pilea pumila 2: clearweed (also *Urtica* in upland transitions)

Rumex altissimus 5: tall dock

Sicyos angulatus 4: bur cucumber

Stachys tenuifolia 2: lowland woundwort

Thalictrum pubescens 3a: meadow rue; rare

Zizia aurea 4: golden alexanders; uncommon, upland transitions

Dicot herbs: legumes (almost no typical species)

Apios americana 4a: potato bean; uncommon

Dicot herbs: composites

Helenium autumnale 5: broadleaved sneezeweed

Helianthus tuberosus 4: meadow sunflower; also uplands

Heliopsis helianthoides 4: ox-eye sunflower; upland transitions

Rudbeckia laciniata 4: cut-leaf coneflower

Silphium perfoliatum 4: cup-leaf rosinweed

Symphotrichum lanceolatum 3: white riparian aster

Symphotrichum prenanthoides 3a: blue streambank aster

Verbesina alternifolia 4: lowland wingstem; also on uplands

Monocots: graminoids

Allium canadense 3r: wild onion; mostly upland transitions

Carex blanda, grisea, jamesii: 2-3r: sedges, upland transitions

Carex emoryi 5: riparian sedge; uncommon.

Chasmanthium latifolium 3: wild oatgrass; larger streams

Eleocharis erythropoda 6: riparian spikerush

Elymus riparius 4a: riparian wild-rye; uncommon

Elymus virginicus 4: common wild-rye; with varieties

Muhlenbergia frondosa 3: riparian muhly grass

Phalaris arundinacea 5: reed grass; may be native

(B) NATIVE WETLAND PLANTS OF THE CENTRAL BLUEGRASS REGION

Larger trees (note general absence of pin oak, sweetgum)

Acer rubrum var. *trilobum* 2ah: swamp red maple; uncommon

Carya laciniosa 2h: lowland shagbark hickory; also on uplands

Celtis laevigata 2h: sugarberry, also hybrids with other *Celtis*; rare

Fraxinus pennsylvanica 2r: green ash; with varieties

Quercus bicolor 3: swamp white oak; uncommon

Quercus shumardii 3h: shumard oak; also on uplands

Salix nigra 4: black willow; especially ponds

Small trees, shrubs and vines

Cephalanthus occidentalis 4: buttonbush; ponds

Cornus amomum 4: eastern silky dogwood

Cornus stricta 4a: swamp dogwood; rare

Rosa palustris 4ah: swamp rose; uncommon

Rosa setigera 4h: prairie rose

Ferns and allies

Onoclea sensibilis 3ah: sensitive fern; uncommon

Aquatic and subaquatic herbs (excluding Lemnaceae)

Alisma subcordatum 6: water plantain

Heteranthera limosa & *reniformis* 6: mudplantains; rare

Ludwigia palustris 5a: common water primrose

Ludwigia peploides 5: southern water primrose

Sagittaria australis & *latifolia* 6: arrowroots

Saururus cernuus 3a: lizard-tail

Veronica anagallis-aquatica [a complex] 5: water speedwell

Zannichellia palustris 6: hornwort; floating aquatic

Dicot herbs: not legumes or composites

Asclepias incarnata 5: swamp milkweed

Boehmeria cylindrica 2h: water hemp

Cardamine bulbosa 2h: swamp cress

Chelone glabra 3ah: turtle-head; uncommon

Hibiscus moscheutos 5: rose-mallow

Lobelia cardinalis 4h: cardinal flower

Lycopus americanus 4h: cleft-leaved bugleweed

Lycopus virginicus 4ah: common bugleweed

Mentha canadensis 5h: wild (American) mint; rare

Mimulus alatus 5h: winged monkey-flower

Persicaria hydropiperoides 5: swamp smartweed

Ranunculus caricetorum 4h & *sceleratus* 6: buttercups

Rorippa palustris 6: marsh yellow-cress

Scutellaria lateriflora 5h: mad-dog skullcap; uncommon

Verbena hastata 5ah: swamp vervain; uncommon

Dicot herbs: composites

Bidens cernua 5h: nodding bur-marigold

Conoclinium coelestinum [*Eupatorium*] 4h: blue mist-flower

Eupatorium perfoliatum 5 & *serotinum* 5ah: bonesets

Eutrochium fistulosum [*Eupatorium*] 5ah: joe-pye weed

Packera aurea [*Senecio*] 3ar: golden ragwort, uncommon

Solidago gigantea 4r: lowland goldenrod (also riparian)

Symphyotrichum racemosum [*Aster*] 5h: lowland white aster

Monocots: non-graminoids (rare orchids not listed)

Arisaema dracontium 3h: green dragon; upland transitions, uncomm.

Monocots: graminoids

Carex conjuncta & *shortiana* 4-5h: sedges; esp. swales

Carex frankii & *vulpinoidea* 5: sedges; more open wet sites

Carex lupulina & *lupuliformis* 4: hop sedges; deeper swamp

Cinna arundinacea 3r: woodland reed-grass; larger valleys

Echinochloa muricata 6: rough barnyard-grass; dried shores

Eleocharis obtusa 6: common (blunt) spikerush; shores

Glyceria striata 4: fowl manna-grass

Iris virginica 3a: southern blue flag; uncommon

Juncus dudleyi & *effusus* 6&6a: rush, small & large tussocks

Leersia oryzoides 5: rice cutgrass

Schoenoplectus tabernaemontani 5: great bulrush

Scirpus atrovirens & *georgianus* 5&5a: common bulrushes

Typha latifolia 5: common cat-tail

(C) NATIVE PLANTS OF DEEPER UPLAND WOODS IN THE CENTRAL BLUEGRASS

Larger trees (note rarity of beech, tulip, sweet buckeye, basswood)

- Acer nigrum*** 1r: black maple
Acer saccharum 1x: sugar maple
Aesculus glabra 2: stinking (or Ohio) buckeye
Carya cordiformis 1: bitternut (or pignut) hickory
Fagus grandifolia 1A: (American) beech; uncommon
Fraxinus quadrangulata 2x: blue ash
Liriodendron tulipifera 2a: tulip poplar; uncommon
Quercus muehlenbergii 2: chinquapin oak
Tilia americana 1r: basswood; uncommon; with varieties
Ulmus rubra 2: red (or slippery) elm

Small trees, shrubs and vines

- Bignonia capreolata* 2: cross-vine
Carpinus caroliniana 2: hornbeam (or ironwood)
Euonymus americanus 2A: (American) strawberry bush
Hamamelis virginiana 3A: witch-hazel
Lindera benzoin 1: spicebush
Parthenocissus quinquefolia 2: Virginia creeper; common wood-vine

Ferns and allies

- Cystopteris protrusa*** 2: running fragile-fern
Dryopteris carthusiana 2: lowland wood-fern; rare
Polystichum acrostichoides 2a: Christmas fern

Herbs: not legumes or composites

- Agrimonia pubescens* & *rostellata* 2x&2: agrimonies
Antenoron virginianum 2 [*Polygonum*]: woodland knotweed
Asarum canadense 1 [with varieties]: wild ginger
Blephilia hirsuta 2: hairy wood-mint; uncommon
Cardamine douglasii 2x: purple cress
Circaea canadensis 2h: enchanter's nightshade
Collinsia verna 2: blue-eyed Mary; uncommon
Dentaria laciniata 2 [*Cardamine*]: cutleaf toothwort

- Dicentra canadensis* 1: squirrel corn
Dicentra cucullaria 1r: Dutchman's britches
Endodeca serpentaria [*Aristolochia*] 2ax: snakeroot
Enemion biternatum 1r: running (or false) rue anemone
Erigenia bulbosa 1: harbinger-of-spring
Epifagus virginiana 1A: beechdrops; rare
Euphorbia commutata 2x: common (or tinted) wood spurge
Galium triflorum 2: fragrant bedstraw
Geranium maculatum 2a: wood-geranium
Hydrastis canadensis 1Ax: goldenseal; rare
Hydrophyllum appendiculatum 2r: biennial waterleaf
Hydrophyllum canadense 1r: running waterleaf
Hydrophyllum macrophyllum 1x: rosette waterleaf
Impatiens pallida 2r: yellow (or pale) jewelweed; uncom.
Iodanthus pinnatifidus 2r: purple rocket
Jeffersonia diphylla 1x: twinleaf
Laportea canadensis 1r: wood-nettle; uncommon
Mertensia virginica 1r: bluebells; uncommon
Osmorhiza claytoni 2: hairy sweet-cicely
Panax quinquefolius 1A: ginseng; rare
Phlox divaricata 1: common woodland phlox
Phryma leptostachya 2: lopseed
Pilea pumila 2r: clearweed (or richweed)
Podophyllum peltatum 2 mayapple
Polemonium reptans 1: Jacob's ladder
Ranunculus hispidus, micranthus 2,2x: buttercups
Sanguinaria canadensis 1: bloodroot
Sanicula odorata [*gregaria*] 2: sanicles
Scutellaria elliptica, nervosa 2,2ax: skullcaps
Silene stellata 2x: starry campion
Stellaria corei, pubera 1,1A: star chickweeds
Thalictrum thalictroides 1a [*Anemonella*]; rue anemone
Vicia caroliniana 3Ax: wood-vetch; uncommon
Viola pubescens 1: hairy stemmed-yellow violet
Viola sororia 1,2x: hairy stemless-blue violets

Dicot herbs: legumes (just one uncommon species)

Hyladesmum pauciflorum 2 [*Desm.*]: creeping wood-trefoil

Dicot herbs: composites

Eutrochium purpureum: 2: wood joe-pye-weed

Helianthus decapetalus 3: deep-woods sunflower

Nabalus altissimus 2 [*Prenanthes*]: common wood-lettuce

Solidago caesia 2A: blue-stemmed goldenrod

Solidago flexicaulis 1: zigzag-stemmed goldenrod

Symphotrichum cordifolium 2: common wood aster

Symphotrichum shortii 2x: midwestern wood aster

Monocots: non-graminoid (excluding rarer orchids)

Arisaema triphyllum 1: Jack-in-the-pulpit

Dioscorea quaternata 2ax: whorled yam

Erythronium americanum 1: yellow trout-lily

Erythronium albidum 1xh: white trout-lily*

Goodyera pubescens 3a: rattlesnake plantain; rare

Polygonatum biflorum 2ax: Solomon's seal

Tipularia discolor 2a: crane-fly orchid; rare

Trillium sessile 2: sessile trillium

Uvularia perfoliata 2ax: lesser bellwort

Monocots: graminoids

Brachyelytrum erectum 1a: beech grass

Camassia scilloides 2: wild hyacinth; uncommon

Carex communis, *hirtifolia*, *laxiflora* 1x,1,1a: sedges

Carex jamesii, *oligocarpa*, *rosea*: 2,2x,2x: sedges

Festuca subverticillata 2 [*obtusa*]: wood fescue

Poa sylvestris 2: wood bluegrass



Impatiens pallida (yellow jewelweed, above) and *Laportea canadensis* (wood-nettle, below): herbs of deeper woods.

(D) NATIVE PLANTS OF INTERMEDIATE UPLAND WOODS IN THE CENTRAL BLUEGRASS

D

Larger trees (note rarity of persimmon, sassafras, pines)

Carya laciniosa 2h: lowland shagbark hickory

Carya ovata 2x: upland shagbark hickory

Celtis occidentalis 3: hackberry

Fraxinus americana 3: northern white ash

Fraxinus biltmoreana 3x: southern white ash

Gleditsia triacanthos 4: honey-locust

Gymnocladus dioica 3: coffee tree

Juglans cinerea 4a: white walnut (butternut); rare

Juglans nigra 4: black walnut

Morus rubra 3: red mulberry

Prunus serotina 4: black cherry

Quercus imbricaria 4xh: shingle oak

Quercus macrocarpa 4: bur oak

Quercus shumardii 3: shumard oak

Robinia pseudoacacia 4: black locust

Ulmus americana 3r: white (or American) elm

Small trees, shrubs and vines

Arundinaria gigantea 4: cane; uncommon

Asimina triloba 3: pawpaw

Campsis radicans 4: trumpet-creeper

Celastrus scandens 4x: bittersweet

Cornus drummondii 4: roughleaf dogwood

Corylus americana 4a: hazel; rare, much declined?

Euonymus atropurpurea 3: (American) spindle

Frangula caroliniana 4 [*Rhamnus*]: (Carolina) buckthorn

Phoradendron leucocarpum 3: (eastern) mistletoe

Prunus americana 3: common wild plum

Ptelea trifolia 4x: hop-tree; uncommon

Rubus occidentalis 4: black raspberry

Sambucus canadensis 4r: elderberry

Smilax bona-nox 4x: saw-briar

Smilax hispida 3r: bristle-brier

Symphoricarpus orbiculatus 4: coralberry

Toxicodendron radicans 3: poison-ivy

Viburnum prunifolium & *rufidulum* 3&3x: blackhaws

Vitis vulpina 3r: fox grape

Zanthoxylum americanum 4x: prickly ash; uncommon

Ferns and allies

Asplenium platyneuron 3x: ebony spleenwort

Botrychium virginianum 3 [*Botrychium*]: rattlesnake fern

Sceptridium dissectum 3a [*Botrychium*]: grape fern

Herbs: not legumes or composites

Agastache nepetoides 4: yellow giant hyssop

Anemone virginiana 3x: tall wood anemone (thimbleweed)

Blephilia ciliata 4x: downy wood mint

Campanula americana 4: tall bell-flower

Cerastium nutans 4r: nodding chickweed; uncommon

Chaerophyllum procumbens 3: wood chervil

Claytonia virginica 3: spring beauty

Corydalis flavula 3: (eastern) corydalis

Galium aparine 3: common bedstraw; probably native

Geum vernum 3: early avens

Hackelia virginiana 3: biennial comfrey

Impatiens capensis 4r: orange jewelweed

Menispermum canadense 4: northern moonseed

Myosotis macrosperma 3: wood forget-me-not

Osmorhiza longistylis 3: smooth sweet-cicely

Passiflora lutea 3: lesser passion-flower

Perideridia americana 3x: eastern yampa; rare

Phacelia purshii 3: Miami mist

Physaria globosa 4x [*Lesquerella*]: bladder-pod; rare

Phytolacca americana 4: poke-weed

Persicaria punctata 4r [*Polygonum*]: white smartweed

Plantago rugelii 4: purple-stalked plantain

Prunella lanceolata 4: (American) self-heal

Ranunculus abortivus 3: smooth lesser buttercup

Ranunculus recurvatus 4: recurved buttercup

Ruellia strepens 4: lowland petunia
Salvia lyrata 4a: lyre-leaved sage
Sanicula canadensis 3: common sanicle
Scrophularia marilandica 3: common fig-wort
Scutellaria incana 4a: greater skullcap
Teucrium canadense 4: (American) germander
Thalictrum pubescens 4ar: lowland meadow-rue; uncom.
Urtica chamaedryoides & *gracilis* 3,4r: nettles; much declined?
Valerianella radiata 3: common corn-salad
Verbena urticifolia 4: white vervain
Viola papilionacea 4: common stemless-blue violet
Viola striata 3: stemmed-white violet

Dicot herbs: legumes (only one common nitrogen-fixer)

Amphicarpaea bracteata 4: peavine; much declined
Desmodium paniculatum 4a: narrow-leaved tick-trefoil
Orbexilum onobrychis 4x [*Psoralea*]: broadleaf scurfpea; rare
Trifolium kentuckiense 3x: Kentucky clover; highly endangered
Trifolium stoloniferum: 3h: running buffalo clover; endangered

Dicot herbs: composites

Ageratina altissima 2 [*Eupatorium*]: white snakeroot
Elephantopus carolinianus 3: common elephant's foot
Fleischmannia incarnata 4 [*Eupatorium*] pink mist-flower; unc.
Helianthus tuberosus 4r: meadow sunflower
Lactuca biennis & *floridana* 4&3: wild lettuces
Nabalus crepidineus 3 [*Prenanthes*]: giant wood-lettuce; rare
Rudbeckia triloba 4: three-lobed coneflower
Silphium trifoliatum 4ax: whorled rosin-weed; uncommon
Smallanthus uvedalius 3 [*Polymnia*]: yellow leafcup
Symphotrichum lateriflorum & *ontarione* 3ar&4: asters
Verbesina alternifolia 4r: lowland wingstem
Verbesina occidentalis 4a: opposite-leaved wingstem
Verbesina virginica 4: white wingstem

Monocots: non-graminoids

Arisaema dracontium 3h: green dragon; uncommon
Liparis liliifolia 3a: lily-leaved twayblade
Lilium michiganense 4: midwestern lily; much declined?
Polygonatum commutatum 3r: greater Solomon's seal
Smilax herbacea s.l. 3: carrion-flower
Spiranthes ovalis 3a: wood ladies-tresses; uncommon

Monocots: graminoids

Allium canadense 3r: wild onion
Carex blanda & *grisea* 3: more common sedges
Carex davisii, *normalis* & *sparganioides* 4,3,3: less common
Dichanthelium clandestinum 4 [*Panicum*]: broadleaf panic
Elymus macgregorii, *villosus*, *virginicus* 3,3x,4: wild ryes
Leersia virginica 3: common rice-grass
Muhlenbergia schreberi 3: nimble-will
Sphenopholis intermedia 3r: lowland wedgescale-grass; uncommon

(E) NATIVE PLANTS OF OPEN UPLANDS IN THE C.B.G.

Small trees, shrubs and vines (also cane, coralberry, and other species that occur at edges in 'intermediate woods'; esp. trees like bur oak)

Crataegus crus-galli 4x: cock-spur hawthorn

Crataegus mollis 4: downy large-leaved hawthorn

Crataegus pruinosa 4a: smooth large-leaved hawthorn

Prunus munsoniana 4: midwestern plum; uncommon

Rhus glabra 4: smooth sumac

Rosa setigera 4xh: prairie rose

Rubus flagellaris 5: dewberry

Rubus pensilvanicus 5: blackberry

Herbs: not legumes or composites

Apocynum cannabinum 5xr: Indian hemp

Asclepias syriaca 5: common milkweed

Asclepias tuberosa 5ax: orange milkweed

Asclepias viridis 5xh: green milkweed

Calystegia fraterniflorus 5 [*Convolvulus*]: bindweed

Cynanchum laeve 5: climbing milkweed

Fragaria virginiana 5x: wild strawberry

Gaura biennis 5r: biennial bee-blossom

Houstonia lanceolata 5x: lance-leaved bluets

Hypericum punctatum 4: dotted St. John's wort

Ipomaea hederacea 6: blue morning-glory; spread from south

Ipomaea lacunosa: 6r: small white morning-glory

Lobelia siphilitica 5r: great blue lobelia

Monarda fistulosa 5x: common bee-balm

Oenothera biennis: 6: common evening-primrose

Onosmodium hispidissimum 5x: gromwell; endangered

Physalis heterophylla & *subglabrata* 5: ground-cherries

Penstemon calycosus & *digitalis* 5x&5h: beard-tongues

Persicaria erecta 6: domestic knotweed; seeds are edible

Persicaria lapathifolia & *pennsylvanica* 6h: smartweeds

Solanum carolinense 5: horse-nettle

Dicot herbs: legumes (only two common species)

Senna marilandica 5 [*Cassia*]: common senna (no N-fixation)

Desmanthus illinoensis 5r: prairie mimosa; rare

Desmodium perplexum 5: old-field tick-trefoil

Dicot herbs: composites (minus ragweed, other annuals)

Astranthium integrifolium 5: glade daisy; rare

Brickellia eupatorioides 5x: alternate-leaved boneset

Cirsium discolor 5: old-field thistle

Conoclinium coelestinum 5h [*Eupatorium*]: blue mist-flower

Eupatorium altissimum 5x: midwestern boneset

Helianthus grosseserratus 5: saw-tooth sunflower; uncommon

Heliopsis helianthoides 5: oxeye sunflower

Ratibida pinnata 5x: gray-headed coneflower; uncommon

Rudbeckia serotina 5: (western) annual coneflower

Solidago altissima 5: (eastern) old-field goldenrod

Symphotrichum novae-angliae 5: great purple (New England) aster

Symphotrichum pilosum 5: old-field (little white) aster

Vernonia gigantea 5: common ironweed

Monocots: non-graminoids

Spiranthes gracilis & *vernalis* 5a&5axh: ladies-tresses

Monocots: graminoids (excluding some annuals)

Andropogon virginicus 5a: old-field broomsedge (a grass)

Carex aggregata & *mesochorea* 5: common upland sedges

Carex brevior (rare) & *molesta* 5&5hx: Ovales sedges

Carex annectans 5xh, *granularis* 5h, *leavenworthii* 5hx

Cyperus esculentus, *squarrosus*, *strigosus* 6hx: flatsedges

Dichanthelium acuminatum 5a: narrowleaf panic grass

Eragrostis spectabilis 5a: showy lovegrass

Panicum anceps 5a: old-field fall-panic grass

Panicum capillare & *gatingeri* 6: annual fall-panic grasses

Paspalum laeve, *setaceum*, *pubiflorum* 5a,6,5: lens-grasses

?*Poa angustifolia* 5: narrow-leaved bluegrass; native race?

Setaria parviflora 5: perennial foxtail grass

Sisyrinchium angustifolia 5: blue-eyed grass

Sporobolus compositus 5x: common dropseed-grass

Tridens flavus 5: grease-grass (or purple-top)

(F) NATIVE PLANTS OF MESIC ROCKY SLOPES S
IN RAVINES OF THE CENTRAL BLUEGRASS S

Larger trees (much mixed with sugar maple and others of C)

Aesculus flava 2: sweet buckeye, locally abundant in eastern sections
Cladrastis kentuckea 3x: yellow-wood, esp. northeast-facing cliffs
Quercus rubra 1a: northern red oak, locally dominant on upper slopes
Tilia americana 1: basswood (or linden, lin); with varieties

Small trees, shrubs and vines

Cornus alternifolia 1; alternate-leaved dogwood; uncommon
Dirca palustris 2x; leatherwood; upper slopes & riparian transitions
Hydrangea arborescens 1: wild hydrangea
Ribes cynosbati 2x: eastern gooseberry
Staphylea trifolia 1x: bladder nut; mostly in dry transitions
Viburnum molle 1: roundleaved arrowwood; rare
Viburnum deamii 3 [*dentatum* var.]: interior arrowwood; rare

Ferns and allies

Adiantum pedatum 1: maidenhair fern
Asplenium rhizophyllum 1: climbing fern; ledges
Cystopteris bulbifera 2: bulblet fern; cliffbases
Dryopteris marginalis 1: marginal wood-fern; ledges
Homamosorus pycnocarpus 1r [*Athyrium*]: glade fern

Herbs: not legumes or composites

Actaea pachypoda 1 [*alba*]: doll's eyes
Eurybia divaricata 1a [Aster]: white wood aster; uncommon
Eurybia macrophylla & *schreberi* 1 [Aster]: broad-leaved aster; rare
Caulophyllum thalictroides 1: blue cohosh
Collinsonia canadensis 2: horse-balm
Delphinium tricorne 2x: wood larkspur
Dentaria diphylla 1 [Cardamine]: broad-leaved toothwort
Euonymus obovatus 1x: running strawberry-bush
Galium circaezans 2 & *concinnum* 2x: upland bedstraws
Hepatica acutiloba 1 [Anemone]: common hepatica
Heuchera americana & *macrorrhiza* 2x: alumroots

Hybanthus concolor 2x: green violet
Mitella diphylla 1r: bishop's cap
Oxalis grandis 2 & *illinoensis* 2x: yellow woodsorrels
Phacelia bipinnatifida 2: purple phacelia
Sanicula trifoliata 1: beaked sanicle
Saxifraga virginensis 1x: common saxifrage; ledges
Sedum ternatum 1: wood stonecrop
Silene rotundifolia 2: round-leaved catchfly; under cliffs
Stylophorum diphylla 1: yellow wood-poppy
Synandra hispidula 2r: synandra (or wood dragonhead)
Thalictrum dioicum 1x: wood rue
Thaspium barbinode 2x & *trifoliatum* 2r: wood-parsnips
Triosteum angustifolium 2x: narrow-leaved horse-gentian
Valeriana pauciflora 1r: valerian
Viola canadensis 1: stemmed white violet; uncommon

Dicot herbs: legumes (only one uncommon species)

Hyladesmum glutinosum 2 [*Desmodium*]: greater wood-trefoil

Dicot herbs: composites

Polymnia canadensis 2x: fragrant bears-foot

Monocots: non-graminoids

Allium tricoccum & *burdickii* 1,1x: ramps; uncommon
Maianthemum racemosum 1 [*Smilacina*]: Solomon's plume
Polygonatum pubescens 1: hairy Solomon's seal
Tradescantia subaspera 2x,r: broad-leaved spiderwort
Trillium flexipes 1: nodding trillium
Uvularia grandiflora 1: greater bellwort

Monocots: graminoids

Carex albursina, *careyana*, *plantaginea* (rare): lax-sedges
Carex hitchcockiana 2x: a sedge
Poa autumnalis 2ar & *cuspidata* 2ax: wood bluegrasses

(G) NATIVE PLANTS OF SUBXERIC SLOPES, BLUFFS & NEARBY RIDGES IN THE CENTRAL BLUEGRASS

Larger trees

Acer saccharum 1m: sugar maple; common in transitions
Carya glabra 2A: pignut hickory; uncommon (also hybrids × *ovata*).
Carya ovata 2s: shagbark hickory; esp. upper slopes
Carya tomentosa 3A: mockernut hickory; uncommon
Diospyros virginiana 4A: persimmon; uncommon
Fraxinus americana 3m: northern white ash
Fraxinus biltmoreana 3: southern white ash
Fraxinus quadrangulata 2: blue ash
Juniperus virginiana 4x: red cedar; esp. xeric or seral
Nyssa sylvatica 2A: blackgum; rare
Quercus alba 2A: white oak; formerly common on ridges
Quercus stellata 4a: post oak; uncommon
Quercus imbricaria 4a: shingle oak; uncommon
Quercus velutina 3A: black oak; uncommon
Quercus muehlenbergii 2: chinquapin oak
Quercus shumardii 3m: shumard oak
Sassafras albidum 3A: sassafras; uncommon except on ridges
Ulmus thomasii 2: rock elm

Small trees, shrubs and vines

Amelanchier arborea 3A: serviceberry; uncommon
Ceanothus americanus 4A: New Jersey tea; rare
Celastrus scandens 4: bittersweet; esp. upper edges
Celtis tenuifolia 4: dwarf hackberry
Cercis canadensis 4: redbud
Cornus florida 3A: flowering dogwood
Frangula caroliniana 4 [*Rhamnus*]: (Carolina) buckthorn
Lonicera dioica & *prolifera* 3,4: honeysuckles; uncommon & rare
Ostrya virginiana 1: esp. gentler slopes above cliffs
Physocarpus opulifolius 4: ninebark, esp. clifftops
Prunus americana 3: common wild plum; disturbed areas
Ptelea trifoliata 4: wafer-ash, esp. clifftops
Rhus aromatica 4: aromatic sumac

Ribes cynosbati 3m: eastern gooseberry
Ribes missouriensis 4: midwestern gooseberry; rare
Rosa carolina 3a: upland rose; ledges back from cliffs
Smilax bona-nox 4: saw-briar
Staphylea trifolia 2m: bladder-nut, mesic transitions
Symphoricarpus orbiculatus 4m; coral-berry, disturbed areas
Viburnum rufidulum 4: rusty blackhaw
Viburnum rafinesquianum 3: sessile arrow-wood; clifftops
Zanthoxylum americanum 4: prickly-ash; esp. clifftops.

Ferns and allies

Asplenium resiliens & *ruta-muraria* 2,3: spleenworts; cliffs
Pellaea atropurpurea 2 & *glabella* 3: purple cliffbrake
Pleioptelis polypodioides 3 [*Polypodium*]; resurrection-fern
Woodsia obtusa 2: common clifftop-fern

Herbs: not legumes or composites

Aquilegia canadensis 3: columbine
Asclepias quadrifolia 2: fourleaved milkweed
Blephilia ciliata 4m: downy wood mint
Boechera laevigata [*Arabis*] 2: rock-cress
Cerastium velutinum 3: clifftop chickweed; rare
Chenopodium standleyanum 3m: wood pigweed
Clematis viorna 4: leather-flower; upper ledges
Corydalis flavula 3m: (eastern) corydalis
Cynoglossum virginianum 3A: wild comfrey
Dasistoma macrophylla 3: mullein-foxglove
Delphinium tricorne 2m: wood larkspur
Dodecatheon meadia 3: shooting-star
Draba ramosissima 3: cliff-crevices
Euphorbia commutata 2x: common (or tinted) wood spurge
Frasera caroliniensis 3: columbo
Heuchera macrorrhiza 3: lime alumroot; cliff-crevices
Houstonia nigricans 6 [*Hedyotis*]: bushy bluets; cliff-crevices
Jeffersonia diphylla 2m: twinleaf
Minuartia patula 6 [*Arenaria*]: limerock stitchwort; cliff-crevices
Oxalis violacea 3A: violet wood-sorrel

Parietaria pennsylvanica 3m: pellitory

Penstemon hirsutus 4: limecliff beardtongue; ledges

Phlox bifida 4: cleft phlox; rare, clifftops on rocky points

Polygala lonchophylla 2m: broadleaf seneca-snakeroot

Sedum pulchellum 6: pink stonecrop; ledges

Silene stellata 2m:

Silene virginica 3: firepink

Silene wherryi [*caroliniana*] 3a: firepink

Taenidia integerrima 2: yellow pimpernel

Thaspium barbinode 2m [s.l.]: dissected wood parsnip

Thalictrum dioicum 1m: wood rue

Triosteum aurantiacum 2m: velvety horse-gentian

Tradescantia virginiana 3a: upland spiderwort

Veronicastrum virginicum 4a: culver's root; rare

Viola palmata 3A [*triloba*]: three-lobed blue-stemless-violet

Viola subsinuata ["*palmata*"] 3: dissected blue-stemless-violet

Zizia aptera 4: upland golden-alexanders; esp. upper slopes

Dicot herbs: legumes (only one common N-fixer)

Desmodium cuspidatum 4a: large-leaved ticktrefoil; rare

Lespedeza frutescens 4a ["*violacea*"]: lime bush-clover

Trifolium kentuckiense 3m; Kentucky clover; endangered

Dicot herbs: composites

Antennaria plantaginea 2A: pussy toes

Helianthus hirsutus 5a: hairy upland sunflower

Helianthus microcephalus 3a: small-headed sunflower

Packera obovata 2m [*Senecio*]: upland ragwort

Polymnia canadensis 2m: fragrant bears-foot

Rudbeckia tenax 5: glade coneflower; uncommon

Solidago sphecelata 3: limecliff goldenrod; ledges

Solidago ulmifolia 2m: elm-leaved goldenrod

Symphyotrichum oblongifolium 5 [*Aster*]: clifftop purple aster

Symphyotrichum shortii 3m: midwestern wood-aster

Monocots: non-graminoids

Erythronium albidum 1m: white trout-lily

Hexalectris spicata 3a: crested coral-root; rare

Monocots: graminoids

Allium cernuum 5: nodding wild-onion

Bromus pubescens 2m: upland wood-brome-grass

Carex albicans, *pennsylvanica*, *communis* 1-2; sedges

Carex eburnea 4: limecliff sedge; ledges

Carex platyphylla 2m & *striatula* 4A: lax-sedges

Chasmanthium latifolium 3: wild oatgrass

Danthonia spicata 4A: poverty-grass

Diarrhena americana 1m: two-stamened wood-grass

Dichanthelium boscii 3A: broadleaved wood-panicgrass

Elymus hystrix 2m: bottlebrush grass (or glumeless wild-rye)

Elymus svensoni 3: clifftop wild-rye; locally common

Melica mutica 3m: southern melic-grass

Melica nitens 4: midwestern melic-grass; rare

Muhlenbergia sobolifera 2: limestone wood-muhlygrass

Nothoscordium bivalve 4: crowpoison

Panicum flexile 6: limestone fall-panicgrass

Poa cuspidata 2am: early wood-bluegrass

Schizachne purpurascens 2: northern melic-grass; rare, rocky points

Sphenopholis nitida 3A: upland wedgescale-grass

SOURCES OF IMAGES AND FOOTNOTES

Cover: mouth of Jessamine Creek at Kentucky River, 2009 Jun 27 [photo by Julian Campbell].

Map of Region: based on the STATSGO data of USDA's Natural Resources Conservation Service. Their mapped "soil associations" are assembled here as follows.

1. Central Bluegrass Uplands and similar land in southeastern Bluegrass: Caleast-Maury-Nicholson; Lowell-Faywood-Nicholson; Lowell-Shelbyville-Faywood; Maury-McAfee-Huntingdon; and Shelbyville-Nicholson-Lowell.
2. More hilly land near rivers or in transitions to Eden Shale: Cynthiana-Faywood-Lowell; Lowell-Faywood-Eden; and McAfee-Fairmount-Maury.
3. Eden Shale Hills: Culleoka-Eden-Lowell; Eden-Lowell-Faywood; and Lowell-Faywood-Eden.

Leaning bur oak: photo of JC ca. 1979. The tree was taken down in the 1980s. It was one of the last ancient trees in the headwaters of Wolf Run, which drains the Southland area.

Wolf Run: from bridge at center of Valley Park in Lexington, Fayette County, 2013 Jul 28 [photos by Julian Campbell]. Left (downstream): stream corridor is continuous with corridor below Preston Spring Park. Right (upstream): stream corridor is more open, with long history of mowing and probably grazing in past decades; in addition to dominant *Phalaris arundinacea*, the native *Rumex altissimus* is unusually common, but aliens are also abundant (e.g. *Conium maculatum* and *Sorghum halepense*)
Soils in general are transitional from typical riparian conditions to somewhat poorly drained (Egam silty clay loam).

Gradient Diagram. This has evolved from several previous reports and the initial analysis of Campbell [1987: Gradients of species composition in the Central Hardwood Forest. Proceedings of the Sixth Central hardwood Forest Conference, p. 325-346. University of

Tennessee, Knoxville, Tennessee]. For examples of recent expanded versions, see:

1. http://bluegrasswoodland.com/uploads/Atlas-Introduction___Explanation.pdf
2. http://bluegrasswoodland.com/uploads/Jessamine_Gorge_Report.pdf

Impatiens pallida: by Jerry Wright at http://herbarium.biol.sc.edu/herb/II/Impatiens_pallida3.jpg

Laportea canadensis: by Per Verdonk at <http://perverdonk.com/wild%20flowers/Nettle/...>

Woodland along the Kentucky River: photo of JC from cliff top south of mouth of Jessamine Creek, 2009 May 18th

Images in Appendix

Amorpha fruticosa

http://www.wildflower.org/image_archive/640x480/PCD3947/PCD3947_IMG0034.JPG
<http://www.sbs.utexas.edu/bio406d/images/pics/fab/Amorpha%20fruticosa%20leaf.jpg>

Cephalanthus occidentalis

<http://www.jeffpippen.com/plants/cephalanthus050702-4859noz.jpg>
<http://www.carolinanature.com/trees/ceoc210542.jpg>

Cornus amomum

<http://www.hort.uconn.edu/plants/c/coramo/coramo03.jpg>
http://farm4.staticflickr.com/3616/3614097074_455525fa37_o.jpg

Cornus obliqua

http://www.illinoiswildflowers.info/trees/photos/sw_dgwd3.jpg
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Cornus stricta

<http://www.carolinanature.com/trees/cofo3927.jpg>

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Rosa palustris

http://www.plantsystematics.org/users/kcn2/7_12_05/2005_07_10_up2/DSC_8847.JPG.8.jpg

http://www.fs.fed.us/wildflowers/plant-of-the-week/images/swamprose/swamp_rose_lg.jpg

Rosa setigera

<http://www.cas.vanderbilt.edu/bioimages/r/wrose2-twthorns13020.jpg>

Salix caroliniana

http://www.dcr.virginia.gov/natural_heritage/natural_communities/images/Salix_caroliniana_400.jpg

<http://pics.davesgarden.com/pics/2006/03/26/lilwren/2728db.jpg>

Salix eriocephala

<http://www.kgnaturephotography.com/photos-wetland-plants/shrubs-vines/slides/Salix-eriocephala--wooly-headed-willow-1.JPG>

http://www.wildflower.org/image_archive/640x480/RWS/RWS_IMG1386.JPG

Salix interior

http://www.illinoiswildflowers.info/trees/photos/sb_willow1.jpg

http://www.flore laurentienne.com/flore/Groupes/Spermatophytes/Angiospermes/Dicotyles/015_Salicacees/images/Salix_sp_002_950.jpg

Salix nigra

<http://www.cas.vanderbilt.edu/bioimages/s/wsani--lf23007.jpg>

http://delawarewildflowers.org/images/salix_nigra.jpg



Woodland along the Kentucky River downstream from Jessamine Creek, including (from left to right) riparian woods with line of taller silver maples (1), woods on submesic terraces (3), mesic ravine slopes (6) and subxeric-xeric bluffs (7)