

SPECIES: Priorities for Micromanagement of Rare Plants and Alien Plants

Floristic List

Appendix One provides a list of the total observed flora in the Goebel (2007), Kinney (2009-2010), Durham (2010-11) tracts, Miller and Byler (2014) tracts. The list is largely complete, except that the early growing season (Mar-May) still deserves more attention to survey the distribution of species that are more ephemeral or impossible to identify later; *Carex* spp. in particular will deserve further attention. Approximately 400 species have been observed on the Miller and Byler tracts, but another 50-100 can probably be added in the future. The total current list for all WKU tracts numbers about 670. Hart County as a whole has at least 920 recorded species, but only about half of these are supported by specimens in herbaria. Nomenclature mostly follows Jones (2005), but still with broad genus concepts in some cases, and will need to be updated with modern phylogeny. Differences from Jones are noted in the right-hand column (with “@” after names), and further taxonomic notes can be found in Campbell & Medley (2012).

Several reported species need further verification, ideally with collections for the herbarium. Some of these records would be notable new county records or other range extensions for the following species: *Aesculus flava*, *Aureolaria* spp., *Heuchera parviflora*, *Melica nitens*, *Penstemon hirsutus*, *Trillium cuneatum*, *T. recurvatum*, *Viola rostrata*. Some uncertainty also results from the recent planting of several species at the preserve, especially in the fields. It would be advisable to record the details of all plantings so that botanists in future will be able to understand the remnants of native vegetation, as distinct from the planted vegetation.

The flora is typical for calcareous regions in south-central Kentucky, but at higher elevations there appears to be more influence of sandy soils, with distinct local shifts in the flora and vegetation. Most of these areas have been heavily logged and largely cleared in the past, but some trends can be noted. Acid-loving trees and shrubs that occur much more often on more sandy soils include: *Liriodendron tulipifera* (locally dominant in young mesic woods), *Pinus virginiana* (locally frequent in young woods), *Carya glabra*, *C. tomentosa*, *Sassafras albidum*, *Gaylussacia baccata* and *Vaccinium* spp. (*arboreum*, *stamineum* and *pallidum*, generally uncommon and restricted to sandy soils). Typical oaks on these soils include *Q. alba*, *Q. velutina* and locally *Q. montana* (including Kinney & Durham but not Goebel); also, *Q. coccinea* reportedly occurs on adjacent WKU land.

Herbaceous species characteristic of more acid soils in these woods on most tracts include *Aureolaria virginica*, *Carex cumberlandensis**, *C. digitalis**, *Desmodium* spp. (especially *rotundifolium* and *paniculatum**), *Hypericum stragulum*, *Iris cristata**, *Lespedeza procumbens**, *Potentilla simplex**, *Pycnanthemum pycnanthemoides*, *Scutellaria incana*, *Solidago* cf. *hispida* and *Symphotrichum dumosum*. Added species of this type that were found on the Kinney and Durham tracts include *Angelica venenosa*, *Carex* cf. *nigromarginata*, *Dentaria* cf. *heterophylla*, *Hypoxis hirsuta*, *Symphotrichum undulatum*, *Tiarella cordifolia**, *Uvularia perfoliata* and *Viola hirsutula*. Added species on the Goebel Tract included *Chimaphila maculata*, *Helianthus microcephalus**, *Lycopodium digitatum*, *Lysimachia quadrifolia*, *S. juncea*. Only a few of these species have been recorded on the Miller or Byler tracts at Lawler Bend (marked by asterisks*). Several of these species are close to the western edges of the ranges, at least within Kentucky.

A few largely Appalachian species within Kentucky occur along this section of the Green River corridor: *Aesculus flava*, *Aralia spinosa*, *Polygonatum pubescens*, *Tiarella cordifolia*, *Uvularia perfoliata*, *Viola rostrata*. However, these species are generally uncommon here, and tend to be absent from areas closer to the karst plain. The only one that has been found at Lawler Bend is *Tiarella*. *Aesculus flava* is remarkably absent at Lawler Bend; this tree is locally frequent two miles to the west, but reaches a local range limit here along the river.

In calcareous subxeric to xeric woods at Lawler Bend, there are several uncommon to rare species: *Carya carolinae-septentrionalis*, *Dodecatheon meadia* (esp. cliff ledges), *Houstonia canadensis*, *Hypericum dolabriforme*, *Lithospermum canescens*, *L. tuberosum*, *Manfreda virginica*, *Nothoscordium bivalve*, *Opuntia cespitosa*, *Oxalis* cf. *macrantha* (to be determined), *Phlox bifida*, *Sideroxylon lycioides*, *Zanthoxylum americanum*. More mesic calcareous sites at Lawler Bend include *Delphinium tricorne*, *Dirca palustris*, *Euonymus obovatus*, *Jeffersonia diphylla* and *Trillium flexipes*. Calcareous toeslopes and riparian zones provide a few more rare species: *Aureolata patula*, *Nabalus crepidineus*, *Solidago rupestris*.

There is, however, a remarkable paucity of species that were formerly associated with thin open woodland or grassland on deeper soil, where open conditions were maintained by burning and browsing before settlement. Among sun-loving woody plants, the complete absence of records for *Crataegus* and *Malus* is notable. And there are virtually no records of species typical of the original native grassland on the karst plain (e.g., *Desmodium sessilifolium*, *Echinacea purpurea*, *Helianthus mollis*, *Lespedeza capitata*, *Silphium pinnatifidum*). In contrast, some species in this section of the Green River corridor are typical of ‘xeric limestone prairie’ or similar rocky habitats; see above under vegetation class G.



Lawler Bend: foam-flower (*Tiarella cordifolia*) in mesic woods on low bench near river. In Kentucky, this species is largely Appalachian and typical of medium-acid soils.



Lawler Bend: running strawberry bush (*Euonymus obovatus*) in mesic woods on talus slope below limestone cliffs. In Kentucky, this species occurs mostly west of the Appalachians.



Lawler Bend: leatherwood (*Dirca palustris*) is locally frequent, especially in transitions from mesic to subxeric woods along or near the west-facing cliffs; a toxic browsing-resistant plant.



Lawler Bend. Clifftops support small populations of drought-tolerant species typical of ‘xeric limestone prairie’ (left: *Lithospermum canescens*, *Zizia aptera*). There are also curious concentrations of *Iris cristata*, usually associated with mesic sandy soils in Kentucky.

Notes on Rare/Uncommon Plant Species. The following notes attempt to summarize all known rare species discovered on the preserve so far, but details are lacking in several cases, especially on the initial tracts. Asterisks (*) indicate the few species that are state-listed or proposed here for listing; rankings are still informal and approximate in several cases. Additional species are on the informal “watch-list” (mostly s7) or of local interest at range margins (s8/s9); s1 = SH of Heritage Program; s2 = S1; s3 = S1S2; s4 = S2; s5 = S2S3; s6 = S3 of Heritage Program; s7 = S3S4; s8 = S4; s9 = S4S5. Mapping codes for each species are indicated after the following notes for rare species that occur on or near the tracts; see attached GIS materials for further details.

Core WKU Tracts. In most cases, details are not yet available to be mapped.

Carex corrugata? (s6): reported in RMP.

**Carya carolinae-septentrionalis* (s6): few trees found on dry bluffs on NW side of river.

Clematis versicolor (s6): one plant in fencerow thicket 10 m E of entrance gate.

Echinacea simulata (s7): known along roadside.

**Juglans cinerea* (s6): location to be mapped (within mesic woods experimental area).

**Lespedeza stuevei?* (s6): probably along roadside.

Liatris aspera (s7): known along roadside.

Liatris spicata (s7): known on adjacent WKY land; one plant found by AM on north side.

Liatris squarrosa (s7): known on adjacent WKY land.

Melica nitens? (s6): if correctly identified, expected on xeric open clifftops.

Ophioglossum engelmannii (s7): known along roadside.

Parthenium integrifolium (s7): known along roadside.

Physostegia virginiana var. *virginiana* (s7): restricted to rocky river banks.

**Podostemum ceratophyllum* (s6): discovered by AM in 2010; common in some riffles.
Prunus angustifolia (s8): 100+ m², young woods edge near preserve entrance opposite barn.
Scutellaria leonardii? (s7): reported as “missouriensis” in RMP.

Bush/Goebel Tract

Aesculus flava (s9): here at the western edge of its range, Hart is a new county record; it is locally common in mesic forest, especially on the steeper bluffs.
Bromus nottowayanus (~s7): a poorly understood species, perhaps much more widespread than records indicate; tentatively identified from one site in low woods.
Bumelia lycioides (s7): scattered on rocky limestone sites in western Kentucky; a few were found, especially on drier blufftops and ridges.
Collinsia verna (s7): one dense patch 2-3 m² found by AM on the river side of levee.
Desmodium cuspidatum (s7): few found along road on higher ground at south side.
Isotrema tomentosa (s8): here at the eastern edge of its range; common on steeper bluffs.
Panax quinquefolius (s7): a few plants found on the steep bluff.
Penstemon tenuiflorus (s7): several plants found along the roadside “glade.”
Phaseolus polystachios (s7): small patch along road on higher ground at S side of Goebel.
Prunus angustifolia (s8): one small patch at edge of field; location and id to check.
Rudbeckia tenax (s8): locally frequent in rocky limestone open woods and glades.
Solidago rupestris (s7): found on Goebel at one site along banks of the river.
Thaspium chapmanii (s7): locally frequent in rocky limestone glades and rocky roadsides.
Tragia cordata (s7): scattered thinly in drier woods and edges; ca. 10 plants seen.
Wisteria macrostachya (s7): found along the river at the base of the bluff.

Kinney & Durham Knob (aka Dorociak) Tracts.

Acalypha deamii (~s7): this is known from scattered localities in east-central states from Ark. and Mo. to Pa. and Va., especially in the Ohio Valley (G. Levin, in prep. for FL. N. Am.). It is probably more widespread than records indicate, but generally restricted to disturbed ground in damp fertile woodland, especially on levees near larger streams and rivers but also occasional along smaller streams and low slopes across calcareous landscapes. At the Bioreserve, it has been found only in mesic forest on toe slopes [JC 05a], especially on disturbed ground with bare soil; only 3-5 plants were noted in Oct 2010.

Hydrastis canadensis (s8): one patch was discovered at the base of a small sandstone cliff around the incipient sinkhole on the south side of the Kinney Tract; the patch extends over ca. 10 x 10 m, with at least 50 stems.

Monarda sp. nov. (“*serotina*” ined.) (s7): this overlooked taxon is scattered through the Ohio Valley, usually on rich alluvial terraces; one patch was discovered on the Kinney Tract.

Panax quinquefolius (s7): one small group of 4 plants was discovered on the north-facing slope, in mesic woods above limestone cliffs.

Tragia cordata (s7): this is scattered in drier woods and edges; the largest concentration, with ca. 20-30 stems, was noted along the gravel road (lower bank on west side) that leads to the old house on the west side of the tract.

Miller & Byler Tracts (Lawler Bend).

**Aureolaria patula* (s2): rare on steep lower west-facing slope near upper potential flood limit

**Carya carolinae-septentrionalis* (s6): locally frequent on ridges above limestone outcrops (see map); 100s of mature trees occur here on Miller and on Byler, together with frequent seedlings, a regional survey would probably reveal extensive populations along the river.

Houstonia cf. *rupestris* (s6): poorly understood segregate of *H. nigricans* that is restricted to limestone cliffs of Interior Low Plateaus and Cumberland Plateau.

Isotrema tomentosa (s8): here at the eastern edge of its range; rare on steeper bluffs.

Liatris squarrosa, sensu lato (s7): few scattered in xeric glades on clifftops with *Phlox bifida*, etc.; includes some plants that may be referred to the midwestern var. *hirsuta*.

Monarda sp. nov. (“*serotina*” ined.) (s7): this overlooked taxon is scattered through the Ohio Valley, usually on rich alluvial terraces; one patch was discovered on a low terrace in the south part of Lawler Bend.

**Nabalus crepidineus* (s7): one patch with 5-10 plants (perhaps clonal), in thin submesic woods on the toeslope to east of the vinyl barn.

Panax quinquefolius (s7): one small group of 4 plants on the north-facing slope, in mesic woods above limestone cliffs.

**Phlox bifida* (s2): scattered along 10-20 m on xeric clifftops facing west at NW edge of project area; plants from this population are now propagated by J. Campbell and A. Meijer.

Prunus angustifolia (s8): one small browsed plant in large bottomland field.

Rudbeckia tenax (s8): locally common just N of Miller tract in scraped area W of road.

Sideroxylon lycioides (s7): occasional in xeric woods above W-facing cliffs.

Solidago rupestris (s5): locally frequent on rocky W-facing banks of Green River.

Sporobolus clandestinus (s6): locally abundant between road and clifftop woods on Byler.

Tragia cordata (s7): a few plants along the rocky roadside at north side of Miller tract.

Zanthoxylum americanum (s8): locally abundant above cliffs at east side in xeric-subxeric woods; this species appears to be a somewhat conservative remnant of dry scrubby woods with a history of influence from browsing mammals.

Next page: provisional map of rare plant species on Core tracts to Durham Knob tract.
See text for notes on each species; see GIS for details of individual records. Mapping codes are as follows. Note that further checking is needed for several species and their locations. Relevant information and collections are available from the past 5-10 years, but a complete synthesis has not yet been achieved.

Ad: *Acalypha deamii*

Af: *Aesculus flava*

Bl: *Bumelia lycioides*

Bn: *Bromus nottowayanus*

Cc: *Carya carolinae-septentrionalis*

Cvn: *Collinsia verna*

Cvs: *Clematis versicolor*

Dc: *Desmodium cuspidatum*

Es: *Echinacea simulata*

Hc: *Hydrastis canadensis*

La: *Liatris aspera*

Ms: *Monarda cf. serotina*

Pq: *Panax quinquefolius*

Pi: *Parthenium integrifolium*

Pt: *Penstemon tenuifolius*

Pp: *Phaseolus polystachios*

Pv: *Physostegia virginiana*

Pc: *Podostemum ceratophyllum*

Pa: *Prunus angustifolia*

Rp: *Ratibida pinnata*

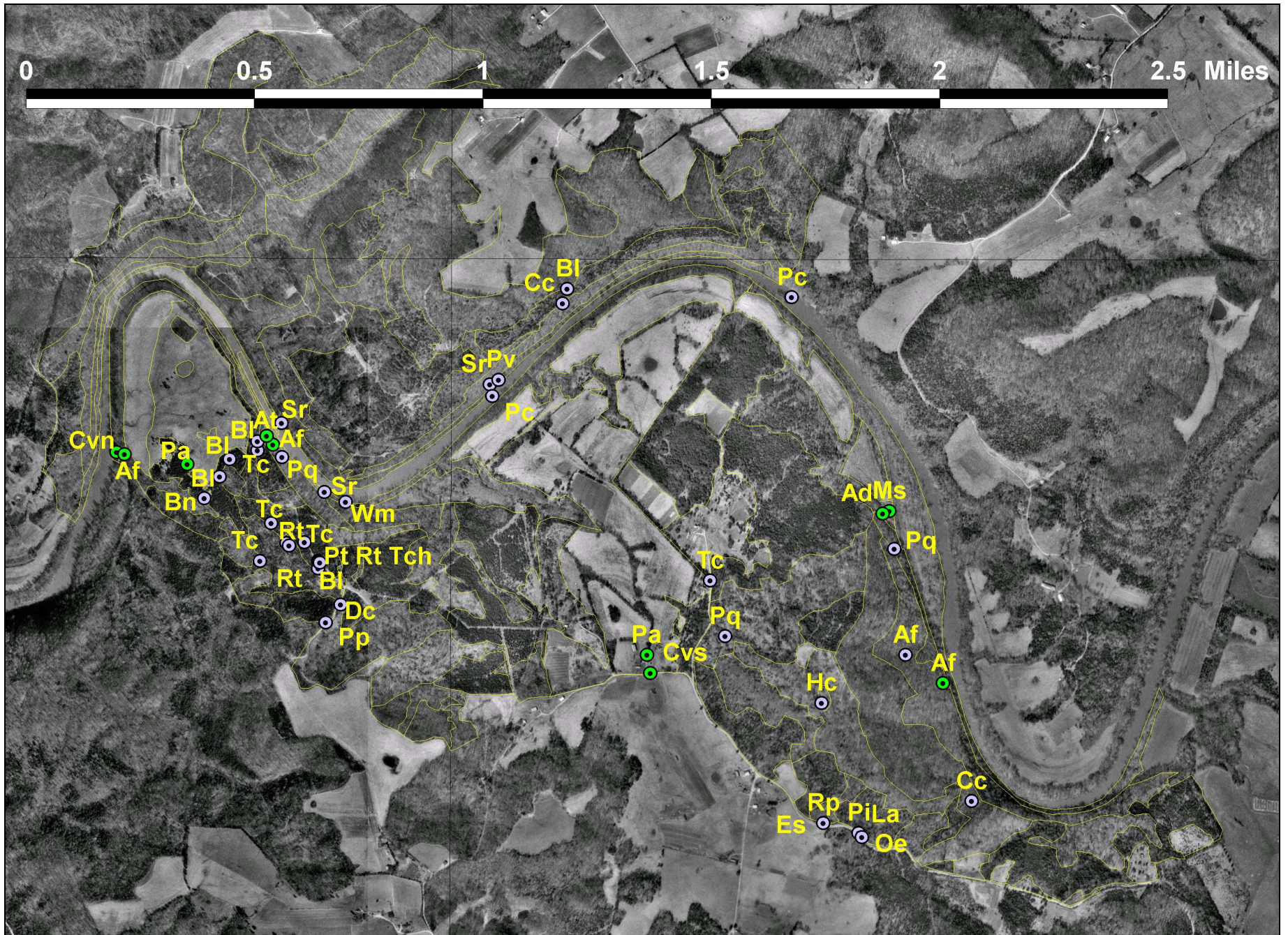
Rt: *Rudbeckia tenax*

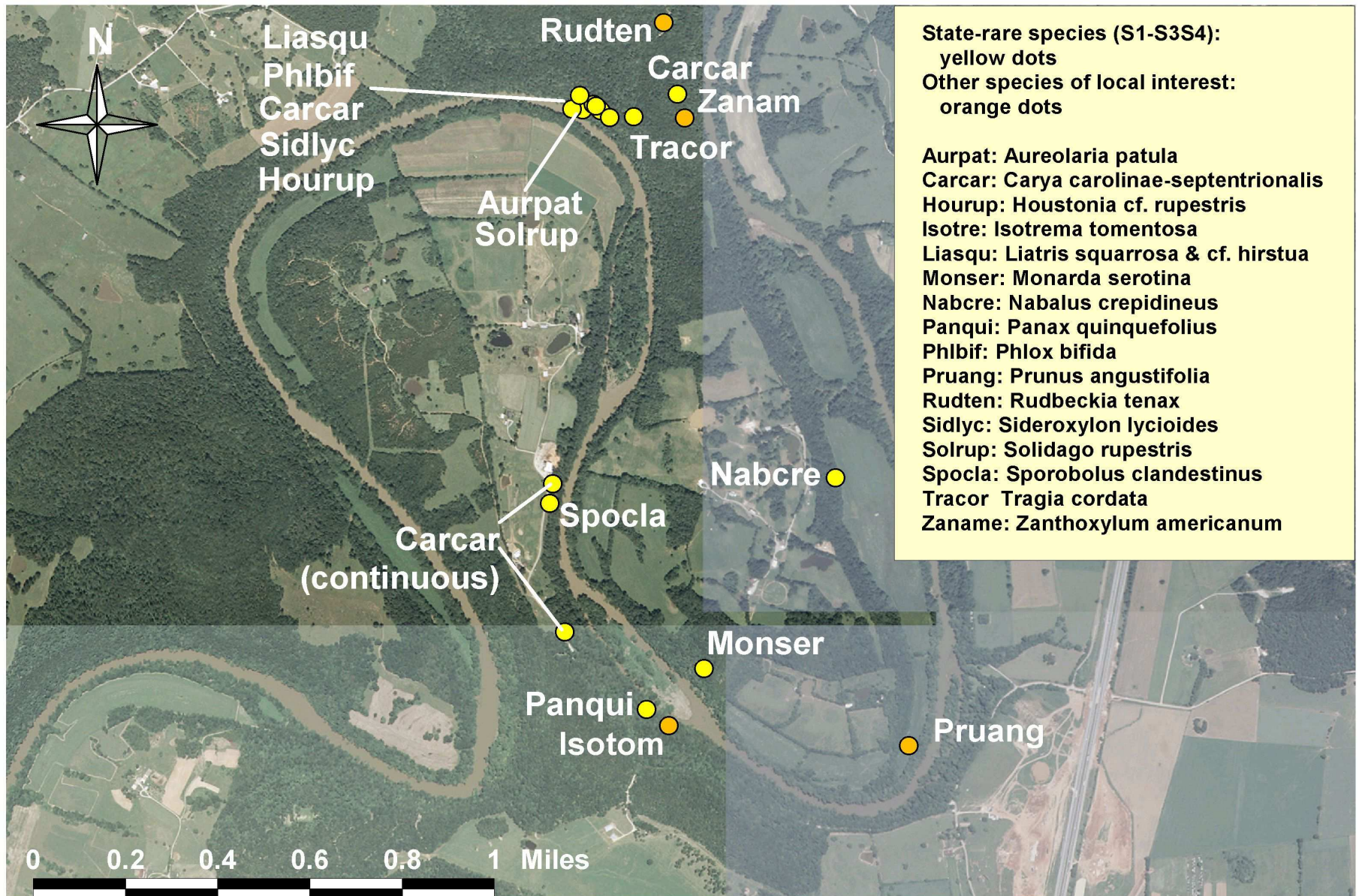
Sr: *Solidago rupestris*

Tc: *Tragia cordata*

Tch: *Thaspium chapmannii*

Wm: *Wisteria macrostachya*





Aerial photo of Lawler Bend area, showing locations of rare species



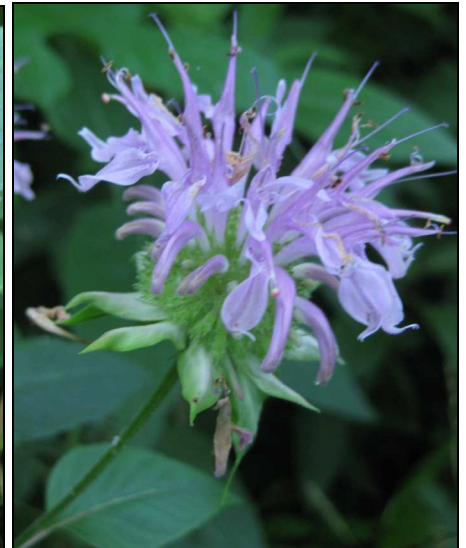
Clematis versicolor grows in a submesic roadside thicket just north of the entrance to the Core WKU tract; here with spicebush and mulberry; an uncommon southern species in Ky.



Acalypha deamii is distinguished from *rhomboidea* by its fruits, which have 2 seeds ca. 2-3 mm long (versus 3 seeds ca. 1-2 mm long). Also, leaf blades are usually bright green (versus often reddish or coppery); mid-cauline ones usually have broader shape (l/w 1.3-1.8 versus 1.8-2.6), with bases often truncate (versus just cuneate).



Carya carolinae-septentrionalis differs from *ovata* in its fruits mostly 2.5-3 cm long (versus 3.5-4 cm); shorter staminate catkins, up to 6 cm (versus 13 cm). Leaflets are generally narrower in shade (the terminal one ca. 2-5 cm versus 6-15 cm), and virtually glabrous (versus pubescent). Terminal buds (6-15 mm long versus 9-18 mm) and twigs (ca. 1-3 mm thick versus 3-6 mm) are less stout, virtually glabrous, maturing or drying to a blackish hue (versus more persistently hairy, brownish).



Monarda “*setrotina*” ined. is intermediate between *fistulosa* and *clinopodia*. Compared to *fistulosa*, its mid-cauline blades are mostly 2.5-4.5 cm wide (versus 1-2 cm), widest about 1/3 from the base (versus 1/4), relatively deep green, and on longer petioles (mostly 2-3 cm versus 0.5-2 cm). Lower surfaces have scattered (not dense), spreading ca. 1-2 mm hairs (versus <0.5 mm). Corollas are paler pink at tips to almost all white, and usually less hairy; the apical beard of hairs on upper petal (lip) is indistinct or absent; and the calyx orifice is usually less hairy. Flowering is usually from early to mid-July (versus variable but most frequent in late July).



Phlox bifida was discovered at Lawler Bend in the 1980s then cultivated by the author in Lexington. There is also a historic record from Mammoth Cave National Park, to be relocated.

This population appears somewhat intermediate between the var. *bifida* (“sand phlox”) and var. *cedaria*, which is largely restricted to cedar glades and cliffs of Tennessee and Kentucky.



Houstonia cf. *rupestris* Raf. is a segregate of *H. nigricans* in the Interior Low Plateaus, with smaller inflorescences, broader leaves, lack of axillary leaf-fascicles, more decumbent habit..

Notes on Invasive Alien Plants. The following lists indicate species that are already problematic invasive aliens or that could become so. Most species typical of the old fields are excluded, since reversion to woodland should eventually reduce or eliminate these sun-loving species. Figure 5 shows locations of more unusual species.

Core WKU Tracts. Notes from RMP and subsequent work of student needs to be incorporated here. Note that *Alternanthera philoxeroides* (Mart.) Griseb., has been reported; this species can be problematic in wetlands.

Bush/Goebel Tract

Glechoma hederacea: this was not noted in original report, but it is present locally here, and needs to be monitored.

Lespedeza cuneata: this is locally dominant in the field, and was probably planted previously; it will be a continuing problem if the field is maintained; it may also become a problem on drier cobble bars and ledges along the river.

Lonicera japonica: locally common in brushy old fields and young woods; intense burning and browsing may reduce this species.

Microstegium vimineum: locally dominant in young woods and disturbed areas within older woods; this species is the major invasive alien plant at the Goebel Tract; control may be difficult or impossible without much effort in chemical control or, if sites are dry enough, frequent burning.

Rosa multiflora: occasional but not abundant in the field and perhaps thin woods elsewhere; this species can be reduced by herbivores (including deer and Japanese beetles), and it

appears to have not spread widely into the Goebel Tract perhaps for this reason; however, its status should be reviewed periodically.

Sorghum halepense: occasional patches in the field, especially at lower elevation; this species may become a problem depending on the management of the field; it can be reduced by intense cattle browsing in early summer.

Kinney & Durham Knob Tracts. The most common invasive aliens in woodlands on these tracts are Japanese honeysuckle (*Lonicera japonica*) and, locally, common chickweed (*Stellaria media*). Status of the Japanese grass, *Microstegium vimineum*, also needs to be monitored carefully, given its local abundance on adjacent land to the west.

Ailanthus altissima: this is locally common along edges of old fields at the west-central side of the tract and a few other patches (A. Meier, pers. comm., to be mapped by undergraduate student, A. Hulsey).

Celastrus orbiculatus: one plant was found on along the trail down to the river on the Durham Knob tract.

Cyrtomium fortunei: a few plants of this East Asian species were discovered by Aaron Hulsey and Albert Meier on low rocky slopes just above the Green River floodplain. This discovery is the first record of the species from Kentucky. It reproduces asexually, through apogamous spore, and is expected to increase gradually across southeastern states.

Glechoma hederacea: this occurs locally in thin woods and edges, especially on relatively bare, disturbed or flooded ground, on floodplain terraces and toe-slopes; it is not a general invasive problem, even in its optimal habitat, but it needs to be monitored.

Lespedeza cuneata: this is locally frequent in young red cedar woods, especially along roadbeds; it may have been planted in abandoned farm land a few decades ago, but it does not seem to have been sown in general within the current old fields.

Lonicera japonica: this is widespread and locally abundant, especially in young woods and edges, but also in some places along clifftops in deeper woods.

Lonicera maackii: one plant was found—and pulled—along the road into the west end of the Kinney tract; this invasive shrub has not taken hold in the Shawnee Hills, but without a vigilant committed program of control, it can be expected to increase.

Microstegium vimineum: this is locally frequent, mostly along smaller streambanks and damp places on uplands, but it has not invaded significantly on most of the lowlands; its scarcity here is in marked contrast to the Bush/Goebel tract and elsewhere on WKU lands, where the disturbance regime may have been different in recent decades (perhaps with more intensive effects of cattle).

Perilla frutescens: this is locally frequent along dirt roads through upland woods, but it is not a widespread problem.

Polygonum longisetum: this is scattered locally on the river bottom, and can be expected on bare disturbed soil elsewhere; it is probably not a significant invasive problem if vegetation remains relatively undisturbed.

Rosa multiflora: this occurs locally in thin disturbed woods and edges, but it is nowhere abundant.

Stellaria media: the common chickweed is locally in low woods, especially on toe slopes and on the river terrace; but if native perennials—including *S. corei*—are well developed, this common alien is much reduced.

Miller and Byler Tracts (Lawler Bend). The most common invasive aliens in woodlands on these tracts are Japanese honeysuckle (*L. japonica*) and Japanese stilt grass (*M. vimineum*). More locally common problems include tree-of-heaven (*A. altissima*), gill-over-the-ground (*G. hederacea*), creeping loosestrife (*L. nummularia*) and chickweed (*S. media*).

Ailanthus altissima: locally abundant at edges, especially near old pastures.

Alliaria petiolata: locally frequent in mesic to submesic woods on lower slopes (Byler Tract).

Euonymus fortunei: few patches, mostly in mesic-submesic woods on the east side of the project area; this species should be controlled aggressively before it becomes common.

Glechoma hederacea: locally abundant in thin submesic woods and edges, especially on relatively bare, formerly grazed or flooded ground of floodplain terraces and toe-slopes.

Lespedeza cuneata: locally abundant, but largely restricted to where it has been planted along old rights-of-way to the south, parallel to the current dirt road.

Lonicera japonica: widespread, locally abundant especially in young woods, edges near fields.

Lysimachia nummularia: locally abundant on wet ground in large lowland fields on east side.

Microstegium vimineum: locally abundant, mostly in low floodplain wood and along logging roads and trails through upland woods.

Ornithogalum umbellatum: occasional, especially in disturbed submesic woods to the south.

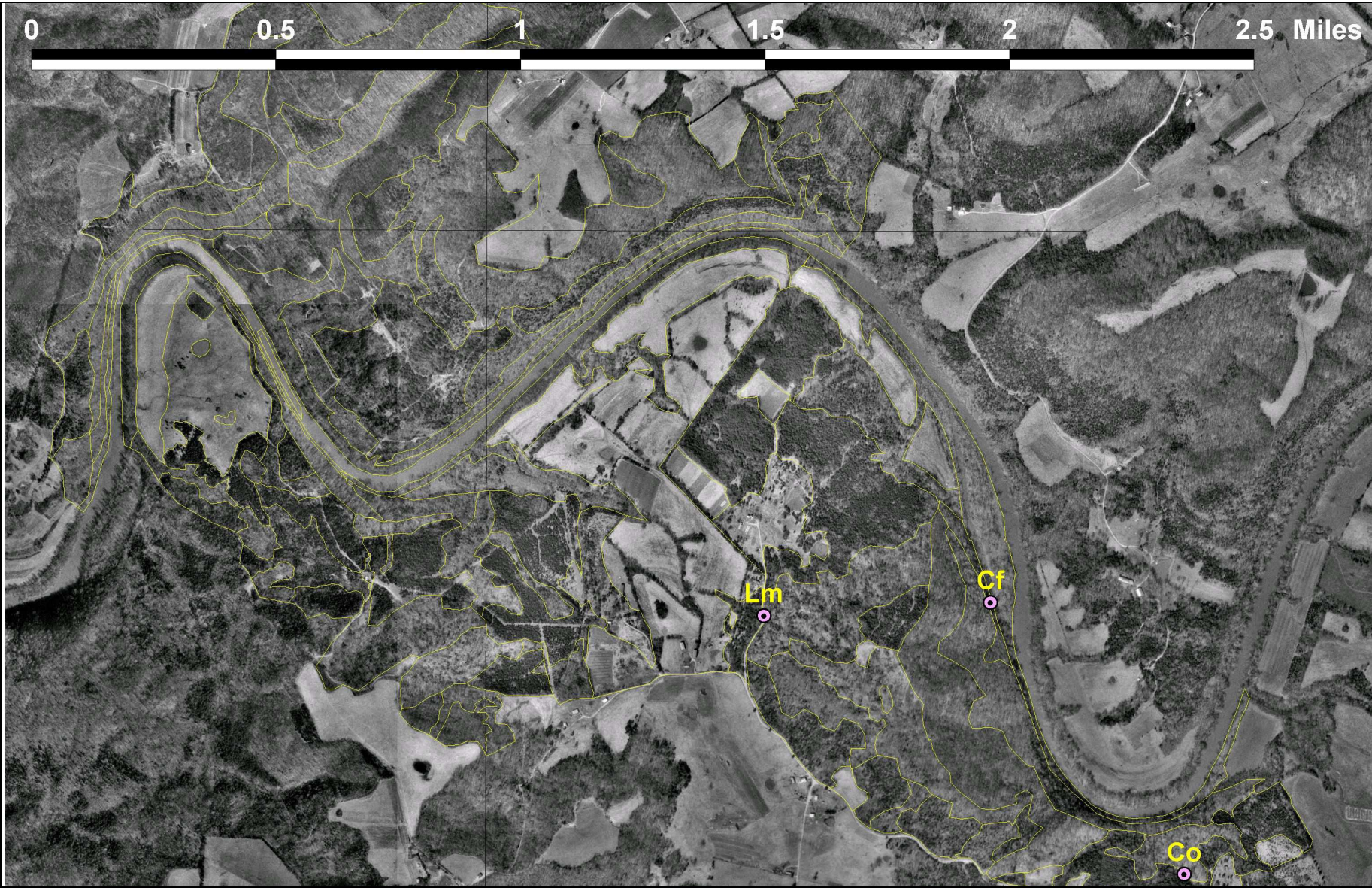
Perilla frutescens: locally frequent along dirt roads in upland woods; not widespread problem.

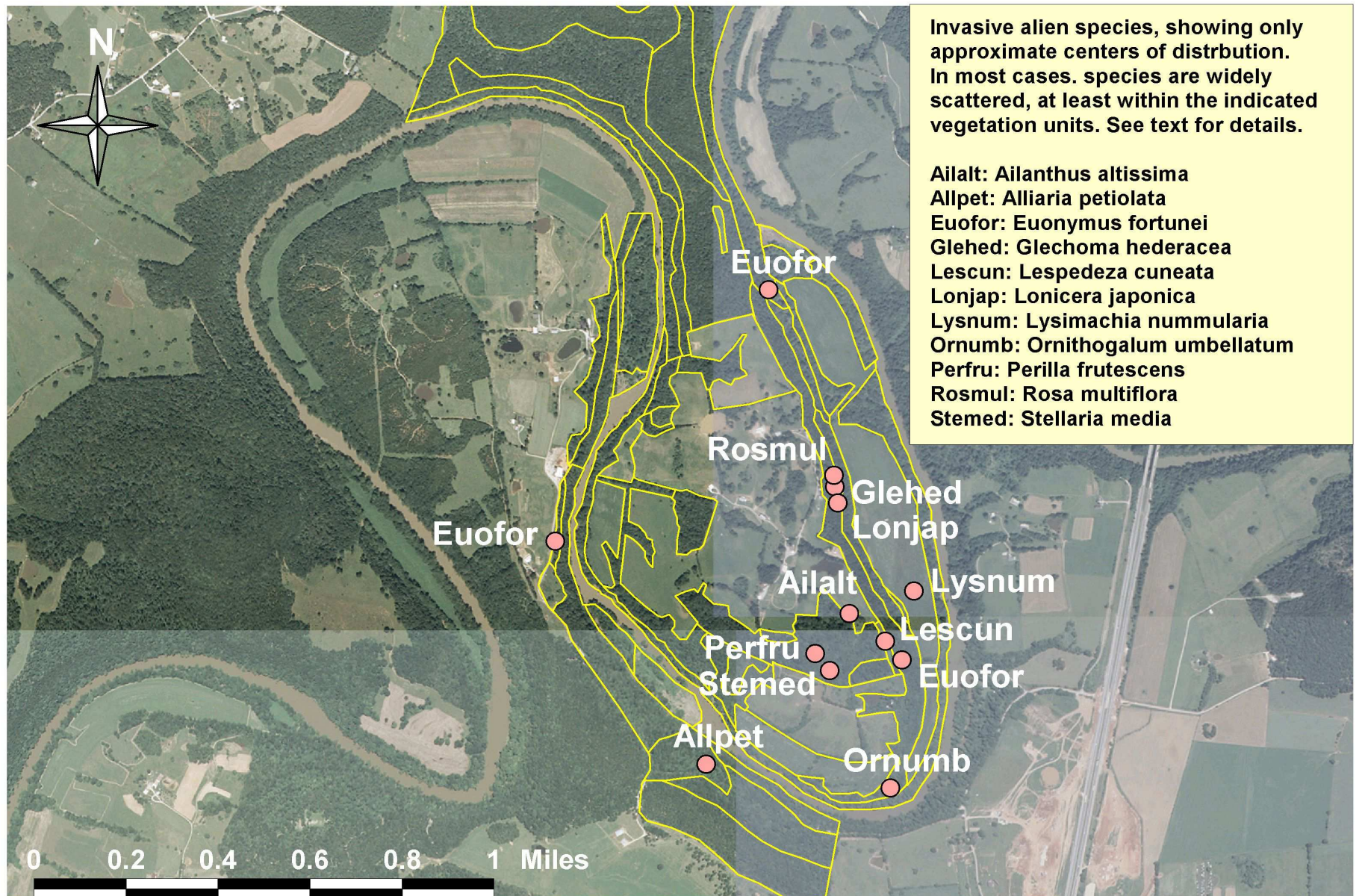
Persicaria longiseta: scattered on the river bottom, and expected on bare disturbed soil elsewhere; probably not a significant problem if vegetation remains relatively undisturbed.

Rosa multiflora: locally frequent in old fields and young or grazed woods.

Stellaria media: locally common, especially in disturbed woods on toeslopes and terraces within the southern section of the project area.

Map showing locations of unusual alien plants in core tracts [Lawler Bend next page].
Cf: = *Cyrtomium fortunei*. Co = *Celastrus orbiculatus*. Lm = *Lonicera maackii*.





Aerial view showing approximate locations of invasive aliens



Lawler Bend (Byler): thin patch of *Euonymus fortunei*—will this species gradually invade the Green River corridor from urban infestations, or will deer and other herbivores reduce it?



DISCUSSION AND RECOMMENDATIONS

It has now been almost 20 years since The Nature Conservancy initiated a major effort to conserve biological diversity in the Middle Green River watershed. A somewhat unexpected—but highly welcome—outgrowth of that effort has been the development of this Green River Preserve by Western Kentucky University. A special focus on imperiled aquatic species in the watershed is clearly warranted, and the preserve offers useful access for intensive research into the river's ecosystem.

Secondary interests in terrestrial systems can also be developed at the preserve, although opportunities for restoration of more grassy open native vegetation on deeper soil are limited. There is still a need for better definition of goals in vegetation management across the watershed, including Mammoth Cave National Park and the varied conservation agencies. Differences in terminology and interpretation of the presettlement scene have continued to limit close cooperative efforts across the watershed. This report is a renewed attempt to document the native vegetation with a flexible functional classification, but further work will be needed to develop specific objectives and measures of success (or failure).

Ecological Gradients. It is impossible to develop a useful system for classifying vegetation without reference to ecological gradients. A method to describe gradual change in composition is particularly important for management to advance or retard succession. The diagrammatic scheme used here (p. 15) outlines the sequence from mesic woods (left) to grassland (right) that appears to have been controlled in this region by disturbance regime before settlement.

After settlement, varied disturbances have tended to scramble the original associations, and this simple diagram will need refinement and adaptation for particular sites.

Human disturbance, especially clearance for farming, has been most intense on relatively gentle slopes, terraces and flats between xeric and hydric extremes. However, the soils on such topography can still experience much seasonal alternation between dry and wet conditions. The two-dimensional diagram used here expresses the mesic-xeric and mesic-hydric dimensions as independent factors, with flatter uplands tending to be ‘xerohydric’ in character. Much fundamental research is needed to document hydrological trends in such soils, and their historical associations with varied disturbance regimes.

Disturbance from flooding along the river and other active streams remains difficult to express in terms of simple diagrams for the whole region. There is a unique ‘rheophytic’ character [from the Greek rheos = stream] in flood-scoured zones (Class 01), and to a lesser extent riparian woods (Class 04). Small-scale spatial patterns—and short-term dynamic patterns—in vegetation that are related to scouring cannot be adequately represented in a two-dimensional diagram for the region.

The role of geology, soil pH and associated factors is also a fundamental interest in this region. With complex alternation of calcareous and non-calcareous soils along topographic sequences, a more detailed mapping of soils will be essential for understanding relationships to vegetation. Different variants of the above diagram can be developed for high pH and low pH, but the chemical and nutritional basis for such patterns remains virtually unexplored at an experimental level.

Conservation Targets. Researchers at the preserve could explore varied concepts and techniques in conservation of terrestrial and aquatic features. Clear ‘conservation targets’ could be developed for this site. Such targets should be the basis for planning useful actions, and for keeping track of progress. If targets can be standardized across the watershed, more synergy could come from mutual support among partners.

The ‘summary of targets’ suggested here (p. 99-100) outlines a primary goal at the landscape level (target number 1): to secure a large block of land with special potential for riparian restoration. Targets 2, 3 and 4 outline broadly defined habitats that need special attention for restoration—mere protection of land will probably not be sufficient. Targets 5, 6 and 7 outline groups of species that deserve special ‘micromanagement’ with propagation and recovery, using methods that focus directly on these species rather than just their habitats. The original grasslands—or “barrens”—of this region (3) and many of its species (7) deserve much more attention, but extensive restoration should be concentrated in less rugged terrain.

This suggested summary could be developed into a tool for guiding and assessing conservation at this site or elsewhere in the watershed. The Nature Conservancy has already produced an overarching strategic plan for the Middle Green River Watershed during the 1990s, but that plan has not been widely circulated or updated in recent years. The potential for deeper collaboration between TNC, Western Kentucky University and Mammoth Cave National Park remains difficult to fathom. While there are clear common interests, where are those common interests articulated, and how are they acted upon? Most importantly, how can the educated, conservation-minded (and tax-paying) public get a clear picture of progress—on particular tracts and across the region?

**Summary of Targets for Conservation at the WKU Green River Preserve
(with notes on desired condition, problems, solutions and progress to date)**

Targets	Status→Goal	Major Problems	Major Solutions	Progress so far
1: 5000+ acres of diverse landscape in useful position for riparian protection (with mussel beds+)	fair→good with 100+ years of minimal management; program to be linked with efforts across watershed	shortage of funds and willing sellers; need to enhance leadership and legwork at WKU and across the community	persist with HLFC and other sources; develop broader, deeper program across watershed	solid core of land secured; diverse research program initiated
2: restored forest on most bottomland & other appropriate areas	poor→good with 100+ years of planting and minimal management	past clearance; locally abundant alien plants	allow appropriate areas to recover; make selected plantings; initiate alien reduction	several planting blocks established
3: restored grassy open woods & glades using prescribed fire	poor/fair→good with 100+ years of burning and perhaps thinning	200 years with declined fire frequency; local abundance of alien plants	establish regular fire regime. selective thinning; micromanagement of worst aliens	a few burn units established, but unclear how much thinning will be needed

4: restored submesic woods and thickets (with cane, plum)	poor→fair with some flexibility in selecting most practical phases of vegetation	past clearance, overgrazing; local abundance of alien plants	research on historical ecology and future options; need experiments	little progress so far, other than concept floated, and sites scouted
5: recovery of trees with pest problems: chestnut, butternut, ash, elm	catastrophic or threatening→fair (?); needs decades of dedicated work	globalization; inadequate control; lack of resistant genotypes	work with state, national and global programs to develop resistance and recovery	small trials with chestnuts have occurred; extent of planning across region remains unclear
6: recovery of woodland herbs impacted by settlement	poor→good with decades of work on selected species	past farming, livestock, collection (esp. <i>Panax</i> , <i>Hydrastis</i>)	develop propagation, recovery trials, harvesting plans	initial trials with a few species
7: recovery of grassland plants impacted by settlement	poor/fair→good with decades of work on selected species	past farming, lack of fire, local abundance of alien plants	develop propagation, recovery trials; develop on-site seed production	initial trials with a few species

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Carya carolinae-septentrionalis: www.cas.vanderbilt.edu etc.

Phlox bifida: <http://2bnthewild.com/plants/H105.htm>

Trillium flexipes: http://prairiebreak.blogspot.com/2015_04_01_archive.html



APPENDIX ONE: PROVISIONAL LIST OF VASCULAR FLORA FOR THE WHOLE GREEN RIVER PRESERVE OF WKU

Incorporating data from the 2008 Resource Management Plan = RMP). The raw Excel file is available from the author, with additional fields that have selected synonyms, and notes from each tract previously surveyed.

Groups are separated in the following sequence:

trees; shrubs; vines; ferns & allies; herbs (non-legume/composite/monocot);
legumes (Fabaceae s.l.); composites (Asterceae); monocots (with graminoids).

Alien status as follows

AAA = alien to eastern North America and a major problem in native vegetation;
AA = alien to eastern North America but not a major problem in native vegetation;
A = native to western or southern North America, status uncertain in parts of KY;
a = uncertain status, perhaps N. American mixed with S. American and/or Eurasian.

Previous records for Hart Co.

1 = unverified; 2 = collection reported; 3 = coll. accessed.

p = recorded on Western Kentucky University tracts in Hart County

Abbreviations for field notes are as follows

abu (abundant); com (common); dbh (diameter-at-breast-height); esp (especially); fre
(frequent); loc (local or locally); nea (nearby, within a mile or so); occ (occasional); pre
(present); rar (rare); ROW (right-of-way); sev (several); wid (widespread).

SCIENTIFIC NAME Nomenclature generally follows Jones (2005) et al. except for names followed by "@"; see alternative names in next column.	COMMON NAME	Alien status	Hart rec.	WKU	MILLER: data from 2014; asterisks (*) indicate observations on adjacent private land, not yet confirmed on WKU tracts	BYLER: data from 2014
TREES	TREES				TREES	TREES
<i>Acer negundo</i> L.	boxelder		3	p	loc abu: riverbanks	loc abu: riverbanks
<i>Acer nigrum</i> Michx. f.	black maple		1	p	loc fre: slopes below E cliffs	loc fre: lower slopes on talus
<i>Acer rubrum</i> L. var. <i>rubrum</i>	upland red maple		3	p		
<i>Acer saccharinum</i> L.	silver maple		3	p	loc fre: riverbanks (rar along upland roadside)	loc fre: riverbanks
<i>Acer saccharum</i> Marsh.	sugar maple		3	p	loc dom; esp below cliffs	abu; loc dom: most of area at least in understory
<i>Aesculus flava</i> Ait.	sweet (mountain) buckeye		1	p	NONE? remarkable absence compared to downstream	
<i>Aesculus glabra</i> Willd.	stinking (Ohio) buckeye		3	p	occ; loc fre: below and above E cliffs	occ: esp above cliffs
<i>Ailanthus altissima</i> (P. Mill.) Swingle	tree-of-hell	AAA	1	p	loc fre: field edges & adj woods esp in south; being killed with garlon hack&squirt	occ: esp upper edges
<i>Betula nigra</i> L.	river birch		1	p		
<i>Carya carolinae-septentrionalis</i> (Ashe) Engl. & Graebn.	southern shagbark hickory		3	p	loc com: drier uplands above E cliffs	loc abu: ridge near road
<i>Carya cordiformis</i> (Wangenh.) K. Koch	bitternut hickory			p	occ; loc fre: mid/low slope esp submesic (petering) toeslopes	loc dom: submesic woods; esp broad gully with gentler slopes on deeper soils
<i>Carya glabra</i> (P. Mill.) Sweet	pignut hickory		1	p	loc fre: upper slopes esp deeper soil above limestone	occ: upper slopes
<i>Carya laciniosa</i> (Michx. f.) G. Don	shellbark hickory		1	p	rar: one sed on terrace above river S end	occ: lower slopes
<i>Carya ovalis</i> (Wangenh.) Sarg.	sweet pignut hickory			p	occ; loc fre? upper slopes	

<i>Carya ovata</i> (P. Mill.) K. Koch	shagbark hickory		1	p	loc fre: mid/upper slopes incl broad terrace to S	occ; loc fre; esp upper slopes but perhaps overlapping with <i>laciniosa</i> below
<i>Carya pallida</i> (Ashe) Engl. & Graebn.	sand hickory		3			
<i>Carya tomentosa</i> (Lam. ex Poir.) Nutt.	mockernut hickory		1	p	occ: mid/upper slope; few to 4-5 dm in south on high terrace of river	occ: ridge
<i>Castanea dentata</i> L.	American chestnut		3	p		
<i>Catalpa speciosa</i> (Warder) Warder ex Engelm.	northern catalpa	A		p		
<i>Celtis laevigata</i> Willd.	southern hackberry			p	occ: esp field edges south end; some x <i>tenuifolia</i> ?	
<i>Celtis occidentalis</i> L.	common hackberry		1	p	loc fre: esp submesic woods in south but also sca elsewhere in gaps, near roadsides	
<i>Celtis tenuifolia</i> Nutt.	dwarf hackberry		3	p	loc fre: above W cliffs but mostly sdl/sap	rar: sap at ridge roadside
<i>Diospyros virginiana</i> L.	persimmon		1	p	occ: edges of fields, roadsides on ridge; often with red cedar	occ: upper edges; often with red cedar
<i>Fagus grandifolia</i> Ehrh.	American beech		1	p	occ: not colonial at all, upper to lower on deeper soil esp broader terraces of river (where mostly ca 1-2 dm); up to 8 dm	loc fre: esp toe slopes above river
<i>Fraxinus americana</i> L.	northern white ash			p	occ; loc fre? esp submesic/subxeric woods	occ; loc fre: mesic-subxeric woods
<i>Fraxinus biltmoreana</i> Beadle @	southern white ash		3	p	com; loc abu: esp subxeric woods, mostly <i>smallii</i> ?	occ; loc fre? esp sdl/sap on upper slopes; includes much <i>smallii</i> ; not true <i>americana</i> noted
<i>Fraxinus lanceolata</i> Borkh. @	green ash		1	p	occ; lowlands esp in wetter sites	
<i>Fraxinus pennsylvanica</i> Marsh.	red ash		3			
<i>Fraxinus quadrangulata</i> Michx.	blue ash		3	p	loc com: esp above cliffs in rocky soils ca 2-4 dm	loc fre: esp subxeric woods along larger cliffs
<i>Gleditsia triacanthos</i> L.	honeylocust		3	p	occ: odl fields; submesic woods in south and sca sdl along roadside elsewhere	
<i>Gymnocladus dioica</i> (L.) K. Koch	coffee tree		1	p	rar: toeslope below E cliffs towards field	

<i>Juglans cinerea</i> L.	white walnut		1	p		
<i>Juglans nigra</i> L.	black walnut		1	p	loc fre: sca in submesic to subxeric woods; including mid/upper slopes near cliffs, often knarly perhaps rooted in cracks	occ: upper slopes/ridge
<i>Juniperus virginiana</i> L.	redcedar		1	p	loc dom: esp above cliffs but also old fields on worn out parts of terrace to south; much cut few decades ago 2-4 dm; now much 1-3 dm	loc abu: esp upper edges, drier clifflines
<i>Liquidambar styraciflua</i> L.	sweetgum		1	p		
<i>Liriodendron tulipifera</i> L.	tuliptree		3	p	occ; loc abu: below and above cliffs, esp saps in thickets along ROWs and field edges; loc dom on terrace N of big field also a few trees along road up to 9 dm	loc abu: esp toeslopes above river; not on bitternut toeslope; 3-4(5) dm
<i>Maclura pomifera</i> (Raf.) Schneid.	osage-orange	A		p	occ: field edges esp in south, roadsides on ridge and sed along trail near cliffs	
<i>Magnolia tripetala</i> (L.) L.	umbrella magnolia		1			
<i>Morus rubra</i> L.	red mulberry		1	p	occ: widely sca in forest gaps, edges, esp roadsides	occ; (loc fre?) esp edges, thin woods including along clifflines; seems to be widely dispersed and succeeds in mesic gaps of varied type
<i>Nyssa sylvatica</i> Marsh.	blackgum		1	p	rar: sdl above cliffs; also 2.5 dm on terrace with Lirio	
<i>Oxydendrum arboreum</i> (L.) DC.	sourwood		2	p		
<i>Paulownia tomentosa</i> (Thunb.) Sieb. & Zucc. ex Steud.	princess tree		2			
<i>Pinus taeda</i> L.	loblolly pine	A	1	p		
<i>Pinus virginiana</i> P. Mill.	scrub pine		3	p	rar: worn out field on high terrace in south	
<i>Platanus occidentalis</i> L.	American plane-tree (or sycamore)		1	p	loc fre: esp river and streambanks, incl bad gully near river in S; go back for photogenic hulk below E cliffs to south	loc fre: riverbanks and gaps nearby

Populus deltoides Bartr. ex Marsh.	cottonwood		1			
Populus grandidentata Michx.	big-toothed aspen		1			
Prunus serotina Ehrh.	black cherry		3	p	occ; loc fre? esp younger woods and edges	occ? esp above cliffs
Pyrus calleryana Dcne.	useless pear	AAA	3			
Pyrus communis L.	garden pear	AA	3			
Quercus alba L.	white oak		2	p	occ: esp above cliffs near road (where not logged out), also sca in older woods on terraces in south, esp deeper soils? up to ca. 10 dm?	occ; loc fre: esp mid/upper slopes
Quercus bicolor Willd.	swamp white oak		1			
Quercus coccinea Muenchh.	scarlet oak		1	p		
Quercus falcata Michx.	southern red oak		2	p	rar? (RStauffer says maybe on ridge)	
Quercus imbricaria Michx.	shingle oak		1	p	rar: sdl on ridge, high terrace and old pathway to south	occ; loc fre: drier roadside
Quercus macrocarpa Michx.	bur oak		1			
Quercus marilandica Muenchh.	blackjack oak		1	p		
Quercus montana Willd.	chestnut oak		1	p		loc fre: E-face upper slopes to S*
Quercus muehlenbergii Engelm.	chinquapin oak		3	p	com; loc abu: esp submesic and subxeric slopes above cliffs on rocky calc ground; also midslope with Acs	loc fre: esp upper slopes
Quercus palustris Muenchh.	pin oak		2			
Quercus phellos L.	willow oak		1			
Quercus rubra L.	northern red oak		3	p	loc fre; esp mid-slopes but wide range; up to 8+ dm	occ; loc fre?
Quercus shumardii Buckl.	western red oak		1	p	occ; loc fre; esp upper slopes with rocky soils	occ; but few including trees to 8 dm

<i>Quercus stellata</i> Wengenh.	post oak		3	p	loc fre: clifftops esp on W side; upper ridge near road	
<i>Quercus velutina</i> Lam.	black oak		1	p	occ: subxeric woods on ridge, and rar on high terrace of river in south (much disturbed older woods)	
<i>Robinia pseudoacacia</i> L.	black locust		2	p	NONE?	rar: sap at ridge roadside
<i>Salix nigra</i> Marsh.	black willow		3	p	loc fre: gravel bars, ponds	
<i>Sassafras albidum</i> (Nutt.) Nees	sassafras		3	p	occ; loc fre; up to 6 dm next to large <i>Fagus</i>	occ; loc fre: upper slopes, roadside
<i>Taxodium distichum</i> (L.) L.C. Rich.	bald cypress		1			
<i>Tilia americana</i> L. var. <i>americana</i>	northern basswood		1	p	occ; lower slopes in steepest section; none in submesic petering slopes	rar: toeslopes
<i>Tilia americana</i> L. var. <i>heterophylla</i> (Vent.)	mountain basswood		3			
<i>Tsuga canadensis</i> (L.) Carr.	hemlock		3			
<i>Ulmus alata</i> Michx.	winged elm		2	p	com; loc abu; esp above cliff in thin or young woods	loc fre: upper slopes, roadside
<i>Ulmus americana</i> L.	white (or American) elm		3	p	occ; esp roadside, riverbanks; perhaps also loc fre in submesic woods to south near river	loc fre: riverbank
<i>Ulmus rubra</i> Muhl.	red (or slippery) elm		3	p	loc fre; almost no trees (?) but wide sca in understory at mid-slope under ashes, oaks, hicks; perhaps resprouting with deer browse pressure	loc fre: esp shrub-layer with bitternut; also 7 dm tree along road near gully
SHRUBS	SHRUBS				SHRUBS	SHRUBS
<i>Alnus serrulata</i> (Ait.) Willd.	common alder		1			
<i>Amelanchier arborea</i> (Michx. f.) Fern.	common serviceberry		3	p	occ: high river terrace	
<i>Amorpha fruticosa</i> L.	indigo-bush		3	p		

<i>Aralia spinosa</i> L.	devil's walking stick		1	p		
<i>Aronia melanocarpa</i> (Michx.) Eil.	black chokeberry		3			
<i>Arundinaria gigantea</i> (Walt.) Muhl.	cane		1	p	occ; loc abu; esp riverbanks and slopes near river but also small patches above cliffs	loc fre: toeslope-riverbank transition; also roadside above
<i>Asimina triloba</i> (L.) Dunal	pawpaw		1	p	loc com; esp mesic/submesic woods below cliffs on toe slopes near river and thin woods near fields	loc abu: esp gully with bitternut
<i>Carpinus caroliniana</i> Walt.	hornbeam			p	loc fre: esp below cliffs near river	occ: esp lower slopes
<i>Castanea pumila</i> (L.) P. Mill.	chinquapin oak		3			
<i>Cephalanthus occidentalis</i> L.	buttonbush		1			
<i>Cercis canadensis</i> L.	redbud		3	p	loc fre: wide range but esp dry thin woods	occ: esp upper slopes, edges
<i>Chionanthus virginicus</i> L.	fringe tree		3			
<i>Cornus florida</i> L.	flowering dogwood		3	p	loc fre: esp above cliffs on deeper soils; also high terrace in south	
<i>Cornus obliqua</i> Raf.	narrow-leaved silky dogwood			p		
<i>Corylus americana</i> Walt.	eastern hazelnut		1	p		
<i>Crataegus incaedua</i> Sarg. ?	uncertain hawthorn		3			
<i>Dirca palustris</i> L.	leatherwood		2	p	loc fre: esp near cliffs in transition from subxeric to mesic, esp W side; slopes near river in south with browse history; but none along E side slopes	
<i>Elaeagnus umbellata</i> Thunb.	autumn olive	AAA		p	rar; sap above cliffs on W side	
<i>Euonymus alatus</i> (Thunb.) Sieb.	burning bush		1	p	rar: thin woods near paved road on uplands	
<i>Euonymus americanus</i> L.	strawberry-bush		3	p	occ: upper/mid/low slopes; esp near <i>Fagus/Q. alba</i> ; some w/scale	occ: upper slope/ridge
<i>Euonymus atropurpureus</i> Jacq.	spindle			p	rar: roadside on ridge	

Frangula caroliniana (Walt.) Gray	southeastern cascara		3	p	loc fre: most/all var mollis; esp above cliffs and in young woods near fields; not browsed by deer!	loc fre: upper edges
Gaylussacia baccata (Wangenh.) K. Koch	huckleberry		2			
Hamamelis virginiana L.	witchhazel		1	p	rar; low slope below E cliffs	
Hydrangea arborescens L.	wild hydrangea		1	p	loc abu: lower slope below cliffs above river	loc abu: steeper slopes
Hypericum prolificum L.	shrubby St. Johnswort		1	p	occ: thin woods near fields	
Ilex cornuta Lindl. & Paxton	Chinese holly	AA	1			
Ilex opaca Ait.	American holly		1			
Kalmia latifolia L.	mountain laurel		1			
Ligustrum sinense Lour.	Chinese privet			p	rar: edges along paved road on upland	
Lindera benzoin (L.) Blume	spicebush		1	p	loc abu: mesic-submesic woods	loc com: esp lower slopes
Lonicera maackii (Rupr.) Herder	Amur honeysuckle	AAA	1	p		
Ostrya virginiana (P. Mill.) K. Koch	hophornbeam		1	p	loc fre: esp mid/upper slopes; up to 2.5 dm	occ? upper slopes?
Phyllostachys aurea Carrière ex A. Rivière & C. Rivière	golden bamboo	AA	1			
Physocarpus opulifolius (L.) Maxim.	ninebark		3	p	occ: cliff ledge on W side	
Prunus americana Marsh.	common plum		1	p	occ: roadside and field edge; var. lanata	
Prunus angustifolia Marsh.	Chickasaw plum		2	p	rar: sdl 1 m tall in big field at S end, much browsed	
Prunus persica (L.) Batsch	peach	AA	1			
Ptelea trifoliata L.	hoptree			p		
Rhus aromatica Ait.	aromatic sumac		3	p	occ: clifftops; roadside on rocky soil*	

<i>Rhus copallinum</i> L.	shining sumac		1	p	nea: scraped landing to N	
<i>Rhus glabra</i> L.	smooth sumac			p	loc fre: old row now grown up	occ? upper edges
<i>Ribes missouriense</i> Nutt.	mid-western gooseberry		1			
<i>Rosa carolina</i> L.	hill rose			p	occ; loc fre; upper slopes and ridge	occ; loc fre: drier roadside
<i>Rosa multiflora</i> Thunb. ex Murr.	multiflora rose	AAA	3	p	occ; loc fre; old fields, young / grazed woods, ROWs, field edges	
<i>Rosa setigera</i> Michx.	climbing rose		1	p	occ: roadside to south by submesic petering slope	
<i>Rubus argutus</i> Link	southern blackberry			p	loc abu; edges of fields	
<i>Rubus flagellaris</i> Willd.	northern dewberry			p		
<i>Rubus occidentalis</i> L.	wild raspberry		1	p	occ; thin woods, edges near road along petering slope	
<i>Rubus pensilvanicus</i> Poir.	common blackberry			p		
<i>Salix caroliniana</i> Michx.	river-rock willow			p		
<i>Salix humilis</i> Marsh.	upland willow		3			
<i>Salix sericea</i> Marsh.	silky willow		3			
<i>Sambucus canadensis</i> L.	elderberry		1	p	occ: low edges of fields, thin riparian woods	occ? damper spots?
<i>Sideroxylon lycioides</i> L.	smooth chittimwood		3	p	occ; loc fre: above cliffs on drier rocky ground usually with <i>Juniperus</i>	
<i>Staphylea trifolia</i> L.	bladdernut		2	p	loc abu: low slopes esp between riverbank and cliffs	loc fre: lower rocky slopes
<i>Symphoricarpos orbiculatus</i> Moench	coralberry		3	p	loc abu; esp thin submesic-subxeric woods near edges	occ; loc fre: upper slopes, edges
<i>Vaccinium arboreum</i> Marsh.	sparkleberry		3	p	occ: clifftops on W side w/post oak & <i>Danthonia</i> ; roadside on ridge*	
<i>Vaccinium pallidum</i> Ait.	lowbush blueberry		3	p		
<i>Vaccinium stamineum</i> L.	deerberry		3	p	occ: above cliffs W side	

<i>Viburnum prunifolium</i> L.	smooth blackhaw		1	p		
<i>Viburnum rufidulum</i> Raf.	rusty blackhaw		2	p	occ: esp mid/upper slopes, edges, roadsides	
<i>Zanthoxylum americanum</i> Mill.	prickly ash			p	loc abu: above/along cliffs on ridge at E side	
VINES (& epiphyte)	VINES				VINES	VINES
<i>Bignonia capreolata</i> L.	crossvine		1	p	occ; loc fre: wide range from low woods to on Juniperus along road	occ; loc fre: esp upper slopes
<i>Campsis radicans</i> (L.) Seem. ex Bureau	trumpet creeper		1	p	occ: roadsides, field edges, fencerows (bitter>>bignonia)	occ: roadsides
<i>Ceanothus americanus</i> L.	New Jersey tea		3	p		
<i>Celastrus orbiculatus</i> Thunb.	Asian bittersweet	AAA		p		
<i>Celastrus scandens</i> L.	American bittersweet				NONE?	
<i>Clematis virginiana</i> L.	old man's beard		1	?	occ? low thin woods/edges near river?	
<i>Euonymus fortunei</i> Hand.-Maz.	spindle	AAA	1	p	occ: small patches on mesic-submesic slopes	occ: upper edges
<i>Isotrema tomentosa</i> (Sims) Huber @	southern pipevine		3	p		rar: lower slope; check id
<i>Lonicera japonica</i> Thunb.	Japanese honeysuckle	AAA	3	p	fre; loc abu: esp thin submesic woods near fields, roadside	loc fre: upper edges?
<i>Parthenocissus quinquefolia</i> (L.) Planch.	Virginia creeper		2	p	loc com: wide range but esp above cliffs with Tox rad etc	abu; loc dom: esp mid-upper slopes; dom with Crc
<i>Phoradendron leucarpum</i> (Raf.) Reveal & M.C. Johnston	eastern mistletoe		3			
<i>Smilax bona-nox</i> L.	rough greenbrier		3	p	occ; loc fre: esp thin submesic-subxeric woods, edges above cliffs	occ; loc fre? esp upper edges
<i>Smilax glauca</i> Walt.	pale greenbrier		3	p	NONE?	
<i>Smilax hispida</i> Raf. @	bristly greenbrier		3	p	occ: esp thin woods on lower slopes near river	occ: esp lower slopes
<i>Smilax rotundifolia</i> L.	common greenbrier		3	p	NONE?	

Toxicodendron radicans (L.) Kuntze	poison ivy		3	p	com; loc abu; esp thin submesic-subseric woods, incl above cliffs; perhaps much browsed in past	com; loc abu: esp edges (lower and upper); large leaves due to global warming???
Vitis aestivalis Michx.	upland hairy-grape		1	p	occ? mid/upper slope	
Vitis cinerea (Engelm.) Millard	gray grape		3			
Vitis vulpina L.	common smooth-grape		3	p	occ: esp lower slopes but also below cliffs and roadsides on upper	
Wisteria macrostachya (Torr. & Gray) Nutt. ex B.L. Robins. & Fern. @	western wisteria			p		
FERNS AND ALLIES					FERNS	FERNS
Adiantum capillus-veneris L.	southern maidenhair fern		2			
Adiantum pedatum L.	maidenhair fern		3	p	loc com: lower talus & toeslopes slopes below E cliffs	loc com: toeslopes
Asplenium pinnatifidum Nutt.	pinnatifid spleenwort		3			
Asplenium platyneuron (L.) B.S.P.	common ebony spleenwort		3	p	occ; loc fre: esp in cedar/mixed woods	occ?
Asplenium resiliens Kunze	small ebony spleenwort			p	occ; crevices on upper slopes, cliffs	
Asplenium rhizophyllum L.	climbing spleenwort		3	p	NONE?	
Asplenium trichomanes L.	maidenhair spleenwort		3			
Athyrium asplenioides (Michx.) A.A. Eat.	southern ladyfern		3	p		
Botrypus virginianum (L.) Michx.	rattlesnake fern		3	p	sca; loc fre: esp red cedar & submesic woods on eastern slope	occ: upper slopes
Crepidomanes intricatum (Farrar) Ebihara & Weakley	filmy fern gametophyte		2			
Cyrtomium fortunei J. Smith	Asian netvein hollyfern	AA	3	p		
Cystopteris bulbifera (L.) Bernh.	bulblet fragile-fern			p	loc com: cliff bases E side; CHECK tern also	loc fre: dripping cliffs in steepest zones

Cystopteris protrusa (Weatherby) Blasdell	running fragile-fern			p	com loc abu: mesic and submesic woods, esp where browsed	loc abu: esp upper slopes with more deer?
Cystopteris tennesseensis Shaver	hybrid fragile-fern		2	p	occ; ledge on cliff to E at way down in middle	
Diphasiastrum digitatum (Dill. ex A. Braun) Holub	ground-cedar		3	p		
Diplazium pycnocarpon (Spreng.) Broun	giant spleenwort		3	p	occ; loc abu: only toeslopes below E cliffs, with Trillium flexipes, Laportea	occ
Dryopteris marginalis (L.) Gray	marginal wood-fern			p	NONE?	
Equisetum arvense L.	branched horsetail		3	p		
Onoclea sensibilis L.	sensitive fern			p	loc? perhaps seen in gully near river; CHECK	
Ophioglossum engelmannii Prantl	limestone adderstongue			p		
Pellaea atropurpurea (L.) Link	purple cliffbrake		3	p	occ: clifftops; rocks in subxeric-xeric woods	
Phegopteris hexagonoptera (Michx.) Fée	beech fern		3	p		
Pleopeltis polypodioides (L.) Andrews & Windham var. michauxiana (Weatherby) Andrews & Windham	resurrection polypody		3	p	loc com: along cliffs E & W? P180side	
Polypodium virginianum L.	rock polypody		2	p		
Polystichum acrostichoides (Michx.) Schott	Christmas fern		3	p	loc abu: mesic-submesic woods esp deeper soils	occ?
Pteridium aquilinum (L.) Kuhn var. latiusculum (Desv.) Underwood ex Heller	bracken-fern		3			
Sceptridium dissectum (Sprengel) Lyon var. obliquum (Muhl. ex Willd.) new comb.	grape-fern		2			;
Thelypteris noveboracensis (L.) Nieuwl.	New York fern		2	p		
Woodsia obtusa (Spreng.) Torr.	blunt clifftop fern		3		NONE?	

DICOT HERBS (NON- LEGUME/COMPOSITE)					DICOT HERBS	DICOT HERBS
<i>Acalypha deamii</i> (Weatherby) Ahles	lowland mercury		2	p	CHECK	
<i>Acalypha rhomboidea</i> Raf.	greater mercury			p	loc fre: gravel bars, low fields	loc fre: roadsides etc
<i>Acalypha virginica</i> L.	lesser mercury			p	occ; clifftops on W side*	
<i>Actaea pachypoda</i> Ell.	white baneberry		3	p		loc fre: esp midslopes with bitternut, up to 7 dm tall
<i>Aethusa cynapium</i> L.	fool's parsley		1			
<i>Agalinis gattingeri</i> (Small) Small	western mouseglove		2			
<i>Agalinis tenuifolia</i> (Vahl) Raf.	common mouseglove		3	p	occ; clifftops on W side*	occ: thin woods w/ <i>Danthonia</i> <i>Carya</i> <i>Quercus</i>
<i>Agastache nepetoides</i> (L.) Kuntze	yellow giant hyssop		1			
<i>Agrimonia parviflora</i> Ait.	wetland agrimony		1			
<i>Agrimonia pubescens</i> Wallr.	hairy agrimony		3	p	occ?	
<i>Agrimonia rostellata</i> Wallr.	smooth agrimony		2	p	occ; loc fre: esp submesic woods	
<i>Alliaria petiolata</i> (Bieb.) Cavara & Grande	garlic mustard	AAA		p		loc fre: mesic-submesic woods on lower slopes with bitternut
<i>Alternanthera philoxeroides</i> (Mart.) Griseb.	alligatorweed	AAA	2	p		
<i>Anemone virginiana</i> L.	thimbleweed		3	p	occ: ridgetop roadside	
<i>Anemonella thalictroides</i> (L.) Spach @	common rue-anemone		3	p	occ	
<i>Angelica venenosa</i> (Greenway) Fern.	upland angelica		3	p		
<i>Antenoron virginianum</i> (L.) Roberty & Vautier @	woodland knotweed		1	p	occ; loc fre?: submesic woods in south	
<i>Apocynum cannabinum</i> L.	dogbane			p		
<i>Aquilegia canadensis</i> L.	columbine			p	loc fre: cliffs (on E side > W)	NONE? check; must be here

<i>Arabidopsis thaliana</i> (L.) Heynh.	mouseear cress		1			
<i>Aralia racemosa</i> L.	spikenard		3			
<i>Arenaria serpyllifolia</i> L.	thymeleaf sandwort		3			
<i>Aruncus dioicus</i> (Walt.) Fern. var. <i>dioicus</i>	goat's beard		3			
<i>Asarum canadense</i> L. var. <i>reflexum</i> (E.P. Bickn.) B.L. Rob. @	wildginger		3	p	loc abu: lower slopes	loc fre: lower
<i>Asclepias exaltata</i> L.	poke milkweed		1			
<i>Asclepias quadrifolia</i> Jacq.	fourleaf milkweed		3	p	occ: subxeric woods, esp near road on ridge	
<i>Asclepias syriaca</i> L.	common milkweed			p	occ: fields, esp big lowland fields	occ? field?
<i>Asclepias tuberosa</i> L.	orange milkweed			p		rar: upper roadside
<i>Asclepias variegata</i> L.	white milkweed		1	p		
<i>Asclepias verticillata</i>	fine-leaved milkweed			p	rar: clifftops W side*	
<i>Asclepias viridiflora</i> Raf.	slender green milkweed		3	p		rar: rocky roadside
<i>Aureolaria flava</i> (L.) Farw. var. <i>macrantha</i> Pennell	western yellow foxglove		1	?		
<i>Aureolaria patula</i> (Chapm.) Pennell	riparian yellow foxglove		2	p	rar: lower W-facing slope near upper potential flood limit	
<i>Aureolaria pectinata</i> (Nutt.) Pennell	pectinate yellow foxglove		2			
<i>Aureolaria virginica</i> (L.) Pennell	downy yellow foxglove		2	p		
<i>Barbarea verna</i> (P. Mill.) Aschers.	lesser winter-cress		3			
<i>Barbarea vulgaris</i> Ait. f.	common winter-cress	AAA	3	p	loc fre: fields	
<i>Bartonia paniculata</i> (Michx.) Muhl.	paniculate screwstem		2			

<i>Blephilia ciliata</i> (L.) Benth.	blue wood-mint		1	p	occ: subxeric woods esp along road on ridge	
<i>Boechera burkii</i> (Porter) Windham & Al-Shehbaz ?	narrow-leaved rockcress		3			
<i>Boechera laevigata</i> (Muhl. ex Willd.) Al-Shehbaz @	common rockcress		3	p	occ: rocks, cliffs	occ
<i>Boehmeria cylindrica</i> (L.) Sw.	water hemp		3	p	loc fre: banks of back slough; swales in woods, fields	
<i>Brasenia schreberi</i> J.F. Gmel.	water shield		3			
<i>Calycocarpum lyonii</i> (Pursh) Gray	cupseed vine		1			
<i>Calystegia fraterniflora</i> (Mackenzie & Bush) Brummitt @	eastern bindweed		2	p	occ: low old fields	
<i>Campanulastrum americanum</i> (L.) Sm.	tall bellflower			p	occ: roadside, mesic bank	
<i>Capsella bursa-pastoris</i> L.	shephards-purse	AAA	3	p	occ: fields	
<i>Cardamine bulbosa</i> (Schreb. ex Muhl.) B.S.P.	bulbous bittercress		3	p		
<i>Cardamine hirsuta</i> L.	common bittercress	AAA	3	p	loc fre? drier fields	
<i>Cardamine pensylvanica</i> Muhl. ex Willd.	riparian bittercress			?		
<i>Caulophyllum thalictroides</i> (L.) Michx.	blue cohosh		1	p		occ: one patch on toeslope, near Diplazium
<i>Cerastium glomeratum</i> Thuill.	sticky mouse-ear chickweed	AAA		p	loc com: fields	
<i>Cerastium nutans</i> Raf.	nodding chickweed		3			
<i>Cerastium vulgare</i> Hartman	common mouse-ear chickweed	AAA	3	p	loc: fields	
<i>Chaerophyllum procumbens</i> (L.) Crantz	smooth wild chervil			p	loc fre: submesic woods, roadsides to south	
<i>Chaerophyllum tainturieri</i> Hook.	hairy wild chervil		3	p	occ: drier roadsides on ridge	
<i>Chamaesyce maculata</i> (L.) Small	common milk-purslane				loc fre: gravel bar? CHECK	

Chamaesyce nutans (Lag.) Small	greater milk-purslane			p	occ: gravel bar	
Chenopodium missouriense Aellen	midwestern pigweed	A?		p		
Chenopodium standleyanum Aellen	woodland pigweed		1			
Chimaphila maculata (L.) Pursh	striped wintergreen		3	p		
Cicuta maculata L.	water hemlock		1	p	occ: low wet field (big one)	
Circaea alpina L.	northern enchanter's nightshade		2			
Circaea canadensis (L.) Hill	common enchanter's- nightshade		1	p	loc fre: mesic-submesic woods	pre?
Claytonia virginica L.	spring-beauty		3	p	occ; loc fre: mesic-submesic woods	pre?
Clematis versicolor	southern leather-flower		3	p		
Cocculus carolinus (L.) DC.	red-berried moonseed		2	p		
Collinsia verna L.	blue-eyed-Mary			p		
Collinsonia canadensis L.	horsebalm		1	p	rar: toeslope with Liriodendron & C.cordiformis N end of big field	occ: upper slopes along logging road
Comandra umbellata (L.) Nutt.	bastard toadflax		3			
Conium maculatum L.	poison hemlock		1			
Conopholis americana (L.) Wallr. f.	squawroot		1	p		
Corydalis flavula (Raf.) DC.	yellow fumewort		3	p	loc fre: submesic woods, roadsides to south	
Crocianthemum bicknellii (Fern.) Barnh.	hoary frostweed		1			
Croton capitatus Michx.	woolly croton		2	p		
Croton monanthogynus Michx.	limestone croton		3	p	occ; loc fre: gravelly roadsides	loc fre: rocky roadside
Cryptotaenia canadensis (L.) DC.	honewort		1	p	occ; loc fre? low woods near river	pre?

<i>Cuphea viscosissima</i> Jacq.	blue waxweed			p		
<i>Cuscuta campestris</i> Yunck.	common dodder			p	loc abu: gravel bar on <i>Justicia</i> , <i>Persicaria</i> spp. ?	
<i>Cuscuta gronovii</i> Willd. ex J.A. Schultes	common dodder			p		
<i>Cynanchum laeve</i> (Michx.) Pers.	honey-vine			p		
<i>Cynoglossum virginianum</i> L.	wild comfrey		3	p	loc fre: high terrace woods, slopes to south	
<i>Dasistoma macrophylla</i> (Nutt.) Raf.	bulblet fern		3	p	loc fre: above cliffs in more mesic spots (mostly E side?)	
<i>Datura stramonium</i> L.	jimsonweed	A		p		
<i>Daucus carota</i> L.	wild carrot	AAA		p	loc fre: fields	loc abu: field
<i>Delphinium tricornis</i> L.	wood larkspur		3	p	occ: midslope on petering slope with <i>Jeffersonia</i>	
<i>Dentaria diphylla</i> Michx. @	broad-leaved toothwort			p	occ: loc fre: lower slopes below E cliffs; only steepest section	
<i>Dentaria heterophylla</i> Nutt. @	variable-leaved toothwort		1	p		
<i>Dentaria laciniata</i> Muhl. ex Willd. @	lacinate toothwort		3	p	loc fre: wide ranging but esp mesic- subxeric woods	loc fre: lower slopes
<i>Dentaria multifida</i> Muhl. ex Ell. @	dissected toothwort		3	p	loc fre: submesic-subxeric sites, esp slopes of high terraces to south with oaks, ashes, hicks, beech, maple etc	
<i>Dianthus armeria</i> L.	Deptford pink	AA	3	p		
<i>Dicentra canadensis</i> (Goldie) Walp.	squirrel-corn		3	p		
<i>Dicentra cucullaria</i> (L.) Bernh.	Dutchman's breeches		3	p	loc fre: lower slopes below E cliffs; less/none on petering slope	
<i>Dicentra eximia</i> (Ker Gawl.) Torr.	turkey-corn	A	3			
<i>Diodia teres</i> Walt.	upland buttonweed		1	p	occ; loc fre; eroding roadbank of terrace gravel to S	
<i>Diodia virginiana</i> L.	lowland buttonweed			p	occ: gravel bar	

Dodecatheon frenchii Vasey	French's shooting-star		1			
Dodecatheon meadia L. @	shooting-star		3	p	loc fre: above cliffs W side	
Echium vulgare L.	viper's bugloss	AA	3			
Endodeca serpentaria (L.) Raf. @	birthwort		3	p	occ: mesic-subxeric woods	occ: upper slopes?
Enemion biternatum Raf.	running rue-anemone		3	p	occ; loc fre: lower slopes esp transitions from steepest section to more disturbed petering slope (?)	loc fre: lower rocky slopes
Epifagus virginiana (L.) W. Bart.	beechdrops					
Epigaea repens L.	creeping arbutus		1			
Epilobium coloratum Biehler	eastern willowherb		1			
Eriogonum bulbosum (Michx.) Nutt.	harbinger-of-spring		1	p	NONE?	
Eryngium yuccifolium Michx.	rattlesnake-master		1	p		
Euonymus obovatus Nutt.	creeping strawberry-bush		3	p	occ: lower slopes in steepest section; bared ground or near rocks	
Euphorbia commutata Engelm.	woodland spurge		3			
Euphorbia corollata L.	showy spurge		3	p	loc fre: clifftops on W side	
Euphorbia dentata Michx.	toothed spurge	A		p	occ: rocky roadsides	
Fallopia scandens (L.) Holub var. scandens @	lowland climbing buckwheat			p	loc abu: field edges of riparian woods	
Fragaria virginiana Duchesne	wild strawberry		3	p		
Frasera caroliniensis Walt.	columbo		3	p		
Galium aparine L.	climbing bedstraw	a	3	p	occ: esp submesic woods but widely sca	
Galium circaezans Michx.	dry wood bedstraw		3	p	loc fre: esp subxeric woods	

<i>Galium pilosum</i> Ait.	hairy bedstraw			p		
<i>Galium triflorum</i> Michx.	moist wood bedstraw			p	occ: mesic disturbed woods	occ: mid/upper slopes
<i>Gaura biennis</i> L.	giant gaura		2			
<i>Gaura filipes</i> Spach	upland gaura		2	p		
<i>Gentiana puberulenta</i> J. Pringle	prairie gentian		2			
<i>Gentiana saponaria</i> L.	marsh gentian			p		
<i>Geranium carolinianum</i> L.	field geranium		3	p	occ: fields	
<i>Geranium maculatum</i> L.	wood geranium		3	p	loc: mesic woods below cliffs in steepest section	
<i>Geranium molle</i> L.	dovesfoot geranium	AA		p	occ? fields to check and collect	
<i>Geum canadense</i> Jacq.	white avens		3	p	occ? esp submesic woods	
<i>Geum vernum</i> (Raf.) Torr. & Gray	spring avens			p	loc fre? fields, roadsides, thin submesic woods	
<i>Geum virginianum</i> L.	cream avens		3	p	occ; mesic-submesic woods near cliffs	
<i>Gillenia stipulata</i> (Muhl. ex Willd.) Nutt. @	Indian physic		1	p		
<i>Glechoma hederacea</i> L.	gill-over-the-ground	AAA	3	p	loc abu: esp submesic woods and low old fields (probably more with browsing), roadsides to south	
<i>Gratiola neglecta</i> Torr.	common hedgehyssop		2	p	pond margins	
<i>Gratiola viscidula</i> Pennell	pond hedgehyssop					
<i>Hackelia virginiana</i> (L.) I.M. Johnston	beggarslice		1	p		
<i>Heliotropium indicum</i> L.	swamp heliotrope	A		p		
<i>Heliotropium tenellum</i> (Nutt.) Torr.	rock heliotrope		2			

<i>Hepatica acutiloba</i> DC. @	acute hepatica		1	p	loc com: mesic woods below cliffs only in steepest section	
<i>Hepatica americana</i> (DC.) Ker-Gawl.	obtuse hepatica		2			
<i>Heuchera americana</i> L.	common alumroot			p	occ: var. <i>hirsuticaulis</i> on roadside banks; clifftops W side	
<i>Heuchera macrorhiza</i> Small @	lime-cliff alumroot		3	p	loc com: cliff-crevices (vertical) esp W side	
<i>Heuchera parviflora</i> Bartl.	eastern sand-cliff alumroot			?		
<i>Heuchera puberula</i> Mackenzie & Bush	western sand-cliff alumroot		3			
<i>Hibiscus laevis</i> All.	riparian rose-mallow			p	occ: gravel bar, back slough	
<i>Hibiscus moscheutos</i> L.	marsh rose-mallow		3			
<i>Houstonia caerulea</i> L.	common perennial bluets		3	p	NONE?	
<i>Houstonia canadensis</i> Willd. ex Roemer & J.A. Schultes	rosette bluets		3	p	loc fre: above or near cliffs in thin woods, edges, roadsides; esp W side	
<i>Houstonia lanceolata</i> (Poir.) Britt. @	lance-leaved bluets		3	p		occ: roadside
<i>Houstonia purpurea</i> L.	broad-leaved bluets		3	p	occ: high terrace woods near river	
<i>Houstonia rupestris</i> Raf.	lime-cliff bluets			p	occ; loc fre? xeric clifftops esp W side	
<i>Houstonia pusilla</i> Schoepf	common annual bluets		1	p		
<i>Hybanthus concolor</i> (T.F. Forst.) Spreng.	green violet		3	p	occ: mesic-subxeric woods	
<i>Hydrastis canadensis</i> L.	goldenseal		3	p		
<i>Hydrophyllum appendiculatum</i> Michx.	biennial waterleaf			p	loc fre: submesic-mesic woods on petering toeslopes, up to cliff ledges; much browsed; overlaps much with <i>canadense</i> but more widely sca	occ; loc fre? toeslopes just above Laportea zone
<i>Hydrophyllum canadense</i> L.	lowland waterleaf		1	p	loc dom: mesic woods on E side but not in steepest section; and not at S end	

Hydrophyllum macrophyllum Nutt.	upland waterleaf		1			
Hypericum dolabriforme Vent.	cedar-glade St. John's-wort		3	p	loc fre: clifftops, rocky roadside on ridge, esp scraped landing to N	loc fre: roadside
Hypericum drummondii (Grev. & Hook.) Torr. & Gray	"nits and lice"		3			
Hypericum gentianoides (L.) B.S.P.	"orangegrass"		3			
Hypericum mutilum L.	lowland St. Johnswort			p		
Hypericum punctatum Lam.	common St. Johnswort			p	occ: varied disturbed sites, thin woods, edges	
Hypericum stragulum P. Adams & Robson	common St. Andrew's-cross		1	p	occ: ridge in subxeric woods*	
Impatiens capensis Meerb.	orange jewelweed		1	p	loc fre? lowlands near streams?	
Impatiens pallida Nutt.	yellow jewelweed		1	p	loc com: toeslopes below E cliffs esp with/above Laportea	loc com: talus slopes below cliffs
Iodanthus pinnatifidus (Michx.) Steud.	purple rocket			p	loc fre: zone above riverbank; submesic woods on petering slope	
Ipomoea lacunosa L.	lesser morning-glory			p	occ: gravel bar	
Ipomoea pandurata (L.) G.F.W. Mey.	greater morning-glory			p	occ? clifftops W side	
Iresine rhizomatosa Standl.	woolly staff		2	p	rar: shore of back slough	
Isanthus brachiatus (L.) B.S.P. @	lime bluecurls		1	p		
Jeffersonia diphylla L.	twinleaf		3	p	loc abu: mid slopes on petering slopes in mesic-submesic woods	
Justicia americana (L.) Vahl	water-willow		1	p	loc abu: shore of gravel bar, back slough	
Lamium amplexicaule L.	upland henbit	AA	3	?		
Lamium purpureum L.	lowland henbit		3			
Laportea canadensis (L.) Weddell	wood nettle		1	p	occ; loc abu (but not wide): river bottom and toeslopes below E cliffs; much browsed	loc dom: toeslope and upper riparian zone

Leavenworthia uniflora (Michx.) Britt.	common gladeceess			p		
Lechea mucronata Raf.	hairy pinweed		3	p		
Lepidium campestre (L.) Ait. f.	cow-cress		3			
Lepidium virginicum L.	sericea bush-clover		3	p	occ: fields	
Ligusticum canadense (L.) Britt. var. canadense	American lovage		2			
Lindernia dubia (L.) Pennell	pond pimpernel				loc fre: pond margins	
Linum virginianum L.	wood flax			p		
Lithospermum canescens (Michx.) Lehm.	orange puccoon		3	p	loc fre: above cliffs W side	
Lithospermum latifolium Michx.	broad-leaved puccoon		3			
Lithospermum tuberosum Rugel ex DC.	rosette-leaved puccoon			p	occ: subxeric woods on ridge near E side	
Lobelia cardinalis L.	cardinal-flower		1			
Lobelia inflata L.	common lobelia		1	p	exp	
Lobelia puberula Michx.	downy lobelia		1			
Lobelia siphilitica L.	great blue lobelia		3	p	occ: thin riparian woods, esp along path to gravel bar	
Lobelia spicata Lam. var. leptostachys (A. DC.) Mackenzie & Bush	spikate lobelia		3	p		
Ludwigia alternifolia L.	alternate-leaved rattlebox		1			
Ludwigia decurrens Walt	riparian rattlebox			p	occ: shores of back slough	
Lycopus americanus Muhl. ex W. Bart.	dissected water- horehound		1	?		
Lycopus rubellus Moench	southern water- horehound		2			

<i>Lycopus virginicus</i> L.	common water-horehound			p	occ? pond margin near cabin?	
<i>Lysimachia ciliata</i> L.	riparian loosestrife		3	p		
<i>Lysimachia hybrida</i> Michx.	western loosestrife		2			
<i>Lysimachia lanceolata</i> Walt.	lanceolate loosestrife		1	p		
<i>Lysimachia nummularia</i> L.	creeping loosestrife	AAA		p	loc abu: damp areas in big field	
<i>Lysimachia quadrifolia</i> L.	wood loosestrife		3	p		
<i>Matelea obliqua</i> (Jacq.) Woods.	climbing milkvine			p	occ: upper edges near cliffs	
<i>Mecardonia acuminata</i> (Walt.) Small	marsh hyssop		2			
<i>Melothria pendula</i> L.	melonette			?		
<i>Menispermum canadense</i> L.	common moonseed		1	p	occ: roadsides on ridge and on petering slope	occ: lower slope just below bitternut zone
<i>Mertensia virginica</i> (L.) Pers. ex Link	bluebells		2	p		
<i>Micranthes virginiana</i> (Michx.) Small	common saxifrage		3	p	loc fre: cliffs, ledges, roadside bank	NONE? check; must be here
<i>Mimulus alatus</i> Ait.	winged monkey-flower		3	p	occ: shores of back slough	
<i>Minuaria patula</i> (Michx.) Mattf.	rock stitchwort			p	occ: xeric open woods with <i>Opuntia</i>	
<i>Mitchella repens</i> L.	partridgeberry		1			
<i>Mitella diphylla</i> L.	miterwort		3	p		
<i>Monarda clinopodia</i> L. (western segregate)	western woodland bergamot		3	p	loc fre: deer paths down between cliffs on E side in steepest sections	
<i>Monarda fistulosa</i> var. <i>mollis</i> (L.) Benth.	common bergamot		3	p	occ: clifftops W side*	
<i>Monarda serotina</i> ined. (mesic broad-leaved segregate of <i>clinopodia</i>) @	lowland bergamot		2	p	occ: lower slope/terrace at S end near river; with <i>Euprug Veralt</i>	

Mosla dianthera (Buch.-Ham. ex Roxb.) Maxim.	lesser beef-steak plant		3			
Myosotis macrosperma Engelm.	wood forget-me-not		3	p	loc fre: submesic woods, roadsides to south	
Myriophyllum spicatum L.	spike watermilfoil	AAA	2			
Nelumbo lutea (Willd.) Pers.	American lotus		3			
Obolaria virginica L.	pennywort			p		
Oenothera biennis L.	common evening-primrose			p		
Oenothera glauca Michx.	woodland evening-primrose			p		
Opuntia cespitosa Raf.	lime prickly-pear		3	p	occ; loc com: xeric rocky woods on ridge	
Osmorhiza claytonii (Michx.) C.B. Clarke	hairy sweet-cicely			p	occ: mesic woods below cliffs E side	occ? lower slopes; check
Oxalis dillenii Jacq.	weedy wood-sorrel			p	occ; loc fre: wide, disturbed/bare ground, ridges, cliff ledges, to bottoms	occ? upper edges, roadside
Oxalis grandis Small	eastern wood-sorrel		1	p		
Oxalis cf. macrantha (Trel.) Small	interior wood-sorrel			?	occ: to be identified; dry rocky woods near Opuntia	
Oxalis violacea L.	violet wood-sorrel		3	p	occ; loc fre: mesic-subxeric woods; esp deeper soils	
Oxypolis rigidior (L.) Raf.	eastern cowbane		3			
Pachysandra procumbens Michx.	Allegheny spurge		3			
Panax quinquefolius L.	ginseng			p		occ: 3 seen mid slope below cliffs
Papaver somniferum L.	opium poppy		3			
Parietaria pensylvanica Muhl. ex Willd.	pellitory			p	loc fre: dusty soil below cliffs	
Passiflora incarnata L.	purple passionflower		1	p	occ: low fields	occ: fields

<i>Passiflora lutea</i> L.	yellow passionflower			p		
<i>Pedicularis canadensis</i> L.	eastern lousewort		3			
<i>Penstemon calycosus</i> Small	felty beardtongue		3	p		
<i>Penstemon hirsutus</i> (L.) Willd.	smooth closed beardtongue		2	p	occ: clifftops W side*	
<i>Penstemon tenuiflorus</i> Pennell	hairy closed beardtongue		3	p		
<i>Penthorum sedoides</i>	swamp stonecrop			p	occ; loc abu: drawn down pond margin	
<i>Perilla frutescens</i> (L.) Britt.	beef-steak-plant	AAA		p	fre; loc abu: roadsides in woods, edges, fields	occ? edges?
<i>Persicaria coccinea</i> (Muhl. ex Willd.) Greene @	broad-leaved pond smartweed		3			
<i>Persicaria hydropiperoides</i> (Michx.) Small @	pond white smartweed		3			
<i>Persicaria longiseta</i> (de Bruyn) Moldenke @	Asian smartweed	AAA		p	occ; loc fre: roadsides, edges+P443	exp
<i>Persicaria lapathifolia</i> (L.) Gray @	large nodding smartweed			p	loc fre: gravel bar (drier > penn.); pond margins	
<i>Persicaria maculosa</i> S.F. Gray @	European smartweed	AA	3	p	loc fre: fields (gravel bars)	
<i>Persicaria pensylvanica</i> (L.) Small @	large pink smartweed			p	loc fre: gravel bar (lower < lapath.)	
<i>Persicaria punctata</i> (Ell.) Small @	common white smartweed			p	loc abu: low fields, gravel bars; esp pond margins	exp
<i>Phacelia bipinnatifida</i> Michx.	Frankfort fog			p		
<i>Phacelia purshii</i> Buckl.	Miami mist		3	p	occ: submesic woods, only small population on roadside in south	
<i>Phlox bifida</i> Beck var. <i>bifida</i>	blue creeping phlox		3	p	rar: clifftops on W side*	
<i>Phlox divaricata</i> L. var. <i>divaricata</i>	woodland phlox		3	p	loc fre: mesic-subxeric woods	
<i>Phlox paniculata</i> L.	summer phlox		3	p	occ: thin riparian woods, esp along path to gravel bar	
<i>Phryma leptostachya</i> L.	lopseed		1	p	occ: thin submesic-subxeric woods	

Phyla lanceolata (Michx.) Greene	fogfruit			?	loc fre: gravel bar, back slough edge	
Physalis heterophylla Nees	clammy groundcherry		3	p		
Physalis virginiana P. Mill.	upland groundcherry		3	p	occ? upland roadsides CHECK	
Physostegia praemorsa Shinners	upland dragonhead		1			
Physostegia virginiana (L.) Benth.	lowland dragonhead		1	?		
Phytolacca americana L.	pokeweed			p	occ; loc fre: thin woods, edges	occ; loc fre?
Pilea pumila (L.) Gray	clearweed			p	loc fre: esp submesic and low woods	loc com: esp lower slopes
Plantago aristata Michx.	bristle-bracted plantain		3			
Plantago lanceolata L.	lance-leaved plantain	AA		p	loc fre: roadsides, fields	occ; loc fre: roadsides, field
Plantago rugelii Dcne.	broad-leaved plantain			p	loc fre: roadsides, fields, paths in woods	occ; loc fre: paths, roadsides
Plantago virginica L.	hoary plantain			p	loc fre? drier fields	
Podophyllum peltatum L.	mayapple		3	p	loc abu: esp mid-slopes in deeper soil, submesic-subxeric woods	loc abu: esp gully with bitternut; less/none on steeper talus
Podostemum ceratophyllum Michx.	riverweed		1	p	pre: in river (A. Meier)	
Polemonium reptans L. var. reptans	Jacob's-ladder		1			
Potentilla simplex Michx.	scrambling cinquefoil		3	p	loc fre: roadsides, field edge on ridge	
Prunella lanceolata W. Bart.	lance-leaved selfheal		3	p	occ: field edges	
Pycnanthemum pycnanthemoides (Leavenworth) Fern.	hoary head-mint		1	p		
Pycnanthemum tenuifolium Schrad.	narrow-leaved head-mint			p	occ; loc fre: old hayfield on top	
Ranunculus abortivus L.	lowland wood-buttercup		3	p	occ: esp lower slopes in disturbed woods/edges	

Ranunculus caricetorum Greene @	hairy little-buttercup			p	occ: riverbank	
Ranunculus flabellaris Raf.	lesser water-buttercup		2			
Ranunculus hispidus Michx.	woodland buttercup		3			
Ranunculus micranthus Nutt.	lobed wood-buttercup		3	p	occ: esp submesic-subxeric woods, cliff ledges, roadsides	
Ranunculus recurvatus Poir.	prairie coneflower		1	p		
Ranunculus repens L.	ditch buttercup		3			
Ranunculus sarduous Crantz	pasture-buttercup	AA		p	loc com: fields eso where livestock recently grazed	
Rorippa sylvestris (L.) Bess.	creeping yellow-cress	AAA	3	p	occ: gravel bar	
Ruellia caroliniensis (J.F. Gmel.) Steud.	upland petunia		1	p	occ; loc fre: thin subxeric woods, edges	loc fre: upper edges, field, roadside
Ruellia humilis Nutt.	limestone petunia		3	p	occ: clifftops W side*	loc fre: rocky roadside
Ruellia strepens L.	lowland petunia		3	p		
Rumex crispus L.	curlyleaf dock	AA		p	loc com: esp damp/wet fields	
Rumex obtusifolius L.	broadleaf dock	AA		p	loc: fields	
Sabatia angularis (L.) Pursh	rosepink			p		
Salvia lyrata L.	lyreleaf sage		1	p	occ; loc com: esp fields on high terrace; also roadsides esp upper slopes, ridges	
Samolus parviflorus Raf.	water pimpernel		1			
Sanguinaria canadensis L.	bloodroot		3	p	occ: lower slope mesic woods	
Sanicula canadensis L.	common sanicle		3	p	occ; loc fre: esp submesic-subxeric woods, edges, roadsides	
Sanicula odorata (Raf.) K.M. Pryer & L.R. Phillippe	walnut-wood sanicle			?		

<i>Sanicula smallii</i> Bickn.	oak-wood sanicle			?		
<i>Sanicula trifoliata</i> Bickn.	maple-wood sanicle		3	p		
<i>Saponaria officinalis</i> L.	soapwort		3			
<i>Saururus cernuus</i> L.	lizardtail		3	p	occ: low part of gravel bar	
<i>Scleranthus annuus</i> L.	annual knawel		1			
<i>Scrophularia marilandica</i> L.	figwort			p	occ: lower slopes in thin submesic woods near river	
<i>Scutellaria australis</i> (Fassett) Epling	hairy glade skullcap			p		
<i>Scutellaria elliptica</i> Muhl. ex Spreng.	lesser wood skullcap		3	p	occ? subxeric woods near cliffs	
<i>Scutellaria incana</i> Biehler var. <i>incana</i>	greater wood skullcap		3	p		
<i>Scutellaria integrifolia</i> L.	entire-leaved skullcap					
<i>Scutellaria lateriflora</i> L.	mad-dog skullcap		1			
<i>Scutellaria leonardii</i> Epling	smooth glade skullcap		1	?		
<i>Scutellaria nervosa</i> Pursh var. <i>nervosa</i>	creeping wood skullcap		3	p		
<i>Scutellaria ovata</i> Hill ssp. <i>bracteata</i> (Bentham) Epling	cordate wood skullcap		3	p	occ? CHECK	
<i>Sedum pulchellum</i> Michx.	pink stonecrop		2			
<i>Sedum ternatum</i> Michx.	wood stonecrop		3	p	loc fre: mesic woods esp on ledges/damp cliff faces	loc fre: low cliff faces
<i>Sicyos angulatus</i> L.	bur cucumber			p	loc fre: field edges of riparian woods	
<i>Sida spinosa</i> L.	prickly sida	A		p	occ: pond margins (broad-leaved form with vestigial prickles)	
<i>Silene regia</i> Sims	royal catchfly		3			
<i>Silene rotundifolia</i> Nutt.	round-leaved catchfly		2			

<i>Silene stellata</i> (L.) Ait. f.	starry campion		1			
<i>Silene virginica</i> L.	firepink		3	p	loc fre: mesic-subxeric rocky woods esp near road	
<i>Sisymbrium officinale</i> (L.) Scop.	hedge-mustard	AA		p	occ: fields	
<i>Solanum carolinense</i> L.	horse-nettle			p	loc fre: fields	
<i>Spermacoce glabra</i> Michx.	greater buttonweed		3	p		
<i>Stachys cordata</i> Riddell	cordate woundwort		1			
<i>Stachys hispida</i> Pursh	hispid woundwort		3	p		
<i>Stachys tenuifolia</i> Willd.	smooth woundwort			p		
<i>Stellaria corei</i> Shinners	greater wood-chickweed		1	p	loc abu: lower slopes below E cliffs and to south on petering	loc com: toeslopes
<i>Stellaria media</i> (L.) Vill.	common chickweed	AAA		p	loc com: disturbed woods in south	
<i>Stellaria pubera</i> Michx.	lesser wood-chickweed		3	p	occ? CHECK	
<i>Stylophorum diphyllum</i> (Michx.) Nutt.	wood poppy		3	p	occ: with <i>Trillium flexipes</i> on mesic toeslopes	
<i>Taenidia integerrima</i> (L.) Drude	yellow pimpernel			p		
<i>Teucrium canadense</i> L. var. <i>virginicum</i> (L.) Eat.	germander		3	p		
<i>Thalictrum dioicum</i> L.	rue-anemone		1	p	loc fre: ledges below cliffs E side	occ; loc fre? Check
<i>Thalictrum pubescens</i> Pursh	lowland meadow rue		2			
<i>Thalictrum revolutum</i> DC.	upland meadow-rue			p	occ: thin subxeric woods	
<i>Thaspium aureum</i> (L.) Nutt.	ternate wood-parsnip		3	p		
<i>Thaspium chapmanii</i> (Coul. & Rose) Small @	glade-parsnip		1	p		
<i>Thlaspi alliaceum</i> L.	garlic pennycress	AA	3	p		

Tiarella cordifolia L.	foamflower		3	p	occ: mesic woods just above river bank; both sides in narrow zone with fresh alluvium; steepest section only?	
Tragia cordata Michx.	broad-leaved nose-burn		3	p	rar: rocky roadside on ridge	
Trichostema dichotomum L.	sand bluecurls		3	p		
Triodanis biflora (Ruiz & Pavón) Greene	lesser Venus looking-glass			p		
Triodanis perfoliata (L.) Nieuwl.	greater Venus looking-glass			p		
Triosteum angustifolium L.	narrow-leaved horse-gentian			p	occ: mid-slopes in gap between cliffs on E side (pubescent leaf below)	
Truellum sagittatum (L.) Soják	arrowleaf tearthumb		1			
Utricularia gibba L.	common bladderwort		2			
Valeriana pauciflora Michx.	eastern valerian		1			
Valerianella radiata (L.) Dufur.	common cornsalad			p	low fre: low fields, thin/disturbed woods! (small flws, slightly ciliate bracts)	
Verbascum phlomoides L.	orange mullein	AA	1			
Verbascum thapsus L.	common mullein	AA		p		
Verbena bracteata Lag. & Rodr.	prostrate vervain		1			
Verbena simplex Lehm.	field vervain		1	p		
Verbena urticifolia L.	white vervain		1	p	occ? low fields, gravel bar?	
Veronica peregrina L.	smooth sessile speedwell			p	loc fre: fields	
Veronicastrum virginicum (L.) Farw.	culver's root		1			
Vinca minor L.	periwinkle		2			

<i>Viola affinis</i> Le Conte	northern blue-violet		1	p		
<i>Viola bicolor</i> Pursh	field pansy		3			
<i>Viola egglestonii</i> Brainerd	glade violet		3			
<i>Viola hirsutula</i> Brainerd	southern blue-violet		2	p		
<i>Viola palmata</i> L.	palmate blue-violet		3	p	rar: dry woods in south (slightly pubescent below)	
<i>Viola papilionacea</i> Pursh @	common blue-violet		1	p	loc fre: low woods, esp thin flooded	
<i>Viola pedata</i> L.	birds-foot violet		3	p		
<i>Viola pennsylvanica</i> Michx.	smooth yellow stemmed-violet		2	p	occ: toeslopes in mesic woods/edges (smooth)	occ: esp mid/upper slopes, including bitternut area
<i>Viola rostrata</i> Pursh	long-spurred spreading violet		1	?		
<i>Viola sororia</i> Willd.	hairy blue-violet		3	p	fre: mesic-subxeric woods	
<i>Viola striata</i> Ait.	trilobed blue-violet		3	p	loc com: submesic disturbed woods on low slopes in south near fields	
<i>Waldsteinia fragarioides</i> (Michx.) Tratt.	barren strawberry		3			
<i>Zizia aptera</i> (Gray) Fern.	upland alexanders		3	p	occ: clifftops W side with <i>Lithospermum canescens</i>	
LEGUMES (HERBACEOUS SPECIES)					LEGUMES	LEGUMES
<i>Amphicarpaea bracteata</i> (L.) Fern.	common hogpeanut		1	p	occ: petering slope at base in "submesic" area with much disturbance history	occ; loc fre: fencerow, field edge w/cane
<i>Apios americana</i> Medik.	potato bean		1	p	occ: gravel bar	
<i>Chamaecrista fasciculata</i> (Michx.) Greene	greater partridge-pea		1	p	occ: gravel bar, roadsides, fields?	loc fre: adj field (fresh pasture)
<i>Chamaecrista nictitans</i> (L.) Moench	lesser partridge pea		3			

<i>Clitoria mariana</i> L.	butterfly-pea		1	p		
<i>Dalea candida</i> Michx. ex Willd.	white prairie clover			p		
<i>Desmanthus illinoensis</i> (Michx.) MacM. ex B.L. Robins. & Fern.	prairie mimosa					
<i>Desmodium canescens</i> (L.) DC.	hoary ticktrefoil		3	p		
<i>Desmodium ciliare</i> (Muhl. ex Willd.) DC.	hairy small-leaved tick-trefoil			p		
<i>Desmodium cuspidatum</i> (Muhl. ex Willd.) DC. ex Loud.	large-bracted tick-trefoil		1	p		
<i>Desmodium laevigatum</i> (Nutt.) DC.	bluish tick-trefoil		1	p		
<i>Desmodium paniculatum</i> (L.) DC.	narrow-leaved tick-trefoil		3	p	occ; loc fre? thin submesic woods, roadsides on upper slopes	loc fre: ridge along logging road
<i>Desmodium perplexum</i> B.G. Schub.	round-leaved tick-trefoil			p	occ? fields?	loc fre: field
<i>Desmodium rotundifolium</i> DC.	round-leaved tick-trefoil		1	p		
<i>Desmodium sessilifolium</i> (Torr.) Torr. & Gray	tall tick-trefoil		1			
<i>Desmodium viridiflorum</i> (L.) DC.	velvetleaf tick-trefoil		3			
<i>Galactia volubilis</i> (L.) Britt.	downy milkpea		2	p	occ: clifftops W side*	
<i>Hylodesmum glutinosum</i> (Muhl. ex Willd.) H. Ohashi & R.R. Mill	greater wood tick-trefoil		1			
<i>Hylodesmum nudiflorum</i> (L.) H. Ohashi & R.R. Mill @	common wood tick-trefoil		1	p	occ? thin woods on high terrace in south	
<i>Hylodesmum pauciflorum</i> (Nutt.) H. Ohashi & R.R. Mill @	pale wood tick-trefoil		1	p		
<i>Kummerowia striata</i> (Thunb.) Schindl.	Japanese bush-clover (retrose hairs)	AA		p	loc fre: fields, roadsides, scraped landing	
<i>Kummerowia stripulacea</i> (Maxim.) Makino	Korean bush-clover (antrorse hairs)	AA		p		loc fre: roadside

<i>Lespedeza capitata</i> Michx.	large-headed bush-clover		2			
<i>Lespedeza cuneata</i> (Dum.-Cours.) G. Don	sericea bush-clover	AAA	3	p	loc abu: planted in old fields and pathway to south parallel to current road	loc fre: field, roadside
<i>Lespedeza frutescens</i> (L.) Hornem @	lime bush-clover		1	p	loc fre: subxeric-xeric woods near ridge road; also clifftops W side	loc fre: upper slopes in logging road
<i>Lespedeza hirta</i> (L.) Hornem.	broad-leaved bush-clover		2			
<i>Lespedeza procumbens</i> Michx.	hairy creeping bush-clover		3	p	loc fre: roadside on ridge; scraped landing to N	
<i>Lespedeza repens</i> (L.) W. Bart.	smooth creeping bush-clover			p		
<i>Lespedeza stuevei</i> Nutt.	barrens bush-clover		3	p		
<i>Lespedeza violacea</i> (L.) Pers. [sensu stricto]	intermediate-leaved bush-clover		3	p	nea? scraped landing to N	
<i>Lespedeza virginica</i> (L.) Britt.	narrow-leaved bush-clover		3	p	rar: clifftops on W side*	
<i>Medicago sativa</i> L.	alfalfa	AA		p		occ: field, roadside
<i>Medicago lupulina</i> L.	black medick	AA		p	loc fre: fields, roadsides	
<i>Melilotus albus</i> Medikus	white sweetclover	AAA	3	p		
<i>Melilotus officinalis</i> (L.) Lam.	yellow sweetclover	AAA		?	occ? roadsides	
<i>Orbexilum pedunculatum</i> (P. Mill.) Rydb.	Sampson's snakeroot			p		
<i>Phaseolus polystachios</i> (L.) B.S.P.	wild bean		1	p		
<i>Securigera varia</i> (L.) Lassen @	crown-vetch	AA		p		
<i>Senna marilandica</i> (L.) Link	upland senna			p		
<i>Strophostyles umbellata</i> (Muhl. ex Willd.) Britt.	narrow-leaved fuzzybean		3	p		
<i>Stylosanthes biflora</i> (L.) B.S.P.	pencilflower		3	p	rar: clifftops W side*	

<i>Tephrosia virginiana</i> (L.) Pers.	goat's-rue		3			
<i>Trifolium arvense</i> L.	rabbitfoot clover	AA	3			
<i>Trifolium campestre</i> Schreb.	yellow clover	AA		p	loc fre: fields	
<i>Trifolium pratense</i> L.	red clover	AA		p	loc com: fields	loc fre: field, roadside
<i>Trifolium reflexum</i> L.	buffalo clover		3			
<i>Trifolium repens</i> L.	white clover	AA		p	loc fre: fields	
<i>Vicia angustifolia</i> L.	spring vetch	AA		p	fre: fields	
<i>Vicia caroliniana</i> Walt.	eastern wood vetch		3			
<i>Vicia dasycarpa</i> Ten.	smooth winter vetch	AA	3			
<i>Vicia villosa</i> Roth	hairy winter vetch	AA		p		
COMPOSITES (ASTERACEAE)	COMPOSITES				COMPOSITES	COMPOSITES
<i>Achillea millefolium</i> L.	yarrow	a		p		
<i>Ageratina altissima</i> (L.) King & H.E. Robins.	white snakeroot		1	p	loc abu: mesic-submesic woods	loc com: esp gully with Crc
<i>Ambrosia artemisiifolia</i> L.	common ragweed			p	occ; loc fre: fields	loc fre: fields
<i>Ambrosia bidentata</i> Michx.	lesser ragweed		2	p		
<i>Ambrosia trifida</i> L.	greater ragweed		3	p	occ: fields, low edges	occ: sev puny plants along deer trails on steep slopes! Perhaps dispersed by them
<i>Antennaria parlinii</i> Fern. ssp. fallax (Greene) Bayewr & Stebbins	smooth pussytoes			p	occ: clifftops W side; check taxonomy	
<i>Antennaria plantaginifolia</i> (L.) Richards.	hairy pussytoes		3	p	loc com: subxeric-xeric woods, clifftops on ridge; near Opuntia	

Arnoglossum reniforme (Hooker) H. Rob. @	greater Indian plantain		1			
Artemisia annua L.	fine-leaved wormwood			p	occ: gravel bar	
Bidens aristosa (Michx.) Britt.	common bur-marigold			p		nea: roadsides*
Bidens bipinnata L.	upland bur-marigold			p	occ: clifftops W side*	
Bidens cernua L.	sessile bur-marigold			p	occ; loc fre: gravel bar; pond margins	
Bidens comosa (Gray) Wieg.	petioled bur-marigold			p		
Bidens discoidea (Torr. & Gray) Britt.	swamp bur-marigold		3			
Bidens frondosa L.	beggarticks			p	occ: gravel bar, adj edges, low fields	
Bradburia pilosa (Nutt.) Semple	soft goldenaster		2			
Brickellia eupatorioides (L.) Shinnery	alternate-leaved boneset		3	p	occ? old fields*	
Carduus nutans L.	nodding plumeless thistle	AA		p	occ; loc fre: roadsides, fields	
Cichorium intybus L.	chicory	AA		p		
Cirsium altissimum (L.) Hill	narrow-leaved thistle		3	p		
Cirsium discolor (Muhl. ex Willd.) Spreng.	old-field thistle			p	occ; loc fre: old fields*	occ? field?
Conoclinium coelestinum (L.) DC.	blue mistflower		3	p		
Conyza canadensis (L.) Cronq.	common horseweed			p	nea: fields*	loc fre: field
Coreopsis auriculata L.	lobed tickseed		3			
Coreopsis major Walt.	common tickseed		3	p		
Coreopsis tripteris L.	tall tickseed		1	p		
Doellingeria infirma (Michx.) Greene	upland whitetop-aster		1			

Echinacea purpurea (L.) Moench	broad-leaved purple coneflower			p		
Echinacea simulata R.L. McGregor	narrow-leaved purple coneflower		3	p		
Eclipta prostrata (L.) L.	worldwide daisy		1	p	occ: gravel bar, pond margins	
Elephantopus carolinianus Raesch.	common elephant's-foot			p	occ: fields	
Erechtites hieraciifolia (L.) Raf. ex DC.	fireweed		1	p	occ; loc fre? bare ground in fields and woods (incl clifftops)	
Erigeron annuus (L.) Pers.	common daisy-fleabane			p	loc fre: fields CHECK vs strigosus	
Erigeron philadelphicus L.	early daisy-fleabane			p	loc fre: roadsides, fields, thin submesic woods	pre?
Erigeron pulchellus Michx. var. pulchellus	greater daisy-fleabane		3			
Erigeron strigosus Muhl. ex Willd.	western daisy-fleabane			p	loc fre: esp drier fields	
Eupatorium album L.	barrens thoroughwort		3			
Eupatorium altissimum L.	calicole thoroughwort		3	?	occ: drier old fields; scraped landing to N w/Hyp dol	
Eupatorium capillifolium (Lam.) Small	dogfennel		2	p		
Eupatorium hyssopifolium L. (sensu stricto)	lesser whorled thoroughwort		2			
Eupatorium perfoliatum L.	marsh boneset		1			
Eupatorium serotinum Michx.	lowland boneset		3	p	occ; loc fre: gravel bar	
Eupatorium sessilifolium L.	sessile-leaved thoroughwort		1			
Eupatorium torreyanum Short & Peter @	greater whorled thoroughwort		3			
Eurybia macrophylla (L.) Cass. var. ianthina (Burgess) new comb.	broad-leaved aster		1			
Eutrochium purpureum (L.) E.E. Lamont	wood joe-pye-weed		1	p	occ; edges of mesic-submesic woods*	occ: roadside along ditch with Solidago gigantea

Fleischmannia incarnata (Walt.) King & H.E. Robins.	upland mistflower			p	
Gamochaeta purpurea (L.) Cabrera	purple everlasting			p	exp; CHECK argyrea (scrap collection?)
Helenium autumnale L. var. autumnale	broad-leaved sneezeweed		1		
Helenium flexuosum Raf.	narrow-leaved sneezeweed			p	occ: fields on terrace and lowland to E
Helianthus divaricatus L.	sessile wood sunflower		1	p	NONE?
Helianthus eggertii Small	barrens glaucous sunflower		3		
Helianthus grosseserratus Martens	big-tooth sunflower		2		
Helianthus hirsutus Raf.	common glade sunflower		1	p	loc fre: clifftops of W side; old hayfield edge on ridge
Helianthus maximiliani Schrad.	Maximilian sunflower	A		p	
Helianthus microcephalus Torr. & Gray	small-headed wood sunflower		1	p	loc fre: thin woods, edges; esp ridge near road
Helianthus mollis Lam.	downy sunflower		1		
Helianthus strumosus L.	northeastern glaucous sunflower		3		
Helianthus tuberosus L.	meadow sunflower			p	occ; loc com: steep open riverbanks; and along mowed pathway to gravel bar
Heliopsis helianthoides (L.) Sweet var. helianthoides	oxeye sunflower		1		
Heliopsis helianthoides (L.) Sweet var. scabra (Dunal) Fern.	rough oxeye sunflower		2		
Heterotheca camporum (Greene) Shinnery var. glandulissimum Semple	western goldenaster	A	2	p	
Hieracium gronovii L.	common upright hawkweed		3	p	
Hieracium venosum L.	common branched hawkweed			p	

Ionactis linariifolius (L.) Greene	fine-leaved whitetop- aster		1			
Krigia biflora (Walt.) Blake	common orange dandelion		3	?		
Krigia dandelion (L.) Nutt.	narrow-leaved orange dandelion			p		
Krigia virginica (L.) Willd.	annual orange dandelion		3			
Lactuca canadensis L.	common wild lettuce			p		
Lactuca floridana (L.) Gaertn.	common blue lettuce			p		occ: roadside in partial shade; CHECK other tracts
Lactuca hirsuta Muhl. ex Nutt.	barrens lettuce		2			
Leucanthemum vulgare Lam.	oxeye-daisy	AA		p	loc fre: fields, roadsides	
Liatris aspera Michx.	greater blazingstar		3	p	rar: clifftops on W side; rocky roadside on ridge*	
Liatris cf. hirsuta Rydb.	lower midwestern blazingstar		2	p	rar: clifftops on W side; perhaps remnant of squarrosa x cylindracea	
Liatris spicata (L.) Willd.	spikate blazingstar			p		
Liatris squarrosa (L.) Michx. var. squarrosa	common blazingstar		2	p	rar: clifftops on W side	
Liatris squarrolosa Michx.	mountain blazingstar		1			
Nabalus altissimus (L.) Hook. @	common wood-lettuce		1	p	loc com: esp roadsides, (esp browsed?), thin woods; mesic- subxeric	loc fre: esp mid/upper slopes, often with Cyspro; perhaps browsing- associated
Nabalus crepidineus (Michx.) Hook. @	giant wood-lettuce		2	p	rar: one patch, with several plants, thin submesic woods on the toeslope to east of the vinyl barn	
Oligoneuron rigidum (L.) Small	stiff goldenrod		2	p		
Packera anonyma (Wood) W.A. Weber & A. Löve	common ragwort			p		
Packera aurea (L.) A. & D. Löve	golden ragwort		3	p	loc fre: riverbanks	
Packera glabella (Poir) C. Jeffrey	butter ragwort			p	loc fre: damp fields, edges, roadsides	

Packera obovata (Muhl. ex Willd.) W.A. Weber & A. Löve	wood ragwort		3	p	NONE?	
Packera pauperula (Michx.) A. & D. Löve var. pseudotomentosa (Mackenzie & Bush) R.R. Kowal	balsam groundsel		2			
Parthenium integrifolium L.	wild quinine		3	p		
Pluchea camphorata (L.) DC.	camphorweed		3			
Polymnia canadensis L.	white wood-rosinweed			p	loc abu: rocky woods, esp mesic-subxeric talus: almost smooth (esp low) and dense hairy (esp upper)	loc com: esp mid slopes; many sdl this year; few flw
Ratibida pinnata (Vent.) Barnh.	prairie coneflower		3	p		
Rudbeckia hirta L.	eastern blackeyed-Susan		3			
Rudbeckia laciniata L.	cutleaf coneflower		1	p	loc fre: less disturbed riverbanks and bottoms, esp S end in big low field with large patches little mowed	occ: toeslope-riparian transition
Rudbeckia serotina Nutt.	western blackeyed-Susan	A	3	p		
Rudbeckia tenax C.L. Boynt. & Beadle @	limey blackeyed-Susan		3	p	nea: scraped landing to N w/Hyp dol	
Rudbeckia triloba L.	weedy blackeyed-Susan			p		
Rudbeckia umbrosa C.L. Boynt. & Beadle	mountain blackeyed-Susan		3			
Sericocarpus asteroides (L.) B.S.P.	toothed whitetop-aster			p		
Sericocarpus linifolius (L.) B.S.P.	slender whitetop-aster		1	p		
Silphium glabrum Eggert ex Small	smooth rosinweed		3			
Silphium integrifolium Michx.	tall rosinweed		1			
Silphium perfoliatum L.	cupleaf (or riparian) rosinweed		1	p	occ; loc fre: along mowed path to gravel bar; much browsed by deer but spreading with rhizomes along path	

<i>Silphium pinnatifidum</i> Ell.	pinnate prairie-dock		2			
<i>Silphium trifoliatum</i> L.	whorled rosinweed		3	p	NONE?	
<i>Smallanthus uvedalius</i> (L.) Mackenzie ex Small	yellow wood-rosin			p	occ? submesic woods, edges	
<i>Solidago altissima</i> L. @	common old-field goldenrod			p	loc com: fields, edges	occ: upper slopes, roadside
<i>Solidago caesia</i> L.	blue-stem goldenrod		3	p	loc fre: mesic-subxeric woods	
<i>Solidago erecta</i> Pursh	erect upland goldenrod			p	loc fre: subxeric woods near cliffs	
<i>Solidago flexicaulis</i> L.	common zig-zag goldenrod		1	p	loc com: mesic woods below cliffs above river	occ: talus slope below cliffs
<i>Solidago gigantea</i> Ait.	lowland goldenrod			p	loc fre: lowlands near river, thin riparian woods, old fields, roadsides (rar on ridge)	loc fre: thin riparian woods; also ditch along road
<i>Solidago hispida</i> Muhl. ex Willd.	hairy upright goldenrod			p		
<i>Solidago juncea</i> Ait.	early goldenrod			p		
<i>Solidago nemoralis</i> Ait.	gray-haired goldenrod		3	p	occ: drier roadside banks (eroded terrace)	loc fre: drier roadsides
<i>Solidago odora</i> Ait.	anise-scented goldenrod		1			
<i>Solidago rigidiuscula</i> (Torr. & Gray) Porter	western showy goldenrod		3			
<i>Solidago rupestris</i> Raf.	lime-river goldenrod		3	p	rar: rocky riverbank at NW side of site	
<i>Solidago sphacelata</i> Raf.	lime-cliff (or heartleaf) goldenrod		1	p	occ; loc abu: thin dry woods, esp cliff tops on W side; roadside above cliffs	
<i>Solidago ulmifolia</i> Muhl. ex Willd.	lime-wood (or elmleaf) goldenrod			p	loc fre: subxeric woods esp near cliffs	loc fre: upper slope woods
<i>Symphyotrichum cordifolium</i> (L.) Nesom	common wood-blue-aster			p	loc fre? mesic woods esp edges	loc fre: lower slopes
<i>Symphyotrichum dumosum</i> (L.) Nesom	sand little-white-aster		3	p		
<i>Symphyotrichum laeve</i> (L.) A. & D. Löve	lime blue-aster		3	p		

Symphiotrichum lanceolatum (Willd.) Nesom	swamp little-white-aster		1	p		
Symphiotrichum lateriflorum (L.) A. & D. Löve	purplish little-white-aster			p	occ: low woods/edges; gravel bar	
Symphiotrichum lowrianum (Porter) Nesom	smooth wood-blue-aster			?		
Symphiotrichum ontarione (Wieg.) Nesom	soft little-white-aster			p	loc fre: low woods/edges; gravel bar	
Symphiotrichum patens (Ait.) Nesom	sand purple-aster		1	p	occ: subxeric woods w/post oak, Danthonia	
Symphiotrichum patens (Ait.) Nesom var. gracile (Hook.) Nesom	southern sand purple-aster					
Symphiotrichum phlogifolium (Muhl. ex Willd.) Nesom	mountain purple-aster		1			
Symphiotrichum pilosum (Willd.) Nesom	old-field little-white-aster		3	p	loc fre: fields	loc fre? field?
Symphiotrichum pratense (Raf.) Nesom	barrens silky-aster		2			
Symphiotrichum prenanthoides (Muhl. ex Willd.) Nesom	streamside blue-aster			p		
Symphiotrichum shortii (Lindl.) Nesom	limey wood-blue-aster		1	p	com; loc abu: esp subxeric woods	loc fre: upper slopes
Symphiotrichum undulatum (L.) Nesom	sandy wood-blue-aster		1	p	occ: edges, thin woods on ridge	
Taraxacum officinale G.H. Weber ex Wiggers	common dandelion	AA	3	p	loc fre: fields, roadsides, paths in woods	occ: roadside
Verbesina alternifolia (L.) Britt. ex Kearney	lowland wingstem			p	loc abu: thin low woods, edges, old fields near river	loc fre: thin riparian woods; fields
Verbesina helianthoides Michx.	western wingstem		1	p		
Verbesina virginica L.	white wingstem		1	p	occ: upland edges, old fields	occ: fields, roadside
Vernonia gigantea (Walt.) Trel.	common ironweed		3	p	loc fre: fields	
Xanthium canadense P. Mill.	hairy cocklebur			p	occ: gravel bar	

MONOCOTS (NON-WOODY)	MONOCOTS				MONOCOTS	MONOCOTS
<i>Alisma subcordatum</i> Raf.	water-plantain					
<i>Allium canadense</i> L.	wild onion		3	p	loc fre: lower slopes near river, esp toeslope transitions to floodplains	
<i>Allium cernuum</i> Roth	nodding onion			p		
<i>Allium vineale</i> L.	weed onion	AA	3	p	loc fre: fields, edges, thin grazed woods	
<i>Aplectrum hyemale</i> (Muhl. ex Willd.) Torr.	puttyroot orchid		1	p		
<i>Arisaema dracontium</i> (L.) Schott	green dragon		1	p	occ: low (esp browsed?) thin woods near river (esp upper flooded limit?)	
<i>Arisaema pusillum</i> (Peck) Nash	lesser Jack-in-the-pulpit		3			
<i>Arisaema triphyllum</i> (L.) Schott	common jack-in-the-pulpit		3	p	occ; loc fre: esp mesic woods	loc fre: varied slopes; up to 8 dm tall
<i>Asparagus officinalis</i> L.	asparagus	AA		p		
<i>Belamcanda chinensis</i> (L.) DC. @	blackberry lily	AA	3	p	occ? dry roadside	
<i>Chamaelirium luteum</i> (L.) Gray	fairywand		1			
<i>Commelina communis</i> L.	common dayflower	AA		?		
<i>Commelina virginica</i> L.	swamp dayflower			p	occ: low damp edges of riparian woods near back-slough	
<i>Corallorhiza wisteriana</i> Conrad	spring coralroot		3			
<i>Cypripedium pubescens</i> Willd.	yellow lady's slipper		1	p		
<i>Dioscorea quaternata</i> J.F. Gmel. @	wild yam		3	p	loc fre: esp mesic-subxeric woods on ridge and upper slopes; less/none on lower mesic slopes	
<i>Erythronium albidum</i> Nutt.	white trout-lily			p		
<i>Erythronium americanum</i> Ker-Gawl.	yellow trout-lily		3	p	loc abu: lower slopes W side; not seen E side (!)	

<i>Galearis spectabilis</i> (L.) Raf.	showy orchid		1	p		
<i>Goodyera pubescens</i> (Willd.) R. Br. ex Ait. f.	rattlesnake plantain			p	rar: subxeric woods	
<i>Hemerocallis fulva</i> (L.) L.	orange daylily	AA	3	p		
<i>Hexalectris spicata</i> (Walt.) Barnh.	crested coral-root					
<i>Hymenocallis occidentalis</i> (LeConte) Kunth	spiderlily			p		
<i>Hypoxis hirsuta</i> (L.) Coville	yellow-eyed-grass		3	p		
<i>Iris cristata</i> Ait.	common dwarf iris		3	p	loc fre: above cliffs W side in apparently xeric sites; weird!	
<i>Liparis liliifolia</i> (L.) L.C. Rich. ex Ker-Gawl.	tway-blade orchid			p		
<i>Manfreda virginica</i> (L.) Salis. ex Rose	American aloe		1	p	occ: above W cliffs and in adj woods	
<i>Medeola virginiana</i> L.	Indian cucumber		3	p		
<i>Najas guadalupensis</i> (Spreng.) Magnus	southern waternymph			p	pre: in river (AM) to check species	
<i>Narcissus pseudonarcissus</i> L.	daffodil	AA		p		
<i>Nothoscordum bivalve</i> (L.) Britt.	crowpoison		3	p	occ: subxeric-xeric woods on ridge, esp clifftops?	
<i>Ornithogalum umbellatum</i> L.	star-of-Bethlehem	AAA	3	p	occ: esp disturbed submesic woods to south	
<i>Polygonatum biflorum</i> (Walt.) Ell.	common Solomon's seal		3	p	loc fre: esp mesic-subxeric woods	loc fre: upper slopes, mesic- subxeric woods
<i>Polygonatum commutatum</i> (J.A. & J.H. Schultes) A. Dietr. @	greater Solomon's seal			p	occ? lower slopes?	
<i>Polygonatum pubescens</i> (Willd.) Pursh	hairy Solomon's seal		3	p	NONE? (but check photo on cliffledge with Manfreda)	
<i>Pontederia cordata</i> L.	pickerelweed		3			
<i>Potamogeton diversifolius</i> Raf.	diverse-leaved pondweed		3			

Potamogeton foliosus Raf.	fine-leaved pondweed		3			
Potamogeton nodosus Poir.	long-leaved pondweed		3	p	pre: in river (AM)	
Potamogeton pulcher Tuckerman	broad-leaved pondweed		2			
Sagittaria calycina Engelm.	oxbow arrowhead		3			
Sagittaria graminea Michx.	narrow-leaved arrowhead		2			
Sagittaria latifolia Willd.	common arrowhead		2			
Sisyrinchium albidum Raf.	white blue-eyed grass			p	occ: roadside on ridge	
Sisyrinchium angustifolium P. Mill.	rough greenbrier			p		
Smilacina racemosa L. @	false solomon's-seal		3	p	occ; loc abu: mesic woods on steeper slopes, esp talus	loc abu: talus slopes
Smilax ecirrata (Engelm. ex Kunth) S. Wats.	upright carrionflower		3	p	occ: mid slopes on deeper soil or below cliffs	
Smilax pulverulenta Michx. ?	interior carrionflower			p	rar: edge of submesic woods along large bottomland field to E	
Spiranthes cernua (L.) L.C. Rich.	marsh ladies'-tresses			p		
Spiranthes lacera (Raf.) Raf. var. gracilis (Bigelow) Luer	eastern slender ladies'-tresses		2			
Spiranthes ovalis Lindl. var. erostellata Catling	late slender ladies'-tresses		3			
Spiranthes tuberosa Raf.	lesser slender ladies'-tresses		2			
Stenanthium gramineum (Ker-Gawl.) Morong	featherbells		3			
Tipularia discolor (Pursh) Nutt.	crane-fly-orchid		1	p		
Tradescantia subaspera Ker-Gawl.	broad-leaved spiderwort		1	p	occ; loc fre: thin mesic-submesic woods on low slopes near river below E cliffs	
Tradescantia virginiana L.	narrow-leaved spiderwort		3			

<i>Trillium cuneatum</i> Raf.	purple sessile-trillium		2	p		
<i>Trillium flexipes</i> Raf.	nodding trillium		3	p	rar: loc fre: ca 1000 below cliffs to E just S of steepest section	
<i>Trillium recurvatum</i> Beck	clawed trillium		2	p		
<i>Trillium sessile</i> L.	lesser sessile-trillium		3	p	occ; loc fre: submesic woods in south	
<i>Uvularia grandiflora</i> Sm.	greater bellwort		3	p	occ; loc fre: mid-slopes below cliffs to E, incl gap down between cliffs near <i>Monarda serotina</i>	
<i>Uvularia perfoliata</i> L.	lesser bellwort		3	p	NONE?	
<i>Wolffia brasiliensis</i> Weddell	dotted watermeal		3	p		
<i>Yucca filamentosa</i> L.	southeastern yucca (Adam's needle)	A		p		
GRAMINOIDS						
<i>Agrostis perennans</i> (Walt.) Tuckerman	woodland bentgrass		3			
<i>Andropogon gerardii</i> Vitman	big bluestem		1	p	occ: (sca pla in CREP on low fields); above cliffs W side with Lithcan (?); also along rocky riverbank; also at jct Logsdan Rd & Rt 88	
<i>Andropogon gyrans</i> Ashe	sheathed broomsedge		1	p		
<i>Andropogon ternarius</i> Michx.	silvery bluestem		3	p		
<i>Andropogon virginicus</i> L.	common broomsedge		1	p	loc abu: drier old fields; all var. <i>virginicus</i> but some unusually slender?	loc fre: fields, roadsides
<i>Aristida oligantha</i> Michx.	spreading threeawn-grass			p		
<i>Arrhenatherum elatius</i> (L.) Beauv. ex J. & K. Presl	tall oatgrass	AA	3			
<i>Brachyelytrum erectum</i> (Schreb. ex Spreng.) Beauv.	beech-grass		3	p	loc abu: mesic-subxeric woods esp deeper soil	

<i>Bromus inermis</i> Leyss.	creeping brome-grass	AAA		p		
<i>Bromus japonicus</i> Thunb. ex Murr.	Asian cheat-grass	AA		p		
<i>Bromus nottowanus</i> Fern.	lowland brome-grass		3	p		
<i>Bromus pubescens</i> Muhl. ex Willd.	eastern brome-grass			p	occ: subxeric woods near cliffs	
<i>Bromus racemosus</i> L.	European cheat-grass		3			
<i>Bromus tectorum</i> L.	drooping cheat-grass		3			
<i>Carex aggregata</i> Mackenz.	rich meadow spike-sedge		2	p	occ: big field, slightly drier than <i>conjuncta</i> !	
<i>Carex albicans</i> Willd. ex Spreng. (sensu lato)	erect tufted fine-sedge		3	p	loc fre: subxeric woods and transitions; not mesic slopes on E side?	
<i>Carex albursina</i> Sheldon	greater lax-sedge		2	p	loc fre: low slopes E side below cliffs	loc fre: lowest rocky slopes below cliffs
<i>Carex amphibola</i> Steud.	common wrinkled-sedge		2	p	occ; loc fre: deeper less calc soil? lower slopes near river in south (some Lr/Fg nearby); and upper slopes on E side below ridge (some Qa nearby)	exp CHECK
<i>Carex blanda</i> Dewey	weedy lax-sedge		2	p	fre; loc abu: wide but esp submesic woods, roadsides; even cliff ledges	
<i>Carex careyana</i> Torr. ex Dewey	large-seeded lax-sedge		2	p		
<i>Carex cephalophora</i> Muhl. ex Willd.	woodland headed spike-sedge		3	p		
<i>Carex cherokeensis</i> Schwein.	Cherokee sedge		1			
<i>Carex communis</i> Bailey	larger tufted fine-sedge		2	p	loc com: mesic-subxeric woods on steeper slopes below cliffs on both sides	pre? Check
<i>Carex conjuncta</i> Boott	lime fox-sedge		2	p	loc abu: damp areas in big field to E	
<i>Carex corrugata</i> Fern.	lowland wrinkled-sedge			p		
<i>Carex crawei</i> Dewey	prairie-swale sedge		1			

<i>Carex cumberlandensis</i> Naczi, Kral & Bryson	hidden lax-sedge		3	p	loc fre: esp old terrace woods to south	loc fre: esp mid/upper slopes, rich woods NOT just acid; check
<i>Carex debilis</i> Michx. var. <i>debilis</i>	swamp graceful-sedge		3			
<i>Carex decomposita</i> Muhl.	swamp-hummock sedge		2			
<i>Carex digitalis</i> Willd.	lesser lax-sedge		2	p	loc com; widespread esp above cliffs in deeper soil	
<i>Carex emoryi</i> Dewey	riparian sedge		1			
<i>Carex frankii</i> Kunth	scaly head-sedge			p	loc abu: pond margins	
<i>Carex glaucoidea</i> Tuckerman ex Olney	bluish wrinkled-sedge			p		
<i>Carex gracilescens</i> Steud.	slender lax-sedge			?		
<i>Carex grayi</i> Carey	basic rounded hop-sedge			p		
<i>Carex grisea</i> Wahlenb.	greater wrinkled-sedge			p	occ: low submesic woods, edges? CHECK more	
<i>Carex hirsutella</i> Mackenzie	common grassland hairy-sedge		2	p	loc fre: dry fields, roadsides	
<i>Carex jamesii</i> Schwein.	rich-woods tufted-sedge			p	loc fre: esp submesic woods in south; less/none in deep mesic woods near cliffs	loc fre: esp midslopes with Crc
<i>Carex kraliana</i> Naczi & Bryson	Kral's sedge		2	p	occ; loc fre: widespread esp thin mesic-subxeric woods, edges, ROW in partial shade (not special habitat); easily confused with depauperate <i>albursina</i> in field?	
<i>Carex laxiculmis</i> Schwein. var. <i>copulata</i> (Bailey) Fern.	lesser blue lax-sedge		2	p	occ? disturbed woods on terrace to south	occ? mid-slope?
<i>Carex laxiflora</i> Lam.	common lax-sedge		3	p	occ; loc fre: slopes near cliffs, esp on low ledges but above <i>albursina</i>	loc fre: upper slope along logging road [confused with <i>amphibola</i> to check more]
<i>Carex leavenworthii</i> Dewey	broad headed-spike-sedge		3	p	loc fre: fields, dry to damp	
<i>Carex lupulina</i> Muhl. ex Willd.	common hop-sedge		3			
<i>Carex macropoda</i> (Fern.) Mohlenbr.	fine-leaved lax-sedge		1			

Carex mesochorea Mack.	western headed-spike-sedge			p	occ: fields! (< leavenworthii?)	
Carex molesta Mackenzie ex Bright	old field thin-scale-sedge		3			
Carex molestiformis Reznicek & Rothrock	barrens thin-scale-sedge		2	p		
Carex muhlenbergii Schkuhr ex Willd. var. enervis Boott	greater little-spike-sedge		3			
Carex nigromarginata Schwein.	southern hidden fine-sedge		2	p		
Carex oligocarpa Schkuhr ex Willd.	lesser wrinkled-sedge		2	p	loc fre; above cliffs in thin mesic-subxeric woods	
Carex pensylvanica Lam.	spreading fine-sedge			p		
Carex planispicata Naczi	planar wrinkled-sedge		2	p	loc fre? esp deeper soil on terraces to south	
Carex radiata (Wahlenb.) Small	damp-woods little-spike-sedge		1			
Carex retroflexa Muhl. ex Willd.	dry-woods little-spike-sedge		3	p	occ: submesic/subxeric woods, edges, ?esp deeper more acid soil?	
Carex reznicekii Werier	dry-woods hidden-fine-sedge		2	p		
Carex rosea Schkuhr ex Willd.	moist-woods little-spike-sedge		3	p	occ; loc fre: mesic-submesic woods below cliffs or near	
Carex sangamonensis (Clokey) Mohlenbr. @	swamp thin-scale-sedge		2	p	occ; loc abu in swale at back of big bottomland field	
Carex sparganioides Muhl. ex Willd.	rich-woods spike-sedge		2	p	occ: mesic-submesic mid-slope on E side	
Carex stipata Muhl. ex Willd. var. stipata	bog fox-sedge		3			
Carex straminea Willd. ex Schkuhr	northern thin-scale-sedge		3			
Carex striatula Michx.	exert lax-sedge		2	p		
Carex stricta Lam.	bog sedge		3			
Carex texensis (Torr.) Bailey	pasture spike-sedge		3			
Carex timida Naczi & B.A. Ford	interior tufted-sedge		1	p		

Carex torta Boott ex Tuckerman	gravel-bar sedge		3			
Carex umbellata Schkuhr ex Willd.	limestone hidden-fine-sedge		2	p	occ; loc abu: thin subxeric woods esp with cedars	
Carex vulpinoidea Michx.	fine-fox-sedge			p	loc fre: wet places in big soil: to check later	
Carex willdenowii Schkuhr ex Willd.	dry woods tufted-sedge		3			
Chasmanthium latifolium (Michx.) Yates	common wood-oats		1	p	loc com: riverbanks and ledges on or near cliffs	
Cinna arundinacea L.	wood reedgrass		3	p	loc fre: riparian woods, sinkholes on terrace	
Cyperus echinatus (L.) Wood	globe flatsedge		3			
Cyperus erythrorhizos Muhl.	redroot flatsedge		3			
Cyperus strigosus L.	common flatsedge		3	p	occ: damp spots in fields, gravel bar?	
Dactylis glomerata L.	orchard-grass	AA	3	p	loc abu: fields	
Danthonia spicata (L.) Beauv. ex Roemer & J.A. Schultes	common poverty-grass			p	loc abu: subxeric-xeric woods, esp deeper/acid soil?	loc abu: dry roadside, browsed subxeric woods
Diarrhena americana Beauv.	beakgrass			p	NONE?	
Dichanthelium acuminatum (Sw.) Gould & C.A. Clark var. fasciculatum (Torr.) Freckmann	small hairy panic-grass			p	occ?; drier fields, roadsides, thin disturbed subxeric woods	
Dichanthelium ashei (Pearson ex Ashe) new comb.	lesser smooth panic-grass		3			
Dichanthelium boscii (Poir.) Gould & C.A. Clark var. boscii	hairy-noded broadleaf panic-grass		3	p	loc fre: thin subxeric woods on ridge, esp near roadside	loc abu: ridge wood, esp along logging road
Dichanthelium clandestinum (L.) Gould	dotted broadleaf panic-grass		1	p	loc fre: low old fields, esp big fields to E	
Dichanthelium jooirii (Vasey) Mohlenbr.	swamp broad-leaved panic-grass			?		
Dichanthelium lindheimeri (Scribn. ex Nash) Gould	common tufted panic-grass			p		
Dichanthelium malacophyllum (Nash) Gould	soft prairie panic-grass		3			

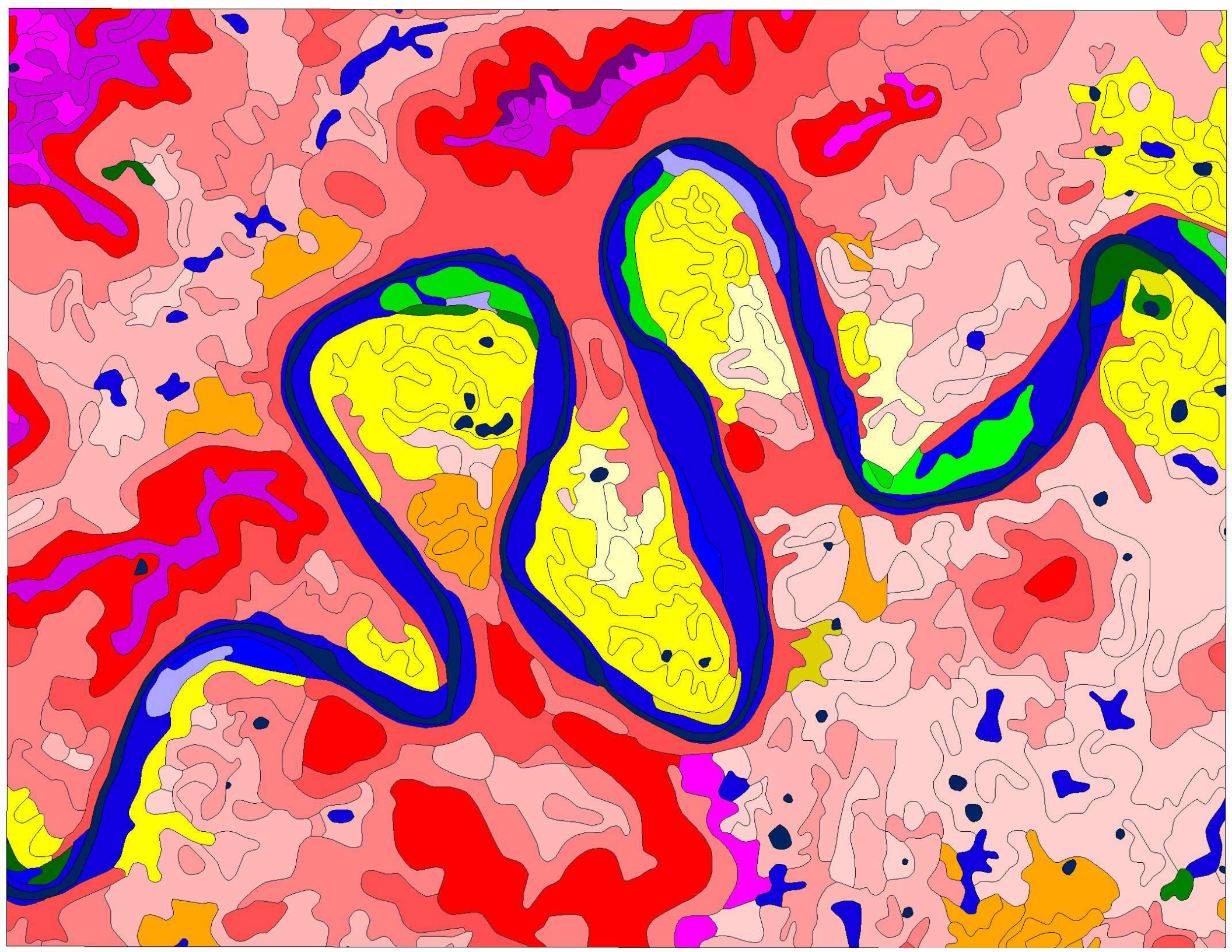
Dichanthelium scribnerianum (Nash) new comb.	midwestern prairie panic-grass		2	p		occ: dry roadsides
Digitaria ciliaris (retz.) Koel.	hairy crabgrass	A		p	loc fre: fields, shorelines	loc fre: roadside
Dulichium arundinaceum (L.) Britt.	threeway-sedge		2			
Echinochloa crus-galli (L.) Beauv.	barnyard grass				loc fre: shores of slough, ponds	
Eleocharis acicularis (L.) Roemer & J.A. Schultes	fine-leaved spike-rush		3			
Eleocharis erythropoda Steud.	reddish spike-rush			p	occ; loc fre: w/Justicia on gravel bar	
Eleocharis obtusa (Willd.) J.A. Schultes	common spike-rush		3	p	loc fre? ponds	
Eleusine indica (L.) Gaertn.	goose-grass	AA		p	occ: shorelines, fields (esp pathways)	occ: roadside
Elymus glabriflorus (Vasey) Scribn. & Ball	southeastern wild-rye		3	?		
Elymus hystrix L.	bottlebrush-grass		3	p	fre; loc com: esp mesic-subxeric woods above or near cliffs	occ: upper slopes
Elymus macgregorii J. Camp. & R. Brooks	early wild-rye			p	occ; loc abu: riparian woods, toeslopes of petering slope with Hydro cana nearby	
Elymus riparius Wieg.	lowland nodding wild-rye		3	p		
Elymus villosus Muhl. ex Willd.	upland nodding wild-rye		3	p		
Elymus virginicus L. var. intermedius (Vasey) Bush	hairy common wild-rye			?		
Elymus virginicus L. var. virginicus	smooth common wild-rye		3	p	loc fre: lowland fields (some rather exerted; pla?)	
Eragrostis frankii C.A. Mey ex Steud.	sandbar love-grass			p	loc fre: gravel bar	
Eragrostis spectabilis (Pursh) Steud.	showy love-grass			p		
Erianthus alopecuroides (L.) Ell.	upland plumegrass		3	p		
Festuca arundinacea Schreb.	tall fescue	AAA		p	loc dom: fields	loc com: fields

<i>Festuca subverticillata</i> (Pers.) Alexeev	wood fescue		2	p	loc fre: mesic-submesic woods	
<i>Glyceria acutiflora</i> Torr.	long-flowered manna-grass		2			
<i>Glyceria striata</i>	common manna-grass			?	CHECK	
<i>Gymnopogon ambiguus</i> (Michx.) B.S.P.	upland beard-grass		2			
<i>Hordeum pusillum</i> Nutt.	little barley	A	3	p	occ; loc fre: drier fields, roadsides	
<i>Juncus acuminatus</i> Michx.	common branched-rush			p	loc fre: around pond near cabin; might be debilis etc???	
<i>Juncus effusus</i> L. var. <i>solutus</i> Fern. & Wieg.	greater marsh-rush			p	loc abu: ponds near cabin	
<i>Juncus tenuis</i> Willd.	common path-rush			p	loc fre: paths in fields and disturbed woods	
<i>Leersia oryzoides</i> (L.) Sw.	cutleaf rice-grass			p	occ; loc fre: pond near cabin	
<i>Leersia virginica</i> Willd.	common rice-grass		3	p	loc abu: esp paths in submesic and riparian woods, damp fields, edges	loc fre: lower slopes in riparian transition
<i>Luzula bulbosa</i> (Wood) Smyth & Smyth	bulbose woodrush		3			
<i>Luzula echinata</i> (Small) F.J. Herm.	common woodrush		3	p		
<i>Melica mutica</i> Walt.	common melic-grass		3	p	occ; loc fre? mesic-subxeric woods	
<i>Melica nitens</i> (Scribn.) Nutt. ex Piper	glade melic-grass					
<i>Microstegium vimineum</i> (Trin.) A. Camus	Japanese stiltgrass	AAA		p	loc abu: paths, roadsides; old fields; low woods, esp swales, upper floodplains	loc abu: roadsides in more shade; esp logging road on upper slope
<i>Muhlenbergia capillaris</i> (Lam.) Trin.	hairawn muhly-grass		3			
<i>Muhlenbergia schreberi</i> J.F. Gmel.	nimblewill			p	loc abu: esp thin submesic woods, edges, fields; roadbeds	occ? roadside?
<i>Muhlenbergia sobolifera</i> (Muhl. ex Willd.) Trin.	limey muhly-grass			p	occ; loc fre: ciffledge on W side	
<i>Panicum anceps</i> Michx.	meadow fall-panic-grass		3	p	loc fre: drier fields	occ? field?

<i>Panicum dichotomiflorum</i> Michx.	spreading fall-panic-grass			p	loc fre: fields, shorelines	
<i>Panicum flexile</i> (Gattinger) Scrib.	rock witchgrass			p	loc fre: rocky roadbeds (above cliffs)	
<i>Panicum laxiflorum</i> Lam.	spreading fall-panic-grass			p		
<i>Panicum virgatum</i> L.	switch grass			p		pla? waif along road at field edge
<i>Paspalum repens</i> Berg.	horsetail lens-grass			p	occ; loc fre: banks of back slough	
<i>Phalaris arundinacea</i> L.	reed canary-grass	a		p	occ; loc abu: few large patches adj to sloughs at back of big field	
<i>Phalaris caroliniana</i> Walt.	maygrass		3			
<i>Phleum pratense</i> L.	timothy	AA		p	loc abu: fields	
<i>Poa autumnalis</i> Muhl. ex Ell.	tulip-wood bluegrass			p		
<i>Poa compressa</i> L.	compressed bluegrass		3	p		
<i>Poa pratensis</i> L.	common bluegrass	a	2	p	loc abu: fields	
<i>Poa sylvestris</i> Gray	walnut-wood bluegrass		3	p	occ; loc fre: mesic-submesic woods CHECK	occ; loc fre? Lower slope
<i>Poa trivialis</i> L.	lowland bluegrass		2	p	loc com: big bottom field to E	
<i>Rhynchospora capitellata</i> (Michx.) Vahl	lesser bog beaksedge		1			
<i>Rhynchospora macrostachya</i> Torr. ex Gray ?	tall horned beaksedge		2			
<i>Schizachyrium scoparium</i> (Michx.) Nash	little bluestem		1	p	occ: clifftops on W side*; check nearby roadsides?	occ? roadside?
<i>Scirpus atrovirens</i> Willd.	pale meadow bulrush					
<i>Scirpus cyperinus</i> (L.) Kunth	marsh bulrush		1			
<i>Scirpus pendulus</i> Muhl.	prairie bulrush			p		
<i>Scleria oligantha</i> Michx.	intermediate nutrush		1	p		

<i>Scleria triglomerata</i> Michx.	lowland greater nutrush		3	p	loc com: clifftop glades on W side*	
<i>Setaria faberi</i> Herm.	giant foxtail	AA		p		
<i>Setaria parviflora</i> (Poir.) Kerguelén	perennial foxtail		2	p		
<i>Setaria pumila</i> (Poir.) Roem. & Schult.	yellow foxtail	AA		p	occ; loc fre: fields	occ: roadside
<i>Setaria viridis</i> (L.) Beauv.	green foxtail	AA	3	p	occ: fields	occ: roadside
<i>Sorghastrum nutans</i> (L.) Nash	Indian grass		3	p	pla: loc abu in lowland field (CREP)	occ: roadside (waif?)
<i>Sorghum halepense</i> (L.) Pers.	Johnson-grass	AAA		p	loc fre: fields	loc fre? field?
<i>Sparganium androcladum</i> (Engelm.) Morong	branched bur-reed		3			
<i>Sphenopholis nitida</i> (Biehler) Scribn.	upland wedge-grass			p		
<i>Sporobolus clandestinus</i> (Biehler) A.S. Hitchc.	lesser dropseed		2	p		loc fre: rocky roadside
<i>Sporobolus compositus</i> (Poir.) Merr.	sheathed dropseed			p	occ; loc fre: clifftops on W side	
<i>Sporobolus vaginiflorus</i> (Torr. ex Gray) Wood	annual poverty-grass		1	p		
<i>Tridens flavus</i> (L.) A.S. Hitchc.	purpletop-grass		3	p	loc fre; roadsides, fields	loc fre? field?
<i>Tripsacum dactyloides</i> (L.) L.	gamma-grass		2			
<i>Typha angustifolia</i> L.	narrow-leaved cattail	A	2			
<i>Typha latifolia</i> L.	common cattail		1	p	occ; ponds	
END						

Next page: expanded soil map; see section on Soils after Introduction for legend.



APPENDIX TWO: NOTES ON GRADIENTS AMONG TERRESTRIAL HABITATS

Figure 1. Diagram showing general relationship of soil series in the Mammoth Cave area to parent material and topography.

Figure 1a (upper) presents soils that are mostly non-calcareous, with subsoil on sandstone, siltstone, acid shale or alluvium from uplands with these rocks.

Figure 1b (lower) presents soils that have at least partially calcareous origin.

Within each box: 1st line = soil group modifier; 2nd line = soil group/class (upper case); 3rd line = series name; 4th line = typical texture. Upper bar indicates the color-coding for each soil order. Most of these series have been mapped by NRCS within a mile of the WKU lands; these soils are indicated by the underlined series names. See Mitchell et al. (1993) and USDA NRCS (2010a) for detailed descriptions of each soil series.

Note that in previous surveys by the NRCS in this region, some soils have been given different series names, or have overlapping descriptions: Crider—formerly Pembroke in part; Frederick—formerly Talbott; Gatton—formerly Zanesville; Jefferson—formerly Frondorf in part; Lily—formerly Hartsells; Tilsit—formerly Clarkrange; Vertrees—formerly Faywood (in w. Ky.); Wallen—formerly Steinsburg. Soils approximating the Brooksville series (by some definitions) are expected locally on purely calcareous slopes, but that series is not regularly recognized in this region.

ULTISOLS	ALFISOLS	VERTISOLS	MOLLISOLS	INCEPTISOLS	ENTISOLS
DIAGRAM FOR MOSTLY NON-CALCAREOUS SOIL SERIES	MORE HILLY LANDSCAPE IN GENERAL: less deep, more drained		INTERMEDIATE LANDSCAPE IN GENERAL moderately deep		LESS HILLY LANDSCAPE IN GENERAL: more deep, less drained
UPLAND sandy residuum on upper slopes to broad ridges	Typic <u>DYSTROCHREPT</u> Ramsey loam	Typic <u>HAPLUDULT</u> Gilpin loam	Typic <u>HAPLUDULT</u> Lily loam	Typic <u>FRAGIU DULT</u> Tilsit silt loam	Typic <u>FRAGIAQUULT</u> Mullins silt loam
UPLAND less leached; loess on sand/shale; mostly ridges	Typic <u>DYSTROCHREPT</u> Wallen gravelly silt loam	Ultic <u>HAPLUDALF</u> Wellston silt loam	Typic <u>FRAGIU DALF</u> Gatton silt loam	Glossic <u>FRAGIU DALF</u> Sadler silt loam	Aquic <u>FRAGIU DULT</u> Johnsburg silt loam
TRANSITION siltstone & shale, local loess; talus slopes to ridges	Typic <u>HAPLUDULT</u> Shelocta silt loam	Ultic <u>HAPLUDALF</u> Carpenter silt loam	Ultic <u>HAPLUDALF</u> Rosine silt loam	Note: the vertical arrangement here is not a consistent real stratification	
TRANSITION acid shale; toe slopes to side slopes	Typic <u>HAPLUDULT</u> Shelocta silt loam	Ultic <u>HAPLUDALF</u> Lenberg silt loam	Aquic <u>HAPLUDULT</u> Latham silt loam		
TRANSITION sandy colluvium or alluvium; low slopes, terraces	Typic <u>HAPLUDULT</u> Jefferson fine sandy loam	Typic <u>HAPLUDALF</u> Donahue loam	Typic <u>HAPLUDULT</u> Allegheny loam	Note: alfic soils in transitions are on loess, trace lime or seepage zones	
LOWLAND miscellaneous; terraces to fresh and locally wet	Fluventic <u>DYSTROCHREPT</u> Clifty gravelly silt loam	Fluventic <u>DYSTROCHREPT</u> Cuba silt loam	Fluvaquentic <u>DYSTROCHREPT</u> Steff silt loam	Aeric <u>FLUVAQUENT</u> Stendal silt loam	Typic <u>FLUVAQUENT</u> Bonnie silt loam

ULTISOLS	ALFISOLS	VERTISOLS	MOLLISOLS	INCEPTISOLS	ENTISOLS
DIAGRAM FOR MOSTLY CALCAREOUS SOIL SERIES	MORE HILLY LANDSCAPE IN GENERAL: less deep, more drained		INTERMEDIATE LANDSCAPE IN GENERAL moderately deep		LESS HILLY LANDSCAPE IN GENERAL: more deep, less drained
UPLAND sandy material slumped on karst; slopes to plains	Typic HAPLUDALF Donahue loam	Note: Jefferson, Donahue, Bledsoe + Brookside are not reliably mapped	Typic HAPLUDULT Riney loam	Note: Riney is close to Lily, Rosine + Latham (on bedrock above)	Typic PALEUDALF Sonora silt loam
UPLAND more limey; rocky slopes to young karst plain	Typic HAPLUDALF Bledsoe fine sandy loam	Typic HAPLUDALF Caneyville rocky silt loam	Typic HAPLUDALF Hagerstown silt loam	Typic HAPLUDALF Fredonia silt loam	Typic PALEUDALF Crider silt loam
UPLAND less limey; shaley slopes to older karst plain	Typic HAPLUDALF [Brookside] silt loam	Typic PALEUDALF Vertrees silt loam	Typic PALEUDALF Baxter cherty silt loam	Mollic PALEUDALF Pembroke silt loam	Typic FRAGIUDALF Nicholson silt loam
UPLAND less hilly; old high terraces and old impure karst	Typic HAPLUDULT Allegheny loam	Typic PALEUDULT Nolichucky loam	Typic PALEUDULT Canmer silt loam	Typic PALEUDULT Frederick silt loam	Aquic FRAGIUDALF Lawrence silt loam
LOWLAND mostly high/old alluvium with more mature soils	Dystric-fluentic EUTROCHREPT Grigsby fine sandy loam	Fluentic EUTROCHREPT Chagrin loam	Ultic HAPLUDALF Elk silt loam	Typic FRAGIUDALF Otwell silt loam	Aquic FRAGIUDALF Lawrence silt loam
LOWLAND mostly fresh/low alluvium with less mature soils		Dystric-fluentic EUTROCHREPT Nolin silt loam	Fluentic EUTROCHREPT Lindside silt loam	Aeric FLUVAQUENT Newark silt loam	Typic FLUVAQUENT Melvin silt loam

Figure 2. Suggested typical associations of native vegetation types with soil series.

Codes refer to "JC" codes for vegetation types in text; letter abbreviations indicate main tree species. These are provisional diagrams, to be tested to more real data from the fields and woods.

On soil series with steeper slopes (over 10-20%), aspect is a significant factor influencing vegetation; within those boxes, more mesic vegetation typical of N/NE-facing slopes is listed above more xeric vegetation.

DIAGRAM FOR MOSTLY NON-CALCAREOUS SOIL SERIES	MORE HILLY LANDSCAPE IN GENERAL: less deep, more drained		INTERMEDIATE LANDSCAPE IN GENERAL moderately deep		LESS HILLY LANDSCAPE IN GENERAL: more deep, less drained
UPLAND sandy residuum on upper slopes to broad ridges			11a+ (Qumo)	07c? PnSsDs grass	
UPLAND less leached; loess on sand/shale; mostly ridges		11a Qua,v	??		
TRANSITION siltstone & shale, local loess; talus slopes to ridges		11a Qua,v(Acs)	??		
TRANSITION acid shale; toe slopes to side slopes		11a Qua,v(Acs)	??		
TRANSITION sandy colluvium or alluvium; low slopes, terraces	05c LrAcs	05-11a Acs/nQur	??		
LOWLAND miscellaneous; terraces to fresh and locally wet					

DIAGRAM FOR MOSTLY CALCAREOUS SOIL SERIES	MORE HILLY LANDSCAPE IN GENERAL: less deep, more drained		INTERMEDIATE LANDSCAPE IN GENERAL moderately deep		LESS HILLY LANDSCAPE IN GENERAL: more deep, less drained
UPLAND sandy material slumped on karst; slopes to plains	05-11a Acs/nQur	05c LrAcs	07c LrQuaCrov??		
UPLAND more leached; local shale or old terrace on karst	05-11b AcsQuFxFr 05b Acs++	12 Jn+ (local) 07b Jn(Pn)? 11b Qua,st (mr,mu) 05-11b AcsQuFxFr	12-07b Jn(Pn)? 07b?	12-07b Jn(Pn)? 07b?	12 brush-grass?? 10 brush-grass??
UPLAND less leached; local shale/chert; older karst plain + loess	05a Acs++	07a AcsCtoJn? 05-11d AcsCrg	07c LrQuaCrov??		
UPLAND less hilly; old high terraces and old impure karst	05c Lr+?	07c LrQuaCrov??			
LOWLAND mostly high/old alluvium with more mature soils	04 Pl?	04 Acne++	05c+ AcsFgLf?	06 LqAcr?	
LOWLAND mostly fresh/low alluvium with less mature soils	Scoured zones: bars on cobble, gravel, sand	04 Pl?	04 Acsn?	06 Fxp?	

Explanation of format for data on soils [subsequent pages]

First line.

Soil class, with abbreviations as follows: a = alfic; ch = chromic; cu = cumulic; d = dystric; f = fluventic; fa = fluvaquentic; h = humic; le = leptic; li = lithic; m = mollic; o = oxyaquic; q = aquic; r = rendollic; t = typic; v = vertic.

At right margin, topsoil color is coded as follows: b = brown; d = dark; g = gray(ish); l = light; m = mottled; o = olive; p = pale; v = very dark; y = yellow(ish).

Second line.

Name of soil series, with abbreviations for typical texture (excluding eroded clayey phases on steeper slopes) as follows: c = clay; csl = cherty silt loam; fsal = fine sandy loam; l = loam; sa = sand; sic = silty clay; sicl = silty clay loam; si = silt; sil = silt loam; shsil = shaly silt loam; rl = rocky loam (or complex mixture); rsic = rocky (or flaggy) silty clay.

At right margin, typical pH of topsoil (ca. 0-8 inches) is coded as follows: A = 4.5-5 (very strongly acid); B = 5.1-5.5 (strongly acid); C = 5.6-6 (medium acid); D = 6.1-6.5 (slightly acid); E = 6.6-7.3 (circumneutral); F = 7.3-8 (alkaline). Note: in most cases pH is less in mid to low horizons by 0-1 units; ">" indicate a strong trend; "<" indicates the opposite trend; "~" = highly variable.

Third line.

Typical slope in percent; followed by typical depth to bedrock in feet.

At left margin, asterisks (*) indicate that slopes are often steep enough for significant differences in soil and vegetation of N/NE-facing versus S/SW-facing aspects.

At right margin, general drainage class is coded as follows: 1 = very poorly drained; 2 = poorly drained; 3 = somewhat poorly drained; 4 = moderately well-drained; 5 = well-drained; 6 = somewhat excessively drained; 7 = excessively drained.

Fourth line.

Parent material, with abbreviations as follows: >> = thick loess mantle; > = thin or patchy loess mantle; As = acid shale; Ca = acid clay; Cc = calcareous clay (often mixed with Ch); Ck = chalky limestone (with marl); Ct = cherty limestone; Cs = calcareous shale; Li = limestone (arg = argillaceous); Sa = sandstone; Sh = shale (undifferentiated),

Followed by topographic context: bot = bottomland (with generally fresh alluvium); col = colluvium; dep = alluvial depression (tending to sla); flu = fluvial; mar = marine; pon = ponded alluvium (tending to sla); res = residuum; sla = slack-water deposits (with fine-textured alluvium on bottomlands, terraces or locally uplands); ter = terrace (with generally weathered alluvium); upl = uplands (often with undifferentiated residuum or colluvium).

DIAGRAM FOR MOSTLY NON-CALCAREOUS SOIL SERIES	MORE HILLY LANDSCAPES IN GENERAL: less deep, more drained		INTERMEDIATE LANDSCAPES IN GENERAL moderately deep		LESS HILLY LANDSCAPES IN GENERAL: more deep, less drained
UPLAND sandy residuum on upper slopes to broad ridges	t-Dystrochreptvdgb [Ramsey l] yb 30-50; 1-2 6? Sa res B	t-Hapludult vdg pGilpin l lyb 2-20; 2-3 5 Sa+ res B	t-Hapludult db +Lily l yr 6-30; 2-4 5 Sa res B	t-Fragiudult yb/b Tilsit/Cl. sil lob/yb 2-12; 4-10 4 Sa+ res A	t-Fragiaquult log pMullins sil g 0-2; >5 2 Sa+ all/res B
UPLAND less leached; loess on sand/shale; mostly ridges	t-Dystrochrept vdg +Wallen gl yb 20-30; 2-3 6 Sa res/col C>	u-Hapludalf b +Wellston sil yb 2-20; 3-6 5 loe>Sa+ res/col D	t-Fragiudalf db Gatton sil yb 2-6; >5 4 loe>Sa+ res B	g-Fragiudalf b [Sadler sil] yb 0-6; 4-8 4 loe>Sa+ res B	aq-Fragiudult dgb pJohnsburg sil lyb 0-2; 4-7 3 loe/ter>Sa+ res B
TRANSITION siltstone & shale, local loess; toe slopes to ridges	t-Hapludult dgb pShelocta sil by 12-35; 4-6+ 5 ShSi col ~C	u-Hapludalf b pCarpenter sil dyb 12-35; 4-6+ 5 ShSi col ~C<	u-Hapludalf yb pRosine sil r 6-30; 4-6 5 loe>ShSi res B<	Note: the vertical arrangement here is not a consistent real stratification	
TRANSITION acid shale; side slopes with shallow soil	t-Hapludult dgb pShelocta sil by 12-35; 4-6+ 5 ShSi col ~C	u-Hapludalf dyb +Lenberg sil yb 6-30; 2-3 5 As res? B	aq-Hapludult b pLatham sil r 6-20; 2-3 4? As+ res? B		
TRANSITION sandy colluvium or alluvium; low slopes, terraces	t-Hapludult b +Jefferson fsal db 12-30; >5 5 Sa+ col B	t-Hapludalf dyb pDonahue l sb 6-35; 2-4 5 Sa col>Li res B<	t-Hapludult dyb +Allegheny l yb 0-12; 5-10 5 Sa+ all (terrace) B	Note: alfic soils in transitions are on loess, trace lime or seepage zones	
LOWLAND miscellaneous; terraces to fresh and locally wet	f-Dystrochrept b pClifty gsil yb 0-2; 4-12 5 all (streams) B	f-Dystrochrept b [Cuba sil] yb 0-2; 6+ 5 all (rivers) B	fa-Dystrochrept b [Steff sil] lbg 0-2; 4-12 4 all (rivers) B	ae-Fluvaquent yb [Stendal sil] lbg 0-2; 5+ 3 all (rivers) B	t-Fluvaquent b [Bonnie sil] g 0-2; 6+ 2 all (rivers) B

DIAGRAM FOR MOSTLY CALCAREOUS SOIL SERIES	MORE HILLY LANDSCAPES IN GENERAL: less deep, more drained		INTERMEDIATE LANDSCAPES IN GENERAL moderately deep		LESS HILLY LANDSCAPES IN GENERAL: more deep, less drained
UPLAND slumped sand on lime; low slopes to karst plains	t-Hapludalf dyb pDonahue 1 sb 6-35; 2-4 5 Sa col>Li res B<	Note: Jefferson, Donahue, Bledsoe + Brookside are not reliably mapped	t-Hapludult yb +Riney 1 r 2-30; 4-10+ 5 SaAs>kar B	Note: Riney is close to Lily, Rosine + Latham (on bedrock above)	t-Paleudalf b Sonora* sil yr 2-12; >5 5 loe>SaAs>kar C
UPLAND more limy; rocky slopes to young karst plain	t-Hapludalf db Bledsoe fsal sb 20-30; >5 5 Li+ col D	t-Hapludalf b +Caneyville rsil yr 6-30; 2-4 5 Li+ res ~D<	t-Hapludalf b +Hagerstown sil r 2-20; 3-5 5 Li kar ~C<	t-Hapludalf b +Fredonia sil r 2-20; 2-4 5 Li res kar C<	t-Paleudalf* dyb Crider sil yr 2-6; >5 5 loe>Li res/kar D>
UPLAND less limy; shaley slopes to older karst plain	t-Hapludalf db [Brookside* sil] sb 30-70; 5-6+ 5 LiSh col ~D	t-Paleudalf b Vertrees sil <r 2-30; >5 5 LiSh res kar B<	t-Paleudalf* b Baxter gsil dr 2-30; 5-8+ 5 Ch res kar B	m-Paleudalf rb pPembroke sil dr 0-12; >5 5 loe>Li res/all ~B	t-Fragiudalf dyb Nicholson sil yb 2-6; 7+ 4 loe>Li+ res C<
UPLAND less hilly; high sandy terraces to old impure karst	t-Hapludult dyb +Allegheny 1 yb 0-12; 5-10 5 Sa+ all (terrace) B	t-Paleudult dyb Nolichucky 1 <r 2-20; >5 5 ter>Li+ res kar B	t-Paleudult b Canmer sil <dr 2-30; >5 5 ter>Li+ res k ~C>	t-Paleudult db Frederick sil r 2-30; 6-10 5 LiSh res B	aq-Fragiudalf b Lawrence sil yb 0-2; >5 3 all/loe>Li+ res ~C
LOWLAND mostly old/high alluvium with more mature soils	df-Eutrochrept b Grigsby* fsal yb 0-4; >5 5 all (streams) D>	f-Eutrochrept dyb pChagrin 1 dyb 0-2; 2-4 5 Li+ all (streams) D	u-Hapludalf* b +Elk sil yb 2-6; 5-20 5 ter<loeLi+ ~C	t-Fragiudalf b +Otwell sil lyb 0-2; >5 4 all<mix ~C<	aq-Fragiudalf b Lawrence sil yb 0-2; >5 3 all/loe>Li+ res ~C
LOWLAND mostly fresh/low alluvium with less mature soils		df-Eutrochrept b +Nolin sil yb 0-4; 5+ 5 all<Li+>dep/kar D	f-Eutrochrept b Lindside sil yb 0-2; >5 4 all<mix ~D<	ae-Fluvaquent db Newark sil g 0-2; >5 3 all<Li+>dep/kar D	t-Fluvaquent gb +Melvin sil lb 0-2; >5 2 all<mix D
EXCLUDED SERIES			t-Hapludult b [Linker 1] yr 2-12; 6+ 5 Sa+ res B		

DIAGRAM SHOWING RELATIONSHIP OF VEGETATION TO HYDROLOGY

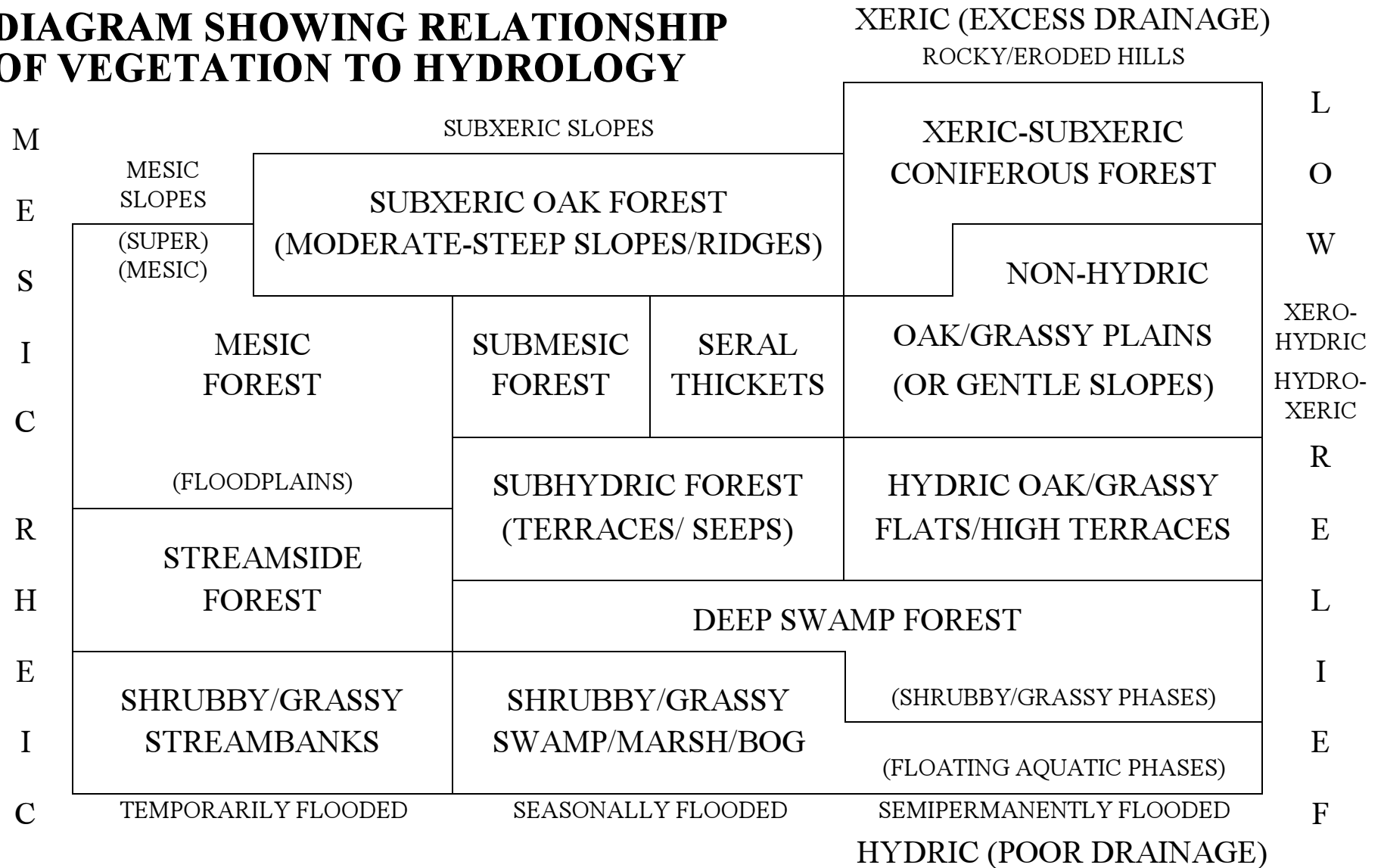


Figure 1.7. Summary diagram showing major forest types at MCNP in 1930s and 1990s data*.

XERIC (EXCESS DRAINAGE)
ROCKY/ERODED HILLS

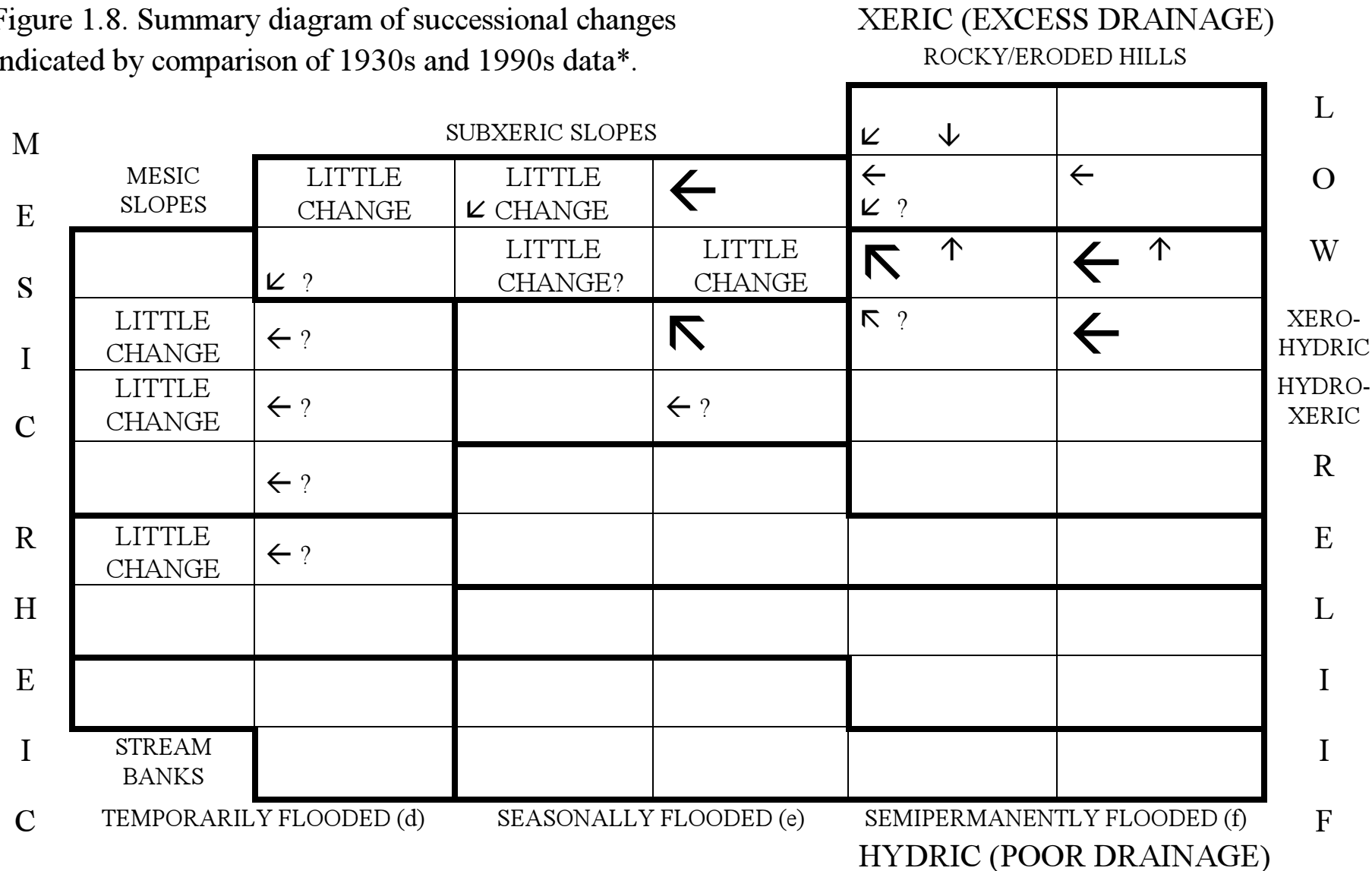
M E S I C R H E I C	MESIC SLOPES	SUBXERIC SLOPES			RED CEDAR OR VA PINE 1		L
		WHITE OAK N RED OAK	CHESTNUT O. OR WHITE OAK	SCARLET OAK OR BLACK	CEDAR/PINE OAK SPP. 1	RED CEDAR BJ./POST OAK	O
		TULIP POPLAR (SUG.MAPLE)	WHITE OAK (S RED OAK)	S RED OAK (WH./POST O.)	BLACK OAK POST OAK	BLACKJACK O. POST OAK	W
	BEECH (N RED, WHITE)	TULIP POPLAR 3		SASSAFRAS PERSIMMON 2	S RED OAK POST OAK	POST OAK	XERO- HYDRIC
	BEECH SUGAR MAPLE	TULIP POPLAR (WHITE ASH) 3		(SWEETGUM) (RED MAPLE) 2			HYDRO- XERIC
		TULIP POPLAR (SUG.MAPLE) 4					R
	BOXELDER SYCAMORE	(SYCAMORE) 4					E
							L
							I
	STREAM BANKS						I
C	TEMPORARILY FLOODED (d)	SEASONALLY FLOODED (e)		SEMIPERMANENTLY FLOODED (f)		F	
					HYDRIC (POOR DRAINAGE)		

* Various species combinations occur above and below the dashed line in subxeric section.

Typical old field succession begins at following numbered positions:

1 = xeric/eroded sites; 2 = subxeric/submesic sites; 3 = mesic upland sites; 4 = mesic floodplain sites.

Figure 1.8. Summary diagram of successional changes indicated by comparison of 1930s and 1990s data*.



*This overlay condenses information from Figures 1(2-6) and Figure 2. Large arrows indicate general changes in forest types; small arrows indicate minor or uncertain (?) changes; in some uncertain cases, changes may still be large.



APPENDIX 3: GENERAL NOTES ON MIDDLE GREEN RIVER WATERSHED

These were notes developed during 1990s during initial planning for this watershed.

Site Name: MIDDLE GREEN RIVER WATERSHED (MGRW); including the following:

- (a) UPPER SECTION (below dam), with Pitman Creek Corridor, Russell Creek Corridor, upper Little Barren River, ?East Fork Little Barren River Macrosite, ?Clay Hill Memorial Forest, ?Russell Creek Glades, ?Ebenezer Woods;
- (b) KARST PLAIN SECTION with lower Little Barren River Corridor, lower Lynn Camp Creek, Deer Pond, Bayles & Dobson Ponds, Hundred Acre Pond, Bunch Creek Swamp, ?Eve Wetland, ?Pierce Wetland, Exie Woods;
- (c) MAMMOTH CAVE SECTION with Mammoth Cave Watershed/Pike Springs Section, Mammoth Cave National Park/SE Section & Cliff Section, ?Chalybeate Flatwoods, ?Sunset Barrens-Shanty Hollow Macrosite.

Design Comment: the definition could be extended downstream to the mouth of Barren River; this extension has a significant forested corridor, and the aquatic system will become enhanced when the Brownsville dam is taken down; there are also significant ravine forests and flatwoods; note also separate potential megasites upstream and downstream of this critical central one.

Counties: Adair, Taylor, Green, Metcalfe, Hart, Edmonson, (Larue, Russell, Barren, Warren, Butler).

Overall Significance: extremely high (B1+)

Urgency: very high

Total Megasite Area: ca. 900,000 acres (including extension to Barren River)

Protectable Natural Area: ca. 200,000-300,000 acres, including current 60,000 acre National Park and eventual restoration goals; mostly mesic/xeric slopes forest, mesic/subhydric riparian forest; and native grasslands.

High Quality Area: a few 1000 acres are approaching older growth status (especially in the park, Middleton Woods, Exie Woods, etc.); a few xeric grassland remnants (ca. 100 acres?) appear relatively undisturbed except for lack of fire.

OUTLINE OF CONSERVATION PLAN

Effective practical targets can be selected through landscape, habitat and species filters. Key actions can be listed as: (1) overall protection of land or water (mega-management); (2) selection of habitat or manipulation of ecosystem processes (macro-management); (3) specific actions to increase or decrease selected biota (micro-management). Details of each target and its subcomponents are listed on subsequent pages (Land Type Associations, Ecological Communities, Rare Species). Questionable or marginal targets are noted in brackets; these need further definition and consideration.

Landscape/watershed targets.

Stream System (aquatic & riparian): very high significance; this river contains one of the best remaining refuges for fishes, mussels and other invertebrates in the Interior Low Plateaus; it is rivaled only by the Elk River in Tennessee; following notes provide brief pointers to program already developed by Richie Kessler.

Problems: past impoundment of Green River Lake (upstream end), and older low dam at Brownsville (downstream end); past and continued farming effects (especially livestock with access to streams, and nearby row-cropping); past and continued excessive logging, continued erosion along dirt roads, potential releases of pollutants from industrial facilities, and interstate/other major roads.

Solutions: further cooperative work among agencies is needed to get USDA and USFWS funds applied to problem areas and laws enforced (details being developed by project team); a generally protected zone along the river and its major tributaries can gradually be developed, including focal areas for some of the other targets.

Measures: (a) effort, as protection of land and mitigation of problems at key tracts causing stress along main stem and major tributary corridors, especially restoration of riparian forest and other sites clearly influencing aquatic system (e.g. wetlands, sinkholes); also, more diffuse effort in broad buffer zones with protected farmland and BMPs; (b) effects, using indicators of water quality and biological integrity (details being developed by project team).

Research: in short-term, we need a general update of aquatic fauna, with special attention to the less well studied tributaries; in long-term, we need to study overall interactions of water

quality and aquatic biota, building a dynamic predictive model that connects the aquatic, subterranean and terrestrial systems.

Mammoth Cave Area Forest/Woodland Matrix (LTAs D,E&F): very high significance; the park is one the largest blocks of protected land in the Shawnee Hills (and the best in the Dripping Springs Hills subsection); it contains 60,000 acres of continuous, maturing forest that represents diverse types on limestone and sandstone, with many rare species; much adjacent or nearby land can become targeted for protection of various types, including transitions to the karst plain to south/east and sandstone uplands to north/west.

Problems: inside park, lack of fire regime, some alien plants (especially Japanese grass, locally Japanese honeysuckle, garlic mustard, etc.); additional problems outside the park are continued excessive logging, continued farming (though much is now abandoned), and potentially more residential/recreational development in selected areas.

Solutions: in the park, fire can be returned to selected areas, perhaps reducing alien plants in some areas; outside the park, selected areas should be acquired/eased as natural areas, especially adjacent to the park and the Green River; some of these adjacent areas should also become managed with fire, especially those containing significant remnants of native grassland; a private forestry initiative might be developed in conjunction with the ‘Upper Green River Hills Forest’, as noted below.

Measures: (a) effort as general increase in forest blocks with at least partial protection, especially in broad corridors along major streams, but also extending broadly onto uplands wherever possible; (b) effects from monitoring of forest changes, and selected bird species.

Research: the park in particular offers good opportunities for long-term research on effects of fire on the forest, soil, hydrology and cave system.

Upper Green River Hills Forest Matrix: this broadly defined target has three components with different geographic contexts that should be understood; however, they are combined here since most differences are not pronounced, and strategies may be similar.

Cherty Calcareous Hills Forest Matrix (LTA A): moderate significance; more hilly portions, including parts of the major stream corridors, have fairly extensive forest still; this megasite offer one of the best opportunities for forest conservation within the whole ‘Cumberland-Green River Hills’ region that lies between the Knobs/Siltstone Hills and the Nashville Basin.

Brush Creek Hills Forest Matrix (LTA G2): moderate significance; part of this minor land type association can be conserved with the megasite; on sandy soils, the forest is somewhat distinct in composition and there are several blocks that deserve attention; none is currently protected.

Upper Russell Creek Forest Matrix (LTA G1): moderate significance; also on sandy soils and somewhat distinct from the generally calcareous matrix.

Problems: past logging and clearance of much land, reducing and fragmenting many sections; continued excessive logging; alien plants, especially Japanese honeysuckle, Japanese grass.

Solutions: more natural conditions in the river and large stream corridors can be promoted gradually by the Conservancy, using easements; compatible uses can be promoted here and

elsewhere in the watershed, perhaps through cooperative management in the private sector; some acquisition by state government (KDFWR or KDF) is possible eventually.

Measures: effort and effects as in the Mammoth Cave Forest.

Research: we need more general survey of forest types and natural qualities.

[*Karst Plain Matrix* (LTA B): perhaps moderate significance; needs further investigation and discussion as potential landscape target, at least in the Green River corridor; or perhaps focus only on restoration of open grassy woodland at community level (see below).]

Habitat/community targets.

Mussel beds: very high significance; with concentrations of several globally imperiled species, these beds deserve special focus for designing work to remove problems along adjacent riparian zones and tributaries (see problems listed above); for example, cold water releases from the lake dam is being modified to allow more reproduction; detailed elsewhere in planning for Stream System.

Cave & Karst Systems: very high significance; there are several cave systems with rare biota, including bats, crawfish, cave shrimp and other invertebrates; most of these caves in the park or nearby, but there are scattered sites of interest elsewhere, generally along river and stream corridors; the following notes are brief pointers to the intensive conservation program already led by the National Park Service, American Cave Foundation and others.

Problems: continued vandalism and other effects of excessive visitation; threats locally from roads or other development; past and continued effects of clearance, farming and development (via runoff, sedimentation, pollution); past impoundment of the Green River, backing up into some caves in the park.

Solutions: appropriate gating or other protection from disturbance at significant sites on private lands is urgently needed; general environmental work in community to reduce runoff, sedimentation, pollution; removal of Brownsville dam on the river.

Measures: (a) effort, as protection for key tracts and necessary gating of cave systems; (b) effects, from monitoring bat populations and other biota.

Research: better overall survey and information on different caves; assessment of how land uses affect subterranean systems.

Bottomland Forest: high significance; several remnants exist in central corridor sections with hydric tendency (and characteristic swamp chestnut oak).

Problems: past clearance of most land; continued logging, farming and draining (though better drained areas have mostly been converted already); alien plants, especially Japanese grass.

Solutions: acquisition or easement as natural areas is urgently needed, especially in the main river corridors, as well as reforestation of adjacent farmland using natural regeneration from local trees or, if necessary, planting from local propagules; cane should be included in protected areas, and replanted in buffer zones.

Measures: (a) effort as protection of remnants, also reforestation in designed areas; (b) effects from monitoring of vegetation, selected birds.

Karst Plain Woodland & Grassland (including transitions to sandy uplands): high significance; open grassy woodland or grassland covered much of the karst plain before settlement due to annual fires; such vegetation extended onto sandy uplands in the Mammoth Cave area, with somewhat distinct species composition and lesser fire effects closer to the river; there are few good remnant of this vegetation, except of more xeric rocky slopes; on deeper soils, a few rights-of-way have conservative grassland plants that might be restored, ideally together with adjacent farmland.

Problems: past conversion to farmland, or succession to forest due to lack of fire; continued farming in most of region (except in more hilly sections); persistent dominance of some alien species, especially fescue, sericea.

Solutions: better remnants of diverse types should be included in natural area designs, especially in the Mammoth Cave area, including several private tracts in foothills to the east; other areas, including widespread farmland in riparian or sinkhole buffers, should become converted to native grasses using USDA and USFWS programs (especially CREP), forming a pool for further restoration in the future; in addition to fire needs, a major problem for restoration would be alien plants such as fescue, johnson grass, sericea, etc.; the program could be developed with USDA funding, perhaps working also with KDF, KDFWR, NPS and others to form a fire management team for the region.

Measures: (a) effort as areas set aside as natural areas, in addition to areas with initial conversion from alien to native grasses, plus implementation of fire regime; (b) effects as persistent diverse native vegetation, with rare/conservative indicators to be determined.

Karst Plain Ponds & Wetlands (including hydric/subhydric forest): high significance; this megasite provides one of the best opportunities to conserve a diverse group of wetlands in the Mississippian Plateaus; the outstanding Hundred Acre Pond is in an upland depression, and other wet woods occur to the south on a band of wetter soils; also included here are wet flatwoods closer to the Brush Creek Hills, where ancient slumped sandy/acid soils occur (including a remarkable site with chestnut oak).

Problems: past conversion and drainage of much land; continued farming in adjacent land; general eutrophication of ground water.

Solutions: better sites deserve protection as natural areas, and adjacent land could be restored eventually using WRP or other funding sources; in buffer zones, artificial drainage should be removed, and native vegetation promoted.

Measures: (a) effort as protection of sites, restoration of native vegetation and fixing of drainage problems; (b) effects as recovery of diverse native vegetation, including rare/conservative indicators (to be determined).

[*Chalybeate Plain Flatwoods & Glades*: perhaps moderate significance; this vegetation is typical of somewhat hydric flats with sandy soil that have now been largely converted to farmland; due to its location just outside the Middle Green River watershed, and its difficult restoration needs, this target is best kept on the ‘back-burner’ for now.]

Species/guild targets.

Mussel species: very high significance; a few species will probably deserve reestablishment using artificially grown individuals (e.g. *Obovaria retusa*); this stream may become linked with a regional program to save mussel populations and reintroduce them where appropriate; we need research in how these species can be secured, grown in captivity then released, etc.

[*Fish species*: perhaps high/moderate significance; some species may deserve special promotion on their own merits, or since they act as hosts for imperiled mussel species.]

Plants of Karst Plain Grasslands (including transitions to sandy uplands); high overall significance; species deserving propagation are listed below (e.g. *Silene regia*, *Trifolium reflexum*, *Gymnopogon ambiguus*).

Problems: several rare species occur in small, isolated, degraded patches (see above), often threatened by forest succession and invasive aliens, or by excessive farming and development.

Solutions: better remnants with rare species (e.g. rights-of-way) should be protected and managed appropriately with fire, mowing, trampling; several species deserve to be transplanted or propagated for use in restoration; a program can be initiated with limited funds, and linked with long-term restoration plans for other open woodland and grassland habitats where species have been widely lost in the region.

Measures: to be determined based on individual species' needs.

[*Plants of Karst Plain Wetlands*: perhaps moderate significance; although there are few remnants, some species should probably be propagated, although waterfowl can provide much dispersal between sites; more basic research is needed into remnants of these systems.]

Alien plants. In the forest, aliens are not yet abundant in many areas, but there are severe local problems from *Alliaria petiolata*, *Ailanthus altissima*, *Euonymus fortunei*, etc.; some of these species deserve serious attention before they become widespread. Problematic species in more open land include Japanese grass, Japanese honeysuckle, sericea, fescue, johnson grass, and other pasture species; it is unclear which, if any, should be targeted independently of ecosystem management such as broad application of herbicides in pastures and appropriate fire or grazing regimes; further assessment is needed, as well as cost/benefit analysis of various strategies.

REGIONAL REPRESENTATION

Significance: high (RE2); good representation a range of Interior Low Plateaus sections, and aquatic system potentially outstanding, but native vegetation not particularly well represented; much restoration of grassland and riparian forest is needed.

Ecoregion: Interior Low Plateaus

Section: Pennyryle-Highland Rim (80%)

Subsections: Somerset Plain

Section: Shawnee Hills (15%)

Subsection: Escarpments & Karst

Section: Knobs Region (5%)

Subsection: Southern Knobs

River Watershed: Green

Subwatersheds: Russell Creek, Pitman Creek, Little Barren River, Lynn Camp Creek.

Land Type Associations (see NRCS STATSGO map and county surveys for soil associations; upper case letters to left refer to map units)

A. Cherty Calcareous Hills: to be defined on east side of megasite

Typical Soil Classes:

Characteristic Efromson Target:

B. Karst Plain (limestone-dominated)

Typical Soil Classes:

Characteristic Efromson Target: karst plain grasslands

B1. Pure Limestone Karst Plain

B2. Cherty Limestone Karst Plain

C. Damp Flats (edge of karst plain)

Typical Soil Classes:

Characteristic Efromson Target: karst plain ponds

D. Calcareous Hills (mixed with shale/sandstone);

Typical Soil Classes:

Characteristic Efromson Target: knobby grasslands

E. Sandstone & Limestone Hills; with sandy grasslands

Typical Soil Classes:

Characteristic Efromson Target:

- F. Sandstone Ravines (often with limestone on lower slopes); these are generally on Pennsylvanian sandstone in this megasite, though Mississippian Ravines do occur locally, especially to the north.

Typical Soil Classes:

Characteristic Efromson Target: sandstone ravine forests

- G1. Sandstone Uplands (Mississippian)

- G2. Sandstone Uplands (Pennsylvanian)

Typical Soil Classes:

Characteristic Efromson Target:

- H. Alluvial Bottomland

Typical Soil Classes:

Characteristic Efromson Target: riverine system

ECOLOGICAL QUALITIES

Significance: extremely high (EC1)

Aquatic: one of most outstanding riverine systems in the world, with restoration possible in this central section, despite severe damage in past.

Subterranean: one of most outstanding cave systems in world, with strong protection from National Park Service.

Terrestrial Systems: explanation of list on following page, with columns from left to right.

- I. Question marks indicate uncertain/peripheral occurrence; a,b,c = megasite sections (see above).
- II. Characteristic land type association, using codes listed above.
- III. Vegetation class code, name and typical species (with G rank in parentheses; and megasite occurrence indicated by ! = poor, !! = fair, !!! = good).
- IV. Asterisks (*) at the right margin indicate community types that will generally need special site design or management for adequate restoration, beyond simple protection of acreage and hands-off reversion to “nature” (such as manipulation with fires/ungulates, replanting of major species, control of hydrology, etc.); single asterisks indicate minor problems; double indicate major problems; triple indicate complete dependence on intensive restoration methods).

[The following codes were an earlier experiment to summarize information of ecological communities of the Middle Green River and Mammoth Cave areas. The data on which these are based, including cross-reference to National Vegetation Classification and condition/size/condition, will eventually be worked into an intelligible table for import to the Natural Heritage program.]

1Agmx(4739,4739*?)/BA1+; 1Asmx(3899,3899*)/BA1+; 1Af(3901,4626)/CB2+;
2As(4742,4699*); 2Ap(2191,2413*?,4527?); 4Ay(5033,7334)/CB2+; 4AzN(2586)/CB1+;
5Ccx(7201,7212)/CB2+; 5Ba(5014)/C2+; 5Bcx(2411,7698)/CB3+; 5Aa(5035)/C1+;
6Cs(7387?)/C1?; 6Bs(7380)/C1; 6As(4694*)/C0; 7Cmx(7209?,7709?)/CD2?;
7Bf(6201#?)/C1+?; 7Bmx(6201,6201*)/CD3?; 7Af(4437#)/C1+?; 7Amx(4437,4741?)/CD3+;
9DtoN(4412~?>????)/CD2-?; 9CsoN(2432>????)/C2-?; 9CtoN(4412>7706N~?)/CD2-?;
10Dfo(7746N?>4006??)/D1??; 10DhoN(7363?>4063??)/D1?? 10Dmo(7247>????)/CB3+;
10DsxoO(5027>4709>2391*?)/CD2+?; 10Cho(2405>5057)/CD1??;
10Cmo(7245>4677*?)/CD3+; 10Csxo(7245*,2075>2417,4756?)/CD3+;
10Bmo(7245~>5134>4677)/CD3+; 10Bsx(4217*,5028>4686>7805)/CD2+;
11Dmxr(7268,5023,7244?)/CB3+; 11Cmxr(2067,7795,5018)/CB4+;
11Bmxr(2070,2070*,7699)/C3+; 12Dxo(5040~>????)/CB2+; 12Cxo(7486>4062)/C1+?;
12CxoO(7486>4738>2214~)/CB3+

I	II	III	IV
HD	1. Shrubby/graminoid streambanks; w/disturbed upland transitions (G3!)	*	
	<i>Cornus obliqua</i> , <i>Salix</i> spp., etc.		
CHG	2. Shrubby/graminoid swamps (G2!!)		***
	<i>Cephalanthus</i> , <i>Carex</i> spp.		
GH	4.C. Acid streamside forests (G5!)		
	<i>Betula nigra</i> , <i>Platanus</i> , etc.		
HB+	4.DE. Basic streamside forests (G5!!!)		
	<i>Acer negundo</i> , <i>Platanus</i> ; rivers w/ <i>A. saccharinum</i> , <i>Populus deltoides</i> .		
DEF+	5.DE. Basic mesic forests (G3!!)		*
	<i>Acer saccharum</i> , <i>Tilia</i> , (<i>Fagus</i> , <i>Liriodendron</i>)		
FE+	5.C. Typic mesic forests (G3!!)		
	<i>Fagus</i> , <i>Liriodendron</i> , (<i>Acer saccharum</i> , <i>Tilia</i>)		
F	5.B. Acid mesic forests (G2!!)		**
	<i>Tsuga</i> , <i>Fagus</i> , <i>Magnolia</i> , <i>Betula</i>		
HCG	6.C. Typic subhydric forests (G3!!)		*
	<i>Acer rubrum</i> , <i>Nyssa sylvatica</i> , (<i>Fraxinus</i> , <i>Ulmus</i>)		
HC	6.DE. Basic subhydric forests? (G3!)		*
	<i>Fraxinus pennsylvanica</i> , <i>Ulmus americana</i> , (<i>Acer rubrum</i> , <i>Nyssa</i>)		
?CG	7.C. Typic submesic forest? (?G3!)		*
	<i>Fagus</i> , <i>Quercus alba</i> , <i>Acer rubrum</i> , etc.		
?BH	7.DE. Basic submesic forest? (?G2!)		**
	<i>Juglans nigra</i> , <i>Aesculus glabra</i> , <i>Elymus</i> spp., etc.		

- ?BH+ 8.DE. Basic seral thickets: canebreaks, hazelpatches, craborchards (?G2!)**
Arundinaria, Cornus, Corylus, Malus, Prunus, Rhus.
- CHG 9.BC. Acid/typic hydric oak/grassy flats (G3!!) ***
Quercus palustris, Q. bicolor, Q. imbricaria, Q. falcata;
 grassy phases perhaps had *Panicum virgatum*, etc.
- ?HC 9.DE. Basic hydric oak woodland/grassland? (?G2!) **
Quercus bicolor, Q. imbricaria; grassy phases w/*Phalaris*?
- BG+ 10.C. Typic non-hydric oak woodland/grassland (G3!!) ***
Quercus stellata, Q. falcata, Andropogon gerardii, Sorghastrum nutans.
- ??H 10.DE. Basic non-hydric oak woodland/grassland? (?G2!) **
Quercus macrocarpa, Q. shumardii, Fraxinus, Ulmus.
- FE 11.AB. Acid subxeric forest (G4!!!)
Quercus montana, Q. coccinea, Oxydendrum, Kalmia, etc.
- DEF+ 11.C. Typic subxeric forest (G5!!!)
Quercus alba, Q. velutina, Carya glabra, C. ovata.
- DE 11.DE. Basic subxeric forest (G4!!)
Q. muhlenbergii, Q. shumardii, Fraxinus spp., *Ulmus* spp., etc.
- FE 12.C. Typic xeric/subxeric coniferous forest/grassland (G3!!) *
Pinus virginiana, Juniperus, Schizachyrium scoparius, etc.
- DEB 12.DE. Basic xeric/subxeric coniferous forest/grassland (G3!!!) **
Juniperus virginiana, Schizachyrium scoparius, Sporobolus asper, etc.

RARE SPECIES

Significance: extremely high (SP1+++)

Note: Letters at left indicate sections of the watershed where each species was probably concentrated before settlement: a = Upper Section; b = Karst Plain; c = Mammoth Cave section. Asterisks at right indicates species that will probably need special protection, propagation or other intensive micro-management in order to recover populations within the foreseeable future; habitat management or restoration with broad-scale methods is probably not sufficient; *** = very urgent needs for globally imperiled taxa; ** = moderately urgent (or uncertain) needs for globally or regionally rare species; * = lower urgency but deserving some propagation for recovery.

Globally Rare Species

Extinct in megasite (or probably so)

b	<i>Bison bison</i> ssp. (eastern) (American buffalo); GX, SX	*
abc	<i>Canis lupus</i> (Grey Wolf); G?, SX	
b	<i>Cervus canadensis</i> ssp. (eastern) (Elk); GX, SX	*
abc	<i>Felis concolor</i> ssp. (eastern) (Mountain Lion); GX, SX	
c	<i>Picoides borealis</i> (Red-cockaded woodpecker); was peripheral	

Extremely Rare (ca. G1/G1G2):

- abc *Cyprogenia stegaria* (Fanshell)
- abc *Hemistena lata* (Cracking pearlymussel)
- abc *Leptodea leptodon* (Scaleshell)
- abc *Obovaria retusa* (Ring pink)
- c *Palaeomonias ganteri* (Mammoth Cave shrimp)
- abc *Pleurobema clava* (Clubshell)
- abc *Pleurobema plenum* (Rough pigtoe)
- abc *Villosa fabalis* (Rayed bean)

Following are cave endemics with uncertain G rank

- c ?*Antroselatus spiralis* (Shaggy cavesnail) Grank?
- c ?*Helicodiscus punctatellus* (Punctate coil) Grank?
- c ?*Pseudanophthalmus audax* (Bold cave beetle)
- c ?*Pseudanophthalmus globiceps* (Round-headed cave beetle)
- c ?*Pseudanophthalmus inexpectatus* (Surprising cave beetle)

Moderately Rare (G2/G2G3):

- abc *Cumberlandia monodonta* (Spectaclecase)
- c *Dodecatheon frenchii* (Sandstone shooting-star)
- c ?*Heuchera longiflora*/western range (an alum root)
- abc *Epioblasma torulosa rangiana* (Northern riffleshell)
- abc *Etheostoma maculatum* (Spotted darter)

bc	<i>Helianthus eggertii</i> (Interior barrens sunflower); perhaps G3	*
abc	<i>Lampsilis abrupta</i> (Pink mucket)	
c	<i>Myotis grisescens</i> (Gray bat)	**
c	<i>Myotis sodalis</i> (Indiana bat)	***
abc	<i>Plethobasus cyphus</i> (Sheepnose)	
abc	<i>Pleurobema pyramidatum</i> (Pyramid pigtoe)	
c	? <i>Silene regia</i> (Royal catch-fly); known nearby to east	**
abc	<i>Toxolasma lividus</i> (Purple liliput)	
c	<i>Trifolium reflexum</i> /northern range (Buffalo clover)	***
abc	<i>Villosa ortmanni</i> (Kentucky creekshell)	

Following are endemic riverine crustaceans with uncertain Grank

abc	? <i>Bryocamptus morrisoni elegans</i> (a copepod)
abc	? <i>Stygobromus vitreus</i> (an amphipod)

Somewhat Rare (ca. G3/G3G4):

- abc *Alasmidonta marginata* (Elktoe)
- c *Amblyopsis spelaea* (Northern cavefish)
- abc *Ammocrypta clava* (Western sand darter)
- abc *Ammocrypta pellucida* (Eastern sand darter)
- bc *Aster pratensis* (Western silky aster)
- bc *Aureolaria patula* (Riverbluff yellow foxglove)
- abc *Barbicambarus cornutus* (Bottlebrush crayfish); endemic to Green Rv; G2G3?
- c *Carex decomposita* (a pond sedge)
- c *Corynorhinus rafinesquii* (Rafinesque's big-eared bat)
- abc *Crystallaria asprella* (Crystal darter)
- cb *Echinacea simulata* (Pale purple coneflower)
- abc *Epioblasma triquetra* (Snuffbox)
- abc *Etheostoma tippecanoe* (Tippecanoe darter)
- abc *Fusconaia subrotunda* (Long-solid)
- c *Gentiana puberulenta* (Prairie gentian); perhaps extinct locally *
- abc *Ichthyomyzon bdellium* (Ohio lamprey)
- abc *Ichthyomyzon greeleyi* (Mountain brook lamprey)
- c *Myotis austroriparius* (Southeastern bat)
- c *Myotis leibii* (Eastern small-footed bat)
- abc *Notropis ariommus* (Popeye shiner)
- abc *Noturus stigmosus* (Northern madtom)
- abc *Orconectes pellucidus* (a cave crayfish)

abc	<i>Percina macrocephala</i> (Longhead darter)	
abc	<i>Pleurobema coccineum</i> (Round pigtoe)	
abc	<i>Pleurobema cordatum</i> (Ohio pigtoe)	
c	<i>Prenanthes crepidinea</i> (Giant wood-lettuce)	*
abc	<i>Quadrula cylindrica</i> (Rabbitsfoot)	
bc	<i>Rudbeckia tenax</i> (Pennyrite black-eyed susan)	
bc	<i>Silphium pinnatifidum</i> (Pennyrite prairie dock)	
abc	<i>Simpsonaiias ambigua</i> (Salamanader mussel)	
abc	<i>Stylurus notatus</i> (Elusive clubtail); perhaps extinct locally	
bc	<i>Thaspium barbinode</i> var. <i>angustifolium</i> (Pennyrite meadow-rue)	
c	<i>Typhlichthys subterraneus</i> (Southern cavefish)	
?ab	<i>Ulmus serotina</i> (September elm); perhaps only G4	
?cb	<i>Viola egglestonii</i> (Glade violet)	*

check for more rocky glade species (Leavenworthia, Malvastrum, etc.)

Other regionally rare, conservative or declining species of special concern

Extinct in megasite (or probably so): to be determined.

Extremely Rare (ca. S1/S1S2)

10.BC *Gymnopogon ambiguus* (Beard Grass) **

Moderately Rare (ca. S2/S2S3)

Somewhat Rare (ca. S3/S3S4; S3S4 species in brackets “[]”)

10.D *Echinacea purpurea* (Broad-leaved Purple Coneflower) **

12.D [*Carex meadii/tetanica*] (Glade Sedge)

10.CD [*Helianthus mollis*] (Downy Sunflower)

10.CD [*Helianthus occidentalis*]

05.CD [*Hydrastis canadensis*] (Goldenseal)

10.C [*Liatris aspera*] (Rough Blazing-star) *

10.C [*Liatris spicata*] (Spiked Blazing Star) *

12.D [*Liatris squarrosa*] (Small Blazing-star)

10.D [*Liatris squarrulosa*] (Blazing Star) *

05.CD [*Panax quinquefolius*] (Ginseng) *

09.D [*Panicum virgatum*] (Switch Grass); status needs research *

10.D [*Pycnanthemum pilosum*] (Barrens Mountain-mint) *

10.CD [*Solidago rigida*] (Prairie Goldenrod)

10.D [*Ratibida pinnata*] (Gray Coneflower)

09.BC *Thelypteris palustris* (Marsh Fern)

GENERAL CONSERVATION ASSESSMENT

Threats: degradation of aquatic system due to pollution/erosion (excessive farming & logging, oil & gas extraction, fords, hazardous material spills, etc.); improper river regulation, hydrological alteration and impoundment; invasion of alien aquatic species; lack of prescribed fire in native grasslands and open woodlands clearance of forest for agricultural or residential uses.

Conservation Status: TNC and partners have initiated watershed protection project (with CREP program proposed); several key riparian tracts have been purchased (mostly with conservation buyer program); USDA conservation programs is paying for riparian restoration and native grass planting, with much work by Seymours; Mammoth Cave protects 60,000 acres but has not yet implemented management with prescribed fire.

Needed Action: establishment of CREP program; expansion of land acquisition and conservation buyer program; better regulation of releases from Green River Lake, and removal of Brownsville dam; restoration of grassland remnants with fire (especially in and near Mammoth Cave National Park); much more establishment of new native grass areas and reforestation of riparian corridors.

Feasibility: moderate to high in short-term (in terms of getting a major project started with multiple partners); moderate to high in long-term.

Lead Organizations:

The Nature Conservancy

CREP program (USDA, Ky. Div. Conservation)

Other Partners:

USFWS

USACE

USDA conservation programs (other than CREP)

KDFWR, Ky. Div. Water, KSNPC other state agencies

County governments

Seymour native grass business

Western Kentucky University

SUGGESTED ACTION IN SHORT-TERM (10 year plan)

Partnerships and Cooperative Planning

Science and Research Needs

Land Protection

Stewardship

Financial Goals

DEVELOP LONG-TERM VISION (100 year plan)

Design of Natural Areas:

Land-use Planning and Zoning:

Advance Community Benefits:

LIST OF INCLUDED SIGNIFICANT SITES FOR DESIGN OF NATURAL AREAS

B1, B2, B3, B4, B5 = initial biodiversity ranks of TNC and Natural Heritage Program.

MIDDLE GREEN RIVER MEGASITE

A. Upper Section (hilly section below dam)

(B1) Middle Green River Corridor: Upper Section (Adair, Taylor & Green Cos.): rare mussels=\$\$\$, crayfish, fish; fairly continuous forest on adjacent slopes; 1000+ acres
C/CD=\$?

?To be defined: Cox Bend & Meadow Creek Mouth

(B2) Lemon Bend (Green, Taylor Co.): aquatics=\$\$?; *Myotis grisescens*/O-Gray bat, *Pleurobema clava*/D, *Barbicambarus cornutus*/D, *Epioblasma triquetra*/D, *Quadrula cylindrica cylindria*/D.

(B4) Green River Hill (Taylor Co., Cane Valley Qd.): bluff forest with disjunct *Tsuga canadensis*; [Romine] Saltpeter Cave.

Major tributary watershed

(B2) Pitman Creek Corridor (Green & Taylor Cos.); includes following site.

(B2?) Boones Cave (Taylor Co., Saloma Qd.): isolated cave site in Pitman Creek Corridor; *Myotis grisescens*/A-Gray Bat, *Myotis sodalis*/H-Indiana Bat, *Corynorhinus rafinesquii*/O-Rafinesque's Big Eared Bat.

Major tributary watershed

(B2) Russell Creek Corridor (Green & Adair Cos.): trib. to Green Rv. with many rare mussels (including *Villosa ortmanni*), crayfishes, fishes; fairly continuous forest on adjacent slopes; some potential bottomland and terrace woods (Green & Adair Cos., Gradyville & Gresham Qds.); *Etheostoma maculatum*/C+B, *Pleurobema clava*/O, *Villosa ortmanni*/O+C+D, *Barbicambarus cornutus*/D, *Epioblasma triquetra*/O, *Ichthyomyzon greeleyi*/C+H, *Percina macrocephala*/D, *Phenacobius uranops*/H+C+D, *Villosa lienosa*/O+D.

(B4?) Todds Cave (Adair Co., Columbia Qd.): along Pettys Fork (with relatively well forested watershed) only 2 miles upstream from Russell Creek; *Myotis grisescens*/O-Gray Bat.

(B2?) Jones Cave (Adair Co., Cane Valley Qd.): isolated cave site about 1 mile from Russell Creek; *Myotis grisescens*/A-Gray Bat, *Myotis sodalis*/H-Indiana Bat.

?(B4) Russell Creek Glades (Green Co., Exie & Gresham Qds.): several rocky openings or eroded areas on S/SW hillsides in this watershed; need exploration.

?(B4) Ebenezer Woods (Green Co., Gresham Qd.): above average woods; needs exploration; check location.

Major tributary watershed

(B3?) Upper Little Barren River Corridor (Hart & Metcalfe Cos.); trib. to Green Rv. with some rare mussels, fishes, but more degraded (*Villosa lienosa* but no *V. ortmanni*); several terrace/bottom woods (Metcalfe Co., Sulphur Well & Summer Shade Qds.).

?(B3) East Fork Little Barren River Macrosite; tentative, based on aerial photos and flyover; in headwater section of watershed; very little field work; 1000s acres C/CD forest potential plus some good watersheds and apparent glades, barrens, or eroded areas (?)

?(B3) Dry Fork Woods (Metcalf & Green Cos., East Fork Qd.): extensive forest, including bottomland; several glades on S/SW hillsides; needs exploration.

?(B3) East Fork Woods (Metcalf Co., East Fork Qd.): extensive forest in varied topography; needs exploration.

(B3) Sulphur Creek Cave (Metcalf Co., East Fork Qd.): isolated cave site several miles from Little Barren River; *Myotis grisescens*/C-Gray Bat. [*Ulmus serotina* found within a few miles.]

Other Uplands scattered in watershed; check locations, site associations.

(B4) Clay Hill Memorial Forest (Taylor Co., Campbellsville Qd.); along KY 289, donated by Campbellsville College; get details from Richie Kessler; nice maturish woods on relatively gentle slopes; mostly mesic-subxeric plus a little seepy acid streamhead character; Crov Fg Qr Asfl Lr Acs; selectively harvested ca. 1970, but CB quality.

(B4) Deep Road Woods (Metcalf Co., Summer Shade Qd.); KSNPC recent inventory site (PNA 47--check location); "mature woods--recovering second growth".

(B4) Cofer Woods (includes Millers Woods) (Metcalf Co., Breeding & Edmonton Qds.); see previous KSNPC file and their recent inventory site...

B. Karst Plain Section

(B1) Middle Green River Corridor: Karst Plain Section (Taylor, Green & Hart Cos.): numerous rare mussels, some fishes and crayfishes/=\$\$\$; rare/notable plants in corridor include *Aureolaria patula* (downstream), *Panicum virgatum*, *Phlox bifida* ssp. *bifida* (downstream), *Physostegia virginiana* ssp. v., *Podostemum ceratophyllum*, *Solidago rupestris*, *Cyrogenia stegaria*/O+D, *Epioblasma obliquata obliquata*/H+D+O, *Obovaria retusa*/O, *Plethobasus cooperianus*/X, *Pleurobema plenum*/D+B, *Cumberlandia monodonta*/D, *Lampsilis abrupta*/D+O, *Pleurobema clava*/O+X, *Pleurobema pramidatum*/D+O+C, *Epioblasma triquetra*/O, *Fusconaia subrotunda subrotunda*/D+O+C; also the rusty crawfish, a large species endemic to the Green River drainage (check with Ron Cicerello); 1Asm(3899.3899*)/B-1Agm(4739,4739*)/B1+=\$. 100s acres CB/B forest=\$ 1000s acres C/CD forest=\$. This macrosite includes the following standard sites.

(B4) Three Hundred Springs (Hart Co., Hudgins Qd.): older-growth forest; *Adiantum capillus-veneris*.

(B4) Bell Cliff (Hart Co., Hudgins Qd.): older-growth forest; not yet explored.

(B3) Middleton Woods (Hart Co., Canmer Qd.): older-growth mesic and subxeric forest plus some xeric open woods; includes Buckner Spring Cave; 4Ay(5033)/BA2+; 5Bcx(2411,7698)/B2+; 11Bm(2707?)/B2+;

11Cmx(2067,7795)/B2+; 11Dx(5023)/CB2+; 12BxoO (7486,4738,2214~)/CB1+;
100s acres CB/B forest=\$

(B4) Buckner Spring Cave (Hart Co., Canmer Qd.): *Myotis grisescens*/O-Gray bat,
Orconectes pellucidus/H

Major tributary watershed

(B2?) Lower Little Barren River Corridor (Hart, Green & Metcalfe Cos.): rare
aquatics=\$\$?; *Cyrogenia stegaria*/D+O, *Obovaria retusa*/O, *Pleurobema*
plenum/B+O+D, *Epioblasma torulosa rangiana*/O, *Etheostoma maculatum*/C,
Lampsilis abrupta/D+O, *Pleurobema clava*/O+H+X, *Pleurobema*
pyramidatum/D+H+B+O+C; includes following sites.

(B4?) Scott Cave (Green Co., Hudgins QD.); 2 miles S of Defries at Scott
Bend; *Myotis grisescens*/O-Gray bat; check location.

(B4) Ray Mays Cave (Green Co., Hudgins Qd.): *Myotis grisescens*/C-Gray bat.

Major tributary watershed

(B3) Lower Lynn Camp Creek (Hart Co., Hudgins Qd.): some relatively extensive
forest adjacent to Green River Corridor; perhaps some older growth; needs
exploration.

Wetlands on upland in watershed

(B4) Deer Pond (Green Co., Hudgins Qd.): sinkhole pond; needs exploration; 2A/C-

(B3) Bayles & Dobson Ponds (Green Co., Hudgins Qd.): natural sinkhole ponds; some adjacent forest; *Decodon verticillatus*, *Nuphar* etc.; 2AB/C+=\\$?

(B3) Hundred Acre Pond (Hart Co., Center Qd.): *Gratiola viscidula*/H, *Rhynchospora macrostachya*/H, *Pontederia cordata*/C, *Potamogeton pulcher*/A, *Carex decomposita*/C, *Carex stricta*/C; 2As(4742,4699*,4324)/C2=\\$?; 6BCDs(7300,7387,4480)/C2-=\$?; 10BCs(2432~,2432)/C1-; design 220/110 acres.

(B3?) Bunch Creek Swamp (Taylor Co., Hibernia Qd.); Martina's new discovery, the only wet flatwoods in county with good ground vegetation:

6Cs(7387)/C2; 9Bs(2432~)/C2=\$

Possible long-term extension to following sites:

(B4?) Mac Flatwoods (Taylor Co., Hibernia Qd.): Fg Qua Ox Ns Acrt Lq Qpa
Quercus montana (very unusual in flatwoods); 6Cs(7387)/B1-;
7DCm(7208~,7209)/B1-=\$??

?(B4?) Eve Wetland (Green Co., Hudgins Qd.): not yet explored.

?(B4?) Pierce Wetland (Green Co., Exie Qd.): not yet explored.

Upland woods

(B3?) Exie Woods (Green Co., Exie Qd.): older-growth forest (Fg Lq Qua Lr etc.) on subhydric-mesic soils; 7Cm(7209?)/CB2=\\$?; 11Cr(5018?)/CB1; ca. 100 acres
CB/B forest=\\$?

C. Mammoth Cave Section

(B1) Middle Green River Corridor: Section below Mammoth Cave National Park.

(B3) Lawler Bend (Hart Co., Munfordville Qd.): extensive xeric and mesic forest; *Phlox bifida*, *Aureolaria patula*, *Soldago rupestris*.

Also to be defined: Dry Run Area, etc.

(B2) Mammoth Cave Watershed: Pike Springs Section (potential macrosite between Park and Interstate) (Hart Co., Mammoth Cave & Horse Cave Qds.): Pike Springs subterranean drainage critical for endangered Cave Shrimp; several good quality glades and open woodlands on S/SW hillsides; upland ROWs with *Helianthus eggertii*; some karst valley grassland remnants; Ice Cave sinkhole with *Circaea alpina*.

(B3?) Indian Cave (Barren Co., Mammoth Cave Qd.): 2 miles E of Resource Management office along KY 70; Gray Bat/D, *Corynorhinus rafinesquii*/C-Rafinesque's Big Eared Bat, *Myotis sodalis*/D-Ind bat.

(B2) Bald Knob Caves (Edmonson & Barren Cos., Park City Qd.); almost in karst plain; mostly on land of Park Mammoth Resort; also there is a narrow extension of the park along KY 255; this is a new combination of following previously defined sites; corn snake.

(B2) Jesse James Cave (Edmonson Co., Park City Qd.): *Myotis grisescens*/A, *Myotis sodalis*/D, *Myotis austroriparius*/C, *Plecotus raf*/D, *Corynorhinus rafinesquii*/D.

(B3) Coach Cave (Edmonson Co., Park City Qd.): *Myotis grisescens*/D (was 100,000 but bad gates only recently replaced), *Plecotus rafinesquii*/C, *Myotis sodalis*/C.

(B4?) Dooley's Cave (Barren Co., Park City Qd.): *Helicodiscus notius specus*/O; *Myotis grisescens*/O.

(B4) Park City Barrens (Barren Co., Park City): mostly along extension of park along KY 255, plus hills between Park City and Park Mammoth Resort; includes barrens recently found by KSNPC (PNA 53); *Helianthemum bicknellii*/H, *Helianthus eggertii*/Cx2; 10BxoO(4686,7805)/CD2+=\$?

(B3) Toohey Ridge Barrens (Barren Co., Mammoth Cave Qd.): fairly nice barrens remnants on deeper soil of sandy ridge and karst valley; *Aureolaria pectinata*, *Helianthus eggertii*; 10BmO(4677)/C2+=\$

(B3) Ice Cave Barrens (Hart Co., Horse Cave Qd.): *Helianthus eggertii*/C+D, *Aster phyllolepis*/C, *Circaea alpina*/B, *Liatris cylindracea*/D, *Muhl cyl*; 10Bxo(4686,7805)/C1+?; 12BxoO(4738,2214~)/CB2+?=\$?

(B3) Hatcher Valley Glades (Hart Co., Horse Cave Qd.); 10Bxo(4686,7805)/C2+=\$?; 12BxoO(4738,2214~)/CB2+=\$?

Plus several other glades/barrens; need to organize data.

Following sites are more isolated but have possible connection programatically with the above megasite and with the park (through UNESCO Man and Biosphere Program)

(B4) Brushy Knob (Barren Co., Park City Qd.): *Aster pratensis*/B, *Echinacea pallida*, *Eryngium yuccaefolium*; 12BxoO(4738,2214~)/CB2+

(B4) Frenchmans Knob Pit (Hart Co., Horse Cave Qd.): N of Cave City; *Amblyopsis spelaea*/O, *Myotis sodalis*/D.

(B4) London Pace Sink area (Hart Co., Horse Cave Qd.): several glades on S/SW hillsides; extensive forest over varied topography; Mammoth Onyx Cave nearby;

228 (B3?) Chalybeate Wetlands (Edmonson Co., Rhoda Qd.): several scattered forested wetlands on this unusual wet, acid landtype association are more or less intact; needs much more exploration for rediscovery of *Drosera intermedia*, *Platanthera ciliaris*, *Rhynchosia tomentosa*, etc.; 9Ct(4412?)/CD2-?; 9Cs(2432)/C3-=\$; 9Bs(2432~)...

(B1) Mammoth Cave National Park Area: Dripping Springs Hills Section (and some adjacent tracts); extensive forest with varied topography; older-growth in several ravines near river; small/diffuse/low quality glade/barrens remnants urgently in need of fire/other restoration (much potential): gray bat/= \$; Indiana bat= \$; *Helianthus eggertii*/A= \$\$, *Trifolium reflexum*/D= \$!, and many other grassland species; 1000+ B/CB= \$\$; 60,000 acres C/CD= \$\$

(B2) Dixon Cave (Edmonson Co., Mammoth Cave Qd.): *Corynorhinus rafinesquii*/B, *Myotis sodalis*/B-Ind bat, *Myotis austroriparius*/C-SE bat, *Myotis grisescens*/C-Gray bat, *Myotis leibii*/H-Eastern bat, *Nycticeius humeralis*/O.

(B2) Longs Caves (Edmonson Co., Mammoth Cave & Park City Qds.): *Orconectes pellucidus*/H; *Myotis grisescens*/D, *Myotis leibii*/H, *Myotis sodalis*/B.

(B3) Wondering Woods (Barren Co., Mammoth Cave Qd.): *Gymnopus ambiguus*, *Helianthus eggertii*/C; 10Bmx(4677,7805)/C2+= \$

(B4) Crystal Cave Meadow (Edmonson Co., Mammoth Cave Qd.);
10Cmx(4677~,4756?)/CD2+?

(B4) Hansons Woods (Edmonson Co., Rhoda Qd.): private land adjacent to park--
has not been recheck for at least 10 years; *Palemonias ganteri*/D; acid subxeric
forest/B2+

(B1) Mammoth Cave National Park Area: Sandstone Ravine Section (Hart & Edmonson
Co., Mammoth Cave, Cub Run, Rhoda, Nolin Lake & Bee Spring Qds): extensive forest;
sandstone ravines with *Betula allegheniensis*, *Dodecatheon frenchii*, *Tsuga canadensis*,
etc. 5Dcx(4767*)/CB2+; 6Ds(4480?)/C0+; 11Emxr(5022,....)/C3+

(B2) Big Woods (Hart Co., Mammoth Cave Qd.): older growth forest: *Helianthus
eggertii*/B along adjacent road, *Viola septemloba* var *egglestonii*/O;
5Cmx(7201,7212)/CB2+; 10Dm(7247)/C1+; 11Cmxr (2067,7795,5018?)/CB2+;

(B4) Pigeon Creek Gorge (Edmonson Co., Bee Spring Qd.): nice tributary ravine of
Nolin River near park; "Appalachian mesophytic forest"/B; from Hannan et al.

The following site is a continuation of the Middle Green River Corridor; action in this
section may be better transferred to the "Lower Green River Corridor" megasite.

(B2) Green River Corridor below Lock & Dam No. 5 (Butler & Warren Cos.); diverse
aquatic fauna/= \$\$; includes following sites within a mile of the river.

(B3?) Ivy Creek (Warren Co., Reedyville Qd.); Brown's Woods; *Dodecatheon
frenchii*; 1000+ acres C/CD forest=\$?

(B3?) Devils Side-saddle (Warren): *Gentiana flavida*/H (S. Price); mesic and xeric forest; large sandstone cliffs.

The following sites are within half a mile and should probably be combined, but they are in separate watersheds.

(B3) Sunset Barrens (Warren Co., Brownsville Qd.); includes nearby 15 acre Palmer Prairie Remnant (= "Macy Highway Sandstone Barrens") on deep sandy soil with *Schiz (dom)* plus *Sorgh And ger*; grades into open Qst Vacc grasses; *Buchnera americana*, *Dodecatheon frenchii*/B+C, *Isoetes butleri*; 10CDox(2075,4756)/CB1=\$?; 12DCx(4062?)/B1+.

(B4) Shanty Hollow (Warren Co., Reedyville Qd.); *Silene ovata*/C?



Above: nuts of southern shagbark. Back: gravel bar on Green River adjacent to Kinney tract.

