Osher Lifelong Learning Institute at UK, Lexington

Eden on Elkhorn? Natural History & Conservation Planning in Central Bluegrass Region (with botanical emphasis). By Julian Campbell. At Hunter Presbyterian Church, Rosemont Gdn. Contact: OLLI Office 257-2656 or go to www.uky.edu/OLLI for information to register.

Week 1: April 1, 2016 - 10 am to 12, Introduction

The importance of clear concepts when teaching natural history and applying knowledge to local efforts in conservation, restoration and community-based planning.

Week 2: April 8, 2016 - 10 am to 12, Landscape

Outline of the Central Bluegrass region based on geology, topography, soils, native vegetation, flora and fauna, human history & potential future balance of man and nature.

Week 3 April 15, 2016 - 10 am to 12, Habitats

Outline of ecological gradients in original vegetation; focus on problems for restoration of "Bluegrass Woodland", much browsed before settlement, now invaded by aliens.

Week 4: April 22, 2016 - 10 am to 12, Species-groups

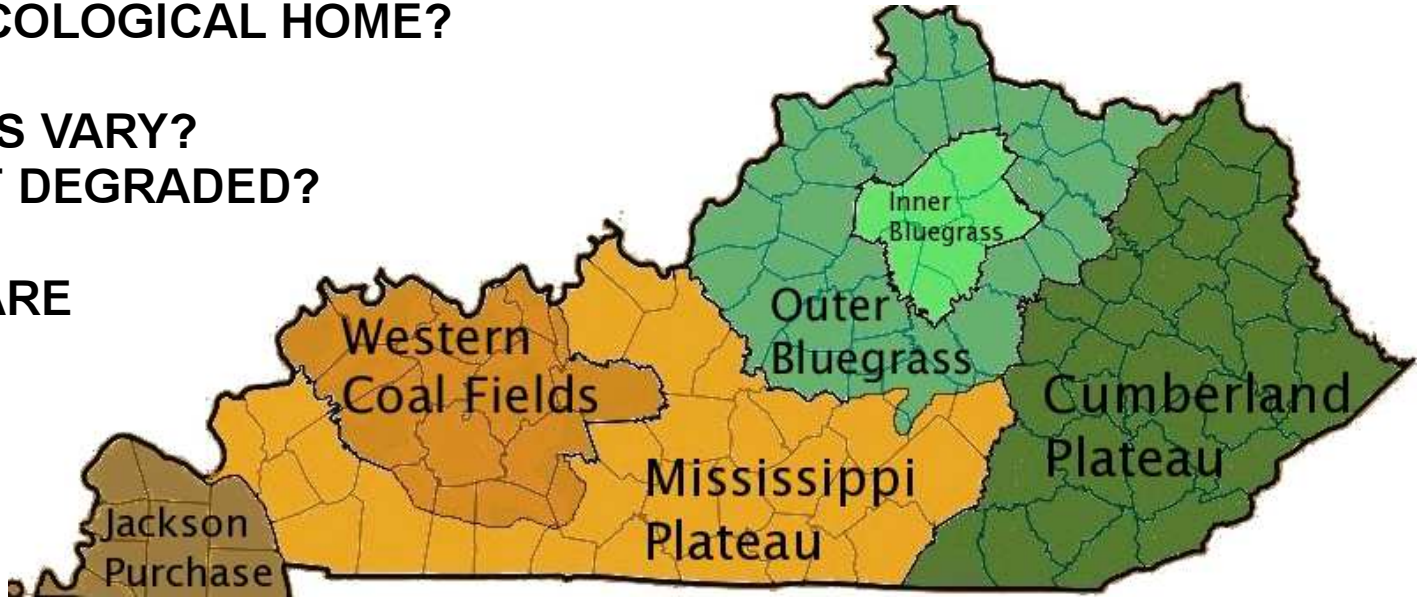
Outline of taxonomic diversity, at least among vascular plants; focus on groups of species that most deserve "micro-management" or propagation for recovery.

WHERE IS OUR ECOLOGICAL HOME?

HOW DO HABITATS VARY?
WHICH ARE MOST DEGRADED?

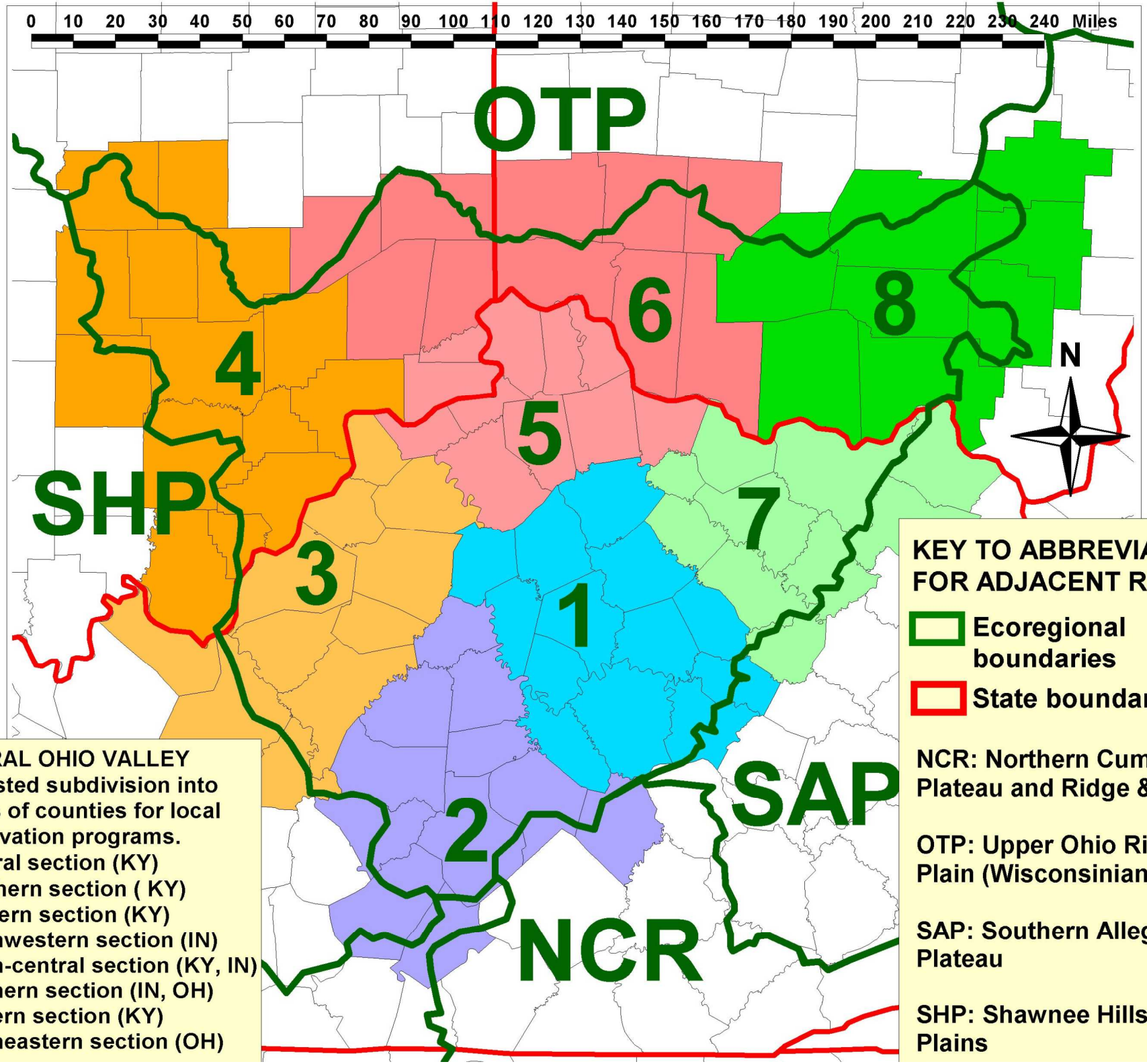
WHICH SPECIES ARE MOST DECLINED, MOST NEEDY?

WHAT SHOULD WE DO?



Eden on Elkhorn? Natural History & Conservation Planning in the Central Bluegrass

We need more regional focus—despite some strong local NGOs centered in Inner Bluegrass (Lexington area), Greater Cincinnati and Greater Louisville



CENTRAL OHIO VALLEY
Suggested subdivision into groups of counties for local conservation programs.

1 Central section (KY)
2 Southern section (KY)
3 Western section (KY)
4 Northwestern section (IN)
5 North-central section (KY, IN)
6 Northern section (IN, OH)
7 Eastern section (KY)
8 Northeastern section (OH)

1. Overview: introduction to the importance of clear concepts when teaching natural history and applying knowledge to local efforts in conservation, restoration & community-based planning.

Part One traces the history of conservationist writing in central Kentucky, from Boone to Dickens to Shaler to Jilson and others, to modern academics, bureaucrats and community-leaders. Traditional 'Natural History' has disappeared from most of modern academia, and yet there is never a greater need for it as Conservation of our supposed Natural Heritage becomes an increasingly urgent matter. We should first step backwards and ask the question—why conserve? Most people are fundamentally curious about broad views of history, especially when it delves into our origins, whether political, economic, ecological or biological. There is also widespread support for the recreational aspects of natural areas and for our associated interests in biological diversity. Thirdly, we have of course material interests in natural resources, from food and fibre to 'ecological services'.

Conservation is, arguably, the pursuit of harmonious balance between reverence for nature and extraction from nature. It should be based on good science, and on building consensus across communities, with transparency and debate. Instead, entrenched bureaucratic interests (through careers, finances and politics) can sometimes dominate. An objective assessment of progress (or failure) is rarely available at local or regional scales, even within relevant agencies and non-profit organizations that have striven for 'measures of success' or for general public education. Such matters would be aided by coordination within 'ecoregions'.

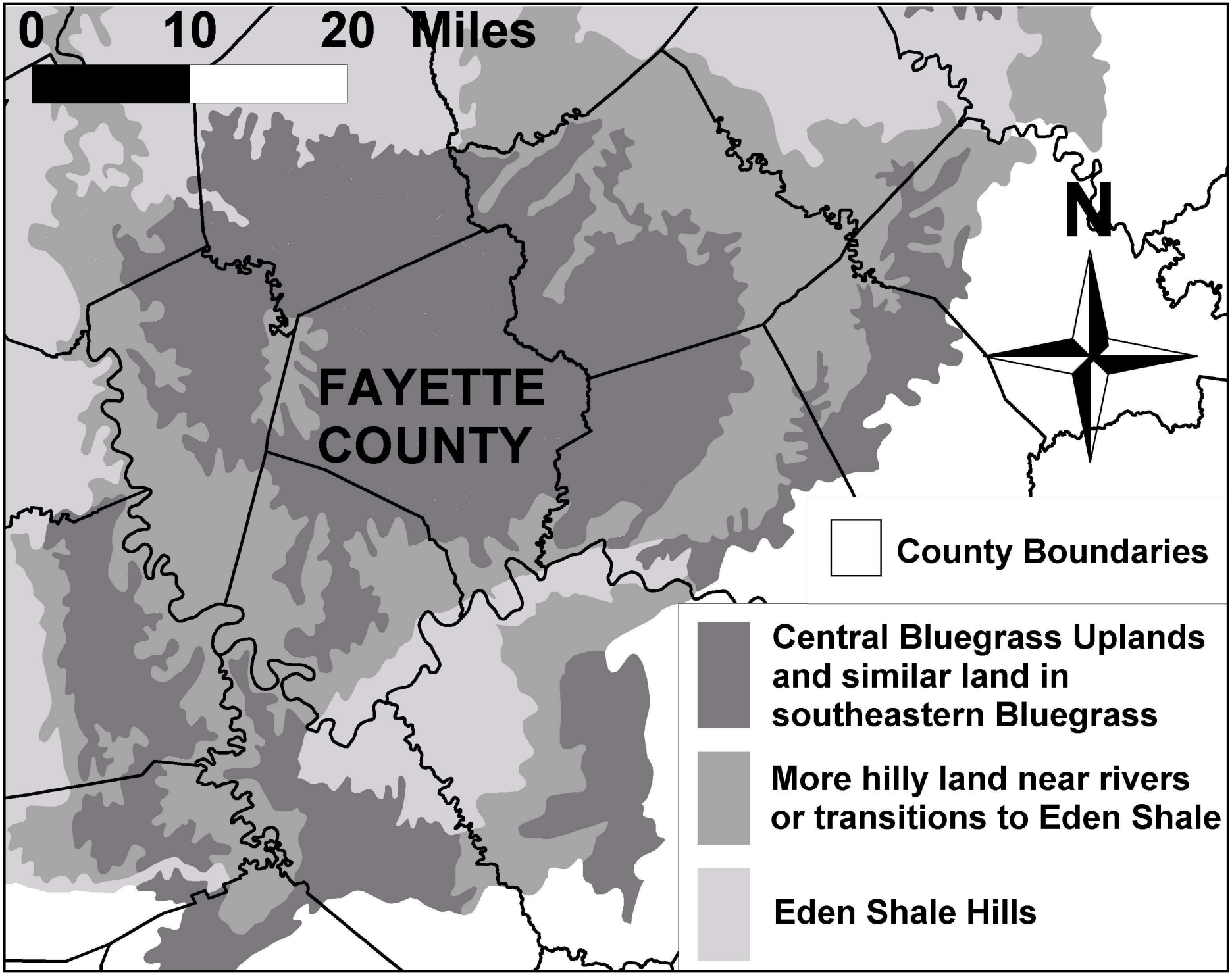
This course focusses on the definition of easily understood goals for conservation. These goals are inspired by The Nature Conservancy's efforts at ecoregional planning during the 1990s, but simplified and tied more directly to future assessments. First, it is important to outline good natural boundaries for our region, and to map the most extensive potential natural areas within it. Second, we must understand how natural habitats vary with this region, and focus on those types with most need for restoration. Third, we should attempt to identify groups of species that are truly imperiled, even after their remaining sites are protected and their habitats restored.

Part Two will deal with climatic factors that define our 'humid mid-temperate' zone, and with the significance of climatic changes. Also, we will look at regional patterns in geology, topography and soils. We will begin with biogeography in its broad scope, going back to Humboldt and other pioneers. Can we outline the 'Central Ohio Valley' (see map) as 'Bluegrass plus Knobs plus Transitions'? What are useful subdivisions, including our 'Central Bluegrass'? And where are tbe best opportunities for preservation of regional features?

In Part Three, the course will focus on simple definitions of habitats (or 'natural communities' or 'ecosystem' types}, avoiding the semantic problems and hierarchical thinking that tend to plague this subject. It is essential that habitat types be viewed as fuzzy concepts that intergrade with each other, rather than as rigid boxes. Yet language should be rooted in real data and concepts of ecological gradients. Planning should focus on types with most need for restoration. We will examine models for local gradients related to geology and overall soil fertility (deeper than pH), to dryness and wetness (which are not opposites), and to the complicating effects of changing patterns in varied disturbances across the landscape.

Last (but not least), Part Four will delve into the vast genetic diversity of just Local Life. Faced with overwhelming, growing information, how on earth can targets for conservation be usefully defined at the level of species? One approach is to focus on those groups of species that appear to have declined most since settlement and that need 'micromanagement' or propagation for recovery—especially those with slow growth, reproduction or dispersal. A selection of declined or imperiled vascular plants for such work is possible, but no organized plan exists. We must also identify the most problematic aliens for micromanagement. The course will provide notes on these species and outline how we can proceed to incorporate them into conservation plans. Ideas will be solicited from the class.

A fundamental goal for this course is to enable more objective assessment of success or failure in local efforts, based on what should be our common understanding of conservation targets. Details from particular sites and projects will be presented. Short trips to the UK Arboretum will illustrate points; longer trips will be supplementary.


0 10 20 Miles
N
FAYETTE COUNTY
County Boundaries
Central Bluegrass Uplands and similar land in southeastern Bluegrass
More hilly land near rivers or transitions to Eden Shale
Eden Shale Hills

2. Landscapes: outline of the Central Bluegrass region based on geology, topography, soils, native vegetation, flora and fauna, human history plus potential future balance of man and nature.

What is our 'ecological address', from immediate locality to region to biome to continent to globe to solar system to universe? Let's work down from 'biome'—a zone with relatively homogeneous climate and native vegetation. Our land used to be mostly covered with humid temperate forest, dominated by deciduous trees except where soils are poorer or where disturbances caused openings. It is important to specify 'mid-temperate' here, equivalent more or less to Hardiness Zones 6 and 7 of the USDA (annual minimum temperature averaging -10 to +10 degrees F). Varied terminologies have been confusing. Within our biome, there is also much geological variation, with profound influences on the native vegetation. Glaciation has smoothed over the landscape further north, but older geological patterns have caused most of Kentucky to have diverse topography and soils. There are many differences in flora and fauna from more siliceous soils, especially on sandstone, to more calcareous soils, especially on limestone. The Central Ohio Valley can be defined as a complex combination of the true Bluegrass region (on calcareous Ordovician bedrock), plus the surrounding Knobs and other transitional hills (Silurian, Devonian, Mississippian), plus transitional glaciated land and recent alluvial plains (Pliocene to Holocene).

The Central Bluegrass is loosely defined here to include the Inner Bluegrass (Middle Ordovician) plus some surrounding sections of the less fertile Eden Shale Hills (Upper Ordovician). The Eden Shale Hills are less pronounced to the east, with much intermixing of soil types, perhaps due to ancient rivers and estuaries flowing from the original Appalachian Mountains. Watershed boundaries are close to geological boundaries in some areas, and they can help define useful regions. The whole Ohio River watershed embraces the central Ridge & Valley, Appalachian Plateaus, Interior Low Plateaus and some southern glacial till plains. The Central Bluegrass includes several tributaries that flow into the Kentucky River Palisades, especially Elkhorn Creek, plus the whole South Fork of Licking River. Centered on Bourbon, Fayette, Jessamine and Woodford Counties, this is a useful region for developing a community of conservationists.

It is reasonable to focus on conservation of more natural landscape and watersheds in the following three areas. These have different ecological emphases, and to some extent different sets of imperiled species. Various organizations have initiated much work within them.

A. The Kentucky River Palisades, broadly defined, extends from Lower Howard's Creek to the mouth of Elkhorn Creek. In addition to this central corridor, the much more degraded Elkhorn Creek watershed could become a focus of work. Also, the adjacent Eden Shale Hills in Garrard and Madison Counties contain relatively extensive woods of potential interest. Ravine slopes and bluffs along the Palisades contain diverse habitats, extensive forest and some unusually old trees in places. Moreover, there is a general concentration of globally and regionally rare species. But the river itself is highly degraded due to locks-and-dams. And on adjacent flatter uplands, the woods have been largely cleared off in the past, leaving few significant remnants. Further away from stream corridors, opportunities for restoration of native vegetation are even less frequent.

B. The South Fork of Licking River (mostly Clark, Bourbon and Harrison Counties) has interest for restoring water quality and aquatic life, especially imperiled species of mussels. This watershed also includes some significant remnants of ancient woodland on the uplands, especially Griffith Woods. There is some potential for recovery of the river system, if the effects of farming can be reduced. However, the main stem of Licking River (further north) has much more integrity, due to less intense farming and more forest in that watershed. Over the long term, it may be possible to increase forested corridors along the South Fork and its tributaries. And Griffith Woods should become a regional model for restoration on the uplands.

C. The Bluegrass Army Depot (Madison County) covers 14,500 federal acres on relatively gentle uplands, part of which is transitional to the dolomitic foothills of the Knobs. Although generally degraded, some sections are already managed for restoration of wildlife and native vegetation. This area contains one of the largest known populations of running buffalo clover, a species maintained by grazing of cattle after settlement but now largely dependent on deer. Conservation remains subservient to military interests, but the Depot could eventually become largely decommissioned.


Jessamine Gorge:
Heart of the
Palisades

3. Habitats: outline of ecological gradients in original vegetation; focus on problems for restoration of "Bluegrass Woodland", much browsed before settlement but now invaded by aliens.

Across the world, there has been a tortured history of classification and nomenclature for habitats—or "natural communities"—or "associations" of species—or types of "ecosystem". These vague terms are somewhat overlapping and interchangeable. As with climatic zones, it is most useful to consider more local variation in ecology as gradual rather than hierarchical. Yet the latter approach still predominates in much conservation-related literature.

Hydrological differences are usually the most obvious clues to fundamental gradients in native vegetation, from "xeric" (extremely dry) rock outcrops to "mesic" (relatively unstressed) sites to "hydric" (generally saturated) swamps and ponds. However, we must also recognize that it is more stagnant water that maintains truly hydric habitats, as opposed to more flowing water, which maintains well-oxygenated streams and their associated "rheic" (scoured riparian) zones. And, on uplands there is a significant difference between truly mesic sites, as in sheltered ravines, and sites with more range of dry-versus-damp conditions throughout the year, as in flats with only local collection of rainwater but poor drainage. Thus, dryness and wetness can be considered somewhat independent dimensions in ecology. There is a third major gradient, associated with chemical and physical differences from more acid soils (usually siliceous) to more basic soils (usually calcareous). This gradient is most obvious when comparing different geological regions of the state (as noted in Part 2). But it is also evident in more local contrasts, such as between regular soils of the Inner Bluegrass and old stream terraces with imported sand or with chert accumulated from weathered limestone.

Overlaid on these three major gradients in the original vegetation, we now have general degradation and intense disturbance by mankind, which tends to be concentrated on relatively gentle uplands with deeper soils. The challenge for conservation is to understand the history of human effects and then to reduce or modify them at carefully selected sites that contain significant or restorable remnants. In some cases, such sites lie outside the three 'megasites' that are priorities for conservation at a larger scale (as noted in Part 2).

Most habitats (without cliffs, caves, water-bodies) can be arranged along ecological gradients; asterisks shiw desired degree of targeting.

----------(Full Topographic Series)----------

1. River & stream corridors + riparian transitions (rheic); rice-grass, wild oats, big bluestem; devastated by dams, largely disappeared.***

4. Riparian woods (subrheic): elm, boxelder & sycamore; largely degraded but still widespread and often recovers without help.

5b. Moist woods (mesic): sugar maple, basswood, northern red oak or bitternut; relatively secure in ravines, and slowly recovers by itself.
5a. Variants on more acid soil: beech, tulip tree; highly degraded.**

11b. Medium dry woods (subxeric): oaks, ashes, hickories, elms, sugar maple; mostly secure in ravines; and slowly recovers by itself.
11a. Variants on more acid soil: white oak, black oak, pignut hickory; much degraded and deserving restoration but remnants widespread.*

12. Dry red cedar woods (xeric): red cedar, oaks, ashes, elms, hickories, shrubs; relatively stable near rocks, and spreads elsewhere.
12x. Open variants on cliffs and flatrocks; stonecrop, prickly pear.***

----------(Wetland Series)----------

2. Lakes, ponds, marshy transitions (hydric): buttonbush, pondweeds, other aquatics; much degraded but many new ponds created.**

6. Swampy woods (subhydric): white elm, green ash, swamp white oak; much degraded but widespread small remnants.**

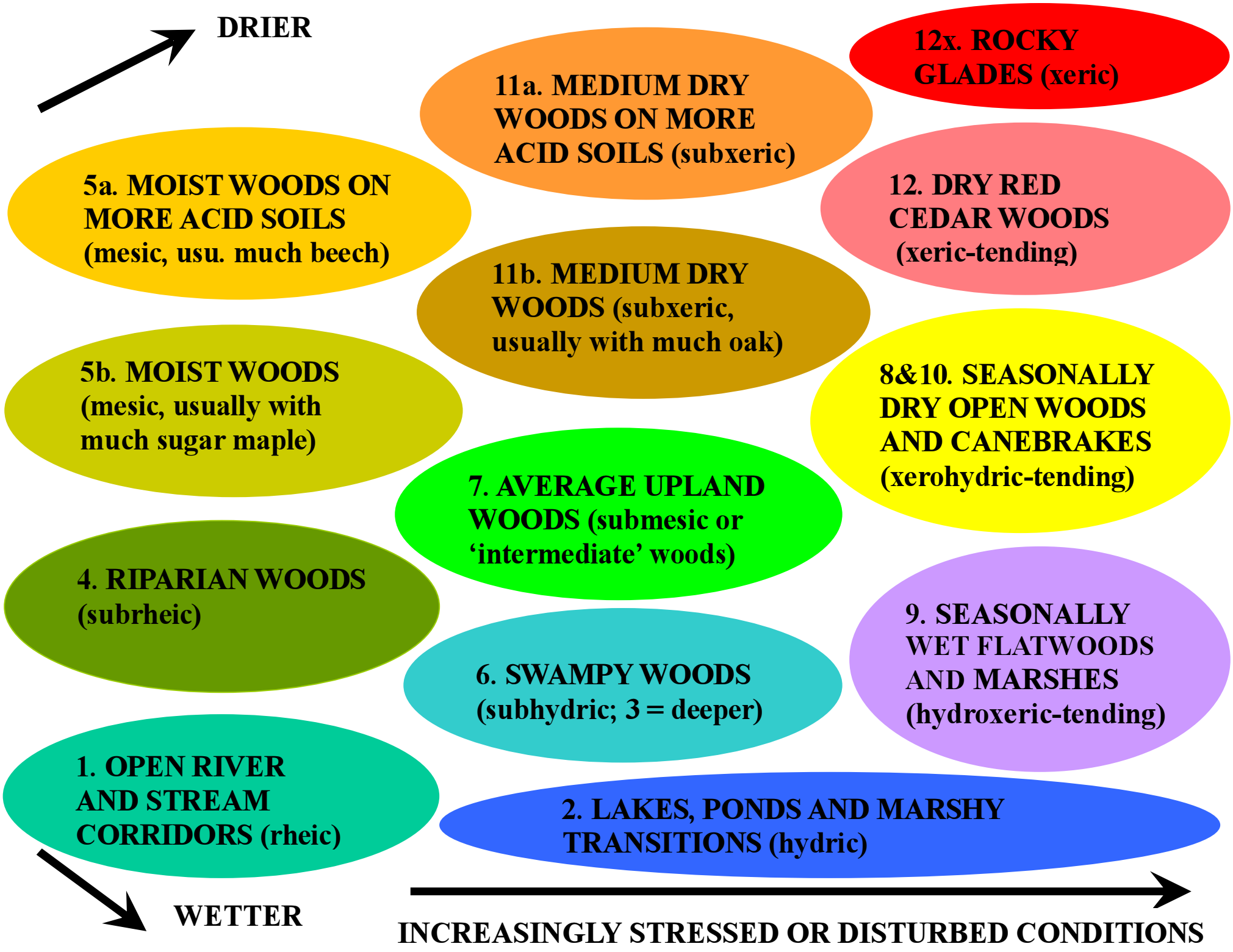
9. Seasonally wet flatwoods and marshes (hydroxeric-tending): sedges, shrubs, oaks; largely disappeared, formerly with beavers.***

----------(Rolling Upland Series)----------

7. Average upland woods (submesic): (maple-bitternut with less disturbance), walnut-buckeye, ash-elm (oak-hickory with more stress): widespread but mostly degraded, without clover.**

8. Thickets maintained by repeated browsing or burning (submesic): locust, haws, pickly ash, sumac, cane, briars; scattered remnants but now highly degraded and unstable, mostly lacking cane.***

10. Seasonally dry open woods and canebrakes (xerohydric-tending): bur oak, honey locust, cane, forbs & grasses; partly developed by Virginian settlers into "woodland pasture". (Perhaps "savanna-like" but that term has been misapplied to combinations of 7, 8 and 10.)**


DRIER
12x. ROCKY GLADES (xeric)
11a. MEDIUM DRY WOODS ON MORE ACID SOILS (subxeric)
5a. MOIST WOODS ON MORE ACID SOILS (mesic, usu. much beech)
12. DRY RED CEDAR WOODS (xeric-tending)
11b. MEDIUM DRY WOODS (subxeric, usually with much oak)
5b. MOIST WOODS (mesic, usually with much sugar maple)
8&10. SEASONALLY DRY OPEN WOODS AND CANEBRAKES (xerohydric-tending)
7. AVERAGE UPLAND WOODS (submesic or 'intermediate' woods)
4. RIPARIAN WOODS (subrheic)
9. SEASONALLY WET FLATWOODS AND MARSHES (hydroxeric-tending)
6. SWAMPY WOODS (subhydric; 3 = deeper)
1. OPEN RIVER AND STREAM CORRIDORS (rheic)
2. LAKES, PONDS AND MARSHY TRANSITIONS (hydric)
WETTER
INCREASINGLY STRESSED OR DISTURBED CONDITIONS

4. Species-groups: outline of taxonomic diversity, at least among vascular plants; focus on groups of species that most deserve 'micro-management' or propagation for recovery.

These groups can be defined as targets for micromanagement, involving careful selection of sites, local improvement of habitats, and artificial propagation in some cases. A secondary value is to use the more showy examples of these species as 'charismatic' vehicles for increasing public interest and funding. But this approach can be abused if no real benefit to the species results from funded actions. There is, unfortunately, no easy way for school systems and the general public to grasp the essential features of our flora and fauna. "Bluegrass Land and Life" by Wharton and Barbour (1991) does allow considerable insight but such information needs to be continually updated and summarized for modern audiences. It is important to distinguish species that really deserve a focussed effort at recovery, from species that tend to recover by themselves. The most deserving plants are those that have declined much since settlement and that remain uncommon or absent even if habitat is restored (due to slow dispersal, growth or reproduction). Even some widely scattered species that are somewhat 'conservative', like cane, roughleaf dogwood and bur oak, deserve to be propagated and replanted at most sites for restoration. Such species should be included in nurseries designed to support restoration, but are not listed here as specific targets for recovery.

Some alien species should also be targeted—but for reduction! The most obvious of these are invasive plants in the woods: especially bush-honeysuckle, winter-creeper and garlic-mustard. But it is important first to consider how 'macromanagement' of habitats can reduce the invasion by these plants. For example, intense browsing during fall can probably increase the proportion of native plants, which are mostly dormant or less prone to be eaten during that season. And mass-plantings of more competitive (yet often conservative) natives can also reduce the invasion. Another special problem is the advent of alien pests and pathogens on some common trees (elms, walnuts, ashes). Prevention is generally impossible, and resistant trees should be selected or bred. An alien disease has also attacked most bat species, and there may no useful human response.

Following are examples of globally or regionally imperiled plants that should be targeted for recovery, with propagation in most cases.

Stream corridors and riparian zones: indigo (*Baptisia australis*) may have disappeared from the wild; others include aquatics (*Vallisneria americana*, *Ranunculus longirostris*) but waterfowl do disperse them.

Moist woods on rocky slopes, Braun's rockcress (*Boechera perstellata*); on mossy seeps, water-stitchwort (*Stellaria fontinalis*).

Medium dry woods, especially along trails: the newly discovered Kentucky clover (*Trifolium kentuckiense*); others include *Physaria globosa*, *Perideridia americana* and *Veronicastrum virginicum*.

Dry cedar woods, trails & glades: gromwell has virtually disappeared (*Onosmodium hispidissimum*); others include *Calamintha glabella, Viola egglestonii*, *Malvastrum hispidum*, and, including adjacent Eden Shale Hills, *Spiranthes magnicamporum, Solidago shortii*.

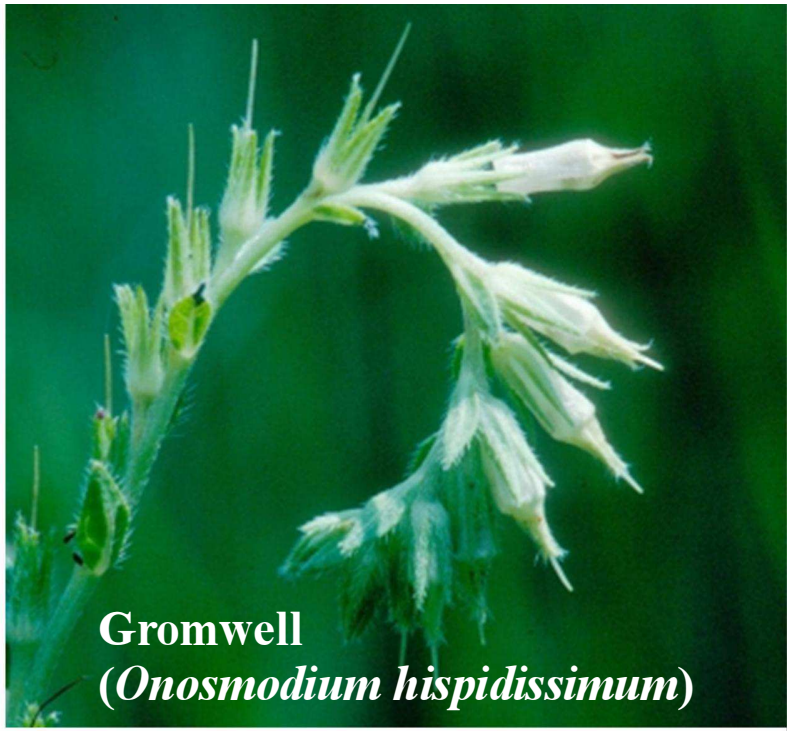
Some species on rocky points along the Palisades are also very rare, but they are much less imperiled due to stable habitats (*Phlox bifida*, *Trillium nivale, Cerastium velutinum*—the latter along trails).

Submesic woods, trails, canebrakes and glades on deeper soils: running buffalo clover is one of the most interesting species (*Trifolium stoloniferum*); others include *Dryopteris carthusiana, Galearis spectabilis, Camassia scilloides, Lilium michiganense, Floerkea proserpinacoides, Juglans cinerea*, *Nabalus crepidineus*; on poorer soils, *Gentiana alba, Orbexilum onobrychis*.

Wetlands of varied type, especially transitions to marshes and fens: the southern ladies' tresses occurs at only one site, here at the edge of its range (*Spiranthes odorata*); others include *Caltha palustris, Anemone canadensis, Lysimachia hybrida*, *Carex vesicaria*.

Two groups of animal species clearly deserve active recovery:
A. Aquatic species: especially imperiled mussels and fishes. Fish & Wildlife agencies are already much involved in this work.
B. Larger mammals: small herds of bison and elk should eventually be established at sites like Griffith Woods; there would be significant expenses in fencing and management, but great value for research. The mountain lion and gray wolf may eventually make their way back into wilder parts of Kentucky without help.

Species that used to depend on seasonal grazing or similar disturbances, but which now largely depend upon the helping hand of mankind.




Mouth of
Jessamine Creek
at Kentucky River