

**The unrealized potential of
Griffith Woods (Harrison
County, Kentucky) to
become a center for
understanding native
Bluegrass Woodland**

Julian Campbell, Feb 2017

Provisional Summary for Initial Draft. During 2003, The Nature Conservancy acquired the 745-acre Silver Lake Farm in southern Harrison County, Kentucky, for protection, restoration and expansion of its ancient woodland remnants, known as Griffith Woods. This site provides our best opportunity to restore native vegetation on uplands of the central Bluegrass. However, the Conservancy's attempt to form a partnership here with the University of Kentucky and Kentucky State Nature Preserves Commission failed, and the property was transferred to the Kentucky Department of Fish and Wildlife Resources in 2011. Moreover, a clear plan for management of the site, in accord with the project's original purpose, has still not been produced. This paper reviews the reasons for institutional difficulties and focuses on central questions that need to be addressed.

Although the highly degraded modern landscape on uplands of this region is well-documented, our understanding of the original vegetation has been hampered by lack of attention to the historical record. That 'Bluegrass Woodland' represented an extreme along the gradient from low to high fertility in eastern North America, with a preponderance of 'eutrophiles': sugar maples, buckeyes, ashes, elms, hackberries, walnuts, selected hickories (bitternut, shellbark, shagbark), selected oaks (especially bur, chinquapin, shumard), cherry, coffeetree and the locusts. Most professional management for conservation biology, forestry and wildlife in Kentucky has been developed from experiences on poorer, drier or wetter soils in less fragmented vegetation on hills or lowlands, with quite different composition.

The original Bluegrass Woodland had much influence from herbivores, including large mammals before reduction by human hunting. There appear to have been ‘licks’ or ‘glades’ maintained by animals or humans, where bur oak was concentrated. Cane was probably extensive along regularly travelled routes. But there is no evidence of regular fire or extensive openings with warm-season grasses. Most woodland has rapid litter-decomposition and low flammability.

Assuming that we are interested in all original habitats, from deeper woods to more open areas, it was agreed in 2003 that a central subject for research at Griffith Woods should be differences in responses of the vegetation to browsing, burning and mowing. These three types of disturbance could all be useful, but we currently have little understanding of their relative value for Bluegrass Woodland. Optimal seasons for disturbances remain largely untested. Despite initial preparation for browsing experiments using grants from USDA, a collaborative framework has not yet been established among potential partners. Grant applications would be improved through more dialog among interested participants, more basis in ecological concepts, and more application to regional problems. For example, there is common interest in better ranking of plant species along disturbance gradients, especially with potential selective effects of native ungulates and livestock. Moreover, it is important to determine what schemes for potential economic uses of the woodland—from deer-hunting to cattle-raising—are most compatible with recovery of native biological diversity and with reduction of alien species.

Given its mixed areas of woods and associated fields, Griffith Woods should be a center for practicing sustainable restoration across the region. While appropriate ‘macro-management’ of whole habitats can be beneficial, there is also a need for ‘micro-management’ of rarer natives for recovery and of selected aliens for reduction. Although we have well-established direct methods of alien reduction, there has been no demonstration of how to fund such reduction through sustainable income from the land. And, although we know which native species are priorities for recovery, there has been little effective promotion of these species on site by the institutions involved. For example, the abandoned ‘Toyota Trail’ through the best part of Griffith Woods should be broadened to allow growth of running buffalo clover.

It would be useful for interested people to review results from the initial plantings of varied species, to discuss how such efforts could be extended in various ways, and to seek consensus in how local labor and good micro-management can be best integrated into the economy of the farm.

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Materials to be assembled, reviewed and summarized for this paper are as follows. This is a general goal, and it may take several phases to become really thorough. I anticipate a growing series of appendices and updates.

To be developed or appended.

Selected correspondence and emails among initial partners or potential partners.

Initial plans and proposals for the whole project, and for management or research at the site.

An attempt to document the flora and vegetation of the site based on the author's research.

A recent report by the author on effects of deer browsing in the 'collection field.'

Completed reports from work at the site by other authors, especially research in theses and any published papers.

Broader review of the literature on ecology and conservation of eutrophic woodland of varied types across east-central states.

Mapped patterns in historical vegetation and remnants (e.g. clusters of bur oaks) across the region, with potential relationships to animal trails and native human campsites or settlements.

Mapped patterns in wildfire occurrence across the region in relation to soil type.

Any recent updates on the status of planning at the site from KDFWR, TNC or others.

Any relevant material from Kentucky Heritage Land Conservation Fund that pertains to their involvement with the site (given their funding of the University's portion of the farm).

Any relevant material from Ky. State Nature Preserves—which aims to classify the “natural communities” and make suggestions for management to selected partners.

LANDSCAPE LEVEL

What does GW represent?
What connections to be made?
(ecoregional team-building)

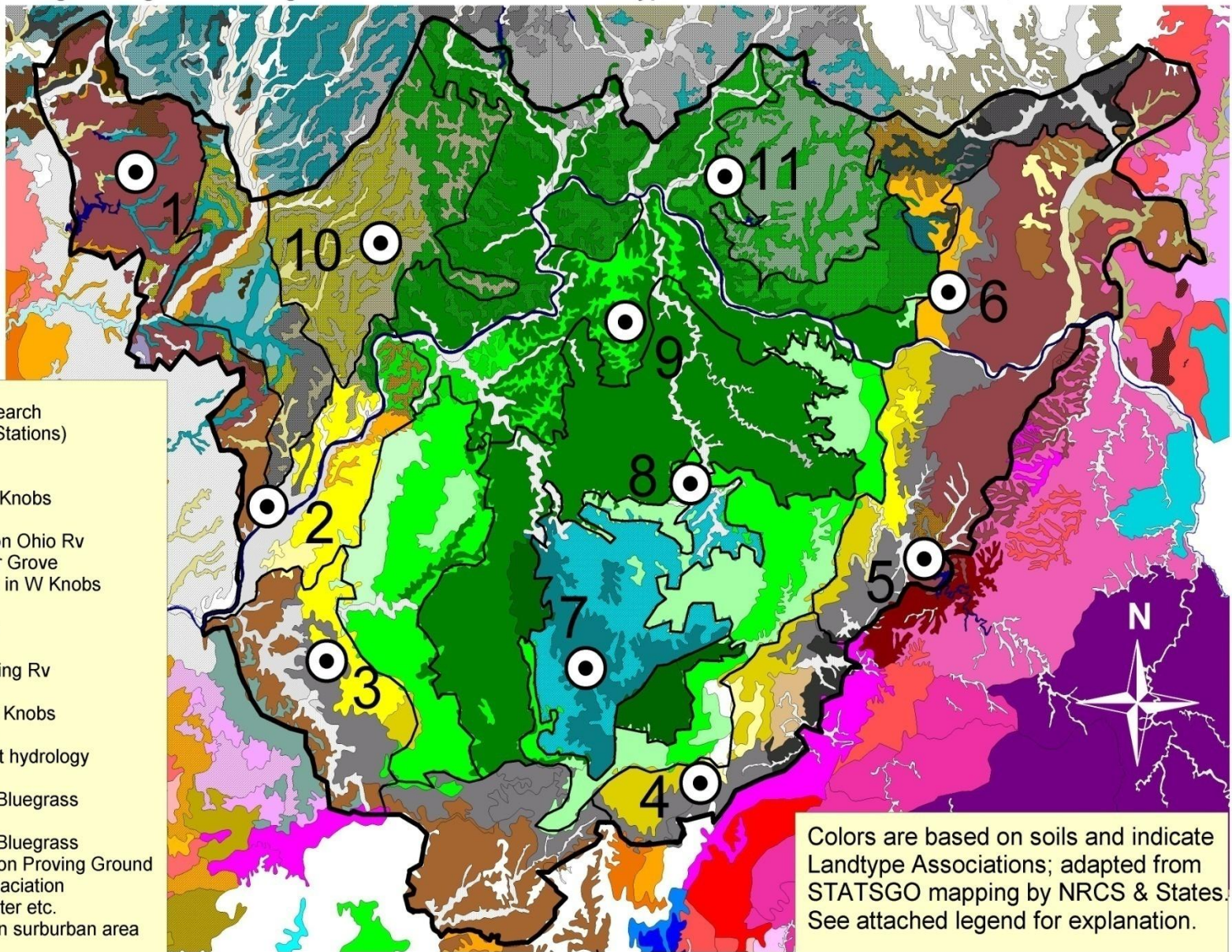
Central Ohio Valley Ecological Region: showing Subsections overlaid on Landtype Associations. Scale is 1:2,500,000 at 11 x 17 inches

Thick black line indicates approx. boundary of this tristate region, which forms a third of the whole Interior Low Plateaus.

Its corners are in Brown Co. IN
Casey Co. KY
and Ross Co. OH

Potential Centers for Research
(some already with Field Stations)

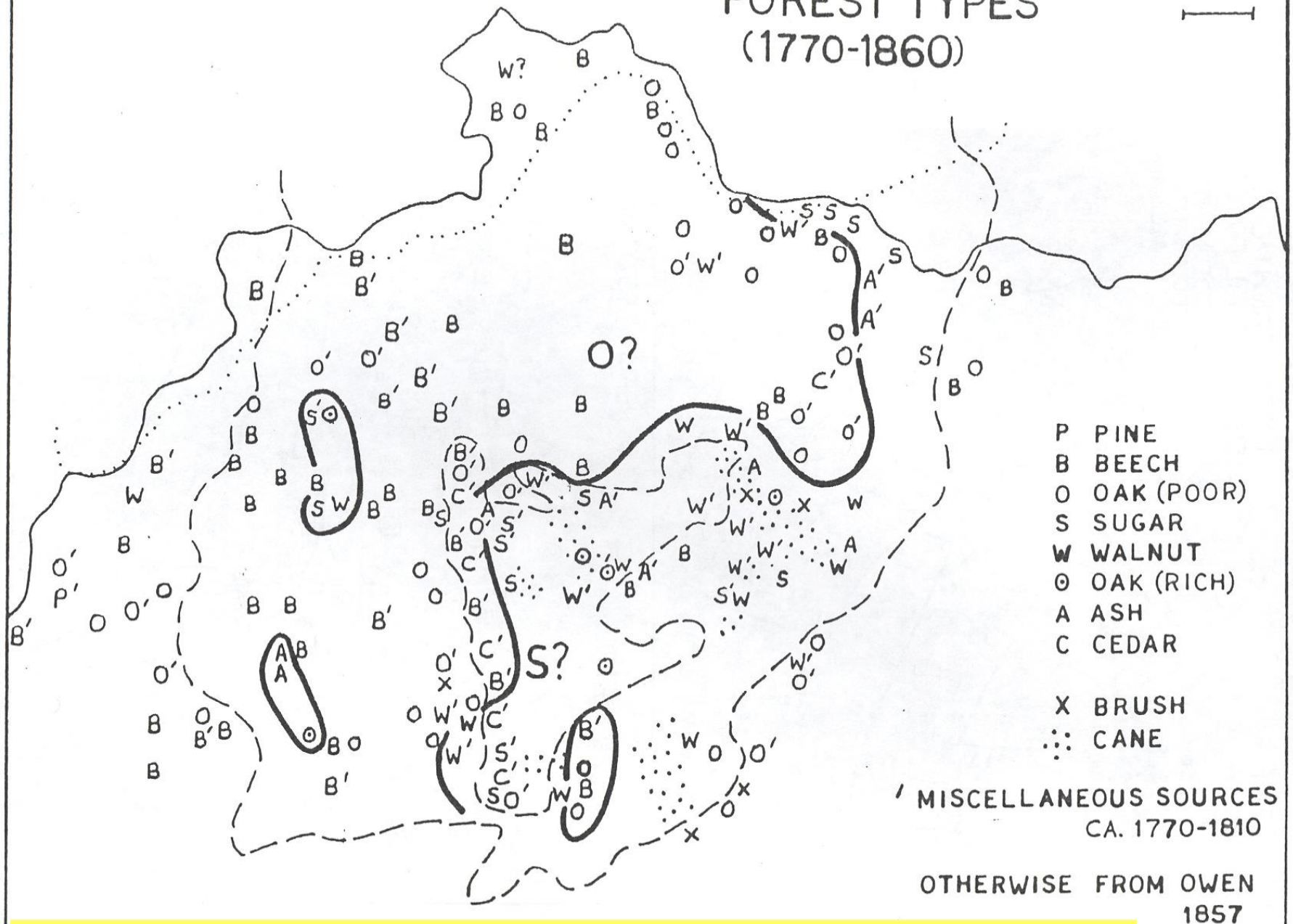
1. Brown County Forest
large forest block in W Knobs
2. Falls of Ohio
central urban location on Ohio Rv
3. Bernheim Forest-Cedar Grove
forest block and glades in W Knobs
4. Maywoods
forest block in S Knobs
5. Cave Run area
central location on Licking Rv
6. Edge of Appalachia
forest/prairie block in E Knobs
7. Palisades/Shakertown
limestone ravines; karst hydrology
8. Griffith Woods
ancient woodland in C Bluegrass
9. Lloyd Woods
ancient woodland in N Bluegrass
10. Big Oak NWR/Jefferson Proving Ground
flatwoods on Illinoian glaciation
11. Cincinnati Nature Center etc.
woods & field stations in suburban area



Colors are based on soils and indicate Landtype Associations; adapted from STATSGO mapping by NRCS & States. See attached legend for explanation.

Most effective regional scale for planning, action & assessment?

FOREST TYPES (1770-1860)



Eutrophic extreme was locally concentrated; also c IL

— BUFFALO TRAIL

— MAJOR ROAD

○ STAMPING GROUND

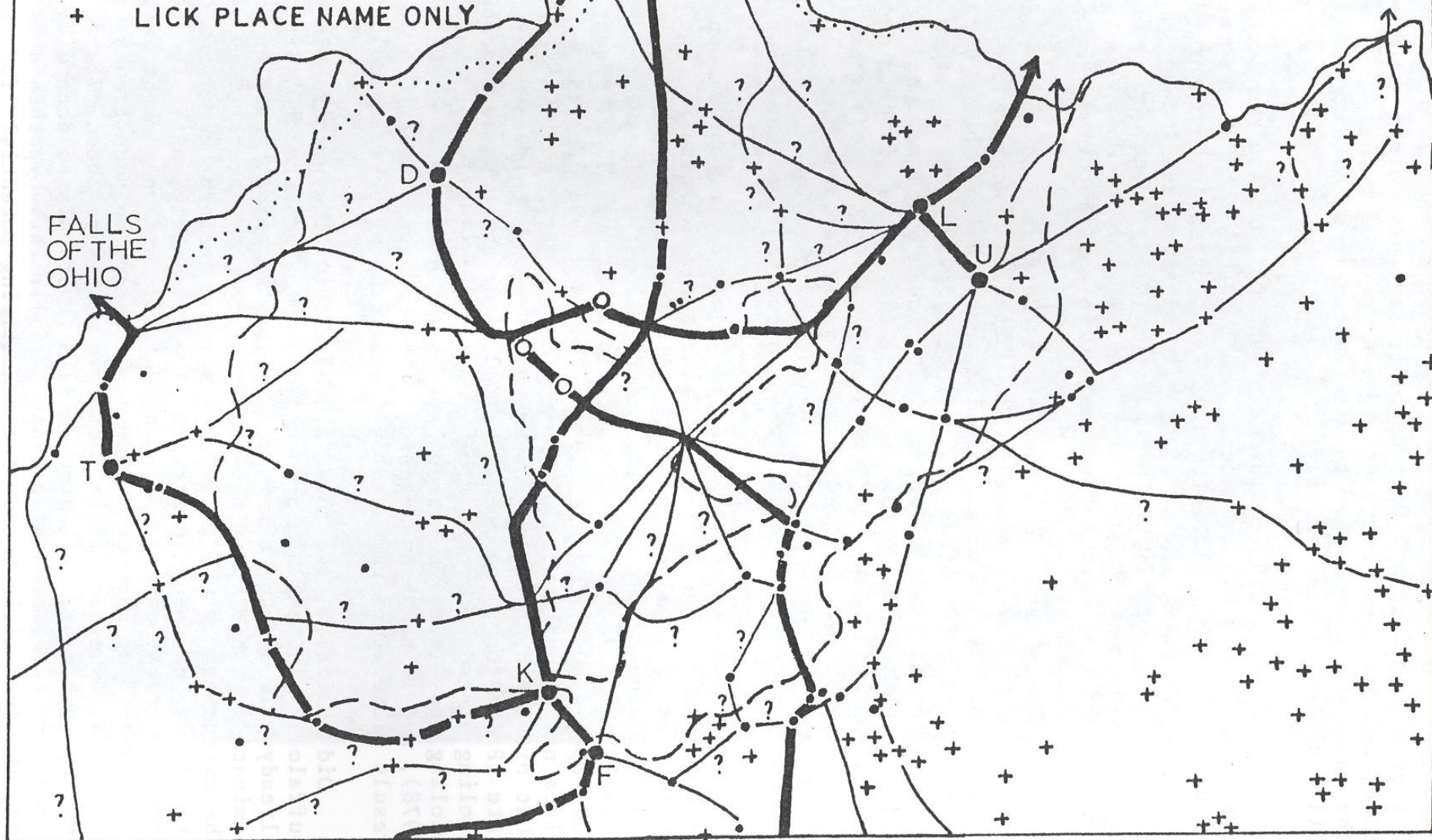
● LARGE LICK

• OTHER DOCUMENTED LICK

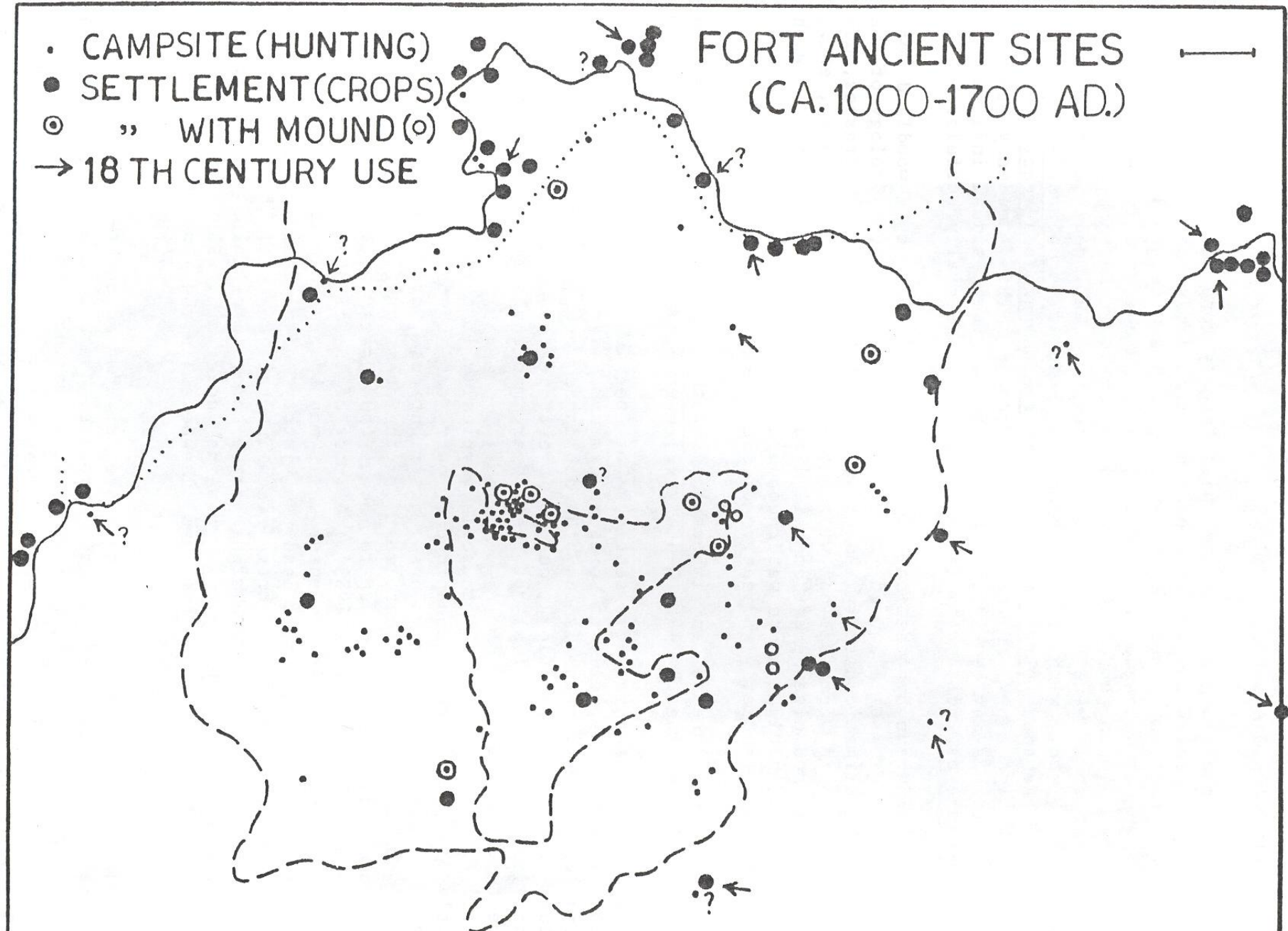
+ LICK PLACE NAME ONLY

TRAILS AND LICKS

B BIG BONE LICK U UPPER BLUE LICKS
D DRENNON'S LICK L LOWER " "
T BULLITT'S LICK K NOB LICK
F FLAT LICK

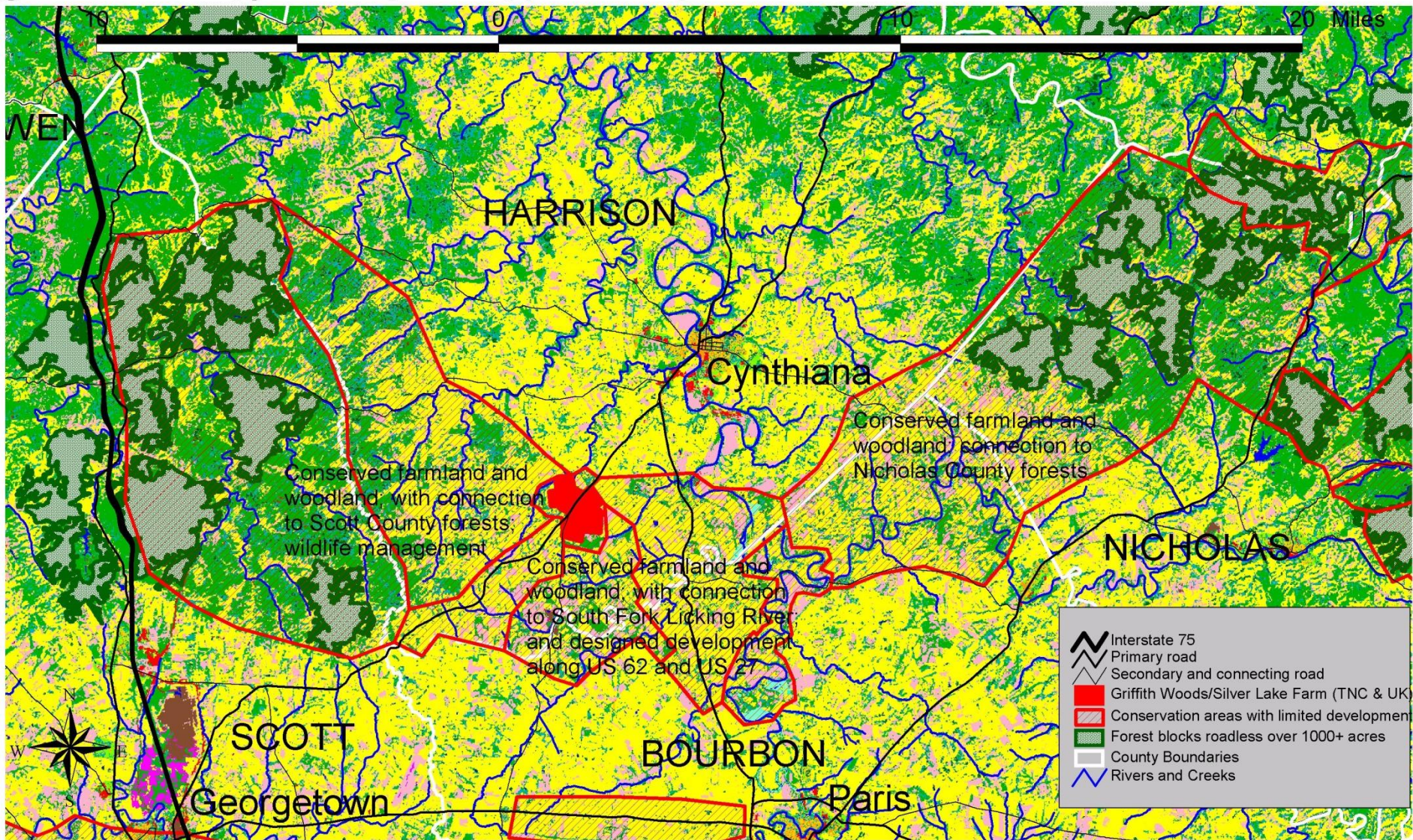


Much more historical evidence of browsing than burning effects—vs. consumption & decomposition!



Were clusters of bur oaks (Davidson 1950) located at villages?

South Harrison County Rural Conservation Vision
green = woods; yellow = pasture; pink = crops



Local plan could be developed to link landscape from W to E.



7500 feet

Julian
Campbell
Feb 2017

The unrealized
potential of
Griffith Woods
(Harrison County,
Kentucky) to
become a center
for understanding
native Bluegrass
Woodland

Google earth

Imagery Date: 9/12/2010

38°19'43.02" N 84°21'18.40" W elev 891 ft

Eye alt 14279 ft

HABITAT LEVEL

Original conditions?
Methods for restoration?
(vegetation science)

GRADIENT IN DRYNESS AND DISTURBANCE	pH-RELATED GRADIENT (A: strongly acid to E: circumneutal)				
	A	B	C	D	E
xeric or seral (to subxeric)	PINES, HEATHS and transitions with sassafras, persimmon		Varied mixes esp. post oak blackjack o.	RED CEDAR, LOCUSTS CHERRIES, PLUMS diverse hawthorns, briars	
subxeric or seral (to submesic)	OAK- CHESTNUT (former)	OAK-HICKORY: esp. white oak, black oak, s. red oak; pignut, mockernut, shagbark; local red maple, blackgum			OAK-ASH+ chink. oak bur oak+
mesic (to submesic or subxeric)	HEMLOCK BIRCHES +	BEECH, SUGAR MAPLE TULIP, BUCKEYES, BASSWOODS and drier transitions with n. red oak			BLACK MAPLE bitternut+
riparian (to mesic)	absent or rare	RIVER BIRCH, SYCAMORE shrubby willows		BOX ELDER, SILVER MAPLE, SYCAMORE local willow, cottonwood	
subhydric	absent or rare	SWEETGUM, SWAMP RED MAPLE, ALDER		GREEN ASH, WHITE ELM taller willows	

Major gradients on KY uplands (no textbook covers this)



Our best opportunity in prime Bluegrass farmland
to restore 500-1000 acres of native vegetation
maintained by quasi-natural processes!

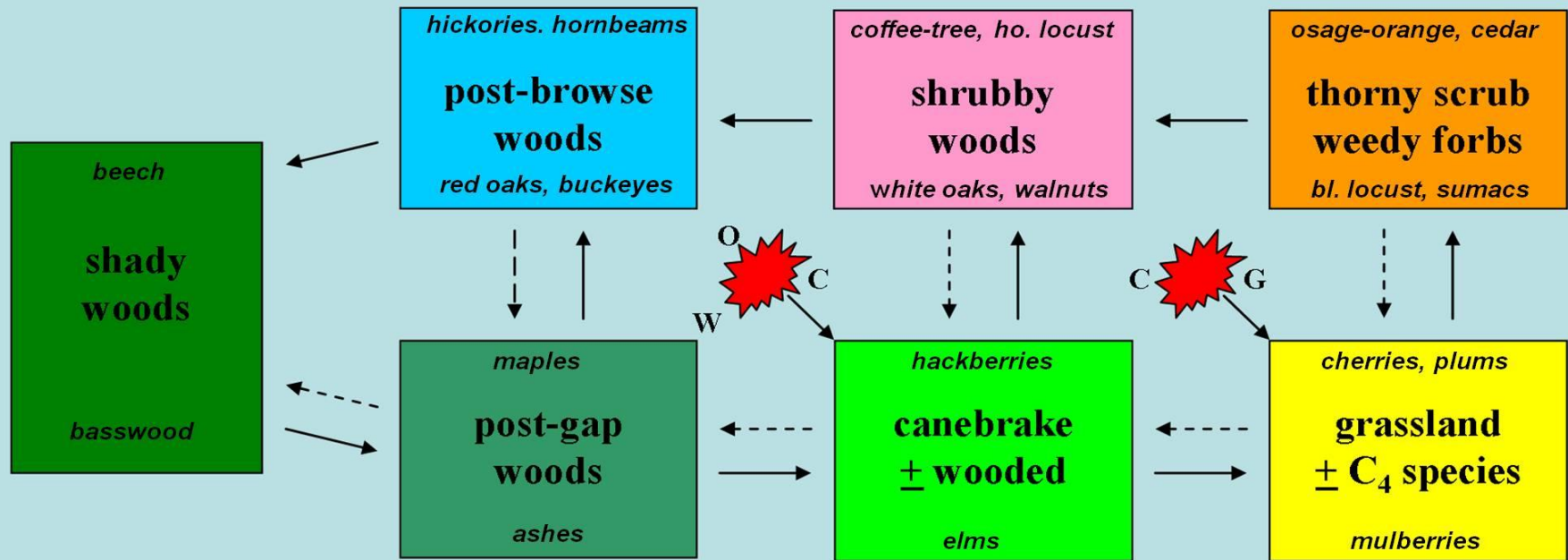
Best remnants at Griffith Woods, recovering in shade on east side



Amazing small glade at Griffith Woods maintained by herbivores?



Woodland development after intense browsing/grazing, with resistant species



Tree canopy decline due to wind/ice, dry/wet episodes, pests/pathogens, fire, cutting; plus increases in forage for ungulates/other herbivores; formerly elephants/mammoths. Potential fuel types are: W = woody debris; O = oak litter; C = old cane; G = old grass.

DIAGRAM OF ECOLOGICAL CONCEPT FOR DYNAMIC VARIATION IN WOODLAND OF THE CENTRAL BLUEGRASS (ASSUMING UNIFORM EUTROPHIC SOIL)

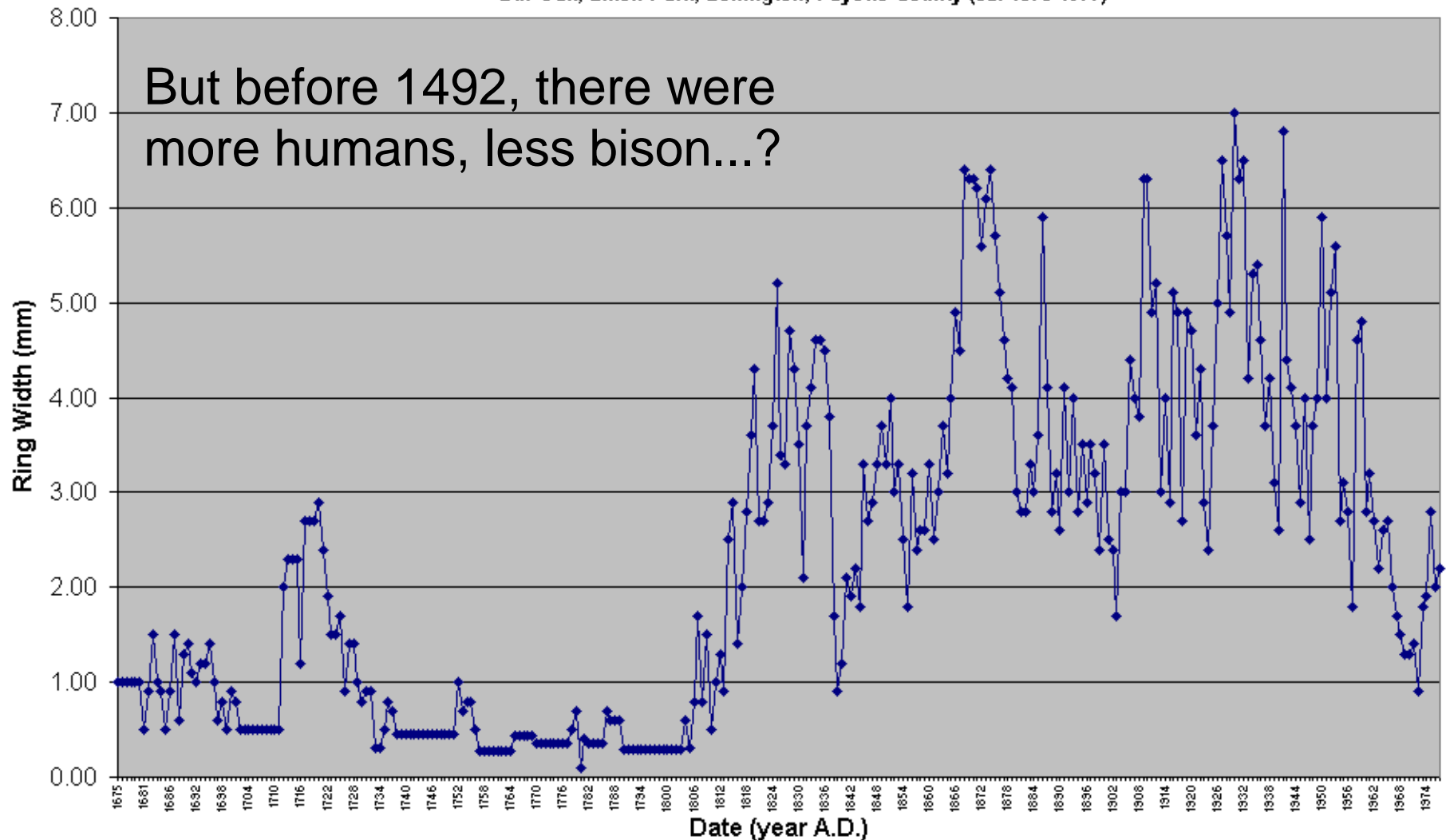
<woodland of 1770s was little opened but much browsed>



Did you ever
want to make
love to a tree?

Bur Oak, Ekton Park, Lexington, Fayette County (ca. 1675-1977)

But before 1492, there were
more humans, less bison...?



Myth of “savanna” came from woodland-pastures of Virginians;
see also dendrochronology of McEwan & McArthy (2008)

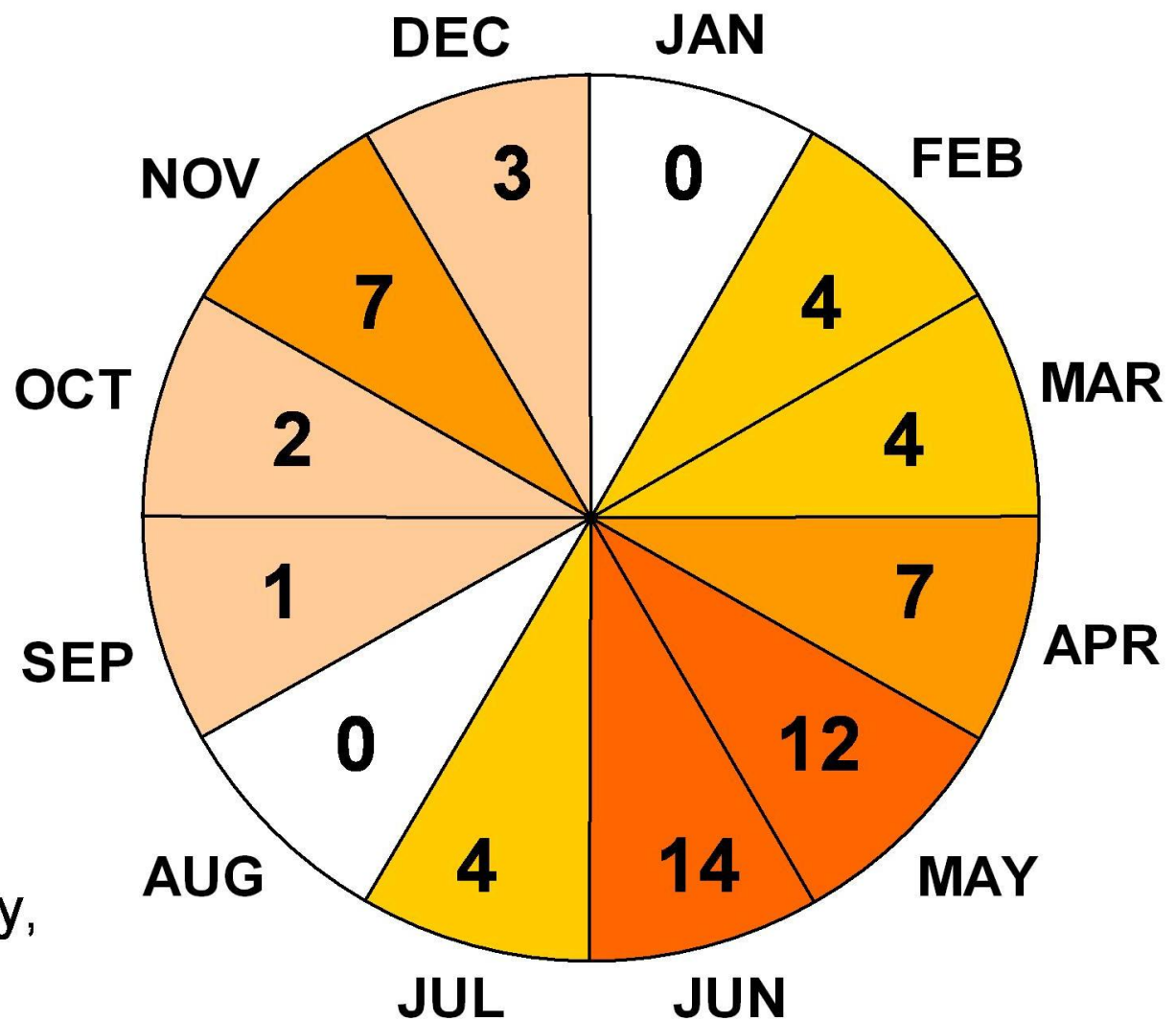


Although a managed herd of bison and elk is not likely to be possible for many years, the concept needs to be kept alive.

Monthly numbers of recorded buffalo sightings in the central Ohio Valley during 1750-86, as reported in all available accounts.

Darker red indicates clustering of records.

The largest herds were reported during Apr-May, with 100-1000+.

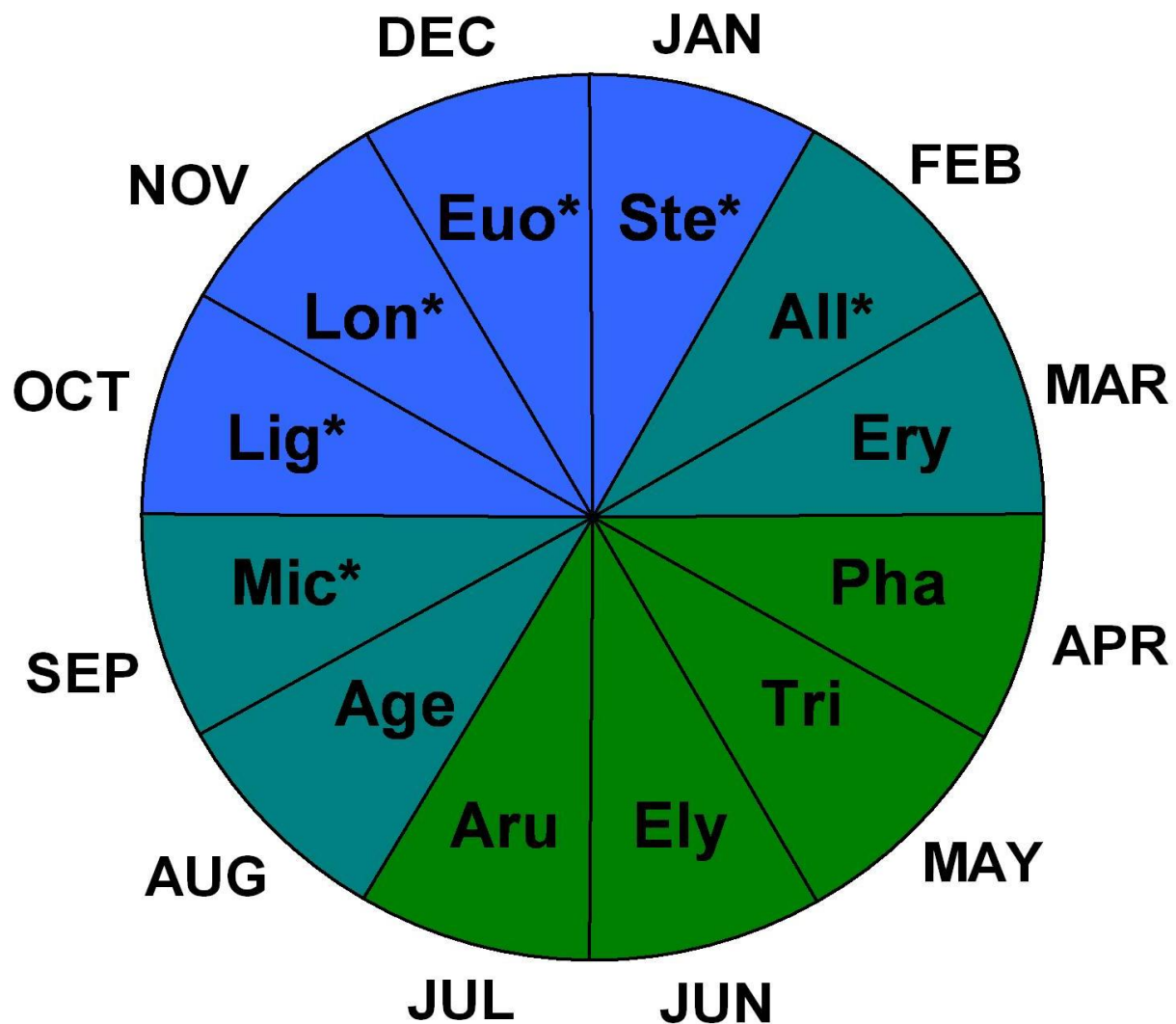


Can some return to original browsing-regime reduce weeds?
Most common aliens during Oct-Dec do provide good forage.

Green: season with most new growth of native forage plants in Bluegrass Woodland.

Blue: season with most exposure of alien plants* relative to native plants.

Cane (Aru) was the only abundant native forage persisting into Oct-Jan.



Abbreviations indicate typical natives and aliens (*) in each month:

Stellaria media (chickweed); **Alliaria** (garlic-mustard); **Erythronium** spp. (trout-lilies); **Phacelia purshii** (Miami mist);

Trifolium spp. (buffalo clovers); **Elymus** spp. (wild ryes); **Arundinaria** (river cane); **Ageratina** (snakeroot);

Microstegium (Japanese grass); **Ligustrum** spp. (privets); **Lonicera** spp. (honeysuckles); **Euonymus** spp. (winter-creeper etc.).

Seasonal browsing may be much more important than burning.

From chip to biochar to goat-forage, there are several potential uses for bush honeysuckles (and some other alien plants).

While probably not leading to much profit, such uses should be explored as the basis for sustainable management of more natural areas in this region.

[photo: Susan Miller, Clark County]



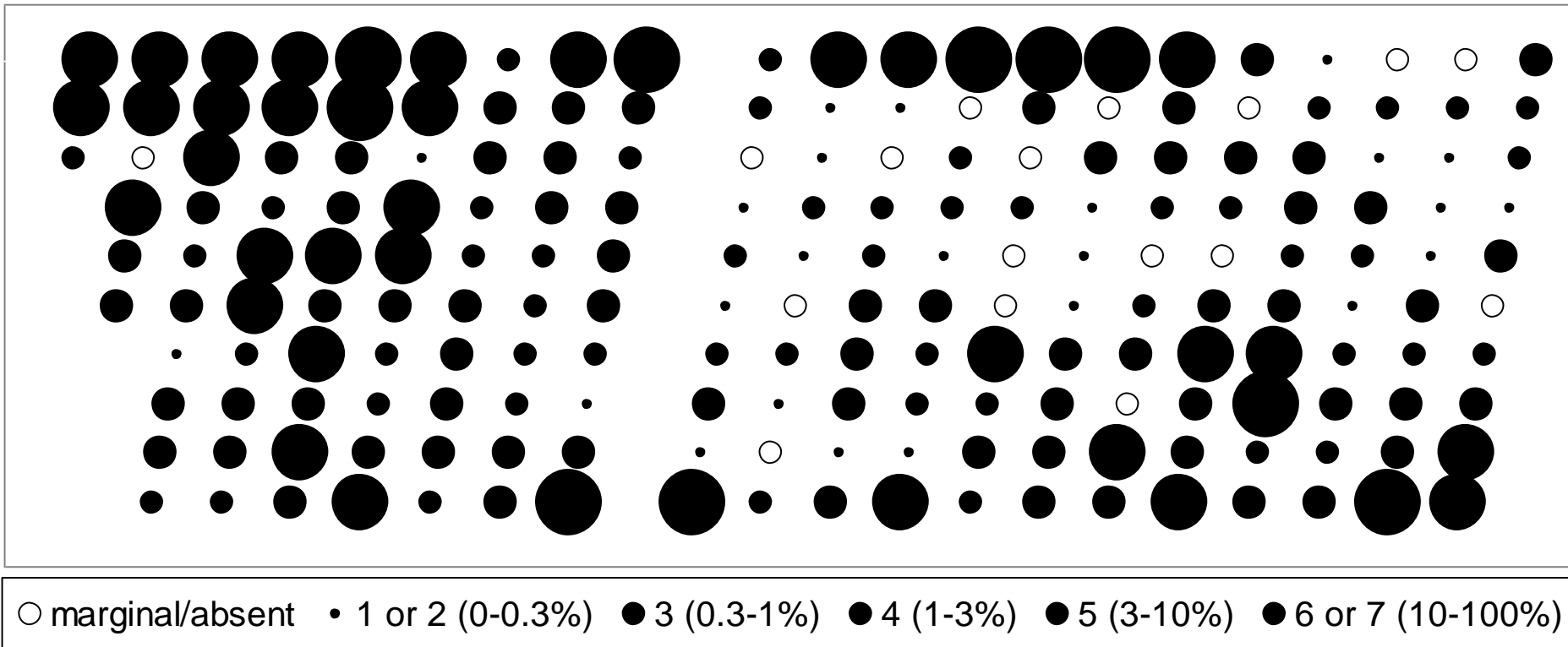


American Mastodon, a species of spruce woodlands and cool temperate lowlands that fed a lot on woody plants (including bark and fruit), rather than mostly grass as in the mammoths. Once common in the Bluegrass region, it survived on Earth until 4000-5000 years ago. [Painting by Charles R. Knight]



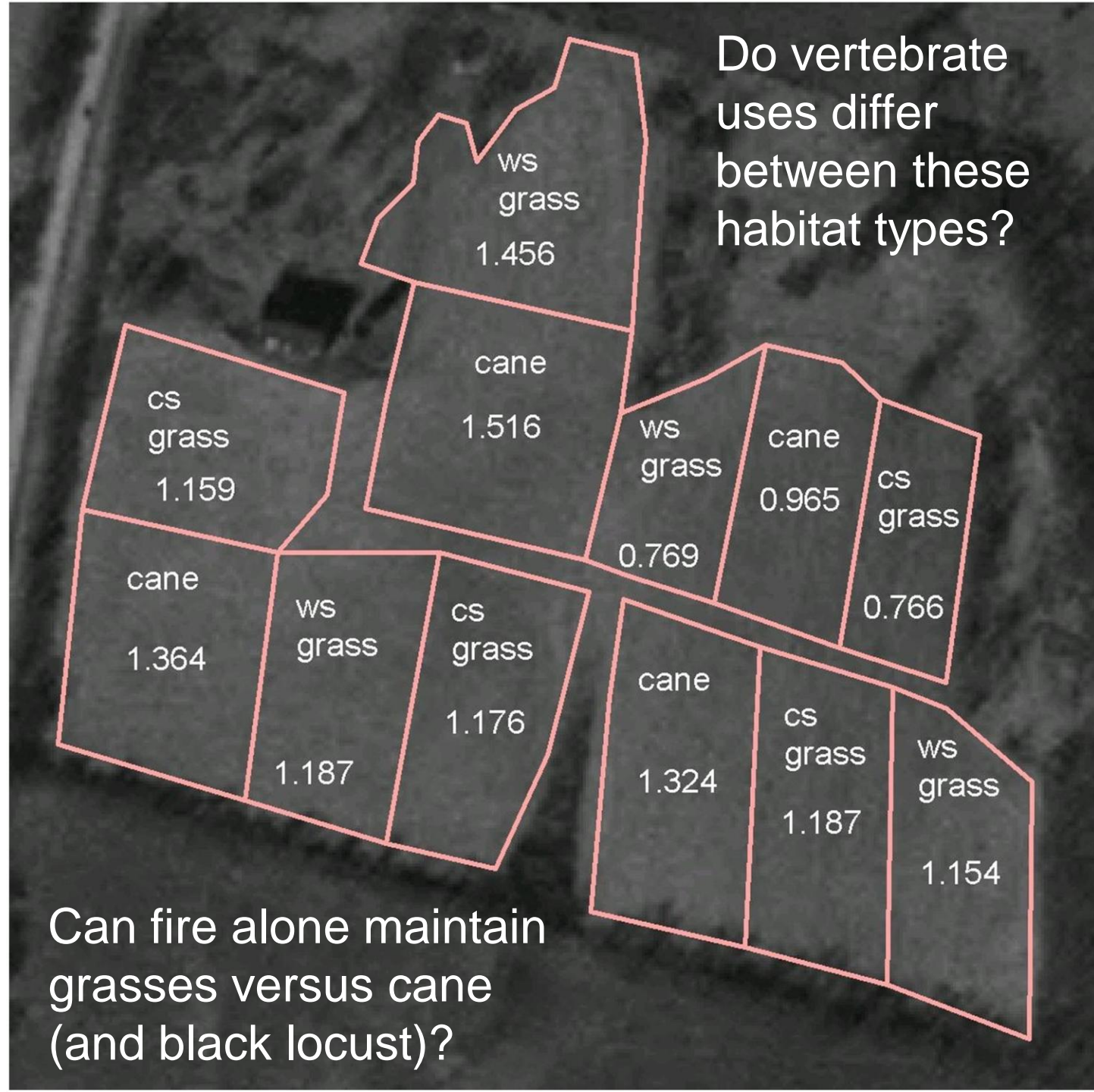
The “Collection Field”. This project has included detailed mapping of a 20 acre hay-field that was last cropped in 2003. The rectangular field is between a busy two-lane highway and a woodland remnant with ancient trees up to 200-350 years old.

Abundance of browsing-tolerant forbs (log-scale % cover); most common species include blackberry, coralberry, hemlock, horsenettle, ironweed, parsnip and carrot



Herbivory's potential role in shaping spatial patterns of woodlands across eastern North America remains an elusive topic in ecological research...

Russell Cave Road field at Griffith Woods: USDA funded cane and warm-season grass plantings; part of an experiment to compare effects of initial cover on woody invasion, wildlife, soils, etc.

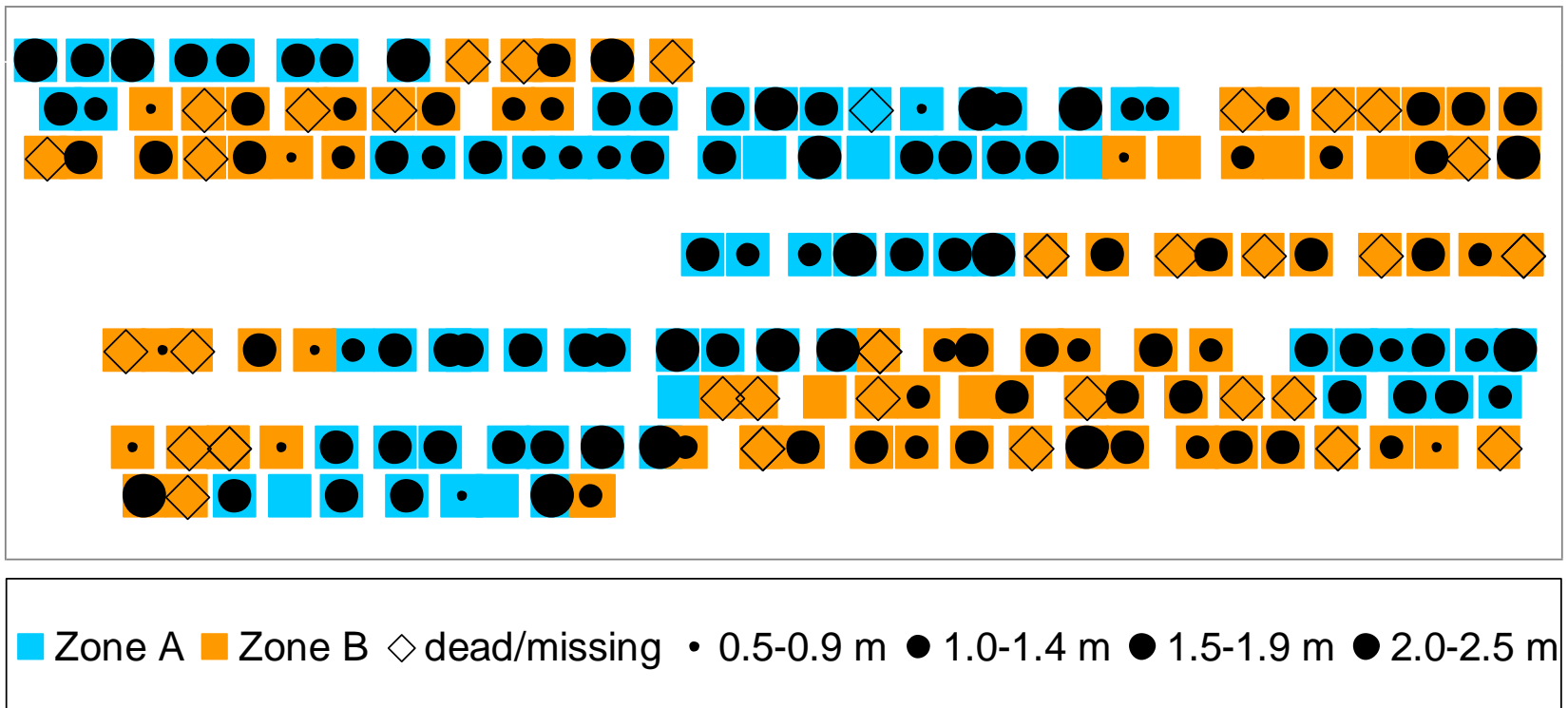


SPECIES LEVEL

Which are most deserving?
Initial trials & experiments?
(at least inventory & monitoring)

Blue-ash: height in Sep 2007 of saplings planted in Feb-Mar 2004.

Zone A (versus B) outlines concentrations of taller survivors and lower mortality.



In addition, a few hundred seedlings or saplings of three native woody species were planted in transects across the field during 2004-2005, so that their fate could be observed. Blue ash had unexplained pattern—NPK?



**Left: white mulberry mistakenly planted
in UK experiment instead of native red,
but much browsed by deer and rabbits**



Rough-
leaved
dogwood



Red plum
blossom



Prairie
rose



Red plum
fruit

Several native small trees and shrubs should be planted in blocks at Griffith Woods so that their ecological effects can be studied, especially potential reduction of invasion by bush honeysuckle.



Garlic mustard and henbit: aliens

Cutleaf toothwort:
moderately conservative

White trout lily:
highly conservative



Running buffalo clover is an important plant to understand and recover in Bluegrass Woodlands. It was widely scattered across the Ohio Valley, especially along trails in submesic eutrophic woods, but now globally imperiled. Observed at GW in 1990s, then grown in nursery 2004-2008.



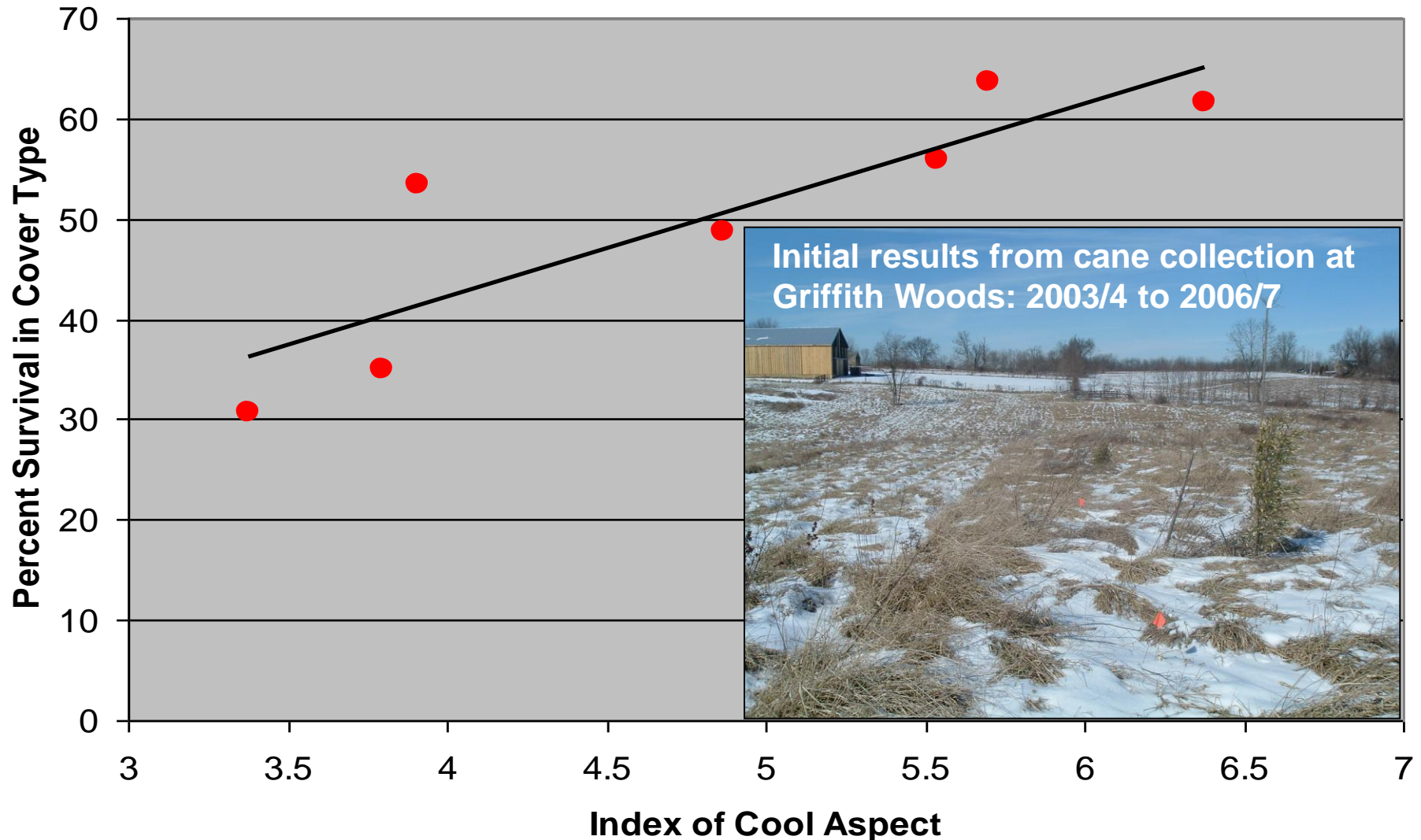
Golden Alexanders (*Zizia aurea*)
is one of the few conservative
plants typical of full sun
at Griffith Woods



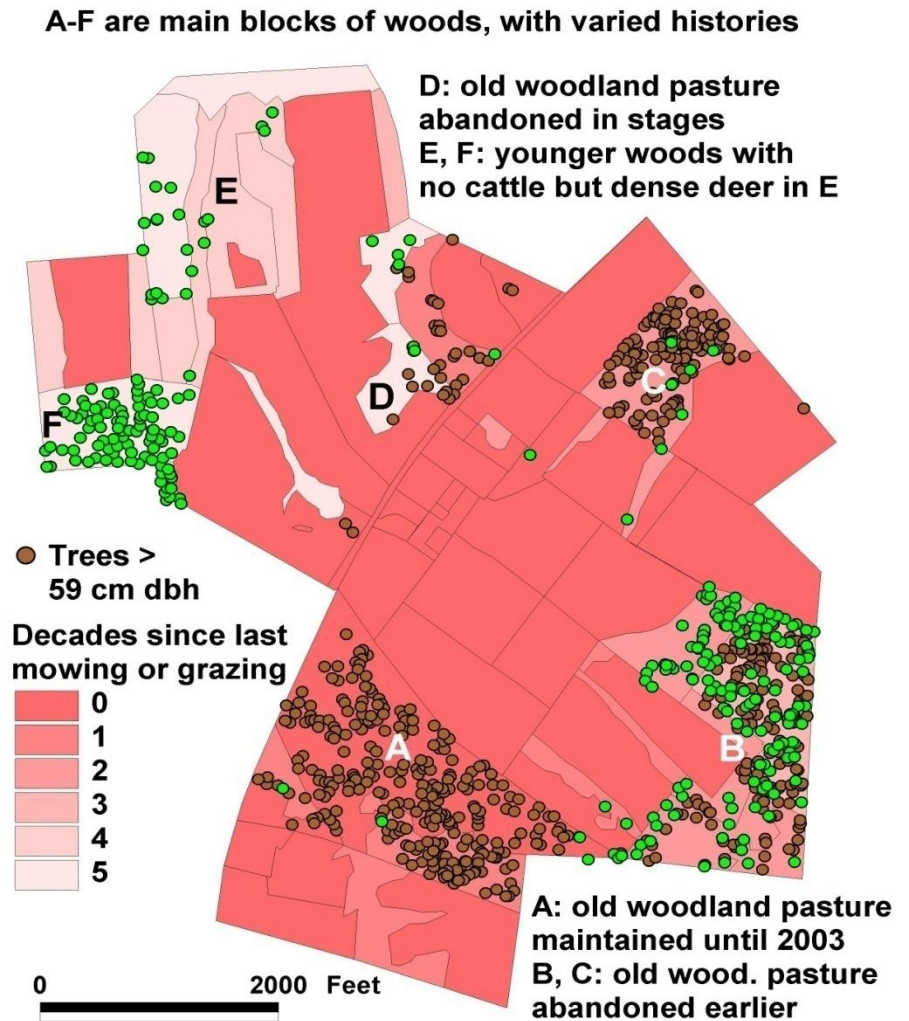


**Becky and Larry Oldham
(Roundstone Native Seed)**

**Survival of plantings in relation to cool aspect
(difference from 200 degrees x slope/90)
R squared = 0.747; P = 0.012 (2 tailed Pearson)**



Note: growth, instead, showed a weak positive relationship with drainage!



Maps of Griffith Woods (Harrison Co., Kentucky) showing locations of *Euonymus fortunei* and *Trifolium stoloniferum* in relation to management history. These data were assembled in 2003-2007, with assistance of Berry (2007). The old 'savanna' to south (A) was partly unmowed since 1986, leading to thickets of *Carya laciniosa/ovata* (which cattle do not eat) plus patches of the endangered clover.

ONE PAGE SUMMARY!

The Three Ts:

Teamwork, Targets, Tradeoffs

Targets (JJNC)	Conditions ; Goals	Primary Problems	Primary Solutions	Progress to 2009
1: 500-1000+ acres of potentially semi-natural vegetation*	fair ; good with this 745 acre farm plus neighbors long-term	lack commitment of partners; economic farm forces rule; neighbors?	develop community interest in target; sustainable uses/\$	no good economic plan: UK's cornmittee; TNC may backout
2: mesic (shady) Bluegrass woodland (maple- bitternut, etc.)	poor-fair ; fair-good (50-200+ acres with various definitions)	lack of deeper shade (maple etc.); lack of natives; weeds	enhance maple sites; recover natives; reduce weeds	no plantings; 20+ acres of weeds attacked (\$1000/acre)
3: submesic Bluegrass woodland (ash-elm, oak-hickory/walnut, buckeye)	poor-fair ; fair-good (200-400+ acres can be defined)	wrong disturbance regime; lack of natives; weeds; EAB	establish simple disturbance trials; rec. natives; reduce weeds	disturbance model advanced; no trials; 40+ ac. weeds attacked
4: open woods, thickets & fields (locusts, bur oak, cane, peavine, ?bluegrass)	poor ; fair-good (200-400+ acres can be defined)	wrong disturbance regime; lack of natives; weeds	establish simple disturbance trials; rec. natives; reduce weeds	no trials yet; small trial plantings but UK corn interfered in 2008
5: major species for recovery in mesic woods (ginger, ironwood, etc.)	poor ; fair-good (some present; others < 10 miles)	absence of starts; slow dispersal and spread in most species	develop native plant collection, nursery, demo/trial plantings	starting w/shade in nursery; plantings not yet in woods
6: plants for recovery in submesic woods (clover, pawpaw, etc.)	poor-fair ; good (some present; clover needs trails)	absence of starts; slow dispersal and spread in some species	develop native plant collection, nursery, demo/trial plantings	starting w/shade in nursery; clover trials small; little coop.
7: plants for recovery in open woods to fields (cane, rl-dogwood, etc.)	poor-fair ; good (most can be planted; some slow to start)	absence of starts; slow dispersal and spread in some species	develop native plant collection, nursery, demo/trial plantings	30+ acres of grid plantings made; coop. plans not clear
8: managed deer, elk & bison herd for experimental trials	poor ; fair (need basic research into dynamics)	management problems (fencing, hunting, health, etc.)	increase potential for small initial short-term trials	dream established among managers but methods unclear

* Griffith Woods is the best opportunity for restoration of woodland on uplands of central/southeast Bluegrass. But we need more review of basic historical and current data. And can the neighborhood be included in plans?

Targets (TNC-UK)	Condition ; Goal	Primary Problems	Primary Solutions	Progress to 2009
1: woodland-savanna-meadow landscape	poor ; fair (745 acre farm is best opportunity)	wrong disturbance regime; ?excess deer; many alien weeds	map veg. & soils research disturbance define seed-sources	some mapping done; coordination & implication unclear
2: mesic Bluegrass woodlands	poor-fair ; fair-good 50-200+ acres (with various definitions)	high edge/interior ratio; ?excess deer; many alien weeds	survey/research veg.; reduce weeds; develop nursery	some mapping done; 20+ acres of weeds attacked
3: open upland Bluegrass savanna	poor-fair ; fair-good? 200-400+ acres can be defined	wrong disturbance regime; ?excess deer; many alien weeds	survey/research veg.; reduce weeds; develop nursery	some mapping & dendrochronology done; 40+ acres of weeds attacked
4: running buffalo clover	poor (gone >2000) ; fair-good?	absence of seed; bad disturbance regime (with “herbivory”)	establish a population	small initial trials; coordination & implication unclear
5: cane understory	poor (gone >1950) ; fair-good?	absence of starts; wrong disturbance regime	plant appropriately	30+ acres of grid plantings made; plans not clear
6: research and research training*	poor-fair ; good?	lack of staffing & coordination, etc.	identify potential projects & proceed	10+ student projects done/under way; coordination & assessment unclear
7: outreach and education*	poor-fair ; good?	lack of staffing & implementation, etc.	develop facilities conduct activities invite professionals	occasional field trips for community, schools, colleges

* Inclusion of these programmatic goals as basic targets conflicts with the essential philosophy of conservation planning: to establish programs that support clearly defined targets, not vice versa.

TNC's plan was partly erroneous: eg browsing as “high stress”



END