



Beargrass in the Bluegrass

Beargrass in the Bluegrass: Rediscovery of Ecological Meaning for Wild Hyacinth (*Camassia scilloides*)

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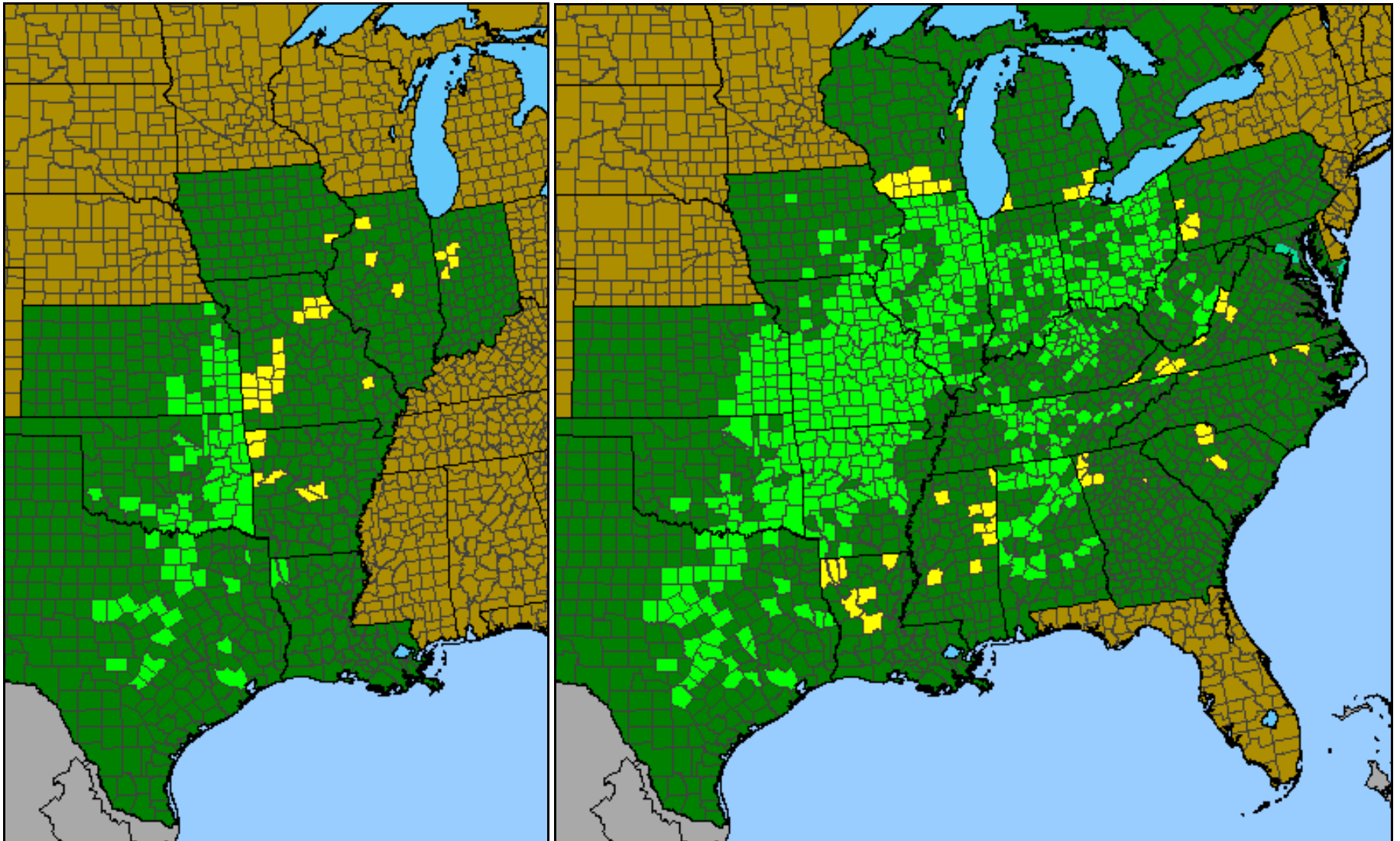
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Cover: plants at Firebrook subdivision
on Harrodsburg Road in Lexington
(Fayette County), 9 May 2015; here
surviving between remnants of de-
graded ancient woodland; and pro-
tected from mowing until seed was
collected by Vicki Holmberg.

Right: naturalizing plants in restored
riparian woods behind the author's
house, 23 Apr 2011; formerly all
mowed bluegrass and fescue in 1990.



The wild hyacinths of North America form the genus known as *Camassia*, a Latin name derived from that used by native people for these plants in northwestern regions—Camas or Quamash. There are six species, more or less, but with much variation in some of these. There is only one species in eastern states, *C. scilloides*. *Camassia angusta* is a more robust, later flowering relative that occurs from western Indiana to central Texas, mostly in grassland not woodland. These plants are all majestic geophytes, sending up 2-4 foot spikes of blue, violet, lavender or white flowers in mid to late spring, then going dormant from summer to early spring. They are currently classified in the family Asparagaceae, and allied with ‘agavoid’ plants (such as *Hosta*, *Agave* and *Yucca*), rather than ‘scilloid’ plants (such as *Hyacinthus*, *Ornithogalum* and *Scilla*). The latter group also includes the European bluebell (*Hyacinthoides non-scripta*), which resembles *C. scilloides* and has similar habitats—mostly in mid-temperate regions on moist fertile soils within ancient woodlands or meadows (where trees have probably been cleared). Both species are slow to spread by seed.

Before settlement, the eastern wild hyacinth was most common in midwestern states from southern Wisconsin to northern Arkansas. It remains locally abundant there, and from western Pennsylvania to central Alabama, but it is largely absent east of the Blue Ridge. The species appears to require soils with high base-status and overall fertility, which were hard to come by on the original mid-Atlantic landscape. But its complete absence from New York to eastern Virginia suggests that slow seed dispersal may also have been a factor restricting its range. One of its eastern clusters covers the Bluegrass region of northern Kentucky, southwestern Ohio and southeastern Indiana. The species remains widespread in this region, but it generally occurs only in remnants of woodlands that have never been cleared, or occasionally in meadows that have never been plowed (and then usually with scattered ancient trees in the neighborhood). It appears to be a ‘conservative’ species, virtually restricted to original populations.



County-based distribution of eastern wild hyacinth, *Camassia scilloides* (right) and its close relative in the Great Plains, *Camassia angusta* (left). Bright green = recorded but not rare in the state; yellow = recorded and a rare plant listed by the state government. Maps were produced by John Kartesz (23). Further west the genus reappears beyond the plains in Idaho & Montana.

Occurrence in the Bluegrass Region

Within the central Bluegrass (or ‘Greater Lexington’ area), eastern wild hyacinth remains locally abundant in deeper soils along the Kentucky River Palisades, but it has virtually disappeared from the uplands. Charles Short was the first botanist to make a full record from this region, in 1828 under an older name (45): “*Phalangium esculentum* Nuttall This is decidedly one of the most beautiful of our indigenous plants... The root, which is bulbous and situated deep in the ground, is eatable and nutritious—Frequent in moist meadows in certain localities, but generally disappearing upon culture—flowers from the 20th of April.” On uplands, the species survives mostly in old woodland-pastures, such as at the back of Griffith Woods in Harrison County (also small patches in ‘Julian Savanna’ near Frankfort). Within Lexington, it is known to survive at only two sites: the ‘Shady Lane Woods’ at the University’s Arboretum; and the ‘Firebrook Woods’ along Harrodsburg Road. A nice patch was destroyed after clearance and development of the ‘Patchen Woods’ off Richmond Road about 1980.

Within the northern Bluegrass (or ‘Greater Cincinnati’ area), it is still locally common in protected woodlands, especially near larger creeks and rivers, forming a dominant ground cover on some lower south- or west-facing slopes. A remarkable account of this region’s settlement by James McBride, within his 1869 history of Butler County, Ohio (27, 1:11), noted what must have been this species. During the winter of 1788-89: “Wild game was abundant, but the breadstuffs which they took with them were soon exhausted, and supplies of corn and salt were only to be obtained at a distance and in small quantities. Various roots of indigenous plants were used as articles of food. The women and children would go from Columbia to Turkey-bottom, one and a half miles above the mouth of the Little Miami to scratch up the bulbous roots of the bear-grass, which, when mashed, boiled and dried, were pounded into a kind of flour which served as a tolerable substitute for wheat and corn flour.”



**Bulbs of the western
Camassia quamash;
photo posted at
<http://arcadianabe.blogspot.com/2012/06/how-to-cook-camas.html>**

Within the western Bluegrass (or ‘Greater Louisville’ area), wild hyacinth remains locally abundant in better woods, including slopes along Beargrass Creek at Cherokee Park. However, the original significance of that site has been largely forgotten. Following old usage of the name “beargrass” in southwestern Ohio, as just noted, we can attribute the naming of Beargrass Creek to this species. The creek was at the center of Louisville’s initial ecology—an ecology that sadly has continued to decline until recent times. Its mouth was just upstream of the Falls-of-Ohio, where bison and other large animals had made their seasonal migrations for many millenia. The first surveys of land west of the Alleghenies (or Appalachians) occurred here in 1773, as recorded in the Survey Book for “Fincastle County” of Virginia (15). The escheated survey of 2000 acres for John Connolly was: “...on the south side of the Ohio River opposite to the Falls, Beginning at a Box Elder & Hickory on the River Bank & runnith thence down the River S 83 W 35 poles to the mouth of Bear Grass Creek...” In 1774, nearby surveys of John Floyd included two 1000 acre tracts on Middle or Sinking fork of Beargrass Creek with one corner “on a hillside near the creek by a Buffalo Ford”.

Until now, the origin of the name Beargrass Creek in Louisville has been mysterious. The first record of this creek was as “Rotten Cr. or Bear Grass C.” on Lewis Evans’ map of 1755 (8). There is no evidence that “beargrass” was a corruption of the French “La Barre Grosse Crique” for “The Big Bar Creek”, which has been suggested since the creek’s mouth is just above the Falls. Instead, Otto Rothert theorized in 1927 (44) that the name was based on the plant *Yucca filamentosa*, often known as beargrass, which he stated “was plentiful in the Virginia colonies”. However, there is no botanical evidence that *Yucca* is native to Kentucky. This author (JC) has previously suggested that Louisville’s beargrass was cane (*Arundinaria gigantea*), big bluestem (*Andropogon gerardii*), gama-grass (*Tripsacum dactyloides*) or some other tall grass; but he has now abandoned that notion.

Photos from Will Overbeck along
Lower Howards Creek in Clark Co.



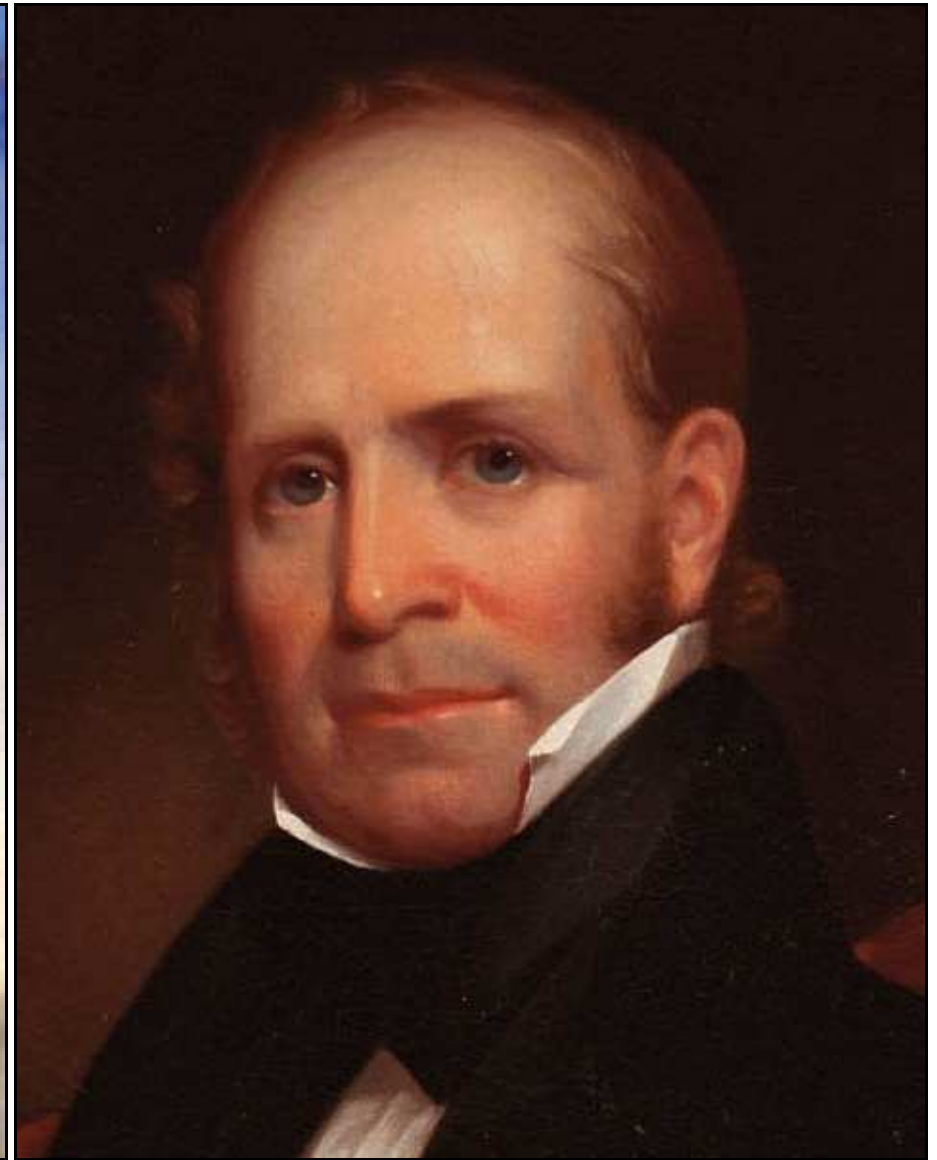
with *Synandra
hispidula*



Confusion of Names

During the 18th century, “beargrass” throughout the central Ohio Valley was probably *Camassia scilloides*, eaten by bears and humans alike. This common name does have a history of usage for eastern wild hyacinth (*C. scilloides*, *C. angusta*) as well as the western species (especially *C. quamash*). See, for example: C.S. Rafinesque’s “Manual of Medical Botany” in 1830 (41), William Miller’s 1884 “Dictionary of English Names of Plants” (31); and Britannica Concise Encyclopedia of 2008 (3). Yet the name “beargrass” has also been applied to several other plants, including *Yucca* and *Xerophyllum*, which are less edible or even toxic. Current usage of “beargrass” in eastern states generally refers to *Yucca filamentosa* (sensu lato), but that plant is native to drier woods, barrens and dunes in warmer regions, not in Ohio or Kentucky. Another eastern plant that may have been called “beargrass” is *Tradescantia subaspera*; David Cozzo unearthed this usage within his 2004 Ph.D., “Ethnobotanical Classification System and Medical Ethnobotany of the Eastern Band of the Cherokee” (6). But there are no records of *Tradescantia* plants being used for human food.

The earliest records of eastern wild hyacinth are somewhat obscure. During 1750-1800, explorers and pioneers from the Atlantic settlements would surely have encountered the species in western Pennsylvania, western Virginia, what became West Virginia, and what became Kentucky. If the name “beargrass” did apply to wild hyacinth, the first known written record may come from the journal of Dr. Thomas Walker in 1750 (54, p. 47-48). On April 12th at the banks of the Powell River in what is now Lee County, Virginia, he called this river “Beargrass” and noted: “Small Cedar Trees [*Juniperus virginiana* or perhaps *Thuja occidentalis*] are very plenty on the flat ground nigh the River, and some Barberry trees [presumably *Berberis canadensis*] on the East side of the River, on the Banks is some Bear-Grass.”



Left: Constantine Samuel Rafinesque (1783-1840): first botanist to reside in Ky., 1819-26.
Right: Charles Wilkins Short (1794-1863): first botanist to reside in Ky. for most of his life.
These men had radically different approaches to life in general—maverick versus steady.

In 1792, Gilbert Imlay (20, p. 233-235) listed “hyacinth” among “natural flowers” in the settled part of Kentucky, But he may have implied the cultivated *Hyacinthus orientalis*, since his list of plants muddles some horticultural species with natives. In 1880, William Renick (42, p. 45) noted: “Indeed, I have had it from the mouths of some of the earliest settlers themselves, that they knew of but two kinds of grasses that were natives of Kentucky, called respectively, the buffalo and the bear, both coarse and almost worthless, but would grow where cane would not.” It is doubtful that the writer had any idea of what species this was.

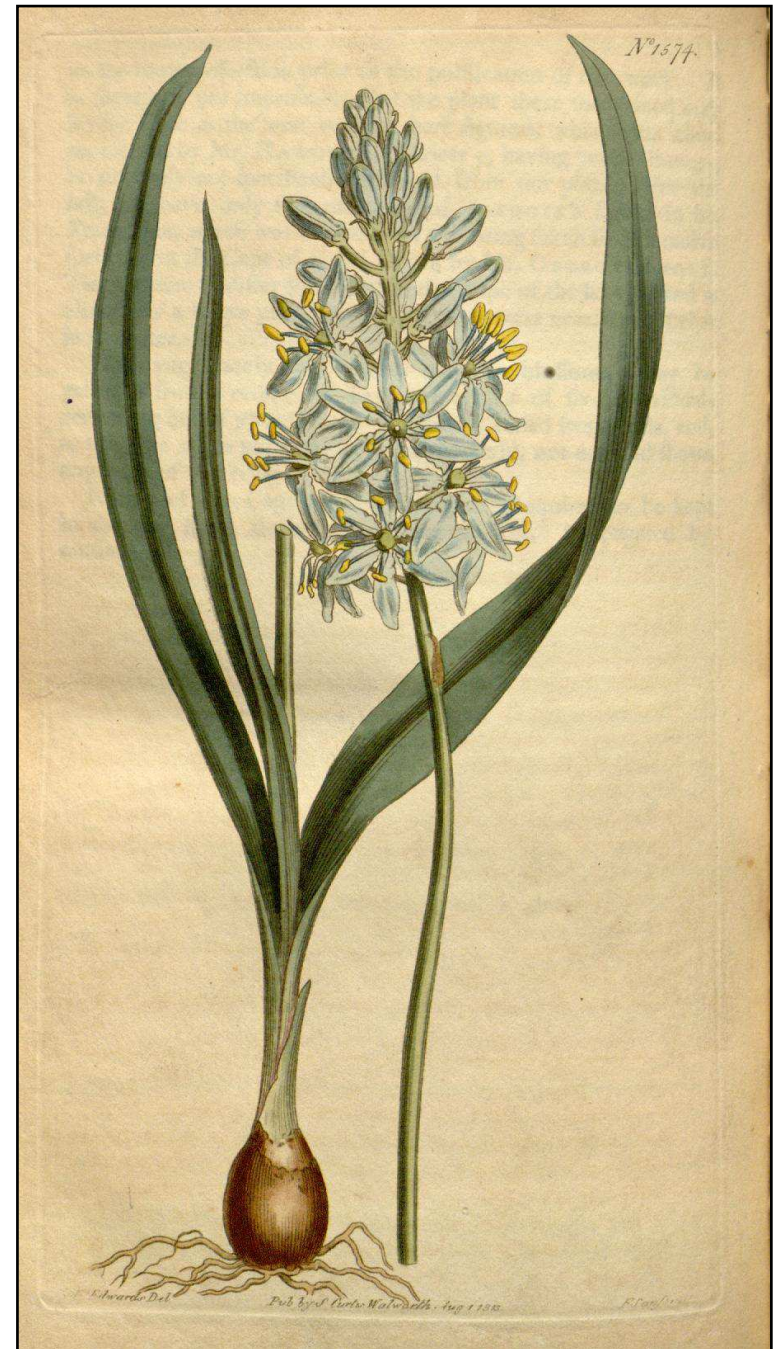
It is particularly odd that neither André Michaux (29) nor his son, Francois (30), mentioned anything like wild hyacinths during their explorations of 1785-1805. Both men travelled widely in the Ohio Valley. Much farther west, the Lewis & Clark expedition recorded the common western species during 1804-1806, but the eastern species had still not appeared in print. Curiously, there is continuing semantic confusion in some current interpretations of the Lewis & Clark journals (22), since they encountered both *Camassia* and *Xerophyllum*, which have both been called “beargrass”. *Xerophyllum* has species in western and eastern North America, like *Camassia*, but it is in a distinct family (Melanthiaceae), with more toxic chemistry; it tends to occur on more dry and infertile sites, with more history of fire. In *X. tenax*, its “bulbous rhizomes were roasted for several days before being eaten” (52).

The first scientific record of eastern wild hyacinth, under the name *Phalangium esculentum*, was not made until 1813 by J.B Ker-Gawler (24). His brief description was based on a plant grown in “John Fraser’s Nursery” at Sloane Square, Chelsea (on the west side of London). The plant had been imported by Thomas Nuttall, probably from near St. Louis, in what became Missouri. Details of this history were assembled by F.W. Gould in 1942 (14). The assignment to *Phalangium* was later abandoned by botanists, when that name became regarded as a synonym of the South American genus *Anthericum*.

Mr. FRASER'S plant, from which our drawing has been made, was of the same species as that he had in view; otherwise we should have doubted its being so, not perceiving the slightest irregularity in the corolla of several specimens we examined. We have not had an opportunity of seeing the figure in Mr. PURSH'S work, which is not yet published. The specific name of *Quamash* that gentleman makes use of, is the appellation given to the plant by certain Indians in the neighbourhood of the Missouri River, in whose country it is spontaneous, and where it serves them as a principal article of food during the winter. The specimens we saw, in our judgment, seemed to belong to *SCILLA* and not to *PHALANGIUM*.

A hardy plant. Blooms in May. Our drawing was made from a plant imported by Mr. NUTTALL, which flowered at Mr. FRASER'S Nursery, in Sloane-Square. G.

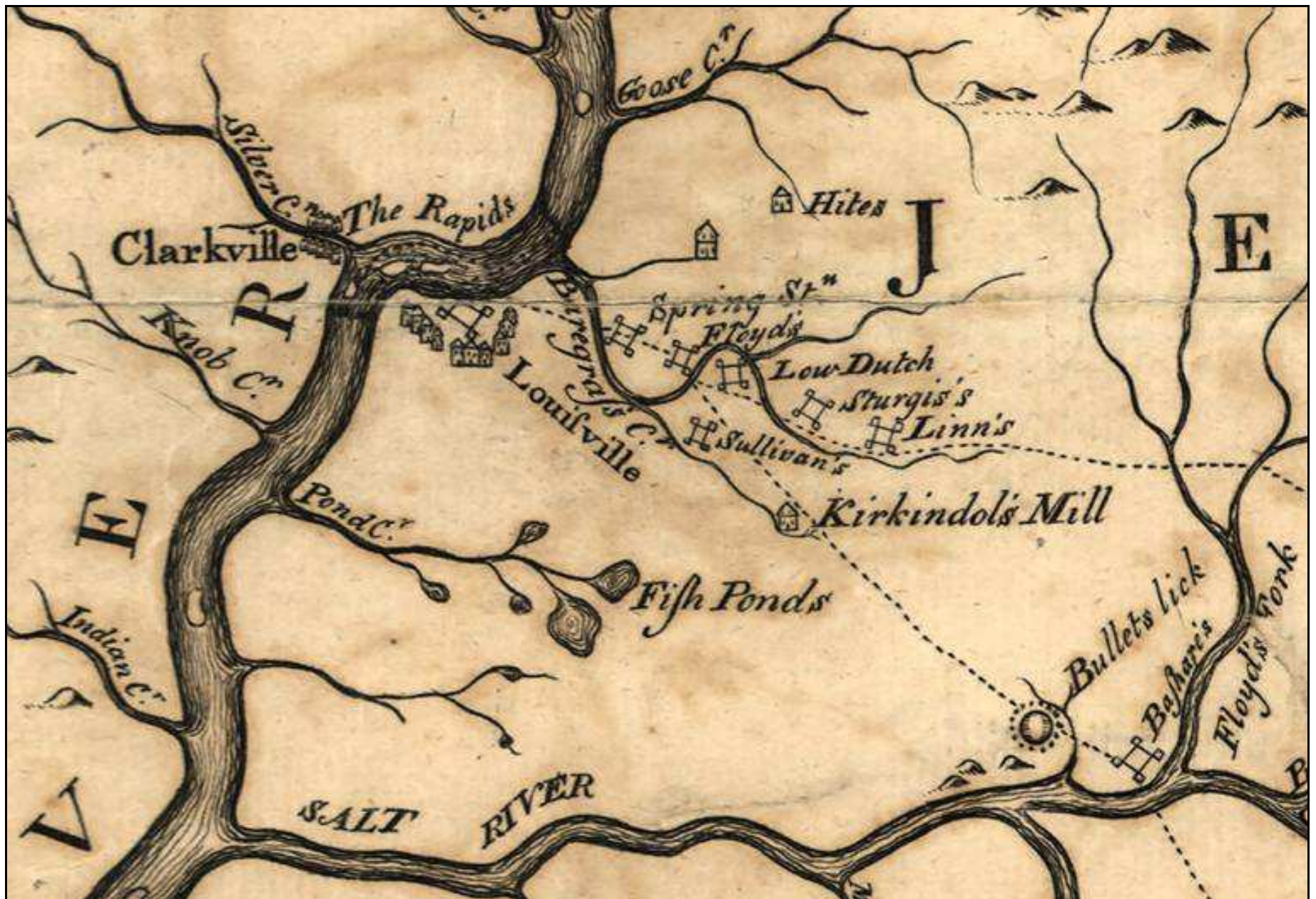
Above: text at end of initial scientific description for the eastern wild hyacinth, under the name "*Scilla esculenta*". The author was J.B. Ker-Gawler in Curtis's Botanical Magazine of 1813 (24). The type was a live plant apparently collected from near St. Louis by Thomas Nuttall, then cultivated in London [a quarter-mile from birth-place of this author, JC]. Also in 1813, F.T. Pursh (38) provided the first description of the common western species, under "*Phalangium quamash*", based on material of Meriwether Lewis from the Rocky Mountains. Right: illustration for Ker-Gawler (24).



In 1818, Thomas Nuttall and Constantine Rafinesque became the first North American botanists to record wild hyacinth within eastern states, but still neither of them separated the eastern species from the western. Nuttall stated (34, p. 219): “*Phalangium esculentum*... In the spring of the year 1810, I discovered this plant near the mouth of Huron River and Lake Erie, I have since found it abundantly in alluvial situations a few miles from St. Louisiana [before Missouri was established]... The distribution of this plant from east to west is over an extent of over 2000 miles, but from north to south not more than 300 miles, if so much.” Rafinesque stated (39, p. 265): *Phalangium quamash* or *Scilla esculenta*, appears to be neither *Scilla* nor *Phalangium*, it has been called *Quamasia esculenta* by Raf. in Fl. Missurica.” But his “Flora Missurica” was never published.

Later, in 1824, Rafinesque provided the first distinct name for our eastern species: *Quamasia scilloides* (40, p. 8). But then in 1828 (7), he published more notes that appeared to unite eastern and western species: “*Quamasia esculenta*, Raf. 1817 [sic]. Quamash, Bear grass, Wild Hyacinth. Wrongly united to *Scilla* and *Phalangium*. Kentucky to Oregon. Onion sweet, esculent, makes a fine bread tasting like Pumpkin bread. Used in poultice for inflamed breast”.

With continued confusion, at least 15 different Latin binomial names became published for the eastern species, as detailed by Gould (14). Not until the revised “Gray’s Manual of Botany”, written by M.L. Fernald in 1950 (10), did its scientific name become stabilized as *Camassia scilloides* (Raf.) Cory. Although Rafinesque’s 1824 “*Quamasia*” might appear to have been the first scientific name for the genus, it was overthrown in favor of Lindley’s 1832 “*Camassia*” by the International Botanical Congress in 1905 or 1930. Their documentation remains obscure, even in our Age of the Internet. We presume that they had good technical reasons, but Rafinesque had not helped himself by changing his own mind after 1824, with publication of at least two potential “substitutes” for *Quamasia*.

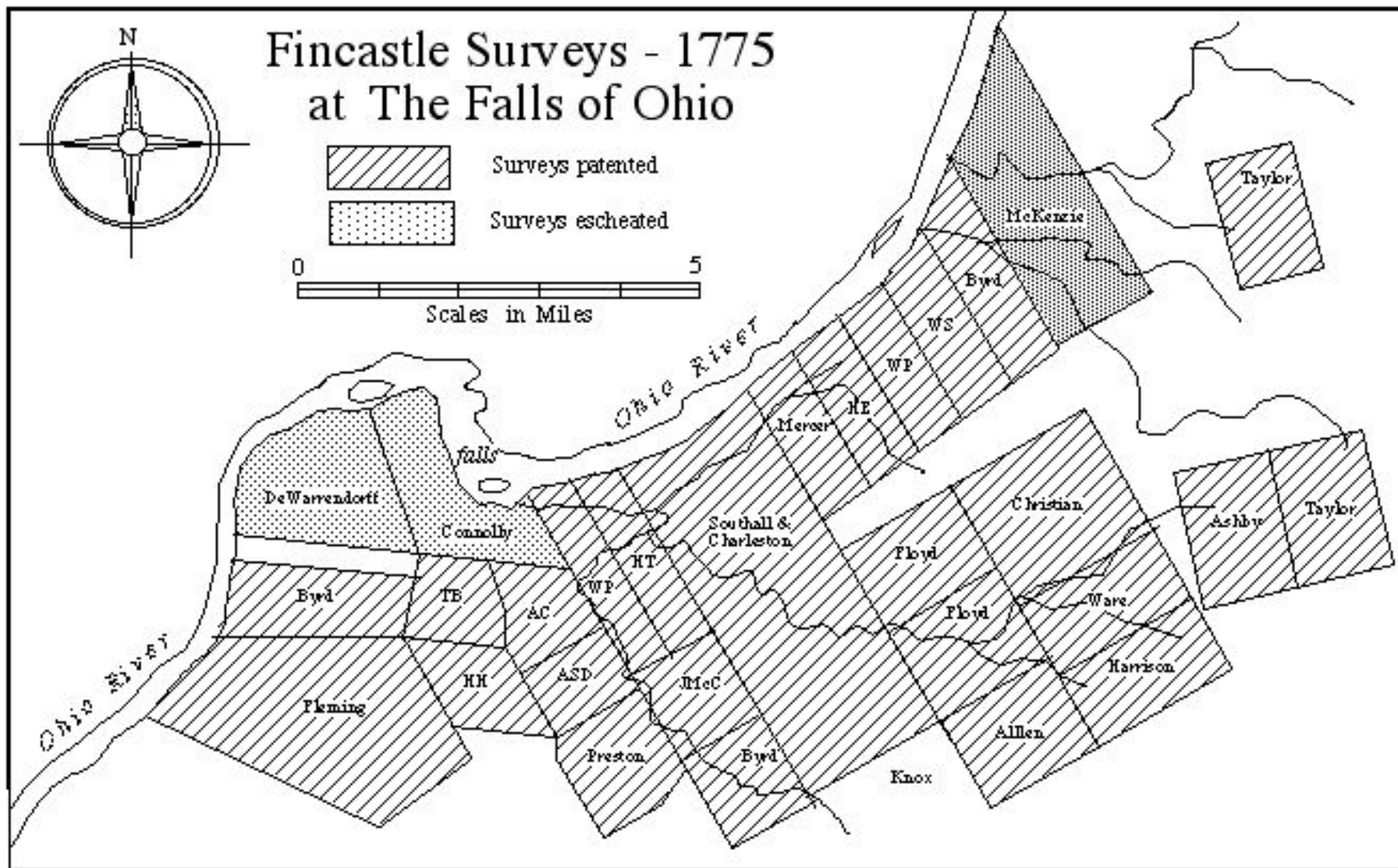


Close-up of Filson's 1784 "Map of Kentucke" (11) showing the early settlements around Louisville. Beargrass Creek drained much fertile land that was rapidly converted to farms.

Ecology of Eastern Wild Hyacinth

The typical habitat in Kentucky, Ohio and Indiana is ‘rich woods’ that are relatively undisturbed, but in some cases subject to seasonal browsing (or occasional burning). Best soils are deep and moist to damp but not poorly drained. It is often absent from shallow rocky soils, even in mesic protected ravines—perhaps because temperatures are too cool there for rapid growth in spring. Lucy Braun summarized for Kentucky in 1943 (2): “Steep hillsides, calcareous soil; usually in woods but persisting after clearing”; Dan Boone adds that it prefers warm south- or west-facing lower slopes in Ohio. The best remnants are usually on lower slopes or terraces, but there are enough patches on uplands to indicate a greater extent before settlement. In addition to agricultural conversion, it is likely that widespread foraging by pigs during the early decades of settlement led to great declines. These animals can dig deeply into loose rich soil in order to find food a foot deep or more. A different kind of geophyte that was also decimated by pigs is “peavine” or “hog-peanut” (*Amphicarpaea bracteata*).

Common trees growing with wild hyacinth are maples (black and sugar), basswood, buckeyes (stinking and sweet), elms (red and white), hackberry, ashes (blue and white), black walnut (and formerly white), hickories (especially white or bitternut), white oaks (bur and chinquapin), red oaks (northern red and shumard) and locally, tulip tree (but little or no beech). These kinds of woods can be described as ‘mesic’ to ‘submesic’—often transitional from deeper woods dominated by maples to more open or disturbed areas with more locust, cherry and brush. However, wild hyacinth sometimes appears to have an unusually wide or even bimodal distribution along the ecological gradient from deep shade to full sun. It may be most abundant in woods with moderate to deep summer shade, especially where later-leafing walnuts, ashes and oaks are mixed with maples, buckeyes and elms. But occasional plants thrive in full sun, presumably where trees have been cleared around them.



Map of land surveys in 1773-1775 at the Falls of Ohio, published by Neal Hammon in 1973 (25). The creek at center of map, flowing from east to west, is Beargrass Creek; see next page for composition of the woods that prevailed over the landscape before settlement..

Percentage composition of trees recorded at corners of earliest surveys in or near the watershed of Beargrass Creek, 1774-1775. This initial summary is based on surveys mapped by Hammon (25); see previous page. It is not yet complete, due to difficulties in locating some tracts. The total number of trees includes some duplicates or triplicates that were recorded for more than one tract. See text for discussion of habitats; beech was concentrated on higher ground.

Tree Recorded	Species Interpreted (ranks estimated within genera)	Percent
Beech	<i>Fagus grandifolia</i>	25.00
Sugar tree	<i>Acer saccharum</i> > <i>A. nigrum</i>	15.22
Ash	<i>Fraxinus americana</i> > <i>F. quadrangulata</i> > <i>F. pennsylvanica</i>	15.22
Linn or lyn	<i>Tilia americana</i> (sensu lato)	5.43
Buckeye	<i>Aesculus glabra</i> > <i>A. flava</i>	5.43
Elm	<i>Ulmus rubra</i> > <i>U. americana</i>	4.35
Walnut	<i>Juglans nigra</i> > <i>J. cinerea</i>	4.35
Sycamore	<i>Platanus occidentalis</i>	3.26
Mulberry	<i>Morus rubra</i>	3.26
White oak	<i>Quercus alba</i> > <i>Q. muhlenbergii</i> > <i>Q. macrocarpa</i>	3.26
Maple	<i>Acer saccharinum</i> > <i>A. rubrum</i>	3.26
Boxelder	<i>Acer negundo</i>	2.17
Honey locust	<i>Gleditsia triacanthos</i>	2.17
Hickory	<i>Carya cordiformis</i> > <i>C. laciniosa</i> > <i>C. ovata</i>	2.17
Hoopwood	<i>Celtis occidentalis</i> ?	2.17
Dogwood	<i>Cornus florida</i>	2.17
Poplar	<i>Liriodendron tulipifera</i>	1.09
Total	Total number of trees for the percentages	92

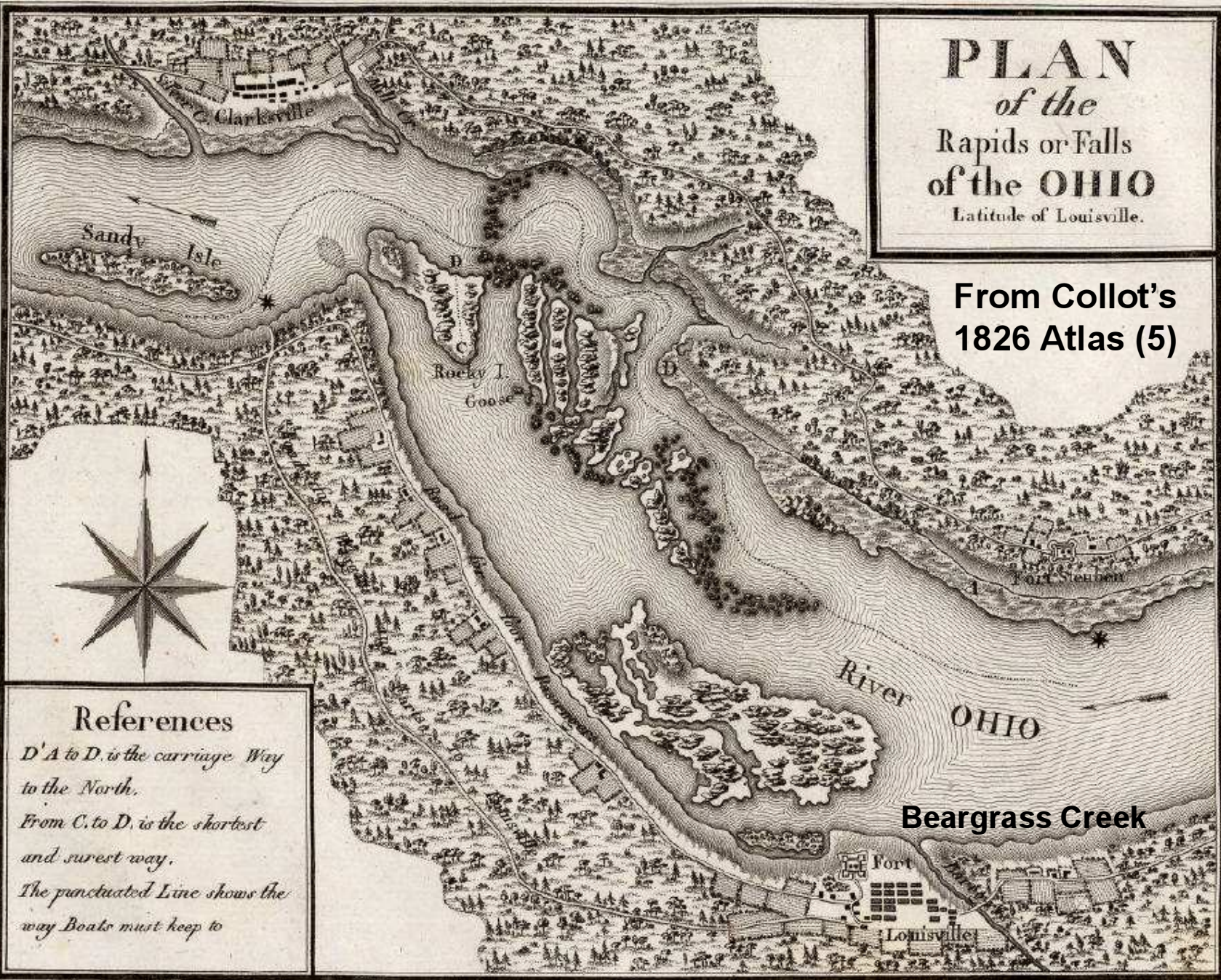
In the Beargrass Creek area, which became central Louisville, uplands were dominated by beech, especially on more deeply weathered soils (paleudalfs and fragiudalfs). Lower and more sloping land along the creek and its tributaries had more sugar maple, together with frequent ash, basswood, buckeye, elm and walnut (see map and table below). These maple-ash woods tended to be on more base-rich soils, with limestone exposed in places (hapludalfs). And based on clues from early surveys and accounts, these woods had probably experienced considerable disturbance from larger mammals, including beaver, deer, elk, buffalo (bison) and bear.

There is little definitive research on its seed germination but wild hyacinth in Kentucky may only establish within wooded habitats. There is no evidence of new seedlings appearing in open areas. Similar behavior is also suspected in mayapple, a more common woodland herb that often persists in pastures and roadsides where trees are removed. In another liliaceous species, bog asphodel (*Narthecium ossifragum*), R.J. Summerfield (49) found that plants can persist in mats of sphagnum completely unsuitable for germination, but with some rooting into mineral soil below. He used the term “biological inertia” to describe such situations. However, there are virtually no reports of wild hyacinths growing in native grassland across the Ohio Valley, unlike farther west. It does appear that plants in this region are not adapted to complete their life-cycles in grassland, although mature plants clearly can survive for many years if woods are cleared around them.

Direct responses of eastern wild hyacinth to browsing and burning remain poorly documented. Deer and elk have been reported to browse the western species sometimes. In 1939, W.C. Stevens (48) reported that a single fire greatly reduced a large population in Kansas, but apparently due to earlier growth in spring that led to damage from a late frost. A more recent study in Illinois found that spring burns had no great negative or positive effects on populations of *Camassia angusta* (13).

PLAN
of the
Rapids or Falls
of the OHIO
 Latitude of Louisville.

**From Collot's
 1826 Atlas (5)**



References

*D'A to D, is the carriage Way
 to the North.
 From C, to D, is the shortest
 and surest way.
 The punctuated Line shows the
 way Boats must keep to*

Gravé par Ferdinand Ulière

Edibility of Eastern Wild Hyacinth

Although eating of western wild hyacinths by some animals is well known, there is little information on the eastern species. In the common western species, *C. quamash*, bulbs contain inulin, hemicellulose, protein and sugar, in decreasing order, but traditional slow baking in buried pits with stones changes the indigestible inulin into fructose (1). In 1813, Pursh (38) summarized Lewis & Clark's notes: "the bulbs are carefully collected by them [the natives] and baked between hot stones, when they assume the appearance of baked pears, and are of an agreeable sweet taste. They form a great part of their winter stores. Though an agreeable food to Governor Lewis's party, they occasioned bowel complaints if eaten in any quantity."

Other than McBride's 1869 account, quoted above (27), there is little evidence of humans eating eastern wild hyacinths. Two later sources from Ohio seem based on McBride: Ford in 1881 (12, p. 51); and Howe in 1891 (19, 2:24). Also, a good account of vegetation in Indiana lists "bear-grass" but not its edibility: the "narrative of Jere Smith, 1817—read at Old Settlers' Meeting, June 11, 1864" (46, p. 272-275). In his 1939 book "Edible Wild Plants", Medsger (28) stated that *Camassia scilloides* was "much eaten" before settlement. But in their 1943 book "Edible Wild Plants of Eastern North America", Fernald & Kinsey (9) stated: "It is possible that the more eastern species is edible, but we have found no evidence of its being eaten". More recently, Mary Celestino (4) noted "aboriginal" use on the Erie Islands; see details below. And Thoms (50) reviewed evidence that wild hyacinths have been eaten by native people in Texas for up to 9000 years. John Baird of Cincinnati is the only person I know who has tasted them; he reported that raw bulbs are virtually inedible due to an abundance of cloying mucilage.

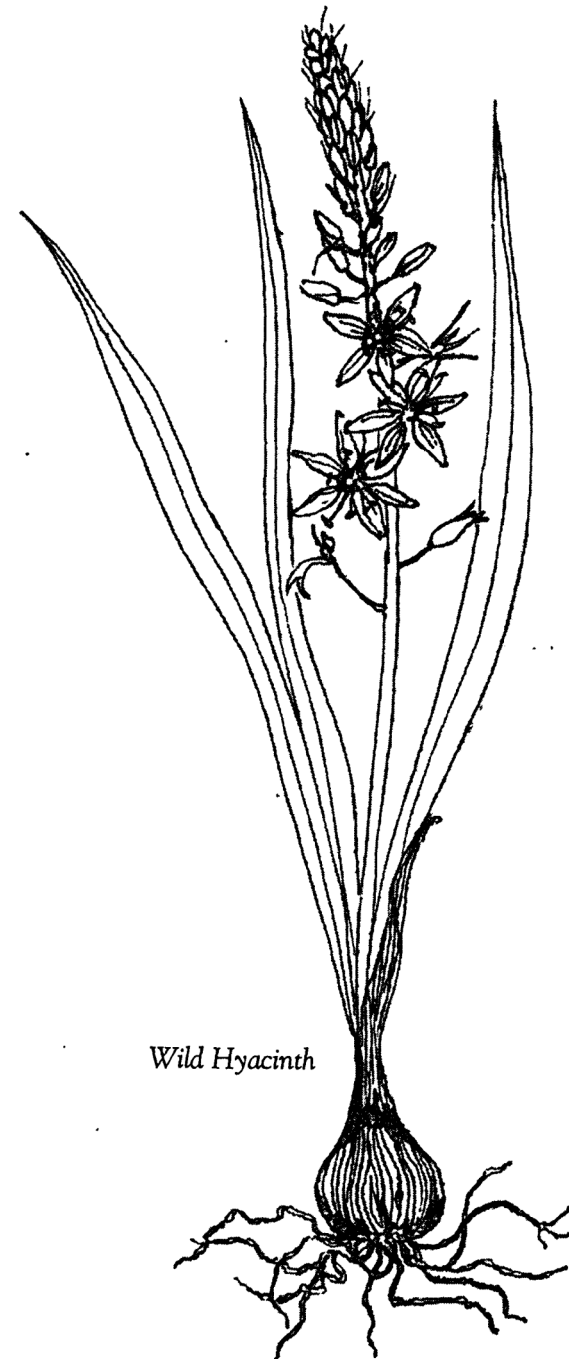
In contrast, there is much literature on human uses of western wild hyacinths and, recently, on the potential for restoration of these practices. At Vancouver Island, Brenda R. Beckwith

From the 2002 book “Wildflowers of the Canadian Erie Islands” (4) by Mary Celestino (1936-2014) .

p. 15: “The aboriginal people who cultivated near their settlements never [over-]exploited a natural site which provided plants as a food source such as Wild Hyacinth, *Camassia scilloides*, being careful to leave enough growing for the next season. Each family had its own natural site for harvesting. They understood the value of burning the land to rejuvenate new growth and to plant their own seeds in newly opened areas. Burning also restricted the invasion of unwanted plant species...”

p. 132: “*Camassia scilloides*... Open woods. Long used by many aboriginal tribes as a favoured food source, the onion-like bulbs were gathered in spring when the blooms were most visible. The bulbs which are rich in sugar were either boiled or baked with other condiments, producing a pleasant tasting but sticky texture.”

Right: illustration by Mary Celestino (4)



summarized as follows in 2004 (1): “I elucidated how camas harvest grounds were essentially agro-ecosystems, maintained by a range of anthropogenic disturbance patterns. The evolution of camas cultivation was a continuum of intensifying intervention between humans and a native root crop, a relationship of human-environment interaction that quickly ended, for the most part, soon after European contact.” She described how agricultural conversions decimated most hyacinth beds in the region, especially due to rooting of hogs and plowing for imported crops.

There is frustratingly little information about the original diet of bears when they emerged from hibernation in the more fertile landscapes of the Ohio Valley before settlement. During the 1840s, Nathan Boone recalled his father’s experiences (16, p. 33): “The bear does not seem to lose flesh during his hibernation. It comes out in the spring and eats young nettles and other tender weeds, but seldom any grass, which makes them very poor.” Draper repeated a similar statement in his account of John Finley (6b, 1:233), but ending with: “...seldom any grass, which acting as a cathartic, soon very much reduces him in the flesh.” Such loss of weight and consumption of herbs during spring has been detailed in the modern scientific era (7). The loss of weight follows expulsion of the “fecal plug” formed before hibernation and composed of indigestible, antibiotic roughage using such plants as evergreen Ericaceae (21).

From broader review, it appears that “geophytes” and roots in general have provided much important food for subsistence of bears, pigs and hominids, leading to some convergence in tooth structure (18). Although overexploitation is clearly possible, some research has shown that rooting by wild boar can increase the growth rate of geophytes (and perhaps even overall abundance in some cases), apparently due to increased nitrogen availability for recovery after the foraging (35, 45b). Grazing by ungulates, which do not usually eat roots and bulbs, can lead to overall increases in geophytes (32) or to decreases (36). A more general review of the literature and deeper analysis would be useful.

Although animals like bears and pigs can forage effectively for wild hyacinths, there are virtually no published descriptions of such foraging. Several fundamental questions arise for further research, such as the following.

1. Which other plants have the most similar chemistry and food value? Fructans are concentrated in composites (Asteraceae, especially inulin), monocots (asparagus, agave, camas, hyacinth, bluebell, onion, yam, banana, some sedges & grasses), and few other families (some Boraginaceae, Campanulaceae & Fabaceae); see Angiosperm Phylogeny Group website of Peter Stevens (47) and other technical sources for details (37).
2. How do herbivores adapt to diets with high inulin content or other fructans (polymers of fructose)? While ruminants can use fructans efficiently (53), much less is known about digestion of fructans in most other vertebrates. For humans of course, there is a vast literature about fructans in the diet, but no simple conclusion about “good” (43) or “bad” effects (25).
3. Does the depth of bulbs reflect selection for avoiding herbivores? In the Ohio Valley, depths are often 10-30 cm (5-15 inches), which is much more than the 5-8 cm (2-3 inches) reported from Kansas by W.C. Stevens in 1939 (48). A similar range occurs among western species, from “great camas” (*C. leichtlinii*) to “common camas” (*C. quamash* ssp. *breviflora*), based on NRCS (33). But we need more data.
4. How do the various types of steroidal saponins (or other glycosides) in different species of wild hyacinth influence selection, digestion and metabolism by herbivores? In addition to tasting bitter, such compounds can have cytotoxic properties (26).
5. What exactly changes in the chemistry of wild hyacinth bulbs during traditional cooking by native people? Clearly, nutritional value is increased through long slow cooking (51).

Horticultural Conclusion

Whether for human food, for ornamental use in gardens, or for ecological restoration, there is growing interest in propagation and recovery of wild hyacinths. Yet the eastern species currently has little availability in commerce. A review of material offered for sale in November 2015 shows only a few sources for seed and almost none for bulbs (Sunshine Farm, Renick, WV). Some of the notices and advertisements confuse or obscure the exact species being sold, as often occurs in horticultural sales, especially through the Internet. Although eastern wild hyacinth has been grown in England for 200 years, this showy species remains poorly known over there. Even the Royal Horticultural Society website does not offer current information about sources or methods for cultivation. The bottom line, based partly on personal experience, is that growth is slow. Germination may be delayed for two or more years; seedlings are small and easily damaged, eaten or lost. Nevertheless, a revival of interest should stimulate more local propagation, especially for landscapes where vast populations have been eradicated.

Many other wildflowers and graminoids occurred in the original Bluegrass Woodland that was typical of uplands with deep fertile soils, as outlined above for the typical habitat of wild hyacinth. But most of these species have become rare in farmed or urban land. A list is provided below, based on historical research and study of modern remnants. Several species deserve propagation and reintroduction to sites where restoration of deeper woods is designed. A more organized program for conservation and restoration is needed to undertake such work.

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Next page: list of vascular plants most typical of relatively undisturbed woods on deep fertile soils of central Bluegrass region. Under last column “TOL”: 1 = more tolerant of deeper shade; 2 = less tolerant of deeper shade (but not a clearcut separation); a = relatively browsing-sensitive; b = neutral or unknown; c = relatively browsing-tolerant.

Modern Scientific Name (generally favored)	Common Name (suggested)	TOL
TREES		
<i>Acer nigrum</i>	black maple	1 a
<i>Acer saccharum</i>	sugar maple	1 a
<i>Aesculus glabra</i>	stinking (Ohio) buckeye	2c
<i>Carya cordiformis</i>	bitternut hickory	1b
<i>Fraxinus quadrangulata</i>	blue ash	2a
<i>Ulmus rubra</i>	red elm	2a
SHRUBS		
<i>Carpinus caroliniana</i>	hornbeam	1 c
<i>Lindera benzoin</i>	spicebush	1 c
WOODY VINES		
<i>Bignonia capreolata</i>	crossvine	2a
<i>Smilax hispida</i>	bristly greenbrier	2b
FERNS AND ALLIES		
<i>Cystopteris protrusa</i>	common fragile fern	1b?
<i>Dryopteris carthusiana</i>	spinulose woodfern	1b?
HERBS (non-Fab/ Asteraceae)		
<i>Agrimonia rostellata</i>	smooth agrimony	2b
<i>Asarum canadense</i> [sensu lato]	wildginger	1b?
<i>Blephilia hirsuta</i>	white wood-mint	2a?
<i>Boechera dentata</i>	Short's rockcress	1
<i>Circaea canadensis</i>	enchanter's nightshade	2a
<i>Collinsia verna</i>	blue-eyed-Mary	2b?
<i>Delphinium tricorne</i>	wood larkspur	1b?
<i>Dicentra canadensis</i>	squirrel corn	1 c
<i>Dicentra cucullaria</i>	dutchman's breeches	1 c
<i>Enemion biternatum</i>	deep-lobed rue anemone	1b?
<i>Erigenia bulbosa</i>	harbinger-of-spring	1b?
<i>Euphorbia commutata</i>	wood spurge	2c?
<i>Floerkea proserpinacoides</i>	mermaidweed	1b?
<i>Hydrophyllum appendiculatum</i>	blue waterleaf	1a?

Modern Scientific Name (generally favored)	Common Name (suggested)	TOL
<i>Hydrophyllum canadense</i>	lowland waterleaf	1a?
<i>Impatiens pallida</i>	yellow jewelweed	1 a
<i>Jeffersonia diphylla</i>	twinleaf	1b?
<i>Laportea canadensis</i>	wood nettle	1 a
<i>Mertensia virginica</i>	bluebells	1a?
<i>Osmorhiza claytonii</i>	hairy sweet-cicely	2a?
<i>Phlox divaricata</i>	eastern wood phlox	1a?
<i>Podophyllum peltatum</i>	mayapple	2c
<i>Ranunculus hispidus</i>	common wood-buttercup	2b?
<i>Sanguinaria canadensis</i>	bloodroot	1 c
<i>Sanicula odorata</i>	walnut-wood sanicle	2b?
<i>Stellaria corei</i>	greater wood-chickweed	1a?
<i>Thaspium trifoliatum</i>	ternate wood-parsnip	2a?
<i>Urtica chamaedryoides</i>	lesser nettle	2b?
<i>Valeriana pauciflora</i>	valerian	1b?
<i>Viola pensylvanica</i>	smooth yellow stemmed-violet	1a?
LEGUMES		
<i>Hylodesmum pauciflorum</i>	pale wood tick-trefoil	2a?
COMPOSITES (Asteraceae)		
<i>Solidago flexicaulis</i>	common zig-zag goldenrod	1b?
<i>Symphotrichum cordifolium</i>	common wood-blue-aster	1 a
MONOCOTS (non-graminoid)		
<i>Arisaema triphyllum</i>	common jack-in-the-pulpit	1b
<i>Camassia scilloides</i>	wild hyacinth	1 a
<i>Erythronium albidum</i>	white trout-lily	1b?
<i>Erythronium americanum</i>	yellow trout-lily	1b?
<i>Smilax ecirrata</i>	upright carrionflower	1
<i>Tradescantia subaspera</i>	broad-leaved spiderwort	1a?
GRAMINOIDS (Poales)		
<i>Carex jamesii</i>	rich-wood tufted-sedge	1b?
<i>Carex oligocarpa</i>	lesser wrinkled-sedge	2b?
<i>Carex rosea</i>	moist-woods little-spike-sedge	2b?

Summary

Eastern wild hyacinth (*Camassia scilloides*) is a magnificent showy geophyte that emerges from its bulb in spring, flowers, seeds and then becomes dormant during June to February. It is widespread in midwestern regions and the Ohio Valley, but rare to absent on the east side of the Appalachians. The discovery and naming of this species forms a complex story of confusion among various authors. An early common name was apparently “beargrass”, based largely on James McBride’s 1869 account of the bulbs being eaten by hungry pioneers during the winter of 1788-89 along the Little Miami River in southeastern Ohio. We can now interpret Beargrass Creek in Louisville, Kentucky, as derived from this species, which is still locally abundant in Cherokee Park. There are close relatives of our eastern wild hyacinth in western North America, which are also known as beargrass in some accounts; these have a long history of consumption and even cultivation by native people.

Within the Ohio Valley, wild hyacinth is most typical of relatively undisturbed woods on deep moist fertile soils, especially along toeslopes and terraces. Within the central Bluegrass section, it extended onto uplands, and a few patches exist in better remnants of the original ‘Bluegrass Woodland’ that prevailed on such soils. In some areas, especially where woods have been thinned to make ‘woodland-pasture’, yet escaped plowing, the species survives in full sun. But it probably does not establish from seed in open land. Plans for conservation and restoration of Bluegrass Woodland (from Cherokee Park to Griffith Woods) should pay more attention the original extent of this vegetation, to the ecological factors that used to maintain it (including large animals), and to the several individual species like wild hyacinth that deserve micromanagement or propagation for extensive recovery. We desperately need integration of ‘the three levels’: landscape/watershed protection; habitat management; and species recovery. Our wild hyacinth should become a charismatic symbol for such integrated effort.



Small patch of plants at Griffith Woods, 7 May 2014. This area was burned earlier in 2014, and the hyacinth appears to have done alright. A much larger patch in the unmanaged “back-woods” is swamped by wintercreeper & somewhat shaded by bush-honeysuckle—it needs more work!

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Back page: *Camassia scilloides* in Hoosier National Forest, Indiana.

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