

On The Fringe

Journal of the Native Plant Society of Northeastern Ohio

Program Schedule – Fall 2016

Saturday, September 17, 10:00 am – Noon – Lake Erie Bluffs Gentian Walk, Lake County. Lake Metroparks Biologist John Pogacnik will lead us on a tour where we hope to see a number of rare and uncommon beach plants. We should also see in bloom some Fringed Gentian (the plant on our logo). Lake Erie Bluffs is a nationally significant successful modern conservation project. The 600-acre Lake Erie Bluffs property will permanently protect a significant amount of wetland, meadow and mostly undeveloped lakefront habitat used by rare and common plant and animal species. The property remains largely unspoiled by previous development. The mix of 40-foot high beach bluffs and open sandy and cobble beach across 9,000 feet of shoreline is the site's dominant feature. The beach area hosts trees, shrubs and small plants including the majority of the park's rare plants. **Directions:** Take Rt. 2 east to where it ends and becomes Route 20. Follow Route 20 to Blackmore Rd. Turn left (north) and follow Blackmore Rd. until it ends. Turn right (east) onto Clark Rd. Entrance to the park will be on the left (north). 2901 Clark Rd., Perry Township, OH 44081 41.788226 N-81.176286 W

Saturday, October 8, 10:00 am – Noon – Sherwin Preserve, Waite Hill. Doug Yates leads this special trip to Western Reserve Land Conservancy property. Tour the 300-acre Sherwin Preserve, part of the 1000-acre farm owned by the Sherwin family of the Sherwin-Williams Paint Company. **Directions:** From Rt 306 in Kirtland take Eagle Rd west to Smith Rd., turn right (north) on Smith Rd., parking in large open field on east side of road. 9800 Smith Rd., Willoughby, OH 44094. **Registration:** required by calling Judy at 440-409-1688 (C) or emailing at judysbarnhart@gmail.com. 41.605346 N -81.399797 W

Saturday, October 29, 5:30 pm – 8:30 pm – Annual Meeting.

The Annual Meeting of the Native Plant Society of Northeastern Ohio will be at the Pine Lake Trout Club, 17021 Chillicothe Rd., Chagrin Falls, OH 44023. Our guest speaker this year will be Jim McCormac. Jim works for the Ohio Division of Wildlife, specializing in wildlife diversity issues, especially birds. Prior to that, he was a botanist with the ODNR Division of Natural Areas and Preserves. He has authored or coauthored six books, including *Birds of Ohio* (Lone Pine 2004); and *Wild Ohio: The Best of Our Natural Heritage* (Kent State University Press 2009). The latter won the 2010 Ohioana Book award. He is a coauthor of the recently released *The Second Ohio Breeding Bird Atlas*. Jim writes a column, *Nature*, for the *Columbus Dispatch*, and regularly publishes a natural history blog. He has written scores of articles in a variety of publications and has delivered hundreds of presentations throughout the eastern United States. He was named *2014 Conservation Communicator of the Year* by the Ohio League of Sportsmen. The following will be his lecture topic at the Annual Meeting:

Lichens: Crusty Treasure Troves of Biodiversity

Few people give lichens more than a passing glance. To most, lichens are at best mysterious crusts on trees. In reality, lichens offer a fascinating example of **symbiosis**: two partners (an alga and fungus) living together to create a lichen. The 235 species of macrolichens found in Ohio support a dizzying array of animal life, including Ruby-throated Hummingbirds, many species of moths, savage predatorial lacewing larvae, and much more. This talk will explore the beautiful and intricate world of lichens, and their connection to a tangled web involving air pollution, bird conservation, and ultimately the importance of protecting all organisms great and small.

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The Mission of the Native Plant Society of Northeastern Ohio is to promote the study, appreciation, and conservation of the native plants and plant communities of Ohio.

Program Schedule – Fall 2016, con't.

Saturday, November 19, 1:00 – 3:00 pm – Winter Tree ID, The West Woods, Nature Center, Geauga County. From fruits, twigs, and bark, learn how to recognize trees in winter condition. Indoor instruction session followed by outdoor hike. Master tree finder booklets which will be used for the program are available for purchase in the gift shop for \$6.00. Joint program with Geauga Park District. **Directions:** take Rt. 87 east from Rt. 306 in Russell Township approximately 2 miles to the park entrance on south side of the road. 9465 Kinsman Rd, Novelty, Ohio 44072. **Registration:** call Geauga Park District at 440-279-0880. 41.458335 N -81.307086 W

**Native Plant Society Field Trip
Cleveland Museum of Natural History Herbarium
January 30, 2016**

By Judy Barnhart

On Saturday, January 30, 2016, Jim Bissell, Curator of Botany at the Cleveland Museum of Natural History, hosted our society's *From Field to Herbarium* program. The beautiful winter weather inspired many across the region to visit the museum on this day. Upon arrival, several in our group were met with a "lot full" sign, which required additional time seeking alternative parking at other nearby museum facilities or plugging street meters. The slight delay this caused only heightened the anticipation for this program. Once all participants were in attendance, our standing-room-only group of nineteen individuals gathered in the herbarium to learn about the intricacies of overseeing the stewardship of a plant collection. The afternoon program passed too quickly as our host captivated our attention with details of the herbarium history, research conducted by the botany department to document the flora of northeastern Ohio as well as eastern Pennsylvania, and his field travels. He even surprised me by showing some of the old rare

plants I had collected in the 1980's and 90's as part of my master's research and Geauga Park District botany work!

The current storage facilities and cataloging methods of the herbarium plant specimens evolved over the years under the guidance and direction of Jim Bissell. When he started at the museum, plant collections were in boxes and crates and a few herbarium cabinets. Many of the historical specimens from the nineteenth and early twentieth century had non-specific locality data such as "Cuyahoga County", "Gauga County", "near Chardon", or "south of Oberlin". This lack of location specificity made post surveying field work efforts difficult. It was only after many years of searching that some of these plants were eventually rediscovered.

In 1985, the Case Western Reserve University herbarium collection housed at The Holden Arboretum was transferred to the museum's herbarium collection. This donation is an historically important 9,000-specimen plant collection. Several plant specimens within this collection were collected in the late 1800's and were not previously reported flora of Ohio. Many of the records are the only evidence of rare natural occurring communities now no longer present due to being destroyed more than a century ago.

Of particular interest and importance are three plant specimens from the Case Western Reserve herbarium collection. Bog rosemary, two-seeded sedge, and sparse-flowered sedge were collected by Edo Claasen on 31 May 1896 on the outskirts of Canton at a bog-fringed glacial lake known as Meyers Lake.

Bog rosemary, *Andromeda polifolia*, is listed as extirpated from

Ohio. Sparse-flowered sedge, *Carex tenuiflora*, remains listed as extirpated. Museum herbarium staff and volunteers have been searching for both sedges. Two-seeded sedge, *Carex disperma*, has been surveyed in four locations in Ashtabula, Portage, and Summit Counties.

The museum herbarium now has more than 75,000 specimens of which Jim Bissell estimates he has collected over 40,000 during his tenure. When other plant specimen collections are brought to the museum, precautions are taken to prevent introduction of organisms that could damage the quality and integrity of the existing herbarium plant specimens. For example, the sources are frozen to kill any dermestid beetles that could eat the plants in the collection.

The botanical data gathered from field inventories coordinated by Jim Bissell throughout the region including land preserves owned by the museum's Natural Areas Division, which now total over 7,000 acres, provided important information on rare plant occurrences to the Natural Heritage Database of the Ohio Department of Natural Resources.

In 2005, the museum cleared a sand barren opening of shrubs and trees at the North Kingsville Sand Barrens, one of fifty-four preserves owned by the museum. After opening the canopy, Jim Bissell discovered several plants of *Geranium bicknellii*, Bicknell's geranium, that had germinated from the seed bank.

The seeds of many plants restricted to open sand barrens or rock barrens can remain dormant until habitat conditions favoring their growth return. Bicknell's geranium had never been reported for Ashtabula County prior to its appearance in the cleared opening.

Since then, it has been located within the Oak Openings west of Toledo.

This is just one example of the importance of gathering and maintaining this data. It is especially important now that the Natural Heritage Database, which maintains records of rare Ohio flora, is in jeopardy.

Awareness, botanical information, keen observation, vigilant efforts, and a bit of good fortune are required to spot the rare plants of this region. If a plant isn't observed in Ohio in twenty years, it becomes listed as extirpated. The challenge is to look for some of the plants that haven't been observed in the wild for some time. More volunteers are needed to search for the plants in the field as limited funding prevents hiring. State botanists meet in February 2016 to update the rare plant list.

During the winter months, Jim Bissell is focused on raising funds to hire staff and to purchase property that protects many rare plants and habitats. He and his staff will conduct a survey of a property upon request if its owner wishes to know what is growing there. This is how he found the extirpated-listed *Populus heterophylla*, swamp cottonwood, in Painesville on a property that is now owned and protected by the museum.

We wholeheartedly wish to thank Jim Bissell for sharing his time and enlightening us on the collective contributions of dedicated individuals whose appreciation for nature resulted in the irreplaceable resource collection of plant specimens that is now safely sheltered and cared for at the Cleveland Museum of Natural History.

Judy Barnhart is the Vice President and Program Director for the Native Plant Society of Northeastern Ohio.

Note: An illustrated version of this report is on our website, <https://nativeplantsocietyneo.squarespace.com/field-notes-from-field-to-herbarium-2016>.

What is “Managed Relocation” and Will It Have a Place in our Conservation Toolbox?

By Jesse Bellemare

Indeed, some studies have estimated that from many hundreds of thousands to more than a million species might be at risk of extinction due to climate change. In these studies, one crucial factor linked to extinction risk has been dispersal ability. This is because species that are slow to disperse will likely see suitable climatic conditions shift poleward faster than the species can migrate to keep up with their required habitat. Regions that support species survival today will likely experience new climatic conditions in the future that might become unsuitable for continued survival and reproduction. This will result in population declines or the outright loss of some species from their current native ranges. If these species are incapable of dispersing and establishing new populations in new areas, they are predicted to slip toward extinction. Although there is some possibility that species might be able to stay in place and adapt to new climate conditions, it appears that the response of most species to past episodes of major climate change, such as during the ice ages, has been migration to follow their favored climatic niche. Further, the high rate of modern climate change is likely to outstrip the speed at which most plants, particularly slow-growing perennials,



Figure 1. The endangered conifer Florida torreya, *Torreya taxifolia*, in seed at the Biltmore estate gardens in Asheville, North Carolina, more than 500 kilometers north of the species' native range on the Florida panhandle. Florida torreya appears to perform quite well in the cooler climate of the southern Appalachian Mountains. In contrast, surviving trees in the native range in Florida are no longer reproducing, likely due to disease and other environmental stresses. (photo courtesy of Connie Barlow and torreyaguards.org)

Along with habitat destruction and invasive species, rapid climate change is predicted to be one of the top threats to biodiversity in this century.

could conceivably evolve to tolerate new conditions. As such, dispersal and geographic range shifts to new areas will likely be a crucial step for enabling at-risk plant species to survive a warming climate.

Given the pivotal role of species' dispersal ability in avoiding climate-triggered extinctions, some ecologists and conservation biologists have proposed that humans might directly intervene to “assist” poorly dispersing species in tracking their required habitats as they shift poleward in coming decades. In other words, if the decisive factor for avoiding the extinction of climate-threatened species will be their ability to disperse to new areas of suitable habitat as climate changes, might there be some role for conservationists in facilitating this crucial step?

This new conservation strategy has variously been called “assisted migration,” “assisted colonization,” or “managed relocation.” Most strikingly, and controversially, this approach would involve moving climate-threatened species beyond their native ranges into regions where they have not occurred historically, but where they are predicted to survive in the future. Not surprisingly, this new strategy of “managed relocation,” although still largely theoretical, has run headlong into several decades of conservation focus on the threats of exotic species and biological invasions! Critics of managed relocation have cited several significant concerns, including the risk that some relocated species might become invasive where they are introduced. Others have argued that this conservation approach might undermine important efforts to fight climate change and protect rare species in their native habitats. Even so, as the rate and magnitude of climate change becomes clearer, it appears that an increasing number of biologists, conservationists, and land managers are taking the possibility of managed relocation seriously and beginning to consider how this new strategy might fit into the conservation toolkit of the 21st century, alongside more traditional approaches such as habitat preservation, passive dispersal corridors, and ex situ conservation in botanical gardens or seed banks.

PLANTS AND THE MANAGED RELOCATION DEBATE

Plant species have played a central role in both triggering and illustrating the debate surrounding managed relocation. Indeed, much of the current discussion was sparked by a 2004 article in *Wild Earth* in which Connie Barlow and Paul Martin proposed “assisted migration” to establish new populations of the endangered conifer Florida torrey, *Torreya taxifolia*, (figure 1) outside its small native range in the Florida panhandle. These researchers noted that torrey was in severe decline in its few remaining populations in the wild due to attack by a new pathogen, possibly combined with climate change and other environmental stresses. However, the Florida torrey survives, and even thrives, when planted in areas to the north of its native range at cooler, higher-elevation sites in the southern Appalachian Mountains.

The radical proposal to establish naturalized populations of torrey in these areas outside its native range was inspired in part by my Smith College colleague Rob Nicholson, who wrote in a 1990 *Natural History* magazine piece on the decline of torrey that an artificial refugium might be

This approach would involve moving climate threatened species beyond their native ranges into regions where they have not occurred historically, but where they are predicted to survive in the future.

The New England Wildflower Society's Position on Managed Relocation

The New England Wildflower Society's regional collaboration, the New England Plant Conservation Program, NEPCoP, discussed managed relocation at a recent regional advisory Council meeting. Jesse Bellemare of Smith College gave an overview of the issues and presented some of his research on transplanting species beyond their historic ranges. John O'Leary of MA Division of Fisheries and Wildlife discussed the adaptive capacity of organisms and suggested that plants and animals may adapt in unknown ways at their current locations rather than shifting their ranges as predicted by various climate models.

The topic of managed relocation is controversial, but members of the Council agreed that the organizations and agencies represented in NEPCoP need to develop guidelines for New England. The Council is hoping to avoid ad hoc translocations of rare species in our region and made the following decisions:

- Managed relocation is a tool that should be considered part of overall strategies to conserve plants in the region, and its use should be guided by the best science available.
- New England endemic (or near-endemic) taxa in habitats that are considered vulnerable to climate change should be researched as potential targets for managed relocation. These are:

Astragalus robbinsii var. *jesupii* (NH, VT)
Carex oronensis (ME)
Carex waponahkikensis (*C. scoparia* var. *tessellata*) (ME)
Crataegus bicknellii (MA)
Crataegus schizophylla (MA)
Eleocharis diandra (MA, NH, NY, VT, ONT Canada)
Eupatorium novae-angliae (MA, RI)
Geum peckii (NH, NB Canada)
Nabalus boottii (ME, NH, NY)
Pedicularis furbishiae (ME, NB Canada)
Potamogeton gemmiparus (Ct, MA, ME, NH, RI)
Potamogeton ogdenii (MA, NY, ONT Canada)
Potentilla robbinsiana (NH)

- Botanists may propose managed relocation of rare species from areas south of New England into our region. We need guidelines before receiving these transplants and need to investigate any such plans for relocation.

established in the southern Appalachians to ensure the continued survival and evolution of the species in the wild. The fossil record has produced evidence of torrey in North Carolina in earlier geologic periods, showing that its natural range has indeed extended elsewhere in the past. Given the negative trends in the present-day wild populations of Florida torrey, it is possible that naturalized plantings outside the native range and in botanic garden collections might be the only place where the species survives in the future. Barlow and Martin argued that ensuring the species survival in the wild, even if beyond its historical range boundaries, should be a top priority. However, alongside this provocative piece, conservation biologist and long-time torrey researcher Mark Schwartz responded with an article contending that “conservationists should not move *Torreya taxifolia*,” citing invasion risks and the need to invest in conserving species within their current native ranges. Even now, 10 years later, the contours of the scientific and ethical debate sketched out by these well-intentioned authors continues.

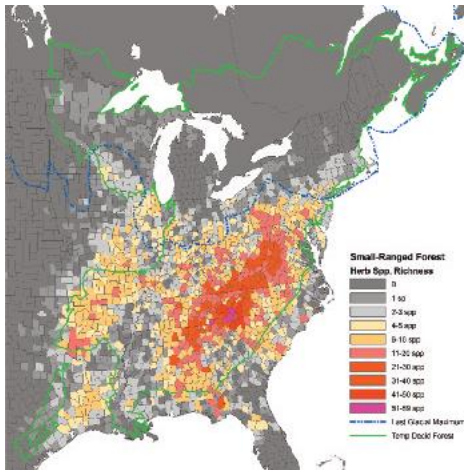


Figure 2. The richness of small-ranged endemic forest herbs by county in the eastern United States, with the outline of the temperate deciduous forest biome highlighted in green. This biogeographic analysis shows that the diversity of small-ranged forest herbs is highly concentrated in the southeastern U.S., while very few small-ranged species have distributions extending into the upper midwest or northeast. In particular, a substantial drop-off in diversity was detected near the last glacial maximum (blue dotted line), the southern boundary of the peak ice sheets of the last ice age about 18,000 years ago. The persistence of this diversity pattern over thousands of years suggests that these small-ranged plant species have limited dispersal ability and were strongly affected by past climate change, characteristics that might place them at high risk with modern climate change. (Based on an analysis presented in a contributed chapter by Jesse Bellemare and David Moeller in the book *The Herbaceous Layer in Forests of Eastern North America*, 2nd edition, Oxford University Press, 2014.)

WHAT PLANT SPECIES MIGHT BE CANDIDATES FOR MANAGED RELOCATION?

Florida *torreya* is typical of the plant species that are often cited as likely candidates for managed relocation. Small-ranged or “endemic” species, like *torreya*, are thought to be at greatest immediate risk from climate change, for two reasons: their small geographic ranges suggest that they might have limited dispersal ability—in that they have not spread widely in the past—and climate conditions could change rapidly across the whole of their small native ranges, exposing them to entirely new conditions in a short period of time. In contrast, species with larger geographic ranges have, to some extent, already demonstrated substantial dispersal ability by expanding over a large area in the past. More importantly, it is likely that some portions of their ranges will remain climatically suitable into the future,

even if other portions are compromised. For example, while the southern margins of a widespread plant species’ range might decline in the eastern U.S., it is likely that more northern areas would remain suitable for many decades or centuries to come. This type of retreat-without-migration scenario would not be an option for a small-ranged endemic species restricted to just a few counties in its native distribution.

In my lab at Smith College, we have been investigating the distribution of small-ranged plant species native to the eastern deciduous forests to gain insight into where at-risk species might be concentrated. Consistent with the prediction that small-ranged species might also be dispersal-limited species, we’ve found that almost all endemic forest plant species are concentrated in the Southeast U.S., with a pronounced drop-off in diversity near the southernmost boundary of the last continental ice sheet about 18,000 years ago (figure 2). Surprisingly, many of these southern endemic species are grown in horticulture far to the north of their native ranges in botanical gardens like Smith College, Garden in the Woods, and the Arnold Arboretum (figures 3A, 3B). This suggests that climatically-suitable habitat might already exist to the north of these species’ small native ranges in the Southeast. Overall, these patterns suggest that some plant species have exhibited little potential for northward migration, even given thousands of years since the last ice age. Unfortunately, while these small-ranged species would probably be well-positioned in the Southeast to survive the climatic cooling of another ice age, the current trend toward rapid climatic warming seems to place many on the wrong side of climate history. It is among this set of species that climate change might pose an immediate threat and where unconventional conservation approaches, like managed relocation, might be necessary to avoid extinctions.

WHAT IS THE INVASION RISK FROM MANAGED RELOCATION?

The top concern for most biologists and land managers is the possibility that some species moved to new regions via managed relocation might be too successful in their new homes—that they might become the next wave of problematic invasives. Despite years of research on exotic species management and invasion biology, it is still challenging to predict invasion potential in plants, so the possibility of invasiveness among translocated species is hard to rule out, even with screening efforts. Citing the precautionary principle, this has led some biologists to argue against



Figures 3A-3B. Bottlebrush buckeye, *Aesculus parviflora*, is a striking example of a forest plant endemic to the southeastern U.S., but grown widely in horticulture outside its native range, including areas far to the north. This map indicates the native range of bottlebrush buckeye centered in Alabama and nearby states (pink), as well as botanical gardens where the species is grown outside its range (red stars), including the Smith College Botanic Garden and Arnold Arboretum. Research in my lab at Smith College in 2012-13 found that bottlebrush buckeye produced viable seeds at both locations in Massachusetts, despite very different climatic conditions than seen within the species' native range in the south. (Photo courtesy of J. Bellemare. Native range drawn from The Biota of North America program's North American plant atlas (www.bonap.org); horticultural sites from bg-base (www.bg-base.com).)

taking any management actions that could inadvertently trigger harmful biological invasions.

However, ecological data are emerging to suggest that the types of *within*-continent movements proposed for managed relocation efforts might not be as risky as they would first appear. In particular, most problematic invasive plants have been introduced from other continents; only a small proportion of plant species considered exotic invasives somewhere in the continental U.S. are native to other parts of the U.S. A fascinating 2012 study by Dan Simberloff and colleagues documenting this phenomenon was titled "The natives are restless, but not often and mostly when disturbed," referring to the observation that the few cases where native plants have been considered problematic usually occur in places where human disturbances have already altered natural ecosystems, such as through fire suppression or overgrazing. Overall, they found that exotic species from other continents were about 40 times more likely to be considered invasive compared to U.S. native species introduced elsewhere in the country. This finding suggests that invasion risk from native species is probably modest and, relative to the permanent loss of

species due to extinction, might be an acceptable risk to consider.

The reasons that native plant species are less prone to invasive behavior are not fully known; however, several interesting hypotheses have been proposed. First, plant species living within a broad geographic area or biome, such as the eastern deciduous forests, likely have a shared ecological and evolutionary history spanning millions of years, even if they do not occur together across the entire region today. This suggests some level of co-evolution within ecological communities that might constrain many native species from becoming too successful or invasive. Similarly, within a broad geographic region, the natural enemies that have co-evolved with native plant species (insects, pathogens, etc.) might regulate population growth. In contrast, plant species introduced from other continents often leave behind their natural enemies and can exhibit more rampant population growth. Second, within a broad geographic region, it is likely that most species prone to rapid spread and population growth have already done so—thousands of years ago. These ancient "invaders" are the common, widespread plant species that we see all around us today in the



Figure 4. Umbrella-leaf, *Diphyllia cymosa*, is a large perennial herbaceous plant endemic to high-elevation forests in the southern Appalachian Mountains of western North Carolina. Since 2008, this species has been the focus of a large-scale field experiment coordinated by my lab at Smith College and our colleague David Moeller at the University of Minnesota. The research is testing how well umbrella-leaf performs when grown in natural forest plant communities beyond its native range in the mid-Atlantic and northeast. Can it grow to maturity from seed outside its range? Does it show signs of being too successful to date? We've found that umbrella leaf grows well beyond its native range and has even flowered and produced seed at some sites; however, its slow growth to maturity and low seed production suggest it would be unlikely to become invasive. At the end of the data collection for the project, the experimental plants will be removed from all sites outside the native range. (Photo courtesy of J. Bellemare)

post-glacial forests of the Northeast. Indeed, the post-glacial period might even be viewed as a “trial run” on species’ potentials for invasiveness, and it appears that many of the small-ranged endemic species concentrated in the Southeast are among those least likely to spread rapidly.

WHAT ABOUT EX SITU CONSERVATION IN SEED BANKS AND BOTANICAL GARDENS?

Given persistent concerns about the potential for invasiveness with managed relocation, why should we risk releasing non-native plant species into the wild? It might seem that preservation of genetic material in seed banks and as representative individuals in botanical gardens would be much safer. However, one of the key goals of managed relocation would be to maintain species as wild, ecologically and evolutionarily

dynamic entities—in other words, enabling these threatened species to adapt and evolve in a new region, maintain ecological interactions with other wild species, and maybe even buy some additional time to adapt to changing climate. Proponents of managed relocation argue that is it not sufficient to simply preserve threatened species as static entities “on ice” in a seed bank, or as small sets of individuals under artificial conditions in a garden setting. Although these ex situ options certainly play a critical role in many plant conservation efforts, they cannot substitute for wild, self-sustaining populations, particularly when the timescales involved with modern climate change extend over many centuries and it might never be possible to reintroduce threatened species to their former native ranges due to permanently altered climate.

MANAGED RELOCATION: THE VIEW FROM NEW ENGLAND

It is likely that the first experience New England botanists and plant enthusiasts will have with managed relocation efforts will come in the form of “climate refugees” from the south. Because of New England’s severe and recent glacial history, the region is home to relatively few small-ranged endemic species, although some alpine and coastal habitats deserve mention. As such, most candidates for conservation intervention will likely come from elsewhere—primarily from the botanical hotspots in the Southeast. The broad climatic, geologic, and vegetational similarities between portions of the Southeast and Northeast suggest that northward managed relocation efforts might be practicable for many at-risk species. And, given that most of the present-day flora in the formerly glaciated Northeast migrated into the region from the south, these regions already share a common biological and biogeographic history, potentially lessening threats of unexpected and negative ecological interactions.

Importantly, there is a great need for additional study and cautious experimentation before any actual managed relocation efforts are undertaken. Although climate models and biogeographic data suggest this approach might be a crucial conservation tool in the future, few would argue these efforts should be launched now, particularly in the absence of clear evidence that candidate species are declining in the wild in their current ranges due to climate change. In collaboration with my colleague David Moeller at the University of Minnesota, my lab has been experimentally growing the southeastern endemic umbrella-leaf, *Diphyllia cymosa*, (figure 4) at a series

The broad climatic, geologic, and vegetational similarities between portions of the Southeast and Northeast suggests that northward managed relocation efforts might be practicable for many at-risk species. And, given that most of the present-day flora in the formerly glaciated Northeast migrated into the region from the south, these regions already share a common biological and biogeographic history, potentially lessening threats of unexpected and negative ecological interactions.

of study sites within and beyond its native range, from North Carolina to Massachusetts, in order to gauge the species' performance under new conditions outside the Southeast and to observe whether it exhibits any trends toward invasive behavior beyond its range. This study has been running for several years and promises to provide fascinating insights into what conservation options might be available for umbrella leaf and similar endemics in the future, should they decline in their native ranges.

Beyond the efforts of individual researchers, organizations like New England Wild Flower Society, botanical gardens, arboreta, and academic institutions are ideally positioned to take a leading role in efforts to refine our understanding of the risks and opportunities of managed relocation. For example, information from decades of native plant horticulture at sites like Garden in the Woods might be leveraged to better understand threatened plant species' actual climatic tolerances, beyond what would be inferred from their small native ranges. Is it generally the case, for instance, that many small-ranged endemics from the Southeast can already tolerate environmental conditions in the Northeast? The many southeastern endemics growing successfully at Garden in the Woods and other botanic gardens in the north suggest this might be the case. However, it is also the case that some endemic plants that might be at risk from climate change are not present in the horticultural trade or botanical gardens due to their lower desirability in gardens, or because they have only recently been discovered and described by botanists. Little is known about these species' tolerances and ecological tendencies, and an important effort might be to bring representatives of these species into semi-natural garden settings where they could be observed in more detail.

In addition to observations drawn from native plant horticulture, organizations like New England Wild

Flower Society and other research and academic institutions might play a key role in coordinating with citizen scientists to install well-documented and well-controlled experimental plots in which the success and ecological behavior of managed relocation candidate species could be gauged in natural plant communities in the Northeast. This type of effort could greatly augment what is possible for individual researchers to accomplish due to time, travel, and funding constraints. In parallel with such efforts, enhancing connections with botanical organizations in the Southeast would also be critical, in order to begin monitoring wild populations of species predicted to be at risk and to make comparisons with experimental plantings outside native ranges. In the Northeast, these investigations would ask whether candidate species are even capable of surviving in the full ecological context of native plant communities outside their native ranges, or, conversely, might they be too successful and displace native species? These types of empirical observations from the field will be crucial for evaluating the potential and risks of managed relocation as a new element in our conservation toolkit for the 21st century.

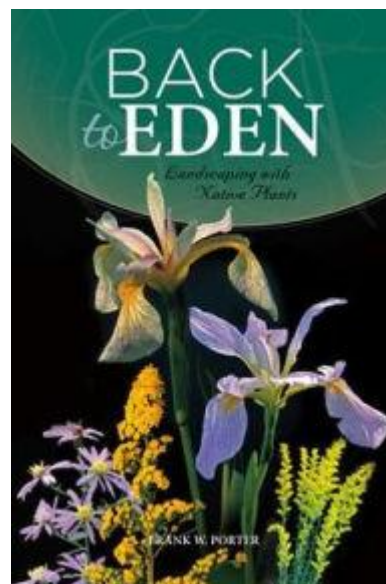
Clearly the many issues surrounding managed relocation also extend beyond the objective purview of science and into the more subjective realms of conservation ethics and philosophy. Nevertheless, this is a conversation that is certainly needed given the pressing reality of climate change, and organizations like New England Wild Flower Society are well poised to contribute significantly to that debate as it relates to the conservation of plant diversity.



Umbrella-leaf, *Diphylleia cymosa*. Photo added by Editor and taken from nargs.org.

Jesse Bellemare is Assistant Professor, Department of Biological Sciences, Smith College, Northampton, MA.

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Book Review:**Back to Eden: Landscaping with Native Plants****By Dr. Frank W. Porter****Publisher:** Orange Frazer Press**Pages:** 164 pages**ISBN-10:** 067002337X**ISBN-13:** 978-1939710000**Soft cover****Price:** \$20**Size:** 5 × 8"

Who among us nature lovers has not dreamt of a world where prairies and woodlands, meadows and shale barrens spread out in every direction, a time when human disturbance was just a blip upon the landscape? In his inspiring book, *Back to Eden*, Dr. Frank Porter helps readers rediscover and recreate those glorious vistas that once covered the eastern United States, each on his or her own small corner of land.

Bolstered by sobering arguments against the planting or careless proliferation of alien species (apparently, 4,500 species of plants and animals of foreign origin are now established in the U.S.), Dr. Porter offers native alternatives that gladden the eye, feed and shelter wildlife, and re-establish a sense of place.

Useful chapters describe how to use native grasses, sedges, and rushes to good effect in sandy areas, how to beautify potential problem spots such as waterlogged areas, gravelly soils, and perpetually eroding slopes, and how to select groundcovers—not just one, but a diverse, limitless mix of native species from grasses, ferns, and sedums to irises, vines, and other flowering plants.

Dr. Porter, a historical geographer by profession, who now runs Porterbrook Native Plants Nursery on the banks of the Ohio River, moves with the confidence of a passionate amateur from prairies to rain gardens to tiny hypertufa gardens. (Hypertufa, for the uninitiated, is a handmade stone made from cement, peat moss and sand that can easily be molded into containers that enable small-scale gardening.)

Individual chapters, small but blooming with suggestions and vivid with photographs, are devoted to blazing stars, *Liatris* spp.; goldenrods, *Solidago* spp.; asters, *Symphiotrichum*, *Eurybia* and *Ionactis* spp.; milkweeds, *Asclepias* spp.; and lobelias, *Lobelia* spp.

Unexpectedly and delightfully, in a book concentrating on the hows and whys of native plant and landscape recovery, there is a chapter entitled “Unsung Heroines in the Movement to Preserve Native Plants”. The author celebrates four women, Lilla Leach, Emily Hitchcock Terry, Eloise Butler and Marianne North, pioneer botanists who made significant contributions to the knowledge of native plants in the U.S. during the last two centuries.

Frank Porter’s focus may be on the plants of Ohio, Virginia and West Virginia, but the principles outlined and the philosophy espoused in his book apply everywhere.

Review by Irene Fedun, editor of *The Blazing Star*.

Reprinted from the *The Blazing Star*, A newsletter of the North American Native Plant Society. Summer 2013, Vol 14, No 3.

Folklore:

New England Aster
Aster novae-angliae

By Marilyn DuFour

The naturalist Neltje Blanchan once wrote,

The flower that offered the best advertisement, as the Composites do, by its showy rays; that secreted nectar in tubular flowers where no useless insect could pilfer it; that fastened its stamens to the inside wall of the tube where they must dust with pollen the underside of every insect, unwittingly cross-fertilizing the blossom as he crawled over it; that massed a great number of these tubular florets together where insects might readily discover them and feast with the least possible lost time—this flower became the winner in life's race. Small wonder that our fields are white with daisies and the autumn landscape is glorified with goldenrod and asters.



New England Aster, *Aster novae-angliae*. Pictures taken from plants.usda.gov.

Truly, the New England Aster is a beautiful example of success in this regard. It was also ranked the third most popular wildflower in North America by a poll of naturalists and botanists in the 1940s.

The New England Aster blooms from late August to early October and, sometimes, into November. Its flower includes a central disk of yellow florets surrounded by 40 to 100 elongated sterile florets called rays in such varying shades as violet, magenta-purple, rosy-lilac, and reddish purple. Each 2-5 foot (61-152 cm) plant can include up to 50 blossoms, which makes for a spectacular show. The ray florets close up over the disk florets at night, probably to protect the flower parts from the heavy dew of fall.

This member of the Composite family is a perennial which spreads slowly by roots and seeds. It produces large numbers of seeds called achenes. These seeds have hard, dry coverings and attached tufts of tiny hairs which help to disperse them on the wind. The New England Aster prefers moist, rich soils and plenty of sunlight and can be found throughout southern Canada and the United States east of the Rockies. It is one of at least 150 asters native to North America.

Both the Latin generic name and the common name of this wildflower mean “star” and suggest a rich collection of folklore. Greek legend explains the aster’s origin as stardust scattered by the weeping of the goddess Virgo from heaven. Asters were considered the herb of Venus, and therefore a talisman of love. It was also believed that the plant could keep evil at bay and drive away snakes. In contrast, the Ojibwas of the Midwest smoked the New England Aster in pipes as a charm to attract deer.

Although not known for their medicinal uses, asters have had a few of note. The Shakers brewed them and used the resulting solution to treat skin rashes. The American Indians also used asters in this way and as treatment for earaches, stomach pains, intestinal fevers, and insanity. The Meskwakis people used smoke produced from the plant in their sweat baths and revived unconscious persons by directing the smoke into their nostrils with a paper cone. The Latin poet Virgil maintained that the roots of a certain variety of aster boiled in fragrant wine could even revive a colony of ailing bees!

Reprinted from the Ottawa Park Nature Education Center, City of Toledo Parks, Recreation & Forestry 2000
Teachers' Resource Packet.

INVASIVE PLANTS DEFINITIONS

U.S. Federal Definitions (Executive Order 13112)

Native Species

“With respect to a particular ecosystem, a species that, other than as a result of an introduction, historically occurred or currently occurs in that ecosystem.”

Alien Species

“With respect to a particular ecosystem, any species, including its seeds, eggs, spores, or other biological material capable of propagating that species, that is not native to that ecosystem.”

Invasive Species

“An alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.”

Other Definitions:

Invasive Plant Species

“A species that is non-native (or alien) to the ecosystem under consideration...whose introduction causes or is likely to cause economic or environmental harm or harm to human health. Invasive species can be plants, animals, and other organisms (e.g., microbes). Human actions are the primary means of invasive species introductions.”

~ National Invasive Species Council

“...usually characterized by fast growth rates, high fruit production, rapid vegetative spread and efficient seed dispersal and germination. Since these plants are not native to Ohio, they lack the natural predators and diseases which would naturally control them in their native habitats.” ~ Ohio Department of Natural Resources, Division of Natural Areas and Preserves



Garlic Mustard, *Alliaria petiolate*,

“Introduced species that can thrive in areas beyond their natural range of dispersal. These plants are characteristically adaptable, aggressive, and have a high reproductive capacity. Their vigor combined with a lack of natural enemies often leads to outbreak populations.” ~ Invasivespeciesinfo.gov

Non-native Plant Species

“...those that occur outside their native ranges in a given place as a result of actions by humans. The term non-native can be used interchangeably with the terms alien, exotic, introduced, and non-indigenous...non-native plants can be thought of as those that accompany non-native peoples to a new land.” ~ National Park Service



Kudzu, *Pueraria montana*,

Alien Plant Species

“...plant species that are transported to regions outside of their natural habitat. Within a new environment, these invaders may be free of the natural controls like predators and disease that had previously regulated their population numbers. Without this control, the aliens can rapidly overpopulate an area, destroying the region’s established ecological balance.” ~ PBS Scientific American Frontiers



Exotic Plant Species

“A plant not native to the continent on which it is now found (Plants from Europe are exotic in North America; plants from North America are exotic in Japan).” ~ USDA, National Resources Conservation Service. (Connecticut)

Sweetclover, *Melilotus officinalis*

Weed

“A plant (native or non-native) that is not valued in the place where it is growing. Any plant that poses a major threat to agriculture and/or natural ecosystems within the United States.” ~ USDA, National Resources Conservation Service. (Connecticut)



Purple Loosestrife, *Lythrum salicaria* L.

Noxious Weed

“A plant that is particularly troublesome. Any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment.” ~ USDA, National Resources Conservation Service. (Connecticut)



Purslane; cheeseslave.com

Naturalized Plant Species

“when a plant has taken over the natural range of native plants and acts like it's always been a part of the original landscape.” ~ National Park Service

“A non-native plant that does not need human help to reproduce and maintain itself over time in an area where it is not native. Even though their offspring reproduce and spread naturally (without human help), naturalized plants do not, over time, become native members of the local plant community. Many naturalized plants are found primarily near human-dominated areas.” ~ USDA, National Resources Conservation Service. (Connecticut)



Tiger Lily, *Lilium lancifolium*; davesgarden.com

Native Plant Species

“...one that occurs naturally in a particular region, state, ecosystem, and habitat without direct or indirect human actions.” ~ Federal Native Plant Committee.



White Trillium, *Trillium grandiflorum*

“those that have not been introduced to a given area through the actions of humans. They are naturally adapted to their given area and they have generally existed there for much longer than have humans. The term native is often used interchangeably with indigenous. While some native species grow aggressively and can appear to invade natural areas, they are all in fact naturally adapted, and are valuable members of the ecosystem.” ~ National Park Service

Indigenous Plant Species

“native to or occurring naturally in a particular area.” ~ National Park Service

Information taken from www.oipc.info. All photos taken from usda.gov, unless otherwise noted.

Chapin Forest Reservation Lake Metroparks



Chapin Forest Reservation in Northern Ohio, has forested hiking trails that display spectacular scenery all day long. Wander through 5.3 miles of mature woodland trails and walk beneath the branches of beech, maple, oak, tulip and hemlock.

To protect this beautiful setting from logging, Frederic H. Chapin purchased the property in 1949 and donated it to the State of Ohio. Under a lease agreement with the Ohio Department of Natural Resources Division of Forestry, Lake Metroparks manages Chapin Forest Reservation. The ledges, or rocky outcroppings of Sharon conglomerate, were formed about 300 million years ago, long before glaciers slid across northern Ohio. To protect the fragile vegetation and for safety reasons, access to the ledges area is restricted to guided walks, which are regularly offered throughout the year.

Sandstone from Quarry Pond and the adjacent streambed were part of a stone quarry that operated during the 1800s. Berea sandstone from this site supplied the foundations for many local buildings, including the Kirtland Temple, which was completed in 1836. Chapin Forest has also served as a study site. During the late 1950s, the Ohio Division of Forestry and Reclamation began using Chapin Forest as a research site to determine the growth rates of trees for possible commercial timber production.

One of the best scenic overlooks in Lake County is found along Lucky Stone Loop hiking trail. On a clear day, you can see Lake Erie and the Cleveland skyline, 18 miles away. Part of the Buckeye Trail, a continuous hiking trail throughout Ohio, passes through Chapin Forest. Blue paint blazes on some trees mark the Buckeye Trail.

Chapin Forest Reservation is located at 9938 Chillicothe Rd., Kirtland, OH 44094, and 10381 Hobart Rd, Willoughby, OH 44094.

Content for this article taken from the websites of www.kirtlandohio.com, hikingohioparks.com and www.lakemetroparks.com. Photo taken from www.reddit.com.

New Leaf Disease Is Threatening American Beeches

By Jane McCullam

The American beech trees, *Fagus grandiflora*, of northeastern Ohio have developed an alarming disease that withers the leaves and is thought eventually to kill the tree. It was first observed in 2012 by John Pogacnik, a biologist with Lake County Metroparks.

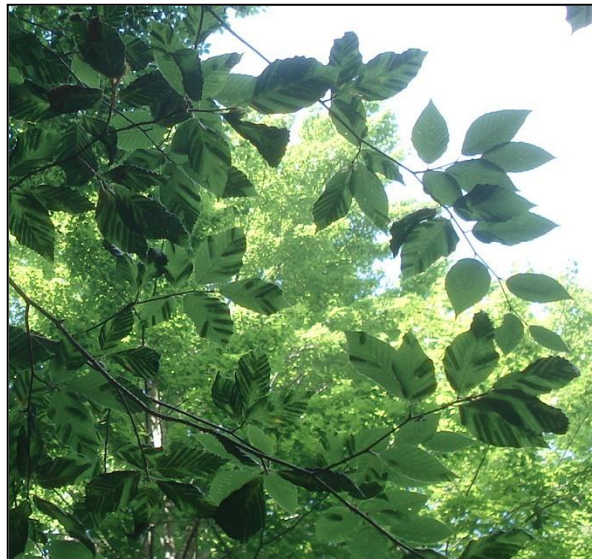
The beech tree, in partnership with the sugar maple, is considered to be a keystone species, enabling the ecosystem to function effectively and efficiently. Loss of this tree would be disastrous to our forests.

As yet, nothing is known about the cause of the leaf damage, but where it has been observed, the trees get progressively worse. The leaves start out showing stripes of darker and lighter green, especially noticeable when seen from below against the sky. The leaves wither and often fall, letting more light into the forest. Beech shade is ordinarily very dense, contributing to an ecosystem dependent on low light levels. In following years more of the tree is affected, progressing up to the top, when the tree dies.

A number of people are currently studying the problem, including the Holden Arboretum. So far, nothing has been identified and nothing has been ruled out. Fungus, virus, bacterium, nematode, insect, environmental toxin?

The disease has spread to Ashtabula, Geauga, and Cuyahoga counties. It may be more widespread, but so far it is not widely recognized as a disease entity. Jim McCormac has posted two entries on his blog *Ohio Birds and Biodiversity*, one in 2014, <http://jimccormac.blogspot.com/2014/06/mysterious-affliction-killing-beech.html>, and another on June 16, 2016, <http://jimccormac.blogspot.com/2016/06/beech-tree-killer-still-unknown-update.html>.

Below are some pictures of afflicted trees in the Geauga Park's Rookery, taken in mid-June of 2016.



Notice the discoloration of the Beech leaf.

Jane McCullam is a Co-editor for *On The Fringe* and is on the Board for the Native Plant Society of Northeastern Ohio. Photos taken by Jane McCullam in her Beech forested yard.

Wildflower in Focus: Virginia Creeper
***Parthenocissus quinquefolia* (Linnaeus) Planchon, 1887**
Family Vitaceae

By Kirsten Johnson

“Ubiquitous in an extraordinary range of wet to very dry, forested to open habitats; tolerant of a range of soil types, tolerant of deep flooding, capable of rooting in deep outcrop crevices and boulder-fields interstices that exclude other plants; scarce at the highest elevations.”

Flora of Virginia, p 977

What a wonderful plant! So common that it's often neglected on our field trip plant lists. In fact, of the 46 Maryland locations for which the Maryland Native Plant Society website has plant lists, only 16 include Virginia creeper. But I'll eat my garden gloves if it's not present at every one of the other 30.

Climbing Mechanism. Like other members of the Grape Family, Virginia creeper is a “liana”—meaning that it's a woody vine. It climbs when it encounters a structure and can also grow a considerable distance along the ground. Some lianas, such as poison ivy, *Toxicodendron radicans*, and English ivy, *Hedera helix*, climb and attach using adhesive adventitious roots. Virginia creeper employs different strategies, having branched tendrils that coil around twigs and that have small adhesive pads at their tips. Charles Darwin was fascinated by adhesive mechanisms in climbing plants, but strangely, Virginia creeper is one of the few species whose adhesive properties have been studied since his time. Upon touch stimulus, the tendril tips swell and flatten against the substrate. Epidermal cells in the tips become papillate, that is, they develop tiny projections, which are believed to produce a polysaccharide adhesive that may become woody and weather resistant as the tendril ages.

Similar Species. Virginia creeper is often confused with poison ivy but they're easy to distinguish. Poison ivy has three leaflets and Virginia creeper has five. They are often seen growing on the same tree, as in the photo below. So-called Boston ivy, *Parthenocissus tricuspidata*, is actually an Asian species, often used as decorative climber. As the name implies, it has three leaflets.

Wildlife Value. The fruit of Virginia creeper is a true berry, meaning a fleshy fruit produced from a single pistil. The deep blue berries are eaten by many animals, especially birds, but they are toxic to humans. Virginia creeper's thick foliage provides excellent cover for small animals, and provides birds with perches, nesting places and leaf surfaces to find insects to eat.



Virginia Creeper and Poison Ivy coexist in this tree, creating a spectacular autumn display of color. Photo by Janice Browne

The larvae of the Virginia creeper sphinx moth, *Darapsa myron*, (also called hog sphinx) feed on Virginia creeper and other members of the Grape Family. The females lay translucent yellow-green eggs in twos or threes on the underside of host leaves. The larvae are “hornworms,” so called because of the pointed tail-like “horn” at their end. Sphinx moths are named for the caterpillars' habit of resting motionless in a reared-back, head-up position reminiscent of the sphinxes of Egyptian mythology.

Landscape Value. Michael Dirr, the guru of woody landscape plants, describes Virginia creeper as “excellent for tough low-maintenance cover,” noting that many apparently ivy-covered walls are in reality covered with creeper. Although creeper may leave an adhesive residue on walls, it does not damage buildings the way English ivy does, by inserting adventitious roots into cracks.

I enjoy having Virginia creeper on a fence in my garden. It needs annual pruning, but is not invasive when compared to English ivy, porcelainberry, *Ampelopsis brevipedunculata*, or the native trumpet vine, *Campsis radicans*.

Reprinted from *Marilandica*, a Publication of the Maryland Native Plant Society, Summer 2015, Vol 6, No 2.

Interesting Factoid:**Black Walnut Trees: The Roots of Evil**

The black walnut tree is one of our most valuable and beautiful native trees. The easily worked, close-grained wood has long been prized by furniture and cabinetmakers for its attractive color and exceptional durability. Its logs are in such demand for veneer that “walnut rustlers” have made off with trees in the dead of night and even used helicopters in their operations.

The early settlers discovered black walnuts growing in mixed forests from Canada to northern Florida and west to the Great Plains. They found that its rich-brown heartwood was exceptionally resistant to decay and put it to use as fence posts, poles, shingles, and sills. When surrounded by other trees in the forest, black walnut grows straight and tall with few, if any, lower branches. When planted in the open, the tree will branch out closer to the ground, developing a spreading shape that makes it easier to harvest its sweet, round, two-inch to three-inch nuts.

Unfortunately, the black walnut does have a dark side. Its roots, which may extend 50 feet or more from the trunk, exude a natural herbicide known as juglone that prevents many plants from growing within their reach.

Juglone is produced in the fruit, leaves, and branches, and can be excreted from the root system into the soil. The actual concentration in each tree part varies with the season. In spring, juglone is concentrated in the actively growing leaves. The amount of juglone in the roots remains relatively high throughout the summer, and the concentration of juglone in the hulls of the fruit increases as the crop matures. Juglone has the ability to kill many types of plants, and its effects range outward from the tree as it grows. Plants such as tomatoes, blueberries, blackberries, azaleas, apple trees, rhododendrons and potatoes cannot survive when juglone is present in the soil. Horse owners should never use walnut trees for sawdust or wood chip bedding as the juglone can cause reactions in the animal.

Black walnut is still recommended for planting in pastures and on hillsides in the Ohio Valley and Appalachian mountain regions to hold the soil, prevent erosion, and provide shade for cattle. Black walnuts seem to have the beneficial effect of encouraging the growth of Kentucky bluegrass and other grasses.

**Interesting Facts:**

- The origin of the word nut is derived from the Latin *nux* referring to the fruit inside the shell, the nut kernel itself. The walnut tree's formal botanical name, *Juglans regia*, comes from the Romans. The word *juglans*, from the Latin, means “the acorn of Jupiter,” while *regia* refers to royalty. You could actually translate its Latin name to mean “the royal acorn of Jupiter.”
- Walnuts are the oldest food tree known to man. It dates back to 7000 BC. The oldest archeological site where walnuts were unearthed is in the Shanidar caves in northern Iraq. Following that find, at a considerable distance from Persia, evidence of walnuts was discovered in a Mesolithic dunghill in Switzerland.
- Mesopotamia, the area that is now modern Iraq, boasted walnut groves in the famed Hanging Gardens of Babylon about 2,000 BCE. As testimony, Chaldeans left clay tablet inscriptions that accounted for these orchards. These are the earliest written records mentioning walnuts.

- Native American Indians enjoyed the pleasures and health benefits of the black walnut well before European explorers arrived. The upper Great Lakes region provides archeological evidence of walnut consumption dating back to 2000 BCE.
- Wherever the black walnut grows, there is limestone in the soil, a good sign of fertile soil. The early Pennsylvania Dutch made a point of selecting properties that had a stand of sturdy black walnut trees on the land, assuring them of rich soil.
- In California, walnuts were first cultivated in the late 1700's by Franciscan Fathers. California walnuts are well known for being the top quality in the world.
- Walnut shells are considered a mild abrasive. They are used as "fine grit" in many women's cosmetics and face cleansers. This same "grit" is also used to set up and prepare the bodies of NASCAR autos prior to painting.
- Juglone is currently being studied for its anticancer properties. One of the potential pathways through which juglone achieves its anticancer properties is induced apoptosis, a naturally occurring process, also known as "programmed cell death," by which our bodies cycle out cells that are no longer wanted, or that present a threat to our health. Scientists are researching whether juglone can be used to produce an apoptotic response in something really nasty inside of us—say, cancer.

The value of a Black Walnut tree varies, but estimates found online are between \$1,300 and \$3,000 for one tree with a diameter of 22" to 26." Good quality trees are gaining value at an annual rate of 7-10%. This does not include inflation or increase in the demand for walnut. If you include these factors, many trees are easily gaining 10 to 15% per year in value. This is a great long term investment that many people on Wall Street would love to have.

This article was based on material taken from www.almanac.com; www.profitableplantsdigest.com; www.iowadnr.gov; www.gardenguides.com; www.almanac.com; www.nemahaweb.com; herballegacy.com; www.agpresidents.com and Wikipedia.com.

The Status List for Rare Native Ohio Plants

The status list for rare native Ohio plants is revised every two years. The current list became effective on December 15, 2014. State status is determined using information stored in the Ohio Natural Heritage Database.

The current list contains 92 presumed extirpated, 254 endangered, 157 threatened, and 111 potentially threatened taxa, plus 4 plant taxa with no assigned status. A species is considered "presumed extirpated" (X) when no valid records are known from the last 20 years. Species designated as "added" (A) have been recently included in the Division's rare plant inventory, and sufficient information is not yet available to assign an endangerment status.

Six Ohio plants are also included on the federal list of endangered and threatened species. Running buffalo clover, *Trifolium stoloniferum*, is federally endangered. Northern monkshood, *Aconitum noveboracense*, Lakeside daisy, *Tetraneuris herbacea*, small whorled pogonia, *Isotria medeoloides*, prairie fringed orchid, *Platanthera leucophaea*, and Appalachian spiraea, *Spiraea virginiana*, are federally threatened.

In addition to studies completed by its botanists, the Ohio Department of Natural Resources relies heavily on volunteers and environmental consultants to track the status of rare plant populations. You can report the occurrence of an Ohio endangered, threatened, or potentially threatened plant, by using the Rare Plant Survey form on their website.

Go to naturepreserves.ohiodnr.gov/rareplants to see the complete list of 2014-2015 Rare Native Ohio Plants Status List. There is a printable list of Ohio rare plants in pdf form that you can click on for more information.



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- Support natural landscaping
- Raise awareness of the ethical issues regarding native plants
- Encourage surveys and research into native plant species and the publication of findings
- Promote cooperation with other programs and organizations concerned with the conservation of natural resources

On The Fringe

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