Sempervirens

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Tyler Urgo, left, stands on a spit of land jutting into a large sinkhole pond at the Lyndhurst Ponds Natural Area Preserve in eastern Augusta County. A Shortleaf Pine (*Pinus echinata*) stands tall in a stretch of forest near a sinkhole pond. (Photos by Nancy Sorrells)

Rare Sinkhole Ponds Protected in Lyndhurst

At first glance, a sinkhole pond might not appear that impressive to a passerby. After all, it is just another swampy spot in the woods, right? Well think again. These naturally occurring wetlands, called Shenandoah Valley Sinkhole Ponds, contain some of the rarest habitats in the world, found only at the western foot of the Blue Ridge Mountains in Rockbridge, Augusta, Rockingham, and Page counties.

The unique geology of this landscape—the acidic soil of the alluvial fan over top of deep limestone—and the intermittent wet conditions—sometimes the water is deep and sometimes the ponds are so dry that one can walk across them—means that very specific plants and animals have evolved to survive in these rare and rather harsh environments.

This summer one of those globally rare habitats in eastern Augusta County was added to the Virginia Department of Conservation and Recreation's Natural Area Preserve System, a program established in 1989 to protect Virginia's rare natural communities. The 350-acre Lyndhurst Ponds site was acquired from Waynesboro Nurseries and the Quillen family with funds from the DuPont Natural Resource Damage Assessment and Restoration settlement.

"By protecting and restoring this rare species habitat, we further our mission to protect Virginia's biodiversity and address the ongoing global extinction crisis," noted Virginia Secretary of Natural Resources Matt Strickler. The Lyndhurst acquisition put the number of natural area preserves at 65, covering over 58,000 acres.

Although the rare flora and fauna found at the site don't know it, they are part of a special rags to riches story. The property would have been heavily impacted by the construction and operation of the Atlantic Coast Pipeline (ACP), Dominion's proposed 600-mile long, 42-inch high-pressure natural gas line that would have cut through the property. The July 2020 announcement of the new natural area preserve came just four days after Dominion pulled the plug on the ACP, meaning that the property went from "endangered" to "protected" in just a few days.

In December, I had the opportunity to tour these ponds with members of the Quillen family and Tyler Urgo, who is the Shenandoah Valley Region Steward for 13 Virginia Division of Natural Heritage properties in the Shenandoah Valley.

Urgo is a 2004 Fort Defiance High School graduate. He went on to earn an undergraduate degree in environmental science at James Madison and a master's degree in wildlife science at Texas A&M.

Urgo talked about the special nature of sinkhole ponds and laid out the management plan for the new preserve for the next several years.

"Shenandoah Valley Sinkhole Ponds are unique and rare assemblages of plants and some animals. Because of the DuPont settlement, we have the opportunity to restore our natural heritage here," he explained.

(See Sinkhole Ponds, page 12)

Push back against damaging invasives

From the President, Nancy Vehrs

Why are garden centers allowed to sell invasive plants? It seems an innocent enough question, and we hear it quite a bit. In fact, someone asked Delegate David Bulova of Fairfax that question on a virtual town hall meeting this past summer. The answer is complex, and, of course, money is involved. Unfortunately, certain invasive plants, such as English Ivy and Japanese Barberry, are big sellers. Currently Virginia's noxious weed law makes an exception "when in-state production of such living plant, or part thereof, is commercially viable or such living plant is commercially propagated in Virginia."

So, how do we get around this conundrum? Delegate Bulova asked his audience to propose some legislation for him. Thus, a small group of representatives from conservation groups met through Zoom over the fall to tackle the issue of reducing or eliminating the sale of invasive plants. Ideas discussed included proposals such as taxing the sale of invasive plants and using the funds to combat their spread in the landscape, posting warning labels on invasive plants at point of sale, or revising the Noxious Weed Ordinance to include plants currently being sold. Knowing that there could be considerable resistance from the nursery industry, our group decided to ask for a study of the issue with recommendations for action. The study group would include state agencies such as the Department of Conservation and Recreation and the Department of Agriculture and Consumer Services, nursery industry representatives, and representatives from conservation groups such as the Virginia Native Plant Society. Delegate Bulova agreed to file a resolution that would require the study group to meet to develop recommendations by December 2021. Depending on the findings of the study group, legislation can be filed accordingly for the 2022 General Assembly session.

The General Assembly has a short session this year beginning January 13 so legislation will move very quickly. The House of Delegates will meet virtually, and the Senate will meet in the Science Museum of Virginia where its members and staff will have room to maintain distance. Most of the legislators' work is considered by a subject matter subcommittee then the full committee. At press time Study Resolution HR527 has moved out of committee and awaits a vote in the full House. If it passes, it will move to the Senate Rules Committee and proceed from there. We will send out Action Alerts as necessary for you, our members, to contact your state legislators. We are hopeful that this study committee will become a step forward in our fight against invasive plants.

Meanwhile, when you go on walks in your neighborhood or local parks this winter, note the overwhelming presence of invasive plants. Sometimes I wish I were blissfully ignorant of their ubiquity. So many invasive plants remain green long into the winter and have a competitive advantage over our natives by greening up early in late winter or early spring. Japanese Honeysuckle has such a stronghold in our fields and forests that we are almost blind to it. The berries and vines of Oriental Bittersweet hang from the tree trunks and English Ivy's greenery corsets others. Some of you toil tirelessly to control these invasive plants and I applaud your efforts. It is easy to become discouraged, but we know you are making a difference.

On another subject, did you enjoy the VNPS annual meeting in September by Zoom? Chris Ludwig's Virtual Tour of Virginia's Natural Area Preserves was the next best thing to being there. The 20 NAPs with public access are listed by the Natural Heritage Program, https://www.dcr.virginia.gov/natural-heritage/document/napbook4web.pdf. If you missed his program, you can find it on our website and watch it online.

(See Invasives, next page)

It's hard to tell, but there is a tree underneath this suffocating blanket of English Ivy.

Witmer adds publications to Society duties

The Society is pleased to welcome Virginia Witmer to the board as the new Publications Chair. Virginia is a long-time VNPS member and lives in Henrico County with her husband Steven and daughters, Katherine and Lauren.

Virginia is the Outreach Coordinator for the Virginia Coastal Zone Management (CZM) Program, a network of state agencies, localities and non-governmental partners, headquartered at the Virginia Department of Environmental Quality in Richmond. For the last 24 years, she has been responsible for coordinating all facets of the program's communication strategy, including publications, website management, media relations, exhibits and workshops. She particularly enjoys her work on social marketing campaigns focused on increasing native plant use and decreasing marine debris.

Virginia worked with partners on the Eastern Shore to design the first regional native plant campaign, and has since supported campaigns across coastal Virginia and into the Piedmont and Mountain regions. As part of the campaigns, she has collaborated with partners to produce a number of marketing materials, including the regional native plant guides. These guides, as well as one for the Northern Neck, and the six campaigns covering Tidewater Virginia, were funded by the Virginia CZM Program through grants from NOAA. Specifically, Virginia was the editor and graphic designer for the ES, NOVA, Capital/RVA, SEVA/HR, and Central Rapp guides. In her role with Virginia CZM, Virginia also initiated and is the current coordinator of the Virginia Native Plant Marketing Partnership, and she co-led development of the partnership's Action Plan. Virginia designed and serves as the primary administrator of the PlantVirginiaNatives.org website, which is home to the partnership and hosts some of the regional campaigns.

Virginia graduated from Allegheny College with a major she designed focused on the social, political, and economic factors influencing environmental protection. She attended the environmental resource policy master's program at George Washington University.

Outside of work, Virginia loves to be outdoors, enjoys reading, sings in a choir, and wishes to spend more time with a camera.

—Nancy Vehrs, President

Virginia Witmer stands next to a Plant RVA Natives campaign exhibit.

Invasives

Continued from page 2

In other good news, I applaud our members for contributing a net donation of $26,945.45 for the 2020 fundraiser for the Flora of Virginia Project. This sum well exceeds our goal of $25K and will assist with the transition to a new board and focus. Thank you all.

As the Covid-19 pandemic continues even as vaccinations have begun, we will offer our Annual Workshop virtually through two sessions on the evenings of March 2 and 9. Information on how to register is found on page 5. This will open up a Saturday on your schedule so you can participate in an outdoor activity that day. How about removing some invasive plants? ❖

VIRGINIA NATIVE PLANT SOCIETY

Sempervirens (ISSN 1085-9632) is the quarterly newsletter of the Virginia Native Plant Society, Blandy Experimental Farm, 400 Blandy Farm Lane, Unit 2, Boyce, Va. 22620, 540-837-1600, info@vnps.org. Nancy Vehrs, President; Nancy Sorrells, Editor; Karen York, Office Manager. Original material in *Sempervirens* may be reprinted if credit is given to the Virginia Native Plant Society, to *Sempervirens*, and to the author of the material, if named. Readers are invited to send letters, news items, and queries for consideration. E-mail items to Nancy Sorrells at lotswife@comcast.net.

Next submission deadline: April 1, 2021

Lyndhurst Ponds
Governor attends celebration of new preserve

Article and photos by Sally Anderson and Richard Cooper

We were pleased to be able to attend and represent VNPS at a 2020 celebration marking five additions to the Virginia Natural Area Preserve system. Under Governor Ralph Northam's Preserve Virginia Initiative and with funds from the DuPont Settlement resulting from mercury contamination of rivers, it was possible to fund creation of and additions to several existing preserves in the Waynesboro area and create a new cave preserve in Grottoes.

The early November gathering took place in an open field at the new Lyndhurst Ponds Preserve, and the day could not have been nicer. Sunshine and fall colors abounded. Remarks by Clyde Christman, director of the Virginia Department of Conservation and Recreation, and Governor Northam were followed by recognition of several partners on the preserves, including Natural Heritage staff, the Waynesboro Nursery family who lives at Lyndhurst, VNPS, the Cave Conservancy, and Potomac Appalachian Trail Club. According to the organizers and speakers, never had there been a dedication celebrating this number of preserves. We were also reminded that the preserve system is only about three decades old, yet we have 65 preserves now, protecting species across the commonwealth. It's also nice to realize that when these hot spots of biological diversity are protected, other uncommon species are often found there after the fact.

Virginia Governor Ralph Northam stands with Richard Cooper and Sally Anderson at the new Lyndhurst Ponds Natural Area Preserve.

Some of you will remember the part VNPS played in this effort a couple of years ago, when VNPS leaders applied for a grant from the DuPont Settlement. We were awarded funds to buy properties related to the Mount Joy NAP near Greenville, one of several sinkhole pond locations in the area.

Following the ceremony, we were treated to a tour of a large, intact sinkhole pond on the Lyndhurst Ponds preserve led by Natural Heritage Vegetation Ecologist Gary Fleming and the steward of these preserves, Tyler Urgo. It was an interesting discussion of the origin and biology of the ponds, maybe most interesting in that, while they have some common attributes and species, each pond has its own suite of species, so preserving as many of them as possible is a good thing. We also toured some ponds that had been converted to farm ponds, but are now being restored. The day marked a big step forward in the preservation of Virginia's natural heritage.❖

NAP manager Tyler Urgo leads a socially distanced group through the new preserve.

Virtual Annual Workshop goes back 50 million years

The VNPS Annual Workshop is back, but due to the pandemic, this year's program will be a two-part zoom video conference with the theme *"Earth's Climate: Present, Past, and Future."* Many of us are concerned about climate change and no longer need to be convinced that it is real. Nevertheless, we can always learn something new about the study of climate and its changes and impacts on Earth's ecosystems. This year's workshop will focus on climate changes at different periods of time, how it might relate to our current climate, and how that can inform our thoughts about today's changes.

Our speakers this year will cover more than 50 million years of Earth's climate history. From the present state of our coastal ecosystems, to climate perturbations during the historic period, to the glacial ages and their influence on eastern forests, and finally to the fossil record far in the past, we will explore environmental changes in our world.

Enjoy two virtual evening workshops, March 2 and March 9, and find out how both the present and the past can inform our understanding of climate and climate change. Registration is free, although donations are most welcome. Registration is now open and can be found under "events" on the vnps.org website. (The direct link is https://vnps.org/events/vnps-annual-workshop-2021-2021-03-02).

The first workshop begins on Tuesday, March 2 with a 5:30 p.m. meet and greet, followed at 5:50 p.m. by a welcome and introduction from Society President Nancy Vehrs.

At 6 p.m., Dr. Scott Wing, Curator of Fossil Plants at the National Museum of Natural History of the Smithsonian Institution, will present "*Global Warming 56 Million Years Ago: What It Means for Plants and Us."* Billions of tons of carbon dioxide are released into the atmosphere in a short time. Global temperatures soar, extreme rainfall events become common, and ecosystems transform. This might be a description of today, but it also describes a fascinating period in Earth's history that geologists and paleontologists are studying with the aim of predicting the future as well as understanding the past.

How are today's forests impacted by climate change from the past, present, and future? Tune into the virtual Annual Workshop to find out.

At 7 p.m., Rodney Bartgis will discuss *"The Pleistocene and Today: Reflections on a Million Years of Past Change and the Future of our Flora."* Bartgis is past West Virginia state director of The Nature Conservancy, a former botanist with the Maryland and West Virginia Natural Heritage Programs, and currently consults on land conservation and conservation planning. For more than a million years, shifting climate has affected the plant life of Virginia. It has altered the distribution of species, rearranged plant communities, driven evolution, and caused extinction. What may this past tell us about the impacts of today's changing climate on plant life in our anthropogenic landscapes?

At 6 p.m., on March 9, Dr. Emily Southgate, a historical ecologist who studies impacts of past human activities on our landscapes, will present *"Interaction of Climate Change and Human Land Use In Eastern North America over the last 10,000 Years."* Climate changes over the last thousand years in North America have occurred at the same time as increasingly dramatic changes in human land use, resulting in disruptions in human populations as well as in natural communities. Records of these changes can provide lessons for current and future climate changes on human, plant, and animal communities. This presentation will discuss the methods used to study recent changes in vegetation as well as some details of events known as the Medieval Optimum, the Little Ice Age, and our current human-caused climate anomalies.

At 7 p.m., Dr. Molly Mitchell will discuss *"Climate Change and Coastal Zone Plant Communities: Impacts and Opportunities."* She is an assistant research professor at the Virginia Institute of Marine Science and the Director of the Professional M.A. program. The latest climate models suggest Virginia will experience increases in temperatures, precipitation, storms, and sea level over the rest of the century. These changes will affect many of the natural plant communities in the state, particularly in the coastal plain. We can anticipate some of the ecological consequences of those changes and we are beginning to get a more realistic sense of the capacity of natural plant communities to help mitigate impacts on human systems.❖

Geraniums: Exploding Fruits & Self-planting Seeds!

One of the challenges to engage student interest in plants is that, for the most part, plants seem so passive. You can abruptly shout at them mere inches from their leaves—I have done this in class--and the plants just sit there, like nothing happened. This little trick, of course, never fails to jolt about half of the class out of their doldrums, momentarily at least, but the plant remains unperturbed. Nevertheless, plants *are* alive, and all living things *do* respond to their environment. The point of my screaming like a madman at little potted plants in front of my class is to make the point that, despite coexistence in the same physical spaces, plants and animals do not inhabit the same sensory environments. Moreover, plant responses to environmental stimuli are usually expressed through growth processes that unfold slowly, over days, or weeks. In comparison, animals (and us humans) are downright twitchy, nervous, muscular, and mobile. In contrast, plants exude Zen-like tranquility.

Yes, plant growth responses are slow and require patient observation over time. But that is not the whole story. Sometimes, some plants can do things lickety-split. Venus Flytraps, for example, can close their leaves quickly enough to capture a fly. And there are quite a few other botanical phenomena that transpire quickly, but these are exceptional cases. This article addresses one category of rapid plant movement, the explosive dehiscence of mature dry fruits that occur in plants of the genus *Geranium*, i.e., plants that include the VNPS 2020 Wildflower of the Year, *Geranium maculatum* (Wild Geranium).

Fruits, of course, develop from ovaries. In flowers of *Geranium maculatum*, the ovary is deeply 5-lobed, and topped with a single columnar style bearing five, short, radiating, stigmas. As fruits develop, styles elongate to about 25 mm in length, roughly 10 times their size at flowering. Fruit dehiscence is complicated and, notably, rapid. Before the fruit can explode, however, it must dry out and, initially, the only notable change is that of color, from green to brown. More significant, though, is the fact that as the style portions of the fruit dry, it becomes a series of spring-loaded levers, inexorably generating outward-directed forces on each seed-bearing segment (mericarp) of the fruit. Eventually the divergent forces exerted by the style ruptures the relatively weak connections between ovary lobes and, with an audible snap, each fruit lobe flings outward quickly enough to launch its seed on an arched trajectory, landing as much as nine feet from its parent plant. This process happens quickly. As the saying goes, blink, and you might miss it. Once the seeds are gone, the dehisced fruit looks like some sort of junk yard umbrella missing its fabric **(Figure 1).**

How do Wild Geraniums accomplish this startlingly rapid trick? Ultimately, the explanation rests on details of the wall structure of cells that make up the style. It is a matter of where these cell walls are thick and where they are thin that, first, directs their 10-fold elongation from flowering to fruiting stages. It is also the pattern of thick and thin portions of the wall that is responsible for the accumulation of elastic strain during fruit desiccation. And there is one further point made by biophysicists who have studied explosive fruit dehiscence in other plants (Galstyan & Hay 2018), the critical presence of cells with weak, thin, walls between the ovary lobes. These strategically located weak zones amount to a hair trigger; because of these weak zones, relatively little elastic strain stored in the style is spent breaking the ovary lobes apart. In short, it is the complex, microscopic pattern of cell wall thickenings that generates the forces to fling seeds away from their parent plant.

The genus *Geranium* contains over 400 species found throughout temperate regions of the globe. As anyone familiar with biodiversity might suspect, details of seed dispersal are not uniform for all species of the genus. In fact, a specialist in the taxonomy of *Geranium*, P. F. Yeo (1984), wrote a paper outlining the different forms of "fruit discharge" found in the genus.

In the system proposed by Yeo (1984) there are three distinct categories of fruit dehiscence and seed dispersal present in *Geranium*; moreover, the different modes of dispersal correlate well with the traditional taxonomic division of *Geranium* into three subgenera. The process described above for *Geranium maculatum* fits what Yeo has termed the "seed ejection" mechanism, typical of *Geranium* subgenus *Geranium*. Subgenus *Geranium* includes two of our Virginia-native species, *Geranium maculatum* and *G. caroliniana*. Also classified in this subgenus are several introduced species that can be found in the Old Dominion: *G. columbinum*, *G. dissectum*, *G. sibiricum*, and *G. thunbergia*.

Using Yeo's (1984) terminology, species of subgenus *Robertium* exhibit a "carpel-projection" mechanism. There are two notable features regarding this category of fruit discharge. First, the seeds remain enclosed in their fragmented portions of the fruit as they are flung away from their parent plant. Second, the style tips disarticulate. But there is variation among species of this subgenus; in some the styles remain attached to the combined seed plus fruit fragments **(Figure 2, upper portion)**, while in others, the styles separate both at their tips and at their points of connection with the fruit lobes--consequently these style segments merely drop with no outward-directed force **(Figure 2, lower portion).** *Geranium robertianum*, native to Virginia, but also found widely in Eurasia and North Africa, is classified in subgenus *Robertium*, as are two additional species introduced to Virginia, *G. molle*, and *G. pusillum*.

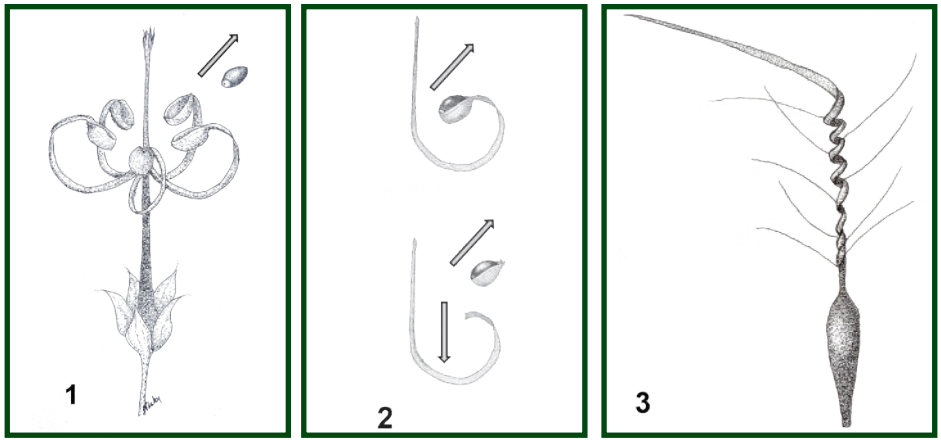

Figure 1. *Geranium maculatum*, fruit after ballistic discharge of seeds representative of *Geranium* subgenus *Geranium* ("seed ejection" mechanism).

Figure 2. Two dehisced mericarps as found in *Geranium* subgenus *Robertium* ("carpel pro-jection" mechanism); mericarps may disperse with an enclosed seed (above) or the seed may disperse alone with the mericarp falling away (below).

Figure 3. Helically twisted dehisced mericarp with enclosed seed typical of *Geranium* subgenus *Erodium* ("Erodium-type" mechanism); hygroscopic twisting and untwisting of the stylar awn effectively drills the seed into soft soil. Drawings by Nicky Staunton.

There is a third group of species, *Geranium* subgenus *Erodium*, but no species of this relatively small subgenus are known to occur in Virginia. Nevertheless, fruit discharge of the "*Erodium* type" is, perhaps, the most fascinating of all. In subgenus *Erodium*, each seed plus fruit fragment remains firmly attached to its corresponding style, the tips of which separate. Thus, all three structures, seed, fruit fragment, and style disperse together—much as in some species of subgenus *Robertium* **(Figure 2, upper portion)**. But for subgenus *Erodium*, there is, literally, a twist, because cells of the style region have a unique pattern of cell wall thickenings. During discharge, while the plant parts are still airborne, a portion of the style closest to the fruit/seed takes on a tightly coiled configuration **(Figure 3).** Further, these tightly twisted styles are hygroscopic. With high humidity, dew, or rain, the dispersed style fragments absorb water, and the coils relax, but as the air dries again, the coils reform. These disarticulated fruit fragments display remarkable mobility, for a plant!

Another important feature of subgenus *Erodium* is the presence of stiff hairs on style fragments. After dispersal, these hairs, and the non-coiling upper portion of the style act like temporary anchors that hold the style apex in place while the style base uncoils hygroscopically. The net effect is that the seed-bearing portion of the structure is pushed forward with every episode of moisture or high humidity, but the hairs prevent backward movement during subsequent episodes of dry air-induced recoiling; in fact, recoiling pulls the temporarily anchored distal end of the style forward a small increment. The angled hairs are critical because they allow forward creep and prevent backward motion. Eventually, the forward thrusting seed-bearing portion encounters a small divot in the soil, or perhaps a rock or pebble too heavy to be pushed aside; when this happens, continued hygroscopic coiling and uncoiling has the effect of drilling the seed-bearing portion of the structure into the soil. In effect, species with the "*Erodium*-type" discharge mechanism plant themselves in the soil!

By the way, if the subgenus name "*Erodium*" has a familiar ring, it is because this subgroup of *Geranium* species was named for its similarity to the fruit-seed discharge mechanism found in genus *Erodium* (Evangelista et al. 2011). There is a species of this genus, *Erodium cicutarium*, that is not native to Virginia, but is commonly found in weedy waste places throughout the state. In fact, other members of the Geranium family, including *Pelargonium* (Florist's Geranium), share this combined seed dispersal and seed self-burial phenomenon. Given the ubiquity of garden *Pelargonium* and the abundance of weedy *Erodium*, ample opportunity exists for curious naturalists to observe the phenomenon of self-planting seeds.

Finally, one of the great delights that comes from the study of biodiversity is the discovery of remarkably similar adaptations in organisms distantly related to each other. Single-seed fruits that drill themselves into soil or sand also occur in two grasses native to Virginia. These are *Piptochaetium* (*Stipa*) *avenaceum*, Eastern Needlegrass, widespread across the state, and *Aristida tuberculosa*, Sea-beach Needlegrass, found on sand dunes of the Eastern Shore. Grasses are monocots and Geraniums are eudicots; these plants are, indeed, only very distantly related to each other, but both groups capitalize on intricate hygroscopically active appendages to bury their seeds underground.

Plants do *seem* to be passive. Hence, the perennial challenge of engaging student interest in botany. Stories about exploding fruits and self-planting seeds certainly help to enliven class, without resorting to yelling hysterically at the green wonders that grace our world!

—W. John Hayden, Botany Chair

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A panoramic view of Difficult Creek Natural Area Preserve. (Natural Heritage)

Dissecting a Piedmont remnant
The Flora of Difficult Creek Natural Area Preserve

From Your Natural Heritage Program

By Johnny Townsend

DCR's Natural Area Preserve system contains some real jewels. No shocking news there. Some of the preserves have that extra wow factor that makes them a natural draw: broad mountain vistas, open marshes, deep, mysterious caves. These places get lots of love – sometimes too much. Others, however crucial they are to conserve, tend to fly under the radar. Difficult Creek NAP qualifies in the latter category – perhaps due to ticks and heat - though its fame as a botanical hotspot is growing each year. In 2018, after years of botanists crowing about the rare species and diversity of the flora there, it was time to document how unique it really is and how it came to be that way.

The method I used was very intensive but relatively common among botanists. A floristic study (or flora) is at its core an intensive botanical inventory of a property, using the collection of voucher specimens to document species composition and habitats. In the case of Difficult Creek, many other factors such as land management, historic accounts of the landscape, and the changing plant communities were equally as important. An account of this 2-year study entitled "Floristics of Difficult Creek Natural Area Preserve: A Piedmont Mafic Woodland Complex in Halifax County, Virginia, U.S.A." was recently published in the *Journal of the Botanical Research Institute of Texas.* After two sweaty and tick-filled southern Piedmont field seasons, I can provide some exciting insights.

First off, this study did not happen in a vacuum. Longwood University professor Alton Harvill and his wife Barbara discovered the first rare plants at Difficult Creek in 1972. Once rediscovered by botanist Chris Ludwig many years later, botanists have visited and documented many odd members of the flora. During my work, I was able to get a full appreciation for the rare, the common, and the weedy, 653 species in all. That number may not sound like much for a 900-acre property but we used other, more rigorous methods that help put this species diversity in perspective. Vegetation plot sampling revealed some astonishing levels of species richness, with 90 to 100 species found in our 100 m^2 plots and over 40 species found in a single, 1 m^2 plot sample. Among the over 4,000 plots sampled by Natural Heritage ecologists across Virginia, these numbers sit right at the top. General feelings about ecosystem diversity are one thing but numbers are always better. Within a single genus, (*Dichanthelium*, or Witch Grasses), for example, species diversity far outstrips documented levels for the Piedmont (or for that matter anywhere else studied in Virginia). Moreover, *Dicanthelium* diversity at Difficult Creek is most comparable to numbers documented in the southeastern Coastal Plain, the area of highest diversity for the genus in the entire U.S. This came as a shock.

Endemism is not a properly apppreciated phenomenon in our Piedmont flora, but examples of plants restricted to the southern Piedmont do exist, including

Johnny Townsend and Chris Ludwig engage in Vegetation Plot Sampling at Difficult Creek NAP (Natural Heriitage)

From left to right: Appalachian Witch Grass (*Dichanthelium appalchiense*) and Harvill's Witch Grass (*Dichanthelium harvillii*) (Natural Heritage)

those documented at Difficult Creek. To mention only the rarest of these species, the preserve is home to Tall Barbara's Buttons (*Marshallia legrandii*), a recently described species known historically from only five locations in Virginia and North Carolina. The populations in North Carolina and at Difficult Creek are the only ones remaining. Going back to the Witch Grasses, we now know of another endemic, Harvill's Witch Grass (*Dichanthelium harvillii*), a species currently known only from Difficult Creek. This is one of two new *Dichanthelium* recently described from Virginia; these species are the first to be recognized in the U.S. in 60 years. These two taxa attest to how unique and crucial the preserve is to our regional biodiversity.

These numbers help paint a picture of a Piedmont flora we rarely see. Surrounded by a sea of converted, fire suppressed, and altered lands, places like Difficult Creek give us a sense of what the Piedmont once was when natural forces (including human) reigned. Similar habitats exist in the Carolinas, also isolated in a landscape that saw some of the earliest impacts from modern agricultural practices. These analogous Carolina habitats have been better studied, providing a good reason for scrutinizing Difficult Creek more thoroughly and putting our preserve on the botanical map.

Finally, but most crucially, habitat management at Difficult Creek is responsible for the diversity we see there. Without this steady work by Natural Heritage Stewardship staff, the flora would continue to be suppressed since many species are adapted to natural disturbance and high light intensity. In other words, without the management angle, I would not have even attempted this study. Guided by historical narratives and estimates of natural fire frequency in the region, management of the property involves thinning of the dense, planted loblolly pine forests and use of prescribed fire. The hardwoods and shortleaf pine native to the site will become more important as management progresses, and at a density that allows the diverse understory flora to thrive.

As to my first paragraph and the appreciation of our preserves, this one in Halifax County should be on the bucket list of every plant lover. Showy species, rare species, species found nowhere else, and impressive diversity – all in a part of the world where we need conservation the most.❖

American Wisteria is VNPS WOY in 2021

For several decades now, the first newsletter of the year has contained the brochure for the selected VNPS Wildflower of the year. The enclosed brochure will introduce all to American Wisteria (*Wisteria frutescens*).

As always, the brochure is a collaborative effort by a number of folks, first and foremost being Botany Chair John Hayden, who draws upon both his deep knowledge of Virginia plants and his wordsmithing skills to craft the text.

The pen and ink drawing is a contribution of Nicky Staunton, past Society president, who has long allowed us to use her detailed illustrations for both the newsletter and the WOY brochure. For that we are very grateful.

In addition, Su Kim has provided the color photographs and Nancy Sorrells is responsible for the brochure layout.

Finally, readers will notice that the cover of this year's brochure is graced with a delightful watercolor illustration from Elena Maza Borkland.

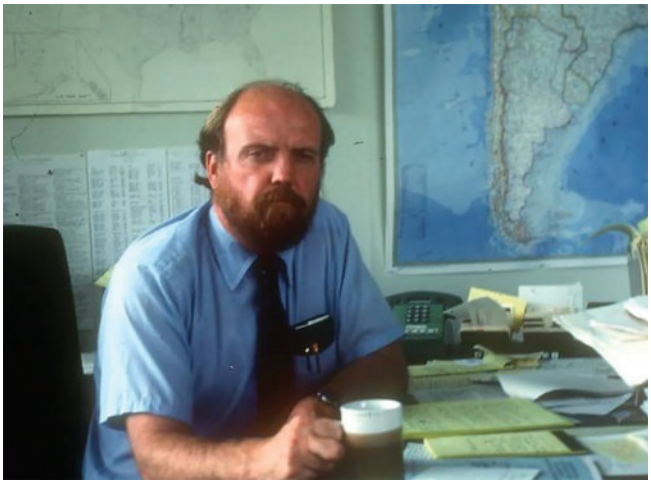
Elena has agreed to contribute a portion of the proceeds from sales of the Wisteria painting to the Cathy Mayes Memorial Fund. If you are interested, contact vnps.org@gmail.com.

In Memoriam
Conservation giant leaves amazing legacy

The methodology and, in fact, the very existence of the Virginia Natural Heritage Program is due to one man, Dr. Robert Jenkins, who passed quietly in late 2020. Dr. Jenkins may not have been as famous as E.O. Wilson, his major professor, but his role in modern biodiversity conservation has been as significant as any.

Bob joined The Nature Conservancy as the group's first vice president of science in 1970. He argued successfully that the organization should focus its land conservation on protecting biodiversity, not just pretty places. While that seems obvious today, at the time, the Conservancy became the first organization with a mission to protect biodiversity.

Dr. Jenkins saw the link between data and conservation as the key to success. After all, how can we protect biodiversity if we can't measure it? In answer, Bob emerged as the designer of the "Natural Heritage" system and its methodologies. Bob and his team brought the system to South Carolina in 1974 and proceeded to establish Natural Heritage Programs in all 50 states, every Canadian province and multiple Latin American countries. The Virginia Program launched in Richmond in 1986. The system, much as Jenkins designed it, lives on to this day and is employed by the Virginia Natural Heritage Program along with more than 100 other programs, employing over 1,000 scientists that stretch across most of the Western Hemisphere. The Natural Heritage Network leadership now resides at NatureServe, developing and directing much of the methodology employed by natural heritage programs.



Bob Jenkins at his desk.

Natural Heritage inventory is designed to provide objective data toward answering fundamental questions needed for successful biodiversity conservation. Where does species A occur on the landscape? What areas are already protected? What is the global status of species B? What is the quality of the natural communities occurring at a given site? This information is basic, but crucial and, in fact, almost every decision made regarding biodiversity conservation is informed by the information collected by the Natural Heritage Network.

If you love natural community, native plants and animal conservation, thank Bob Jenkins. If you love your state natural area preserves and natural heritage program, thank Bob Jenkins. As Bob would say for all our conservation work, "Onward and Upward."

—Chris Ludwig and Tom Smith
Virginia Natural Heritage

Fleming taught nature to all

Another Society stalwart left the VNPS fold. Cristol Schwarz Fleming, known as Cris to us all, passed away peacefully at home with family beside her on January 15.

Cris was born in 1935 in Los Angeles and moved to the Washington, D.C., area with her family, where she met her future husband Jonathan W. Fleming in high school.

Cris earned a BA in literature from Bennington College. She loved children and was a gifted teacher of all ages. In 1975, she initiated the much loved after-school and summer nature programs at the Audubon Naturalist Society (ANS).

Her interest shifted to botany. She led numerous field trips and classes, establishing herself as an accomplished and respected botanist and field instructor. She was the primary author of the book *Finding Wildflowers in the Washington Baltimore Area*, published in 1994. She served on the boards of the Maryland and Virginia Native Plant Societies.

Cris never had any interest in following trends or the world's expectations, instead choosing to find her own joy in her family, friends, nature, and the arts.

Cris Fleming was in her element when outside.

Memorial Fund remembers Mayes

The Piedmont Chapter of the Virginia Native Plant Society invites you to join in creating a Memorial Fund to honor Cathy Mayes, our extraordinary board member, treasurer, and friend. As you might know, Cathy was also a board member at the Clifton Institute. She played significant roles in many more environmental groups, including the American Chestnut Foundation, the Old Rag Chapter of Virginia Master Naturalists, and the Virginia Working Landscapes program at the Smithsonian Conservation Biology Institute. Cathy was also the Treasurer of VNPS at the state level for many years.

Cathy was especially interested in research, helping start the VNPS Research Grant Program using bequests. One grant was recently awarded to Clifton Institute to study the native grasslands of the northern Piedmont. Clifton Institute and the Piedmont Chapter have a long relationship, working together on projects and field trips.

The Memorial Fund will support significant projects under the auspices of Clifton Institute. The first project will be to create a Cathy Mayes Memorial Pollinator Meadow. An area of the Clifton property around the pond and spillway, where no native seed bank remains in the disturbed soil, will be restored, using locally collected seeds of regionally appropriate native species. This meadow will benefit pollinators and serve as a model for restoration and education. Several uncommon plants of the Piedmont grasslands will have a home there, among more common grassland natives. A bench and a plaque will be in the meadow.

Clifton Institute has several research projects ongoing or waiting in the wings. The work there is very exciting to see. One project will survey plants to study the use of fire as a management tool in a special habitat called a greenstone barren. Another will use an insect survey to evaluate the effects of establishing native plants in an old field. If the memorial fund is sufficiently large, it will support students and interns on projects.

Cathy Mayes, longtime Society advocate

Please share in honoring Cathy's life and environmental work by donating to our Cathy Mayes Memorial Fund. Send your tax-exempt donation to VNPS Piedmont Chapter, P.O. Box 336, The Plains, VA 20198 (or donate online at https://vnps.org/piedmont/cathy-mayes-memorial-fund/). A generous donor has offered to match up to $5,000.❖

Forest trails beckoned Society's Jay Shaner

The mountains of western Virginia and West Virginia will probably miss the frequent visits of Staunton's Jay Shaner, an exuberant member of the now discontinued Shenandoah Chapter. Jacob Francis "Jay" Shaner, Jr., 78, husband of Shelda Baldwin Shaner, passed away of heart issues on November 12, 2020. He was born in Ornoco (Amherst County), on January 15, 1942, a son of the late Jacob F. Shaner, Sr. and Frances (Burch) Shaner. Jay graduated from Wilson Memorial High School in Fishersville and (NHLA) National Hardwood Lumber Association Inspection School in Memphis, TN. He was co-owner of (VFP) VA Forest Products.

Jay knew the natural world like the back of his hand. His specialty was plants. He knew what backroad or hidden trail contained the wonders of the plant world and he knew when to visit those places to see peak bloom. He frequently led plant walks into the mountains. I have hiked with him on several occasions; the most memorable was up to a shale barren in Bath County.

Jay Shaner speaks from a mountaintop shale barren during a VNPS Annual Meeting.

When I was researching an Augusta County woman who was a well-known amateur botanist, I asked Jay if he would ride with me to the Virginia Tech herbarium. The wonderful conversation there and back and the several hours spent immersed in the plant world at the herbarium produced wonderful memories.

Surviving in addition to his wife of 54 years is a son, Jason Shaner and wife, Nicole Frazer; beloved grandson, Liam Shaner; sister, Nancy Loth (William) and brother Jed Shaner (Cindy).

Jay is off traveling a new trail through the forest, but he will be sorely missed here in our woodlands.

—Nancy Sorrells, Editor

Sinkhole Ponds

(Continued from page 1)

The Lyndhurst site contains several sinkhole ponds, including the "crown jewel" of the property, a large sinkhole pond where rare plants grow, such as Virginia Sneezeweed (*Helenium virginicum*), Valley Doll's Eyes (*Boltonia montana*), Black-fruited Spikerush (*Eleocharis melanocarpa*), and Lowland Loosestrife (*Lysimachia hybrida*). The ponds are also home to the rare Tiger Salamander.

For much of the 20th and 21st centuries, the land surrounding the ponds has been grazed, but, under DCR, it will be returned to a more natural state. "The pond is the primary focus, but we will manage the site in blocks," Urgo explained. He noted that for the last 15,000 years, from the last glacial period until the 20th century, the landscape was managed by fire, both natural and manmade.

"About 80 acres will be returned to Virginia native grasses like big and little bluestem, as well as other native warm season grasses and forbs," Urgo said.

There will also be a block of the property where the native forest will be restored. One of the trees that Urgo hopes will return in larger numbers is shortleaf pine (*Pinus echinata*), a slow growing, straight, prized timber tree. These pines are rarer today because they were heavily timbered for naval use and because they require fire for germination. One beautiful example stands on the property today just a few hundred yards from the sinkhole pond.

To manage the property for burning, Urgo will divide the site into several blocks with each section being burned every two or three years. "Hopefully this will leave us with a mosaic of habitat diversity," he said.

"A burn takes 40 to 50 people and a lot of planning. It takes many days to plan and one day to burn. Before a match is ever struck here, it will probably be at least the spring of 2022."

In addition to the plantings and fire management, Urgo's team will also work to control the spread of invasive plants such as Autumn Olive and Tree of Heaven that are now on the property.

Urgo is excited about the opportunity to preserve and manage the Lyndhurst Ponds Natural Area Preserve, but notes that the process to return the site to its natural state before European settlement will not happen overnight.

"A lot of monitoring will take place and it will be a decade long process."

—*Nancy Sorrells, Editor*

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