Sempervirens

Fall 2021 The Quarterly of the Virginia Native Plant Society

Identifying and prioritizing Va.'s natural resources

In 2020, I, like many other homebound people, began to renovate part of my house. As with any major renovation, it was important that my contractor understand where existing electrical lines, pipes, and other significant structural items were and their condition. To start the work without this information would be foolhardy and potentially dangerous. Similarly, making changes to our landscape should include the important first step of identifying what the *natural heritage resources* are, where they are, and how they are doing. The Virginia Natural Heritage Program (VNHP) strives to do exactly that, starting with identifying which plant and animal species, natural communities, and unique geological features occur in Virginia.

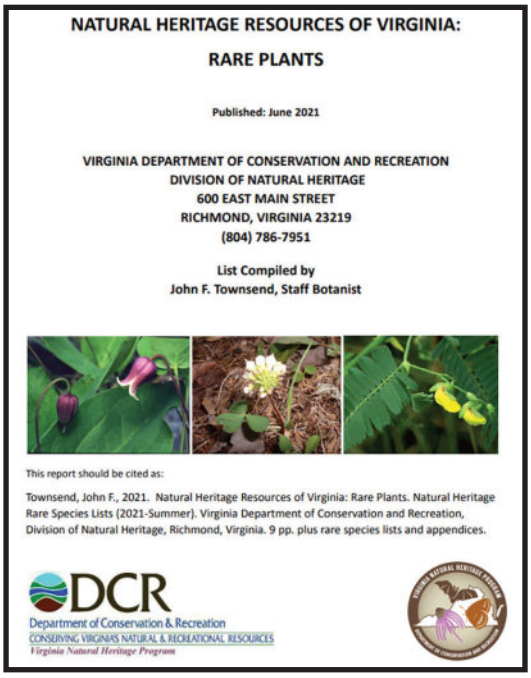
From Your Natural Heritage Program

By Anne Chazal
Chief Biologist, VNHP

The Inventory Section of VNHP is composed of professional botanists, zoologists, karst scientists, and vegetation ecologists. The lead staff from each team is responsible for developing and maintaining a list of all the species, geological features (mainly caves), and community types (collectively called 'elements' of biodiversity) known to occur in the Commonwealth. These lists are always being updated and refined to reflect the best available information. New species to the state are being added each year, whether it's a dragonfly expanding its range northward, or a seldom-surveyed-for bryophyte being discovered. There are also taxonomic changes to keep up with, improved data sets and metrics for defining communities, and explorations of new areas that reveal new significant caves.

But to effectively target priority elements for conservation, we need more than a list, we need additional information to help identify the most vulnerable. To that end, each element is assigned two conservation ranks at different spatial scales: a global rank (G-Rank), and Sub-national rank (aka, state rank, or S-Rank). These ranks are meant to give a quick snapshot of how the element is doing. The G-rank indicates its status across its entire range while the S-rank indicates its status only within Virginia. With this approach, other state Natural Heritage Programs can utilize a consistent G-rank, but have a specific S-rank for conservation decisions. Conservation ranks range from critically imperiled (1) to secure (5) and are applicable to both the G-rank and S-rank (Table 1). There are additional ranks to indicate if elements haven't been seen in a long time, or have been extirpated.

The VNHP considers any element with a G-rank between 1 and 3, or an S-rank of 1 or 2, to be of high conservation concern. These are the elements we track with detailed information about their locations and status, and therefore focus on for our field inventories, data development, project reviews, protection efforts, and stewardship goals. You can find the lists of these tracked species and the ranks of the communities at (https://www.dcr.virginia.gov/natural-heritage/infoservices#lists).


NATURAL HERITAGE RESOURCES OF VIRGINIA:

RARE PLANTS

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DCR
Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL & RECREATIONAL RESOURCES
Virginia Natural Heritage Program

Cover of the Natural Heritage's rare plant resource guide.

The two documents, *Natural Heritage Resources of Virginia: Rare Animals* and *Natural Heritage Resources of Virginia: Rare Plants,* include the scientific name of each species, common name, G-Rank, S-Rank, and any legal threatened or endangered listing (federal or state) assigned to it. Both lists also contain a 'watch list', which includes species that are uncommon in Virginia, but do not (perhaps, yet) warrant listing on the rare species lists. Both lists are updated four times a year. The rare animal list includes both vertebrates (189), and insects and selected other invertebrate groups (619), and an additional 369 taxa on the watch list. The plant list includes information on rare vascular (630) and nonvascular

(See Making a list, page 3)

Society continues to place conservation first

From the President, Nancy Vehrs

Our VNPS annual meeting, with a focus on conservation, seems a distant memory at this point, but conservation is always at the forefront of who we are. Elsewhere in this issue, Peggy Troyer recaps the meeting where we announced the focus of our annual fundraiser, the Natural Area Preserves Fund. As noted in our solicitation letter, State and Federal land acquisition grants are critical to the Virginia Natural Heritage Program for acquiring properties most in need of protection and stewardship. These grant funds are reimbursed upon project completion, and there is no dedicated funding source to pay for required up-front due diligence activities such as title searches, surveys, appraisals, and environmental assessments. As a result, critical land acquisition projects have been delayed or lost altogether.

We want to change that by establishing a dedicated Natural Area Preserves Fund. Too many projects have been affected due to inadequate on-hand funding and timing because of this longstanding issue. Every dollar you contribute toward the Natural Area Preserves Fund will address this concern and help underwrite future land acquisitions by the Natural Heritage Program, all of which protect rare plants and natural communities forever. Our fundraiser continues through the end of the year and we welcome your financial support. A sincere thank you goes out to those of you who have already donated.

In addition to our regular cash donation solicitation, this year we held an online silent auction to benefit this Natural Area Preserves Fund. We asked for donations of products and services, and you delivered! Thank you! Our auction offered more than 70 items ranging from plant inventories to gift certificates, books, T-shirts, original art, and more. The item generating the most bids, 19, was the two-night stay at a home in Lexington. We are grateful to the five businesses that helped fund the auction with gold and silver sponsorships totaling $950. Thanks also to all our members and friends who bid on items to support the effort and especially VNPS fundraiser chair Peggy Troyer and web admin Mark Murphy. Mark's technical prowess and a considerable commitment of time made the auction a model of professionalism. After all the fees and taxes, the auction items netted a grand total of $5,231.

In the last *Sempervirens,* I reported on the progress of the state's Invasives Plant Species Work Group created by House Joint Resolution HJ 527. The group continued to meet through November, but, unfortunately, horticulture industry representatives and conservation representatives were unable to agree on any substantial recommendations. Nevertheless, the VNPS and other conservation groups plan to pursue in the upcoming General Assembly additional measures to combat the sale of invasive species. Watch for action alerts by email and be prepared to contact your elected representatives about this important issue.

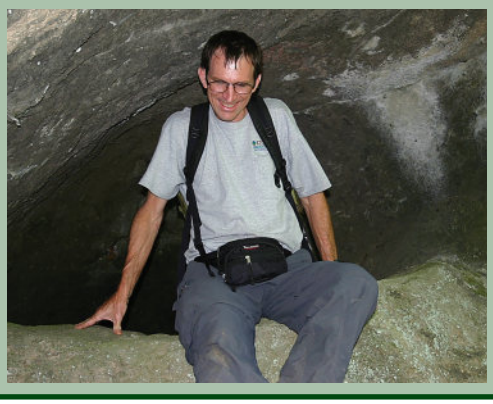
On another note, several key people in the Virginia Department of Conservation and Recreation are retiring by the end of this year. Our friend Tom Smith, currently deputy director for operations, headed the Division of Natural Heritage for many years. His strong leadership will be missed. Irv Wilson served as natural area protection specialist, and his photos grace both the DCR-DNH website and that of the Digital Atlas of the Virginia Flora, http://vaplantatlas.org/. Vegetation ecologist Gary Fleming, legendary for his knowledge, particularly in the area of natural communities, is retiring as well. Gary has led many field trips for the VNPS, is a co-author of the *Flora of Virginia*, and contributed his extraordinary photography both online and in print. We wish them well in retirement and hope that they all will continue to collaborate with the VNPS.

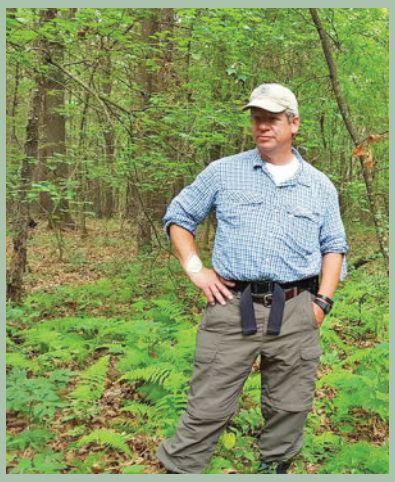
Beautiful glass art work donated by Betty Truax for the silent auction. (Nancy Vehrs)

With a new administration taking office in January, we can expect a number of changes in the executive branch of state government. Conservation is not a partisan issue and we will continue to advocate for funding for conservation staff and programs and strong policies to protect our treasures.

Happy Holidays! ❖

Natural Heritage Legends





Several important Virginia Department of Conservation and Recreation staff members are retiring at the end of 2021. Sorely missed will be, clockwise from top left, Gary Fleming, seen here at False Cape State Park; Tom Smith, inspecting one of the department's Natural Area Preserves, and Irv Wilson exploring a dolomite outcrop.

Making a list

(Continued from page 1)

plants (70) and lichens (25), with 230 additional vascular taxa on the watch list.

The Natural Communities of Virginia: Ecological Groups and Community Types: a listing with conservation status ranks was recently updated to reflect classification changes since 2017. This document includes links to internet resources with further information about Virginia's Natural Communities, including links to *The Natural Communities of Virginia: a Classification of Ecological Community Groups and Community Types.* This work is the latest version of the natural community classification since the initial hard-copy publication in 2001. The website is illustrated with captioned natural community photos added in gallery-style pages linked from the Ecological Group pages. The web content includes descriptions and range maps of Ecological Community Groups, links to Community Type descriptions, and downloadable MS Excel tables of plant species compositional summaries for each Community Type.

Global or State Rank	Meaning
1	Critically Imperiled — At very high risk of extinction or elimination due to very restricted range, very few populations or occurrences, very steep declines, very severe threats, or other factors.
2	Imperiled — At high risk of extinction or elimination due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.
3	Vulnerable — At moderate risk of extinction or elimination due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.
4	Apparently Secure — At fairly low risk of extinction or elimination due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.
5	Secure — At very low risk or extinction or elimination due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.
H	Possibly Extinct — Known from only historical occurrences but still some hope of rediscovery. Examples of evidence include (1) that a species has not been documented in approximately 20-40 years despite some searching and/or some evidence of significant habitat loss or degradation; (2) that a species has been searched for unsuccessfully, but not thoroughly enough to presume that it is extinct or eliminated throughout its range.
X	Presumed Extinct — Not located despite intensive searches and virtually no likelihood of rediscovery.

Table 1 - Definitions of Conservation Ranks

All of these tracked animals, plants, and communities are central to the Natural Heritage mission of documenting, protecting, and managing Virginia's biodiversity. They are the first step to to prioritizing species and ecosystem targets for inventory, mapping, research, monitoring, restoration, and conservation. To move ahead with land use decisions without the most basic information of what could be potentially present, would be foolhardy indeed. ❖

Does coevolution explain vine behavior?

Article and illustrations by W. John Hayden, Botany Chair

Our VNPS Wildflower of the Year, *Wisteria frutescens*, is widely considered to be, relatively speaking, a "well-behaved" vine, not likely to run rampant over the trees and shrubs that it uses to climb into the sunlit canopy of our forests. In this respect, our native Wisteria stands in direct contrast to its relatives from Asia, *W. floribunda*, *W. sinensis*, and their evidently very widespread hybrid, *W.* x formosa. These exotic Wisterias are among the worst of our invasive exotics; they are frequently accused of "strangling" tree trunks, and "smothering" the foliage of the trees they climb; further, exotic Wisterias will also occupy the herb layer of forests, spreading from elongate stems that fail to find a vertical support and from shoots that sprout readily from roots after large climbing stems have been cut. Why is it that native and exotic species of the same genus behave so differently? More broadly, why is it that this seems to be the general case, that exotic vines tend to be rampantly invasive, while native vines seem, overall, more restrained in their plant-to-plant interactions? One answer to these questions has been offered frequently on the VNPS Facebook page: it has often been asserted that native vines and native trees have coevolved for millenia to the mutual advantage of each, whereas exotic vines have been in eastern North America for only a hundred years or so and the exotics therefore lack the coevolutionary adaptations that characterize the natives. This article explores whether coevolution versus lack-of-coevolution is a reasonable argument to explain these contrasting vine-on-tree interactions. Spoiler alert: I am skeptical about the appropriateness of invoking coevolution as an explanation for the seemingly benign interactions frequently noted for native vines and the native trees they climb.

Whenever I have encountered the assertion that native vines and native trees have coevolved, I wonder, immediately, how? In what way did native vines AND the trees they climb change from some previously held suite of characteristics to other, newly evolved, states that function for the mutual advantage of each? For there to be a bona fide case for coevolution, two different species must be demonstrated to have undergone evolutionary change in response to each other. In the case of native vines and native trees, while the general idea of coevolution has been asserted frequently, I have yet to see specifics about how each plant has, somehow, accommodated the other for the mutual benefit of both.

On the heels of wondering what specific characters might have coevolved, other questions arise. For example, let's assume for the moment that our native vines and trees did, somehow, coevolve. If that were the case, would not eastern Asian vines, those that are now invasive here, also have coevolved with the trees of their homeland? It would seem arbitrary to assert vine-to-tree coevolution in eastern North America and deny that the same phenomenon could occur in eastern Asia, or any other corner of the globe, for that matter. If the details of vine-to-tree coevolution were the same in different parts of the globe, and if no other factors were involved, it would follow that exotic vines ought to be no more rampant in their ecological interactions than our native vines—but that is not what we so readily observe. So, if vine-to-tree coevolution were real, the details of co-adaptations made between vines and trees in eastern North America must be different than those made between vines and trees in eastern Asia. I am compelled to note that the hypothetical coevolutionary scenario is getting complex: specific examples of how Virginia vines have coevolved with Virginia trees seem to be unknown, but logic suggests that if we accept widespread vine-to-tree coevolution, the rampant invasiveness of exotic vines in eastern North America suggest that different, also unspecified, co-adaptations must have arisen in other parts of the world.

The coevolution assertion becomes even more complex when we consider the details of how different vine species climb their support trees. Not all vines achieve their lianous growth habit in the same way. Some vines twine, i.e., they wrap their stems around the trunks of the trees they climb; other vines use tendrils to attach themselves to their support; and others, still, produce aerial roots that grip nooks and crannies of tree bark (see the examples listed in Table 1). Further, not all tree bark is structurally the same; bark of some species is smooth,

	Native vines	Exotic vines
Twining vines:	*Celastrus scandens*, American Bittersweet	*Celastrus orbiculatus*, Oriental Bittersweet
	Lonicera sempervirens, Coral Honeysuckle	*Lonicera japonica*, Japanese Honeysuckle
	Wisteria frutescens, American Wisteria	*Wisteria x formosa*, Asian Hybrid Wisteria
Vines with tendrils:	*Ampelopsis* (*Nekemias*) *arborea*, Peppervine	*Ampelopsis brevipedunculata*, Porcelain-berry
	Bignonia capreolata, Cross-vine	
	Vitis spp., Wild Grape	
Vines with aerial roots	*Campsis radicans*, Trumpet Vine	*Hedera helix*, English Ivy
	Toxicodendron radicans, Poison Ivy	*Hedera hibernica*, Irish Ivy

Table 1. Growth habits of native and exotic vines, selected examples.

bark of most trees is rough, and for rough-barked trees, the details of their roughness vary significantly from species to species. Moreover, let's not forget that, within a given tree species, bark surface texture often changes as a function of age. If a history of coevolution were truly fundamental to how native vines and native trees interact, it would take a welter of different coevolutionary adaptations to encompass all the variations of vine climbing strategies and all the different forms and textures of tree bark that may be encountered as any species of vine climbs its way to the canopy of various trees in the forest.

Further still, there is no specificity in the determination of which vines climb which trees. Native and exotic Wisteria will climb pretty much whatever tree is nearby. So, to invoke coevolution as an explanation for the relatively restrained interactions of native vines and native trees as opposed to the rampantly invasive features of many exotic vines, one must posit suites of coevolutionary adaptations to accommodate all possible combinations of native vines and native tree species which they are known to climb.

Bottom line: the assertion that native vines and native trees have coevolved with each other for millenia to achieve mutually beneficial modes of interaction lacks specific examples of co-adaptation between these two categories of plants; further, contemplation of what characteristics might be involved in this hypothetical process of coevolution suggests a mind-bogglingly complex array of potential vine-to-tree adaptations. I cannot disprove the coevolution assertion discussed here, but until someone presents a compelling, evidence-based, case for coevolution between a native vine and a native tree that it climbs, I remain skeptical. Let us remember that millenia of co-existence is not the same thing as millenia of coevolution.

Nevertheless, the fundamental observation at the root of supposed vine-tree coevolution is patently obvious to anyone who takes a hike in the woods. Invasive vines are often rampantly dominant in their interactions with native trees whereas native vines appear to be much more restrained. Why is this so? Perhaps, we should look at invasive exotic vines as merely one growth habit subset of the woefully large category of invasive exotic plant species that plague our environment. Maybe the reason exotic vines become rampant is parallel to the reasons why annual herbs (like Japanese Stilt Grass, etc.), perennial herbs (like Japanese Knotweed, etc.), shrubs (like Autumn Olive, etc.), and trees (like Tree-of-Heaven, etc.) also are so terribly invasive. Maybe the rapaciousness of invasive vines has nothing to do with hypothesized lack of coevolution with the trees they strangle, smother, or otherwise out-compete—maybe it is just another example of the dynamics so commonly observed with invasive species.

My alternative explanation for the rapaciousness of exotic vines shifts the discussion to the more general question: "Why do exotic species, in general, so often prove to be invasive?" While formal, predictive, models for which exotic species may or may not become invasive remain elusive, a number of readily identifiable factors apply in many cases. In general, invasive plants: 1) grow rapidly, 2) reach reproductive age quickly, 3) reproduce prolifically via seeds or via asexual means, and 4) have successful dispersal mechanisms. These four factors, plus the very real possibility that exotic species may have "escaped" from predators (herbivores), diseases, and parasites present in their homelands, will provide an extra competitive edge in their interactions with native flora. Exotic vines may be invasive for the same reasons that apply to invasive exotic plants in general.

It seems reasonable, to me, to expect that whatever negative effect exotic Wisterias might exert on native vegetation, American Wisteria, probably does the same, just to a lesser degree than the exotics. Native vines certainly must add a burden of extra weight to the trees they climb; sail-like, native vine canopies must catch winds and exert some extra

Wisteria frutescens 'amethyst falls'

torsion on the tree trunks to which they are attached; leaves of native vines must inevitably shade, to some extent, the leaves of the trees with which they compete for sunlight; and roots of native vines cannot help but compete for water and mineral nutrients with their arboreal neighbors. My expectation is that the net effect of interactions between native vines and native trees is negative, not positive.

Plants are involved in so many mutualistic relationships with other kinds of organisms, I suppose that it was tempting to assert some sort of mutualism between native vines and native trees. However, plant-plant mutualisms in nature appear to be extremely rare, a fact that should not be surprising given that all green plants have pretty much the same needs in terms of mineral nutrition and water supply from the soil, and access to sunlight to drive photosynthesis in leaves. Fundamentally, plant-plant interactions are competitive. Plant-animal mutualisms and plant-microbe mutualisms evolve much more readily because the basic life-supporting requirements of such disparate partners are complementary, not competitive. The search for a co-evolved mutualistic relationship between native vines and native trees strikes me as quixotic. Let's abandon the idea unless, or until, specific details of coevolutionary mutualism between native vines and native trees can be demonstrated.❖

UJRC members explore McCormick Farm

Article and photographs by Phyllis Fevrier, Upper James River Chapter

In the spirit of the Society's Annual Meeting field trip initiative, a dozen members of the Upper James River Chapter gathered on September 18 at McCormick Farm, an historic landmark that is today part of the Shenandoah Valley Agricultural Research and Extension Center in Raphine, to explore the center's nature trail.

McCormick Farm, a mile from I-81 in Raphine, and open to the public, is a two-acre historic site within the larger agricultural research and extension center owned and operated by Virginia Tech. The 620-acre farm, which straddles the line separating Rockbridge and Augusta counties, was once owned by the McCormick family, during a time when the Shenandoah Valley was one of the largest wheat producing areas in the nation. It was here in 1831 that a young man named Cyrus McCormick successfully demonstrated a mechanical grain reaper. McCormick's invention revolutionized agriculture and he soon moved to Chicago to market his invention and found a company now called International Harvester.

Descendants of the McCormick family donated the farm to Virginia Tech, where innovations in agriculture continue today, however two acres of the site have been set aside to tell the story of McCormick's invention. The blacksmith shop where the reaper was created and a restored working grist mill are open to the public as is the Marl Creek Interpretive Trail, which was the focus of the chapter members on this field trip. Virginia is served by many regional agriculture research stations, but this one is the only one to host a riparian buffer dedicated to native plants. Marl Creek is a headwaters stream of the James River.

On our trip, we rediscovered a local gem for botanists, birders, and historians alike. Our chapter's main interest was to identify as many native plants as possible in the riparian buffer along the Marl Creek Interpretive Trail that starts at the grist mill and follows the creek around the mill pond and to the spring and wetland that is the source for the pond and creek.

Chapter members confer on a plant identification along the trail.

The large welcoming sign at the trail head gave us great insight into the history. The mill pond was built to provide a steady source of water to run the now-restored McCormick grist mill that has been in use since the 1700s. Marl is a sedimentary rock similar to limestone. The half-mile trail has numerous interpretive signs about changing land use over time and its effect on the stream and associated habitat as well as information about the various habitats, plants, and animals found along the trail that parallels the stream.

During the last several centuries, agricultural land practices have changed, affecting the land and the water. The famous McCormick reaper innovated grain farming, but farming practices today lean more toward pasture lands rather than grain fields. Soil erosion from farm pastures and crop fields as well as road construction led to increased sedimentation in the pond, which now includes a large area of wetlands. The extensive surrounding farm fields are now managed for long-term environmental health and agricultural production. Set aside for water quality protection and wildlife corridors, the sensitive riparian areas are now filled with native plants.

On the easy walk through this surrounding vegetative buffer of Marl Creek, we discovered some signage for large native trees like hickories, oaks, walnut, bass wood and elm. We discovered understory plants like Witch Hazel, Fringe Tree, Hawthorn, Blackhaw, Elderberry and Persimmon. We found many bog and shade loving native plants, like White Turtlehead, Blue Lobelia, Jewel Weed, False Nettle, and the tallest Pilewort ever imagined.

Our plant sleuthing rewarded us with a large list of diverse native plants, cultivating many conversations. We shared secrets of useful plant ID apps on smart phones, discussed medicinal uses of some plants, spotted invasive species, and noted the eradication efforts by the present day stewards.

In the spring of 2020, farm superintendent Dr. Gabe Pent introduced a wildflower meadow with a no-till drill using a variety of seed from Ernst Conservation Seeds in Pennsylvania. This wetland meadow at the end of the trail loop was a cheerful spot of bright yellow and blue, with Blue Mist Flower, Black-eyed Susan, and Partridge Peas in full bloom. A tribute sign at the site of a fallen American Chestnut and American Elm connect us historically to today's effort to reintroduce the American Chestnut. The changing landscape from pond to wetlands and beyond makes this site an interesting botanical field trip within an amazing historical context. When the field trip was finished, our plant list included 35 trees and shrubs and 28 other plants. ❖

Chapter 'Lists'

UJRNP Chapter Field Trip
McCormick Farm
September 18, 2021

The native plant meadow at the far end of the Marl Creek Trail.

People list: Jan Smith, Peggy Dyson-Cobb, Katherine Smith, Phyllis Fevrier, Peggy Agnor, Karen Lyons, Bob Biersack, Gary and Mary Helfenberger, Becky McKenzie, Carolyn Helmetsie, Janet Brister

Plant list, Trees and Shrubs: Pignut Hickory (*Carya glabra*), Shagbark Hickory (*Carya ovata*), White Oak (*Quercus alba*), Swamp White Oak (*Quercus bicolor*), Red Oak (*Quercus rubra*), Black Walnut (*Juglans nigra*), Black Cherry (*Prunus serotine*), Red Cedar (*Juniperus virginiana*) American Elm (*Ulmus americana*, deceased), American Chestnut (*Castanea dentate*, deceased), Basswood (*Tilia americana*), Green Ash (*Fraxinus pennsylvanica*, under treatment for emerald ash borer), Elderberry (*Sambucus canadensis*), White fringe Tree (*Chionanthus virginiana*), American Hawthorn (*Crataegus phaenopyrum*, with black knot fungus), Witch Hazel (*Hamamelis virginiana*), American Persimmon (*Diospyros virginiana*), Black Tupelo (*Nyssa sylvatica*), Tree of Heaven (*Ailanthus altissima*, invasive, under treatment for eradication), Eastern Hop Hornbeam (*Ostrya virginiana*), American Hornbeam (*Carpinus caroliniana*, Muscle Wood), Chestnut Oak (*Quercus prinus*), Scarlet oak (*Quercus coccinea*), Hackberry (*Celtis occidentalis*), Mulberry (*Morus rubra*), Yellow Poplar (*Liriodendron tulipfera*), Sassafras (*Sassafras albidum*), Eastern Redbud (*Cercus canadensis*), Black Locust (*Robinia pseudoacacia*), Box Elder (*Acer negundo*), Sugar Maple (*Acer saccharum*), Spicebush (*Lindera benzoin*), American Black Raspberry (*Rubus occidentalis*), Blackhaw (*Viburnum prunifolium*), Mapleleaf Viburnum (*Viburnum acerifolium*)

Others: Posion Ivy (*Toxicodendron radicans*), Virginia Creeper (*Parthenocissus quinquefolia*), Wild Grape (*Vitus* spp.), Trumpet Creeper (*Campsis radicans*), Greenbriar (*Smilax rotundifolia*, Catbriar), Crownbeard (*Verbesina occidentalis*), Wingstem (*Verbesina alternafolia*), Canada Goldenrod (*Solidago canadensis*), Spotted Wintergreen (*Chimaphila maculata*), Hog Peanut (*Amphicarpaea bracteata*), Autumn Olive (*Elaeagnus umbellata*, invasive, under treatment for eradication), Japanese Honeysuckle (*Lonicera japonica*, invasive, under treatment for eradication), Avens (*Geum* spp.), Pussytoes (*Antennaria plantaginifolia*), Bladder Campion (*Silene vulgaris*, non-native), Blue Mistflower, (*Conoclinium coelestinum*), Black-eyed Susan (*Rudbeckia hirta*), White Turtlehead (*Chelone glabra*), Pilewort (*Erechtites hieracifolia*), Jewel Weed (*Impatiens capensis*), Horseweed (*Erigeron canadensis*), Wild/Prickly Lettuce (*Lactuca serriola*), Thoroughwort/ Snakeroot (*Eupatorium* spp.), Calico Aster (*Symphyotrichum lateriflorum*), Partridge Pea (*Chamaecrista fasciculata*), Eastern Gamagrass (*Tripsacum dactyloides*), False Nettle (*Boehmeria ccylindrica*), Great Blue Lobelia (*Lobelia siphilitica*) ❖

One member of the chapter uses a plant app on her phone to identify a plant along Marl Creek.

Grasslands, Wing-mediated Pollination secure Society grants

In 2015, VNPS began a grant program oriented, as you might think, toward native plant biology. The goal is to "advance our understanding of the biology of native plants and their relationship to their ecosystems; teach students about the importance of native plants and habitat preservation; measure the benefits of native plant habitats to the economic and environmental health of the Commonwealth; or address similar topics."

Over $80,000 has been awarded to principal investigators from a variety of academic institutions and non-profit organizations. Information about the grants program can be found on the VNPS website at https://vnps.org/research-grant-program/.

Devin Floyd leads his team on a survey of plants within the grasslands of the Central Virginia Piedmont.

In 2021, we received six very worthy proposals and the reviewers struggled to choose the most worthy with the Society's limited funds. Two proposals were chosen for funding and the funded researchers have been moving forward with their projects. We recently checked on their progress.

One award was made to Devin Floyd, Founder and Executive Director of the Center for Urban Habitats in Charlottesville, for a proposal titled "An Assessment of Native Grasslands of the Central Virginia Piedmont." The primary objective was to assess the quantity, distribution, and condition of unplanted, high quality grassland communities in an eight-county area of the Piedmont with the goal to shed light on the value of conserving existing remnant grasslands and the benefits of restoring adjacent landscapes that are biologically impoverished.

We checked in with Devin recently on his progress and found that he and his crew were working overtime to take advantage of the weather and seasons.

"We have a mountain of data and another mountain of photographs. We have definitely accomplished a lot, including the identification and documentation of over 400 probable remnant grasslands in the eight-county study area. There are a significant number more, but these are the highest quality ones that could be accessed," he said.

Devin's crew has included many knowledgeable volunteers, including students from the University of Virginia, Virginia Tech, and Yale as well as other field techs from other groups. Although their data has yet to be fully analyzed, they are realizing these grasslands are the most species-rich ecosystems in the Piedmont, greater than the forests, and are in sharp decline from problems including development and herbicide use. This research is both exciting and scary and we look forward to the final analysis and report.

Devin's research proposal was chosen by the VNPS Board to be the Mary Pockman Memorial Research Grant Award for 2021. Mary Pockman passed away in 2019 and is recognized for her many contributions as a founding member and past president of VNPS.

The second award was made to Mary Jane Epps, a biology professor at Mary Baldwin University in Staunton, for her proposal titled "Wing-Mediated Pollination in Azaleas (*Rhododendron* spp.) and Lilies (*Lilium* spp.)." In previous research, Mary Jane's group found that the flame azalea, *Rhododendron calendulaceum*, depends on "wing-mediated" pollination, a mode of pollination documented globally in only a few plants.

In the flame azalea, she found previously that pollination is accomplished by large butterflies whose wings carry and transfer the pollen. Preliminary observation and research had suggested this

SPOTLIGHT ON THE VNPS GRANT PROGRAM

mode of pollination may be utilized in other azaleas and in some lilies (*Lilium* spp.); hence, her focus with this current VNPS grant was to investigate the potential for wing-mediated pollination in these taxa.

She has been working feverishly this year at the Mountain Lake Biological Station with help from some of her undergraduate students. Her focus has been the Swamp Azalea (*R. viscosum*) and Canada and Turk's-cap Lilies (*L. canadense* and *L. superbum*).

In her words, "Lots of exciting finds!" Using infrared camera, they have clear footage of moths hitting the anthers and stigmas of the Swamp Azalea with their wings – the first report of such wing-mediated pollination in moths. They are in the process of experimentally looking into the effectiveness of moths as pollinators.

As the azaleas "flowered out," they focused on the Canada and Turk's-cap Lilies. Preliminarily, they have found hummingbirds to be the most frequent visitors on the Canada Lilies and this was not unexpected as this lily's trumpet-shaped flower lacks a good landing platform for butterflies. No butterflies were observed making contact with the lily's reproductive parts.

While hummingbirds, a few bees, and syrphid flies were frequent visitors on the Turk's-cap Lilies, butterflies were by far the most common visitors on these lilies. Five species of butterflies were observed frequenting the lilies with Pipevine Swallowtails, Eastern Tiger Swallowtails, and Great-Spangled Fritillaries being the most common.

Mary Jane reports that "We observed dozens of clear examples of wing-mediated pollination, with the butterflies flapping their wings against the anthers and stigmas. Often a Pipevine Swallowtail or Eastern Tiger Swallowtail would fly up to a flower and come out looking like a kid that got into a Cheetos bag—covered with orange *Lilium* pollen!"

Mary Baldwin University undergraduates Nadia Martin, left, and Isabella Marshall study butterfly wing pollination on Turk's-cap Lily populations.

Mary Jane's team has also been conducting experiments of presenting virgin stigmas to butterflies, and finds they deposit hundreds of pollen grains on a single visit. Further, when they examined stigmas of *Lilium superbum* in the field, over 95% had butterfly scales stuck to their surfaces, which was exciting because it meant that almost all flowers had been visited at some point in their flowering.

Mary Jane reports her group will be very busy working on various aspects of data processing, specimen mounting and analysis of pollen loads, and collecting data on visitor behavior from videos. Very exciting research and VNPS is thrilled to be supporting such efforts.

We invite all researchers to look into the VNPS Grant Program for 2022 at https://vnps.org/research-grant-program/.

Kevin Howe, First Vice President and Acting Grants Manager

Annual Meeting Recap
Natural resource conservation focus of talks

We missed you face to face, but we learned a lot! Next year? Fingers crossed! Full videos of these year's talks are available on the Society website.

We had very informative talks from Nikki Rovner, associate state director for Virginia with The Nature Conservancy (TNC), and from Jason Bulluck and Rob Evans of the Virginia Department of Conservation and Recreation's Natural Heritage Program (DCR).

Nikki, who has been with The Nature Conservancy for 17 years, spoke Friday evening. The Nature Conservancy mission is to "Conserve the land and water on which life depends." Her personal goal is for every elected official to recognize the protection of environmental areas as a function of government.

The Nature Conservancy world consists of one million members, 119 million protected acres across 79 countries, and 600 global scientists.

Their work is science-based, collaborative, solutions-oriented, non-partisan, and non-confrontational. They avoid politics when at all possible, and consider bipartisan support to be the best solution. In Virginia they have 68 professional staff members, 900 volunteers, 500,000 protected acres in 63 preserves, and 229 conservation easements.

Nikki talked about projects in four areas of Virginia: the Allegheny Highlands where at Warm Springs in Bath County they are using fire to help eradicate invasives and restore the forest balance; Clinch Valley in southwest Virginia, a biodiversity hot spot; the Pinelands Project in southeast Virginia where the native Longleaf Pine, Chesapeake Bay oyster, and eel grass restoration are underway; and the Eastern Shore, where TNC owns 14 of the 18 barrier islands, and is preserving habitat for migratory waterfowl and songbirds. On the Eastern Shore, pre-Covid, all fifth, seventh, and ninth graders had educational trips to these barrier islands.

Rob Evans of DCR Natural Heritage used this slide to explain the eligibility steps to preserve a piece of land.

Nikki is also involved in the Virginia Aquatic Resources Trust Fund, which involves cross-department cooperation with DCR, Virginia Department of Wildlife Resources, the National Park Service and Virginia Department of Forestry. She is working on the possibility of recreating wetlands on farmland where they once existed, to be used for sale of carbon credits to industries.

If you are interested in getting involved with the legislative process, she recommends joining the Virginia Conservation Network, which will give you access to policy experts, and ways to approach legislators on timely opportunities for appropriate legislation. This year there was very good funding for multiple environmental projects, which Nikki credits to pressure on legislators from individuals and groups such as VNPS.

A New Chapter for VNH Programs and Natural Area Preserves

It is a new era for Virginia Natural Heritage programs and the stewardship efforts in the state's Natural Area Preserves according to Jason Bulluck and Rob Evans, who also gave a virtual presentation at the Annual Meeting. Jason has been director for DCR's Natural Heritage since 2017, but the Natural Heritage Program has been in place since 1986 and currently owes much of its success to "saints of the organization" such as Dr. Bob Jenkins who passed away in late 2020. He saw the need for what he called "ecological lifeboats" to save endangered species. The department focuses much of its time on biological hot spots and preserving corridors for species to migrate north or south as climate indicates. Bob started the Natural Heritage data-collecting programs, insisting that all work be founded upon reputable science.

In addition to Bob, several other "saints" include Michael Lipford, Tom Smith, Gary Fleming, Larry Smith, Dot Field, Irv Wilson and Chris Ludwig, all of whom are moving to other

positions, have retired, or are in the process of retiring.

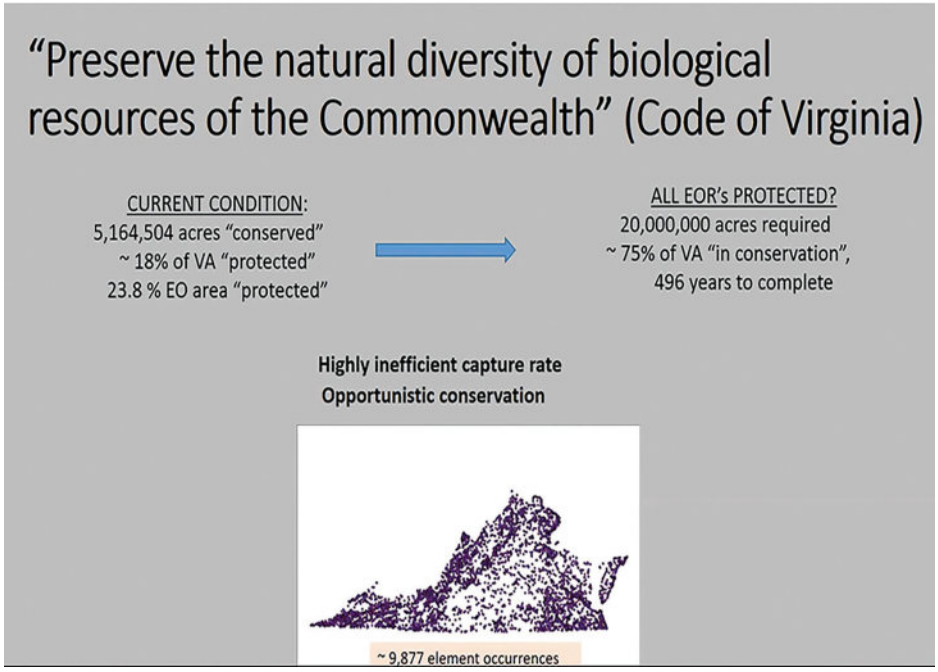
Virginia was the 43rd state to start a heritage program and its first preserve was the North Landing River. South Carolina and West Virginia were the first states to start heritage programs.

Rob Evans began his talk with a radical idea that "Invasives are really bad." Before coming to DCR, he spent some of his career in the upper Midwest, studying under Sigurd Olson and Aldo Leopold.

Rob told everyone that the department focused on the mission to "Preserve natural diversity of biological resources of the Commonwealth." To this end, the Natural Heritage Program has identified 35,000 species of plants, mammals, invertebrates, and natural communities that need protection. Preserves are the tool they use to do this.

He explained that 18 percent of the land in Virginia is protected through preserves, conservation easements, state and national parks, or national forests. The problem is that not all of this land has any connection to the species at risk. This is termed inefficient conservation, and is not limited to Virginia. The forces driving it are opportunity focused rather than endangered species focused. The VNH Program is striving to change this trend. As his slides indicated, near Front Royal, the red-hatched conservation easements, and the solid blue biological hot spots show little overlap. A graph of how many of the endangered plant and animal species are found on protected land, by department, shows VNH with the smallest amount of preserve land, but the highest percentage of species at risk.

Preserved properties are not "off limits" to the public, but their access and use are controlled to keep inappropriate visitation from damaging the species they are hoping to protect. Dr. Bob Jenkins, one of the previously mentioned department "saints," came up with the "Noah's Ark" conservation plan, with a goal to protect at least two sites for each at-risk species. VNH is working hard to meet that goal. Helping meet this goal is where our Society has been extremely effective.



Eighteen percent of the land in Virginia is protected through preserves, conservation easements, state and national parks or national forests. The problem is that not all of this land has any connection to the species at risk. This is termed inefficient conservation.

You may recall when we were invited to tour The Cedars preserve area, which VNH purchased with our assistance. This is a Cave/Karst habitat on which several critically endangered species occur. The state has only been able to purchase strips of the area, but is working to enlarge the holdings as new properties come up for sale. Our funds have helped in the timely acquisition of some parcels before inappropriate development occurs. That is why our 2021-22 fundraiser, which focuses on restocking seed money for short-term use in rapid purchase of sensitive sites, is so critical to the long-term preservation plan of the state's Natural Area Preserves.

Peggy Troyer, VNPS Fundraising Chair

VIRGINIA NATIVE PLANT SOCIETY

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Next submission deadline:
Jan, 15, 2022

Diversity and Inclusion Chair to be added to board

Did you know that our membership has increased approximately 20% over the last year? While monitoring this exciting growth, the Society board began discussions on how to more accurately reflect and properly serve the community at large. This is an important topic for many environmental organizations for myriad reasons, not the least of which is the fact that a group's mission is most effective when it is true to its purpose.

As a refresher, The VNPS mission is as follows: The Virginia Native Plant Society is dedicated to the protection and preservation of the native plants of Virginia and their habitats, in order to sustain for generations to come the integrity of the Commonwealth's rich natural heritage of ecosystems and biodiversity for purposes of enjoyment, enlightenment, sustainable use, and our own very survival.

To this end, we advocate and follow practices that will conserve our natural endowment, and we discourage and combat practices that will endanger or destroy it. We are committed to do all we can to slow the accelerating conversion of natural landscape to built and planted landscape and to reduce its damage to natural ecosystems.

The key phrase, in reference to this important conversation, is "...in order to sustain for generations to come…." For this part of the mission to be feasible, we need to strive toward the ideals of a "Homegrown National Park" set out by Douglas Tallamy in *Nature's Greatest Hope*. We each need to go beyond the borders of our own gardens, and even out of our neighborhoods. Unfortunately, the topic of native plants is often overwhelming.

How can we reach the uninitiated, the disinterested, the chronically exhausted and busy? What can a person do if they live in an apartment or a retirement community? How can we make this important work more accessible and affordable? And, importantly, how can we make it easy?

Sorry, I don't know. There is no magic formula. What I can say is that scholarly articles, success stories, and internet results on the topic show there needs to be a dedicated person, with full support of the organization, to lead the initiative. That is exactly where we have begun.

To that end, we have added a new position to the board. We are seeking a Diversity and Inclusion Chair who will serve on the executive committee, be allocated a portion of the budget for the work, and collaborate with all chairs and committees to address equity at all levels of the organization.

If you are, or know someone who may be, interested, please contact us. If you are not able to serve as the chair but would like to be a part of this important effort, let us know. Let us work together to sustain the integrity of our shared natural heritage for generations to come. Thank you.

Kathleen O'Shea, Membership Chair

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VIRGINIA NATIVE PLANT SOCIETY

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