Marilandica

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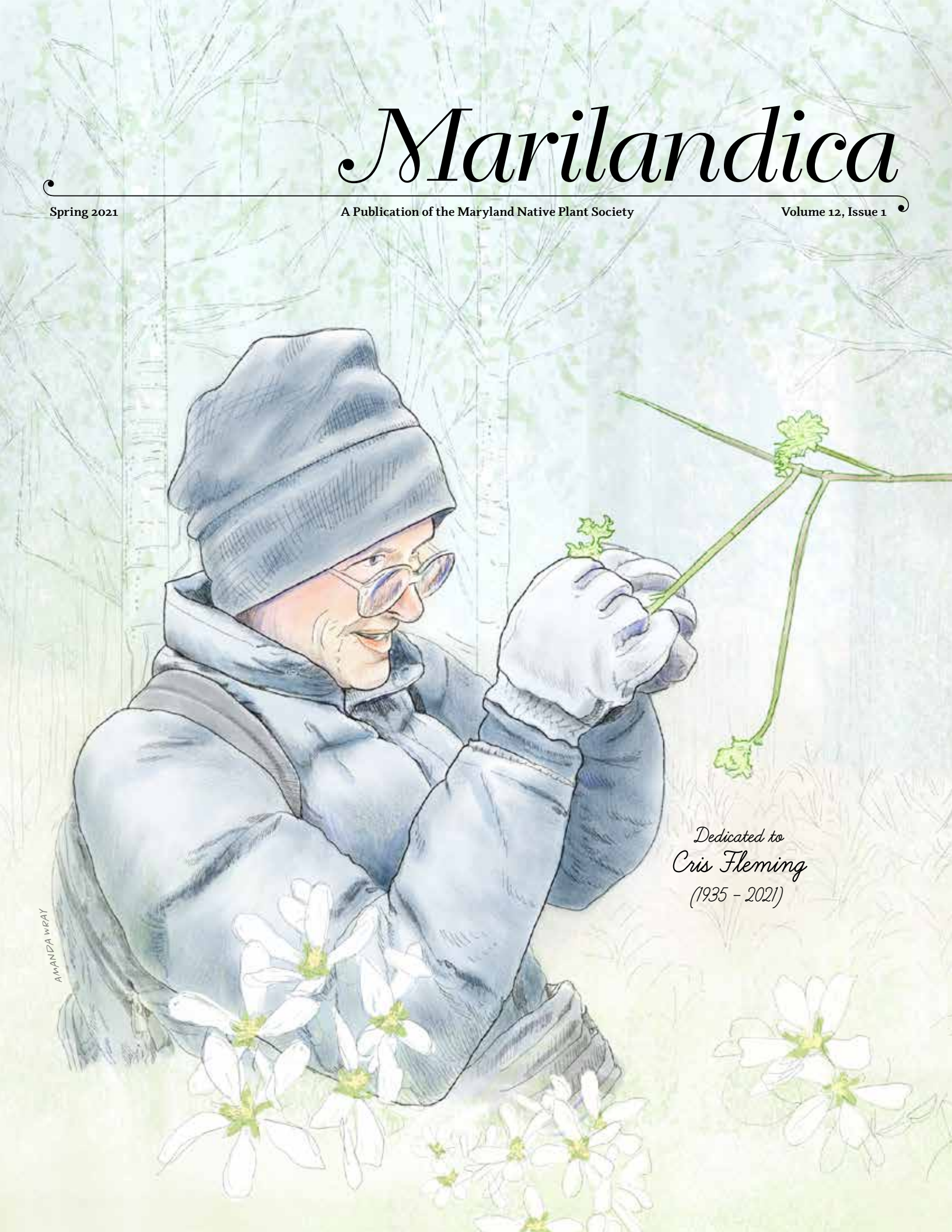

Dedicated to
Cris Fleming
(1935 – 2021)

AMANDA WRAY

ANNUAL FALL CONFERENCE

Rare Plants and Natural Communities of the Baltimore–Washington Corridor

Saturday & Sunday, September 25-26

Showcasing the important **natural areas and species** that may be impacted by the Superconducting Magnetic Levitation train (MAGLEV).

FROM THE PRESIDENT'S LENS

AFTER KIRSTEN Johnson's retirement last year from the Board of the Society and as Editor of *Marilandica*, we have continued unabated by the editorial assistance of Jil Swearingen and Vanessa Beauchamp. We plan to continue to publish two issues this year (spring and fall). **This current issue is dedicated to our dear friend, Cris Fleming.**

Our greatest loss due to COVID-19, has been the in-person interactions through our meetings and field trips. With the pandemic lingering, we started "Monthly Member Meets" or M3s, in March via Zoom. The M3s have helped address this void, in a small way, by providing a venue for talking about what we're seeing in our neighboring parks and sharing our collective knowledge of the local flora. During these monthly member meets we've discussed when and how members want to return to field trips and in-person meetings, advocacy issues (e.g., the proposed Magnetic Levitation train project and problematic stream restorations), society research grants, board recruitment, and many other topics. Also, there have been small surprise plant presentations. The M3s started the process of rebuilding our connectivity in preparation for returning to normalcy.

Our **Annual Conference will be held on Saturday, September 25 and Sunday, September 26** (see back cover) as a hybrid in-person and remote meeting. All meetings will be remote and in-person starting in June for the M3s and October for the regular monthly programs. Technologically, we are ready and able to run these "new normal" hybrid meetings and, with the success of vaccinations, we can safely return to being together both indoors and out. There are so many things happening, so please ... Keep in the Loupe!

Chris Puttock

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A Founding Member, Remembered

By MARION LOBSTEIN

IN THE MID-1980s I was involved with volunteer wildflower walks at Great Falls Park, Virginia. Some of the folks on these walks told me I should meet Cris Fleming, who led walks on the Maryland side. I met her at the Maryland side of Great Falls, and we hit it off immediately. We began botanizing together and sharing botanical finds as well as sharing personal life stories. She was teaching classes and workshops for the Audubon Naturalist Society at Woodend Sanctuary in Chevy Chase, Maryland and for the USDA Graduate School. I was teaching at Northern Virginia Community College. Around that time, Cris played an active role in the young Virginia Native Plant Society (VNPS) and we worked together on projects related to VNPS. Later, she was instrumental in the founding and nurturing of the Maryland Native Plant Society (MNPS). A couple of years into our relationship, Cris told me about a book project on local sites for wildflowers that her friend and colleague, Barbara Tufty, was asked to write. She joined Barbara on developing a manuscript for Finding Wildflowers in the Washington-Baltimore Area. Barbara worked primarily on the Geology, Climate, and Habits sections; Cris on the Places section; and I worked on the Species part. After the publication of the book in 1995, Cris and I continued to botanize together as well as share personal visits, especially at her and her husband Jon's Chevy Chase home. I remember a lovely visit we had at her home about 2013 where we walked about her neighborhood reminiscing about our years of knowing each other as well as future plans and concerns. I heard less and less from Cris after 2015. I realized the Christmas letters began to be written by Jon rather than Cris. In one letter, Jon mentioned he and Cris were moving to a retirement community in Maryland. It was only later I learned that Cris was battling Alzheimer's disease. I called and talked with Cris and Jon realizing that she was the same Cris, but different. I visited them in their new apartment home in Mitchellville, Maryland in late summer 2019 and had a lovely visit with them both. Cris knew me and

Photo: Carole Bergmann

IN MEMORIUM

Cristol (Cris) Schwarz Fleming passed away peacefully at home with family by her side on January 15, 2021. Cris was born on January 13, 1935 in Los Angeles, California to Charles and Mary Reed Schwarz. Cris moved to the Washington, DC area with her family as a child. She attended Bethesda Chevy Chase High School, where she met her future husband, Jonathan W. Fleming.

Photo by Jil Swearingen

Remembering Cris

CRIS HELPED ME *learn how to identify grasses—she would say, "Grasses are divided into fishes and turtles!" This referred to the shape of their florets.*

—Marion Lobstein

CRIS FLEMING WAS *one of the few people in my life who dramatically changed my life. Yes, she was a talented botanist and a gifted and inspiring teacher. But what really impressed me about Cris was her commitment and dedication to a cause—the appreciation and preservation of the natural world and its biodiversity. I learned to identify plants through her classes and by going into the field with her on a regular basis as she scouted locations for Finding Wildflowers in the Washington-Baltimore Area—the book she authored with Marion Blois Lobstein and Barbara Tufty. Her inspiration led me to make a midlife career change—trading a tedious desktop job as a career Federal bureaucrat for a lower paying, but much more rewarding, job as a field botanist with the Virginia Natural Heritage Program. I've never had a moment's regret about that. This spring, as I tromp around Virginia looking at plants, Cris frequently comes to mind as I think to myself: "I first saw that plant with Cris Fleming!" For me, memories don't get any better than that!*

—Allen Belden

THIS IS A LOSS *to the society. I met her in the 1970's when she brought a group of students to Catoctin Mountain Park. I showed her around that time and maybe once or twice more. I still have my autographed copy of the book she co-authored with Marion Lobstein and Barbara Tufty. I still occasionally refer to it for directions to a park or what is growing there.*

—Marney Bruce

CRIS WAS A DRIVING force *behind the Maryland Native Plant Society, encouraging me and others to help found the organization in 1991. She was generous in sharing her knowledge, love and joy of plants and nature.*

—Karyn Molines

CRIS WAS MY FRIEND *for 35 years and my mentor in all things natural history. She taught me to be curious, have fun and work hard to get the ID right without fearing to say, "I don't know." She had a great sense of humor and didn't suffer fools. Cris and I laughed throughout Woodend [Audubon Naturalist Society, Chevy Chase, Maryland] and most of the natural places in the DC region. We always enjoyed a glass of wine together, and sometimes even let our husbands tag along. When I visit the stately senior trees at Woodend, I know Cris's spirit will be there too. What a legacy of teaching and learning Cris leaves behind. She inspired so many of us to learn more about the precious natural world that she treasured and understood so deeply.*

—Lisa Alexander

CRIS WAS AN EXTRAORDINARY *person and mentor to us all. I always looked for her at every meeting that we had with the special importance that she held to our society. What intrigued me was that her mind was like that of the teacher who turned me to botany, her curiosity in winter buds and bark. For her there was botany in every season.*

—Christopher Puttock

was so glad to see me, but I realized the disease was taking its toll on her memory. She and I took a walk alone outside their apartment and she talked about the plantings there. She, Jon, and I had a wonderful long walk on the grounds. We chatted away about so many good memories. I will forever cherish that visit with the both of them. In 2020, I learned that Cris's health was really declining. When I called, I talked with Jon as well as caretakers and learned she was in a rapid decline. I had hoped to tell her one last time how much her friendship had meant to me and that I loved her.

Cris's family and friends will remember her love, enthusiasm, and devotion to conservation of our precious natural resources, second only to her love and devotion to her family and friends. She has left a wonderful legacy and we will all miss her. *Rest in peace, Cris.*

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MORE ON INVASIVE GRASSES IN MARYLAND

By JIL SWEARINGEN

IN HER ARTICLE "Invasive Grasses in Focus," (Marilandica vol. 11, issue 2, fall 2020) Kirsten Johnson brings important attention to silvergrass and fountaingrass—invasive plants that are increasingly impacting natural areas in Maryland. The following comments provide clarification on the current taxonomy and known distributions for these non-native species. The current accepted genus name for fountaingrass is Cenchrus, based on the USDA Germplasm Resources Information Network (GRIN). **Two species of fountaingrass (Chinese and Crimson) have been reported for Maryland and the surrounding region.** According to the Mid-Atlantic Invaders Tool (MAIT) website, there are over 600 species of invasive plants occurring in the mid-Atlantic region. Plant Invaders of Mid-Atlantic Natural Areas 5th ed., referenced in the article, features about 80 highly invasive plant species. While fountaingrass is not included in the book, it is a well known invasive species in the U.S. Reported occurrences in Maryland for these grasses are provided here, along with links to their distribution maps.

When you see these and other invasive plants, animals or pathogens, please report them using the Early Detection and Distribution Mapping System (EDDMapS) or the associated Mid-Atlantic Early Detection Network (MAEDN) phone app.

Early Detection & Distribution Mapping System (EDDMapS): eddmaps.org

Mid-Atlantic Early Detection Network: maedn.org

Mid-Atlantic Invaders Tool: invasive.org/midatlantic/plants.cfm

Plant Invaders of Mid-Atlantic Natural Areas, 5th. ed (2014): maipc.org/PlantInvadersMidAtlanticNaturalAreas5thEdition.pdf

USDA Germplasm Resources Information Network: npgsweb.ars-grin.gov/gringlobal/taxon/taxonomysearch

CHINESE FOUNTAINGRASS
Cenchrus purpurascens Thunb.
Reported in **Howard, Montgomery, and Prince George's Counties**, Maryland.
invasive.org/midatlantic/subject.cfm?sub=28488

CRIMSON FOUNTAINGRASS
Cenchrus setaceus (Forssk.) Morrone
Reported in **Montgomery County**, Maryland.
invasive.org/midatlantic/subject.cfm?sub=6165

CHINESE SILVERGRASS
Miscanthus sinensis Andersson
Reported in **Anne Arundel, Baltimore, Frederick, Howard, Montgomery, Prince Georges, Washington, Wicomico, and Worcester Counties**, Maryland.
invasive.org/midatlantic/subject.cfm?sub=3052

SALT MARSH RESPONSES TO CLIMATE CHANGE

By KERRIE SENDALL

SALT MARSHES are extremely important habitats because of the considerable amount of carbon they sequester and store in their plant tissues. Following each growing season, plant tissues die back and become buried, but do not break down and decompose due to the low oxygen levels in their waterlogged or flooded soils. This lack of decomposition keeps carbon dioxide (CO_2) trapped belowground, rather than being released to the atmosphere and contributing to further climate change. Marshes are referred to as "ecosystem engineers" because they build soil elevation through this accumulation of organic matter, both from the turnover of belowground root tissues as well as the trapping of soil sediments by aboveground plant shoots.

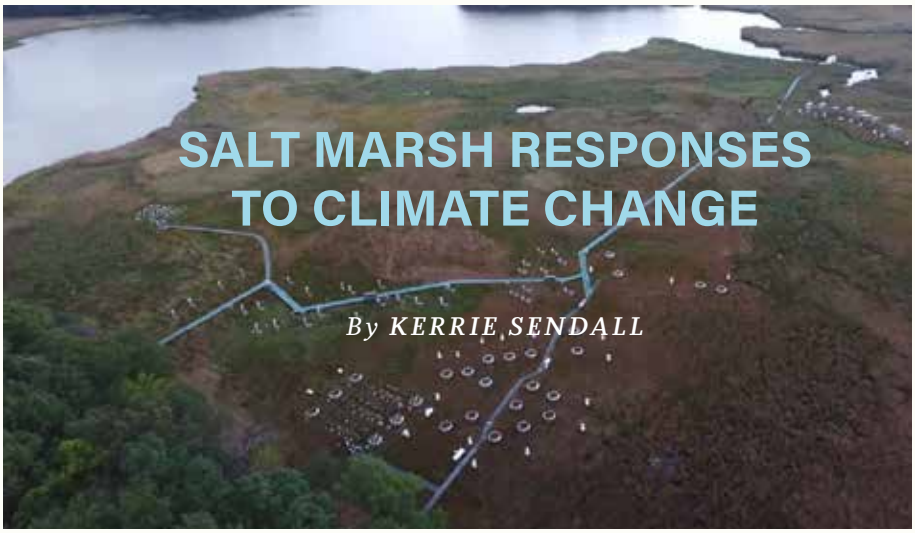


Fig 1. Aerial image of the Global Change Research Wetland field site

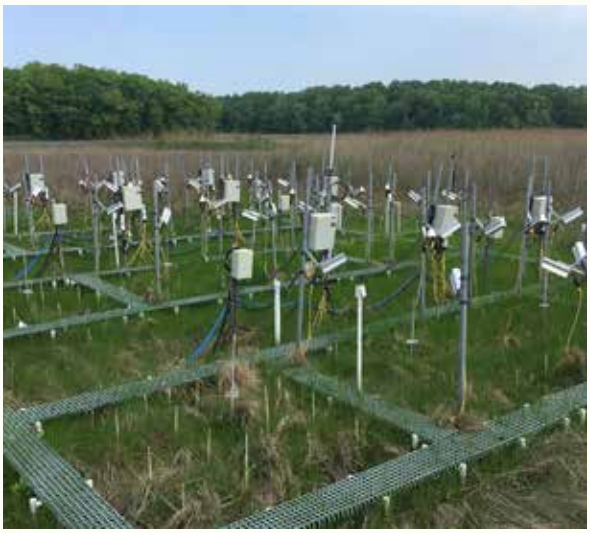


Fig 2. Warming plots

In addition to building soil elevation and long-term carbon storage, salt marshes also help prevent flooding and erosion, improve water quality, and provide habitat for many types of wildlife such as birds and fish, but are some of the most vulnerable habitats to the threats of climate change. Scientists at the Global Change Research Wetland in Edgewater, Maryland (Figure 1) study the effects of elevated CO_2, nutrient addition, and Phragmites australis invasion in a series of experiments, some dating back to the mid-1980s.

Salt marshes are relatively species-poor, with only a handful of plant species dominating most areas. In this marsh, slightly higher elevation areas that flood during ~30% of high tides are dominated by two C4 grasses, saltmeadow cordgrass (*Spartina patens*) and seashore saltgrass (*Distichlis spicata*). The lower elevation areas that flood during ~70% of high tides are dominated by the C3 sedge, chairmaker's bulrush (*Schoenoplectus americanus*).

In 2016, an experiment called Salt Marsh Accretion Response to Temperature eXperiment (SMARTX) was installed into the marsh, with half the research plots built into a C3-dominated community, and other half built into a C4-dominated community. SMARTX studies the effects of two climate stressors, elevated temperature and elevated CO_2 levels, on the marsh plant communities. SMARTX consists of plots arranged across an active heating gradient consisting of unheated ambient plots and plots that are heated to 1.7, 3.4, and 5.1°C above ambient. We warm both above and belowground, with heating rods inserted into the ground every 20cm to warm the soil and infrared lamps to warm the aboveground biomass (Figure 2). In the C3 community, there are six additional plots with open-top elevated CO_2 chambers which raise the amount of CO_2 plants are exposed to from 400 to 700 ppm (Figure 3), half at ambient temperatures and half heated to +5.1°C above ambient.

My research focuses on leaf-level traits of the three dominant plant species and how they respond to

warming and elevated CO2 treatments (Figure 4). We measure traits such as stomatal conductance (how open or closed leaf stomata are, which controls the exchange of gases such as water vapor and CO2 between leaves and air) and chlorophyll fluorescence (a measurement that indicates how much salinity or heat stress plants are experiencing). These finer scale, species-specific responses can inform land managers and other groups involved in wetland restoration projects about which species are most robust and which will fare well under future environmental conditions. Leaf traits can be measured over a short time scale of weeks to months, but they have been found to be well-correlated with long-term plant growth and survival in different environments ranging from less to more stressful.

Fig 3. Taking measurements

Fig 4. Elevated CO2 open-top chambers

We found that leaf traits in the C4 community have been unresponsive to the warming treatment, in part because the different photosynthetic pathway allows plants to keep their stomata closed for prolonged periods compared to C3 plants. However, we also believe it's because our data were collected during wet, rainy summers, so the plants likely did not undergo much in the way of drought or salinity stress the way they would in a hot, dry summer.

In the C3 community, however, the dominant sedge species showed much stronger responses to both warming and elevated CO2 levels. As both temperature and CO2 increased, rates of stomatal conductance declined. This was expected under elevated CO2, as these plants are able to obtain the necessary carbon required for photosynthesis and growth more easily and can therefore close stomata more often to minimize water loss. Rates of stomatal conductance also declined as temperature increased, likely due to a higher evaporative demand in the higher temperature treatments, which requires plants to close stomata more often to minimize water loss. As rates of stomatal conductance declined, chlorophyll fluorescence data indicated higher levels of stress in the sedges. We believe that as plants close stomata to conserve water, they simultaneously reduce evaporative heat loss in from leaves, leading to higher degrees of thermal stress.

Based on these results, land managers may want to focus on establishing C4 communities in restored marshlands that are projected to experience warm, wet summers under future climate scenarios. However, sea level rise will also need to be considered, as the C4 plants do not thrive under frequent inundation. My summer intern will work to see whether our measured leaf-level traits are related to variations in growth measured by other researchers at SMARTX, and whether they have the potential to predict population and community responses to future environmental conditions.

Figure 1. Aerial image of the Global Change Research Wetland field site.

Figure 2. Warming plots built into the C4 plant community, which is dominated by Spartina patens and Distichlis spicata. Warming treatments range from ambient to +5.1°C above ambient.

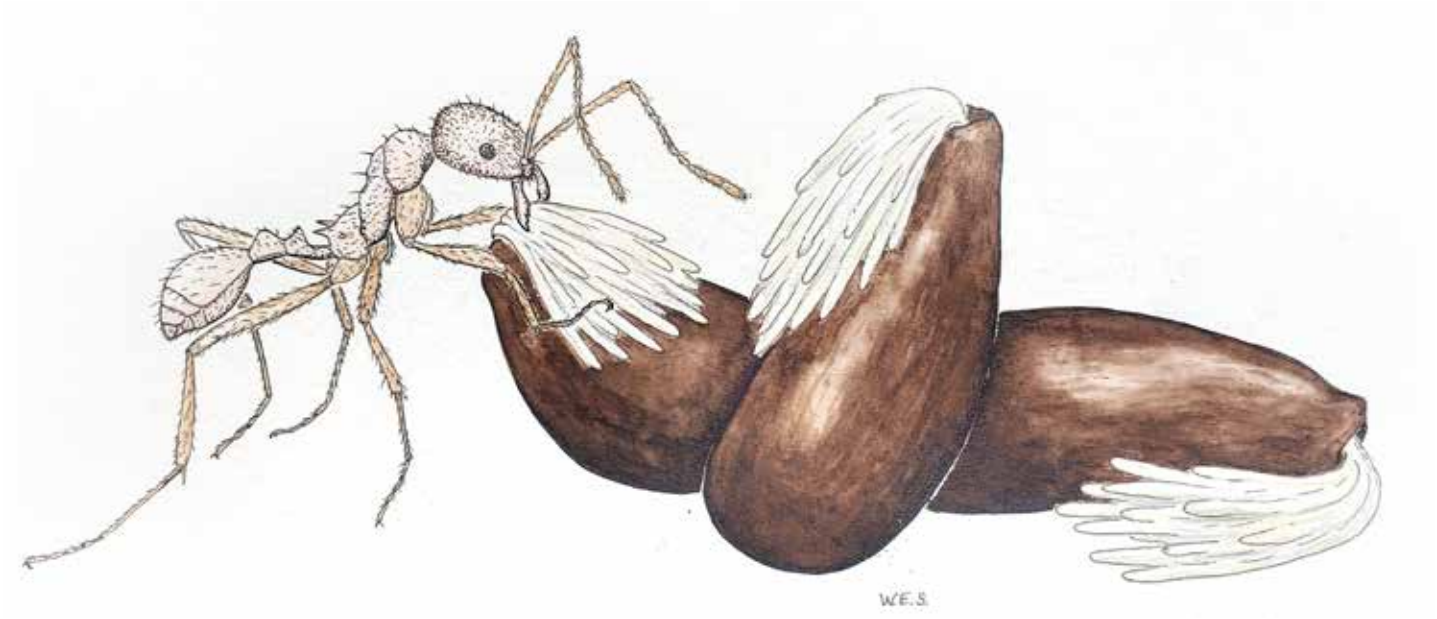
Figure 3. Former masters student Lyntana Brouham measures pre-dawn chlorophyll fluorescence in the C3-dominated sedge community. Plants primarily use red and blue wavelengths of light and cannot effectively absorb green light, so she used green headlamps to ensure that plants remained dark-adapted during measurements.

Figure 4. Elevated CO2 open-top chamber plots C3 plant community, which is dominated by Schoenoplectus americanus. Three chambers are at ambient temperatures, three are warmed to +5.1°C above ambient.

Myrme-who? Elaio-what?

Spring ephemerals enlist ants to spread their seeds

By JIL SWEARINGEN



Aphaenogaster rudis (ant) grasping the elaiosome of a twinleaf (*Jeffersonia diphylla*) seed. (Illustration by Warren E. Steiner, 1991)

THE EMERGENCE of our spring wildflowers is an awe-inspiring phenomenon and the perfect cure for the winter blues. This event is all too fleeting and, as quickly as the lovely flowers appear, they fade away. With patience, however, the enjoyment can be extended by observation of the fruiting stage of some species whose seeds are adorned with food bodies called elaiosomes (*e-lie-oh-somes*). Elaiosomes are rich in fats and fatty acids and are believed to be an important source of nutrition for ants in the early spring, when insect food sources are scarce (Bresinsky 1963). Chemicals in the elaiosomes, including oleic acid, attract ants to the seeds and spur them to pick up and carry the seeds (Brew et al. 1989; Edwards et al. 2006) in a process known as myrmecochory (*mer-muh-ko-curry*) or "ant-dispersal."

THE PLANTS. In moist deciduous forests of eastern North America, 50 native ant-dispersed plant species in 18 families have been reported—see "Plants with Ant-dispersed Seeds in the Eastern U.S." More await discovery. Among these ant-dispersed plants, or myrmecochores, are bloodroot (*Sanguinaria canadensis*), twinleaf (*Jeffersonia diphylla*), wild ginger (*Asarum canadense*), Dutchman's breeches (*Dicentra cucullaria*), squirrel corn (*Dicentra canadensis*), hairy woodrush (*Luzula echinata*), yellow trout lily (*Erythronium*), ten species of violets (*Viola*), two species of trillium (*Trillium*), two species of hepatica (*Anemone*), and some sedges (*Carex, Scleria*) and grasses (*Melica, Dichanthelium*). Three introduced myrmecochores—greater celandine (*Chelidonium majus*), purple dead nettle (*Lamium purpureum*), and mile-a-minute weed (*Persicaria perfoliata*) are widespread invasive species.

Worker ants haul the seeds into their nest and either remove the elaiosome or offer the seed-elaiosome unit to larvae for them to feed upon.

THE ELAIOSOMES. Elaiosomes of spring wildflowers come in a dazzling array of shapes, colors, sizes and configurations. For example, the elaiosome of bloodroot resembles a white sausage

PLANTS WITH ANT-DISPERSED SEEDS IN THE EASTERN U.S

By JIL SWEARINGEN

APOCYNACEAE

EASTERN BLUE STAR *Amsonia tabernaemontana* 16

ARISTOLOCHIACEAE

WILD GINGER *Asarum canadense* 14
EVERGREEN WILD GINGER *Hexastylis arifolia* 17
VARIABLE-LEAF HEARTLEAF *Hexastylis heterophylla* 6
LITTLE HEARTLEAF *Hexastylis minor* 17
DWARF-FLOWER HEARTLEAF *Hexastylis naniflora* 6

ASTERACEAE

SOUTHERN GREEN AND GOLD
Chrysogonum virginianum var. *australe* 6

BERBERIDACEAE

TWINLEAF *Jeffersonia diphylla* 2

CYPERACEAE

FIBROUSROOT SEDGE *Carex communis* 9
JAMES' SEDGE *Carex jamesii* 2
CREEPING SEDGE *Carex laxiculmis* 2
BROAD LOOSEFLOWER SEDGE *Carex laxiflora* 6
BLACK EDGE SEDGE *Carex nigromarginata* 6
LONG-STALKED SEDGE *Carex pedunculata* 8
LINED SEDGE *Carex striatula* 6
PARASOL SEDGE *Carex umbellata* 9
WHIP NUTRUSH *Scleria triglomerata* 6

ERICACEAE

TRAILING ARBUTUS *Epigaea repens* 4

EUPHORBIACEAE

GULF CROTON *Croton punctatus* 16

FUMARIACEAE

YELLOW FUMEWORT *Corydalis flavula* 2
SQUIRREL CORN *Dicentra canadensis* 3
DUTCHMAN'S BREECHES *Dicentra cucullaria* 3

JUNCACEAE

HAIRY WOOD RUSH *Luzula acuminata* 9
FIELD WOOD RUSH *Luzula campestris* 9
HEDGEHOG WOOD RUSH *Luzula echinata* 2

LAMIACEAE

PURPLE DEAD NETTLE *Lamium purpureum* 10 NNI

LILIACEAE

YELLOW TROUT LILY *Erythronium americanum* 14
YELLOW MANDARIN *Prosartes lanuginosa* 6
WAKE ROBIN *Trillium erectum* 2
WHITE TRILLIUM *Trillium grandiflorum* 7
PERFOLIATE BELLWORT *Uvularia perfoliata* 13

PAPAVERACEAE

BLOODROOT *Sanguinaria canadensis* 13
GREATER CELANDINE *Chelidonium majus* 12 NNI

POACEAE

MELIC GRASS *Melica* sp. 14
NEEDLELEAF ROSETTE GRASS *Dicanthelium aciculare* 6
BOSC'S PANICGRASS *Dichanthelium boscii* 6
CYPRESS PANICGRASS
Dichanthelium dichotomum var. *dichotomum* 6

POLYGONACEAE

MILE-A-MINUTE WEED *Persicaria perfoliata* 16 NNI

PORTULACEAE

SPRING BEAUTY *Claytonia virginica* 14

RANUNCULACEAE

SHARP-LOBE HEPATICA *Anemone acutiloba* 14
ROUND-LOBE HEPATICA *Anemone americana* 1
WOOD ANEMONE *Anemone quinquefolia* 2

RUBIACEAE

LICORICE BEDSTRAW *Galium circaezans* 6

VIOLACEAE

SWEET WHITE VIOLET *Viola blanda* 13
CANADA VIOLET *Viola canadensis* 13
SWEET VIOLET *Viola odorata* 11 NNI
BIRDFOOT VIOLET *Viola pedata* 5
YELLOW FOREST VIOLET *Viola pubescens* 13
LONGSPUR VIOLET *Viola rostrata* 5
COMMON BLUE VIOLET *Viola sororia* 5
CREAM-WHITE VIOLET *Viola striata* 13
THREE-LOBE VIOLET *Viola palmata* 5

Numbers refer to references; NNI = non-native/invasive.
(*Reference list on Page 11*)

Bloodroot pod with seeds with elaiosomes. *Photo by Kathy Bilton*

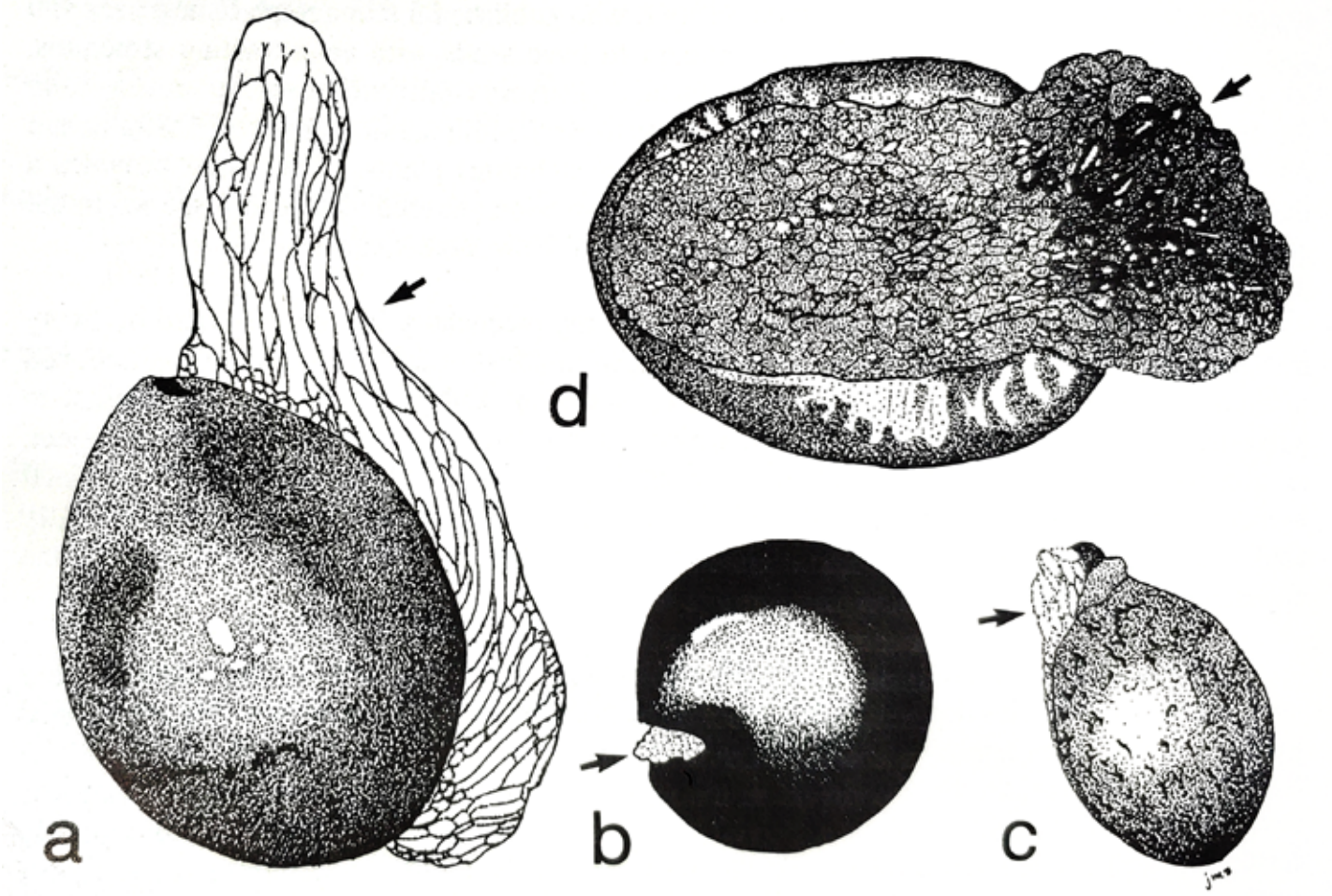
glued to a basketball, Dutchman's breeches and squirrel corn elaiosomes resemble tiny translucent fingers and wild ginger elaiosomes are a mass of pale brown grapes. Some spring ephemerals (e.g., twinleaf, ginger and bloodroot) drop their seeds directly under the parent plant while others (e.g., bloodroot, violets) propel their seeds through ballistic seed dispersal. Fruits develop at different rates, depending on the species. On your walks, look for mature fruits and pop a few open. Many seeds and elaiosomes are easily seen with the naked eye. However, for smaller seeds or seeds with very small elaiosomes, a 10-X power hand lens will be needed.

THE ANTS. Myrmecochory is not restricted to North America. Ants are the dominant group of invertebrate seed dispersers worldwide and they disperse more than 3,000 species of plants (Beattie & Hughes 2002). In the eastern U.S., thirty species of seed-dispersing ants have been documented (Swearingen 1991). Worker ants haul the seeds into their nest and either remove the elaiosome or offer the seed-elaiosome unit to larvae for them to feed upon. Cleaned seeds are discarded unharmed outside of the nest (Handel 1990).

Who Benefits Most? There are selective advantages of this mutualistic relationship to both the ants and the plants. As mentioned, ants benefit from having a rich plant-based source of nutrition for their larvae in the spring. Benefits to plants that have been investigated include dispersal for distance (Andersen, 1988), escape from seed predators (Boulay, et al 2007), improved survivability of seeds dispersed to sites with enhanced nutrient supply (Hanzawa, Beattie & Culver 1988), and escape from competition with parent plants other plant species (Handel 1990).

Twinleaf fruit and seeds. *Photos by Jil Swearingen*

A study of possible seed preferences of two ant species: *Lasius alienus* and *Aphaenogaster rudis,* when offered seeds of four species of spring ephemerals (twinleaf, bloodroot, wild ginger and common blue violet), was conducted by Swearingen (1988). It was hypothesized that the ants would preferentially select seeds with the greatest food reward in the form of elaiosome to diaspore (diaspore = seed + elaiosome) or e/d value. The e/d values for the seeds,



Seeds with elaiosomes (see arrows): **a.** Bloodroot/*Sanguinaria canadensis* **b**. Hairy Wood Rush/*Luzula acuminata* **c.** Common Blue Violet/*Viola sororia* **d.** Wild Ginger/*Asarum canadense*. (*Illustration by Jil Swearingen, 1991*)

from lowest to highest, were twinleaf, bloodroot, common blue violet and wild ginger. The ants differed significantly in size and morphology and their seed preferences and techniques for transporting seeds to the nest also varied greatly. Individual long-legged

Aphaenogaster workers were able to pick up and quickly haul away all of the seeds offered including the larger seeds of bloodroot, twinleaf, and ginger. In contrast, the smaller and shorter-legged *Lasius* individuals could easily transport violet seeds but struggled to carry the three larger seeds. For the larger seeds, *Lasius* relied on coordination with several workers that took more time and effort to get a seed to the nest. The results of this study showed that *Lasius* showed a preference for ginger seeds with the highest e/d and Aphaenogaster favored twinleaf seeds with the lowest e/d. This suggests that other factors may be responsible their choices.

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Maryland Mountain Notes

By LIZ MCDOWELL

ONE OF THE few positive results of the COVID-19 pandemic has been an ***astronomical increase in the number of people venturing outdoors for exercise and solace***. Maryland State Parks recorded a 45% increase in visitors in 2020 according to the Department of Natural Resources. Even parks that are far from urban areas have seen a rise in attendance. New Germany State Park in rural Garrett County is one such place. Since the start of COVID, many more families and individuals have come to bike, bird-watch, botanize, camp, fish, hike, paddle, ski, swim, or just relax. Unfortunately, guided walks are still on hold until they can be done safely. Luckily there is plenty of information for those curious about plants native to the mountains of western Maryland. Below the dam there is a native plant garden that contains more than 50 species, all labeled with botanical markers. Interpretive signs explain the critical importance of native plants to a region's natural heritage and 'sense of place'. This garden that serves as a 'living key' and note the species in flower. These same blooms will likely be encountered along the various park trails.

Pycnanthemum incanum

Magnolia acuminata

Cornus florida

In 2019, the Friends of New Germany State Park expanded their efforts to identify native plants beyond the garden boundary, and at least 28 native species have been tagged throughout the day-use area and along the trails, including: **Striped Maple** (*Acer pensylvanicum*), **Red Maple** (*Acer rubrum*), **Sugar Maple** (*Acer saccharum*), **Common Serviceberry** (*Amelanchier arborea*), **Allegheny Serviceberry** (*Amelanchier laevis*), **Yellow Birch** (*Betula alleghaniensis*), **Sweet Birch** (*Betula lenta*), **Pignut Hickory** (*Carya glabra*), **Shagbark Hickory** (*Carya ovata*), **American Chestnut** (*Castanea dentata*), **American Beech** (*Fagus grandifolia*), **Tulip Poplar** (*Liriodendron tulipifera*), **Cucumber Tree** (*Magnolia acuminata*), **Blackgum** (*Nyssa sylvatica*), **Hop-hornbeam** (*Ostrya virginiana*), **Eastern White Pine** (*Pinus strobus*), **American Sycamore** (*Platanus occidentalis*), **Bigtooth Aspen** (*Populus grandidentata*), **Black Cherry** (*Prunus serotina*), **White Oak** (*Quercus alba*), **Scarlet Oak** (*Quercus coccinea*), **Chestnut Oak** (*Quercus montana*), **Northern Red Oak** (*Quercus rubra*), **Black Oak** (*Quercus velutina*), **Black Locust** (*Robinia pseudoacacia*), **Sassafras** (*Sassafras albidum*), **American Basswood** (*Tilia americana*), and **Eastern Hemlock** (*Tsuga canadensis*).

The Friends would love to add at least one more species to that list namely, Flowering Dogwood (*Cornus florida*). It has been reported at New Germany during bio-blitz events and is found on nearby private lands and the Savage River State Forest. So far however, this showy native tree has eluded park volunteers searching for it. But with more and more visitors to New Germany, perhaps it will finally be found. There is one catch however. The tree must be within clear sight of a trail or day-use area so that it can be easily viewed by others. So take the challenge and go in quest of the Flowering Dogwood! ***Please email detailed sightings to the Friends of New Germany State Park, at friendsofnewgermany@gmail.com***

Photos 1 & 3: Liz McDowell; Photo 2: Public Domain

A LACK OF OVERSIGHT IMPERILS SEEPAGE WETLANDS AND FORESTED STREAM VALLEYS IN MARYLAND, D.C., AND VIRGINIA

By RODERICK H. SIMMONS

NATURAL CHANNEL DESIGN (NCD) is an engineering practice for stream reconstruction that attempts to mitigate the effects of uncontrolled stormwater runoff from upstream development. These projects are highly destructive to forest communities and wetlands because they require extensive clearing of canopy trees and forest along the stream valley to create artificial floodplains where none naturally exist (Fig. 1). The process involves raising incised stream channels by dumping tons of compacted soil, wood, and rock into them to deliberately cause overbank flooding into adjacent, non-alluvial seepage wetlands and forest communities. (Non-alluvial, in its simplest sense, means not formed or sustained by the actions of a stream.)

Fig. 1. A recent stream construction project at Upper Watts Branch Forest Preserve, City of Rockville, Maryland. Notice that the existing stream was completely destroyed to create an artificial floodplain by clearing the forested valley and raising the channel with tons of fill (sediment), tree trunks, and boulders. *Photo by City of Rockville.*

The Nationwide permit 27 (NWP 27) for stream projects is often inadmissibly granted. The NWP 27 is a federal permit for protecting Waters of the United States (WOTUS) by regulating dumping and filling in wetlands and waterways, among other activities. Reconfiguring and filling stream channels are routine when using NCD and regenerative stormwater conveyance (RSC) methods for stream construction projects. Boulder-armoring of stream banks (rip-rap) is also a form of filling waterways, even if a stream is not significantly altered by doing so. Therefore, all stream construction projects require a NWP 27 permit before any work can begin.

The U.S. Army Corps of Engineers (USACE) oversees and authorizes NWP 27 permits. ***Yet many permits are impermissibly granted because applicants and their consultants deliberately mischaracterize jurisdictional wetlands explicitly protected by the NWP 27.*** While jurisdictional wetlands (WOTUS) are regularly delineated within project limits of upper headwater streams, they are often incorrectly classified in documentation supporting the NWP 27 Permit Application Preconstruction Notification and the NWP 27. For example, a currently scheduled project in the City of Alexandria, Virginia, refers to non-alluvial seepage wetlands in the project footprint as "alluvial overbank wetlands" and states that the "full

Fig. 2. Coastal Plain / Outer Piedmont Acidic Seepage Swamp: *Acer rubrum - Nyssa sylvatica - Magnolia virginiana / Viburnum nudum / Osmundastrum cinnamomeum—Woodwardia areolata* Forest (USNVC: CEGL006238) along the south bank of Taylor Run at Chinquapin Park in the City of Alexandria, Virginia. Despite some protection from physical encroachment, natural channel design construction will destroy this groundwater-controlled, non-alluvial wetland by creating an artificial floodplain where none naturally exists and using the non-alluvial wetland as an alluvial habitat to be washed out by overland flooding regimes. *Photo by R.H. Simmons.*

design... includes restoring the channel to handle current and future watershed conditions in order to reestablish a stable, natural flooding regime," as well as the "facilitation of overbank flows that will help improve water quality" (WSSI 2020). Most, if not all, upper headwater streams throughout the region do not overflow their banks, and natural floodplains do not exist along such streams. **In pre-settlement conditions, these headwater streams were small, meandering brooks that never overflowed their banks simply because there was insufficient streamflow volume to exceed the capacity of the channel.** Instead, what occurs are narrow, ancestral alluvial benches and stream banks. These are very different from floodplains. The forested stream valley ravines we see today were likely formed during the Early Pleistocene Epoch in prehistory, not by events in the last few millennia to present.

Degrading and potentially destroying non-alluvial seepage wetlands for the purpose of stormwater management impermissibly converts these highly functioning wetlands into another aquatic type (Figs. 2 & 3). This is a *prima facie* violation of the terms and conditions of qualifying for a NWP 27 permit and is an unambiguous case of causing or creating more than minimal adverse environmental effects. As such, a NWP 27 cannot be lawfully issued. Impermissible conversion of aquatic types abuses seepage wetlands as an on-the-ground surrogate for truly alluvial habitats. Anticipated adverse impacts include severe flooding, sedimentation, loss of groundwater flow through, and unquantified changes to geochemistry and hydrology. The "French-drain" type pore space loss of hydrostatic water to the subsurface soils which support groundwater-fed wetlands would also be lost.

The streams themselves are also destroyed and all supporting biotic functions and values with them. The NWP 27 requires that whatever habitat remains post-construction must be demonstrably shown to provide ecological function lift (a net increase or improvement in aquatic resource functions and services) over and above existing functions. No NWP 27 can be issued without this evidence. Most project plans involving headwater streams and seep-

age wetlands, as submitted and coordinated, do not provide documentation of either existing functional baseline or the amount of anticipated functional lift and how it will be quantitatively measured. Moreover, the direct and indirect adverse environmental effects the activity would cause (as required in the pre-construction notification) are typically inadequate and erroneous.

The main drivers of this abuse of our stream valleys are unchecked growth and urban sprawl—rubber stamped by planning boards in virtually every jurisdiction regionwide—and conversion of protected stream valleys to stormwater management facilities in a futile attempt to accommodate runoff from massive amounts of stormwater runoff into small streams—in lieu of properly managing runoff outside of the immediate watershed—shocked and confused the environmental community and general public (Hobson 2021). Fairfax County Stormwater Planning recommended that "the realigned Colvin Run segment be designed using natural channel design to incorporate aquatic habitat, improve water quality, and enhance the adjacent wetlands," according to Craig Carinci, Director of Stormwater Planning. Carinci also wrote to the Virginia Marine Resources Commission and USACE to complain that NCD was not embraced here (Hobson 2021). In this case, as starkly contrasted with the City of Alexandria examples, USACE decided to protect a large Pied-

Fig. 3. Huge ferns and a series of acidic woodland seeps along the south branch of Lucky Run in the City of Alexandria, Virginia are critically imperiled by a misapplied natural channel design project that plans to flood the wetlands with unchecked stormwater runoff from I-95 and other impervious surfaces. Acidic woodland seeps are also non-alluvial wetlands and are intermediate in floristic diversity between Magnolia Bog and Acidic Seepage Swamp communities (Simmons 2015). *Photo by R.H. Simmons.*

greatly expanded impervious surface. Recently, near Tysons Corner in Fairfax County, Virginia, the serious environmental problems caused by dumping

mont / Northern Coastal Plain Basic Seepage Swamp (USNVC: CEGL006406) along the south side of Colvin Run above the confluence with an alluvial

Fig. 4. A recently constructed massive drainage channel replacing a section of 1960s-relocated Colvin Run in Fairfax County, Virginia. Leesburg Pike (Rt. 7), shown in photo center, is being doubly widened. A large Piedmont / Northern Coastal Plain Basic Seepage Swamp (USNVC: CEGL006406) runs along the south side of the above channel outside of the right photo frame. Despite the denuded, degraded landscape, the concrete channel is the only way to confine and accommodate enormous quantities of stormwater runoff from the widened roadway and environs without transferring it to forested wetlands and stream valleys, especially with 72" culvert outfalls aimed at said wetlands (middle left of photo). *Photo by R.H. Simmons.*

swamp at Difficult Run by not allowing NCD. This required the large, straight concrete channel to protect the non-alluvial forested wetlands (Fig. 4). "Of 10 total options considered for Colvin Run with input from the environmental agencies, this option was determined to be the least environmentally impactful" (Hobson 2021). Perhaps if stormwater management agencies and consultants would direct their agendas to upholding environmental regulations and protecting WOTUS instead of operating as facilitators of development, conditions might improve. Those enabling and funding the stream construction industry have little appreciation or understanding of the scientific disciplines of stream geomorphology, geohydrology, wetlands science, and stream ecology. Protection of our irreplaceable natural resources requires a strict adherence to scientific integrity, best practices, and environmental regulations.

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STRAWBERRY FIELDS FOREVER

By JIL SWEARINGEN

ARE YOU LOOKING for what might be a near-perfect groundcover? One that's native, semi-evergreen, spreads by runners, provides wildlife benefits, and will help you reduce your lawn? If so, you might want to try **wild strawberry (*Fragaria virginiana* Mill.) which is native to all physiographic provinces in Maryland**. In addition to being an attractive groundcover, wild strawberry has the added bonus of sweet, tasty fruits. Cultivated strawberries were developed from hybridization of *F. virginiana* and the South American beach strawberry *F. chiloensis* (L.) Mill.

Wild strawberry might be confused with mock strawberry (*Potentilla indica* (Andrews) Th. Wolf, synonym *Duchesnea indica* (Jacks.) Focke), a native of eastern and southern Asia. Mock strawberry is a common weed in lawns and disturbed landscapes and is invasive in natural areas throughout the eastern U.S. Both wild and mock strawberry have trifoliate leaves (each leaf has 3 leaflets) and flower in the spring and early summer.

The two species are easily distinguished by their flowers, fruits and leaves. Wild strawberry has white flowers and red "berries" (technically a multiple or accessory fruit) with pale brown achenes embedded in a fleshy swollen receptacle, and the fruits are drooping. Mock strawberry has yellow flowers, and the fruits sit on top of the five-toothed calyx. The achenes appear as red bumps on the fruit surface, somewhat like a red coronavirus. These fruits have white flesh and no flavor.

The leaves are also helpful in identification. Wild strawberry leaflets have evenly serrate margins with pointed teeth directed towards the tip of the leaf and the terminal tooth is smaller than the others. The teeth of mock strawberry leaflets are rounded, giving the margin a scalloped appearance. ***Mock strawberry is a problem in parks, preserves and other natural areas where it is spreading.*** It can be pulled up easily by hand but large patches may require the use of a herbicide such as glyphosate.

Buy wild strawberry from a native plant nursery (e.g., Chesapeake Natives in Upper Marlboro, Maryland, or Earth Sangha in Springfield, Virginia) where you can be sure it is locally native, not a cultivar, and has not been pre-treated with neonicotinoids. Neonicotinoid insecticides, or "neonics" are toxic to bees, beetles, butterflies and many other insects. Industrial nurseries and box stores routinely sell pre-treated plants. *For native plant nurseries in and around Maryland, go to: MDFlora.org/nurseries.html*

I would like to thank Hess Muse for showing me how well this plant works in her yard as an alternative to lawnscapes.

SPRING WILDFLOWER PLANT MATCH

Match the following plants that flower in spring with the correct picture.

(*Answers are provided below)*

A. Celandine Poppy / *Stylophorum diphyllum* **B.** Common Blue Iris / *Iris Versicolor* **C.** Fig Buttercup / *Ficaria verna* (non-native) **D.** Ground Ivy / *Glechoma hederacea* (non-native) **E.** Golden Ragwort / *Packera aurea* **F.** Jacob's Ladder / *Polemonium van-bruntiae* **G.** Virginia Bluebells / *Mertensia virginica* **H.** Round-lobe Hepatica / *Anemone americana.* *Photos: Judith Fulton (1, 2, 5, 7, 8) , Jil Swearingen (3, 4, 6)*

ANSWERS: 1-F, 2-G, 3-A, 4-E, 5-D, 6-C, 7-H, 8-B

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June 22, Tuesday, 7:00 PM
Meet & MD flora talk

July 20, Tuesday, 7:00 PM
Meet & MD flora talk

August 24, Tuesday, 7:00 PM
Meet & MD flora talk

September 21, Tuesday, 7:00 PM
Final preparations for annual conference

MONTHLY SPEAKERS

June 29, Tuesday, 7:30 PM
Dr. Sara Via: *Climate change and Maryland's ecosystems (remote only)*

July 27, Tuesday, 7:30 PM
Liz Matthews: *National park forests in the eastern US: ecological value and natural resource challenges (remote only)*

August 31, Tuesday, 7:30 PM
Katalin Szlavecz: *Non-native earthworms and their effects on temperate forest soils (remote only)*

September 28, Tuesday, 7:30 PM
(no meeting)

October 26, Tuesday, 7:00-8:45 PM
Wesley Knapp: *The Maryland checklist of vascular plants (in-person & remote)*

November 30, Tuesday, 7:00-8:45 PM
Dr. Christopher Puttock: *Gardening with local ecotype native plants (in-person & remote)*

ANNUAL CONFERENCE
(In-person & remote)

September 25, Saturday
9:00 AM-12:00 PM
Rod Simmons & Bill Harms
1:00-5:00 PM Field trips
6:00-9:00 PM Social and evening talk

September 26, Sunday
10:00-11:30 AM Douglas Tallamy
The ecological importance of oaks (remote only)
1:00-5:00 PM Field trips

ANNUAL GENERAL MEETING
(Members only)

December (date/time TBD)
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