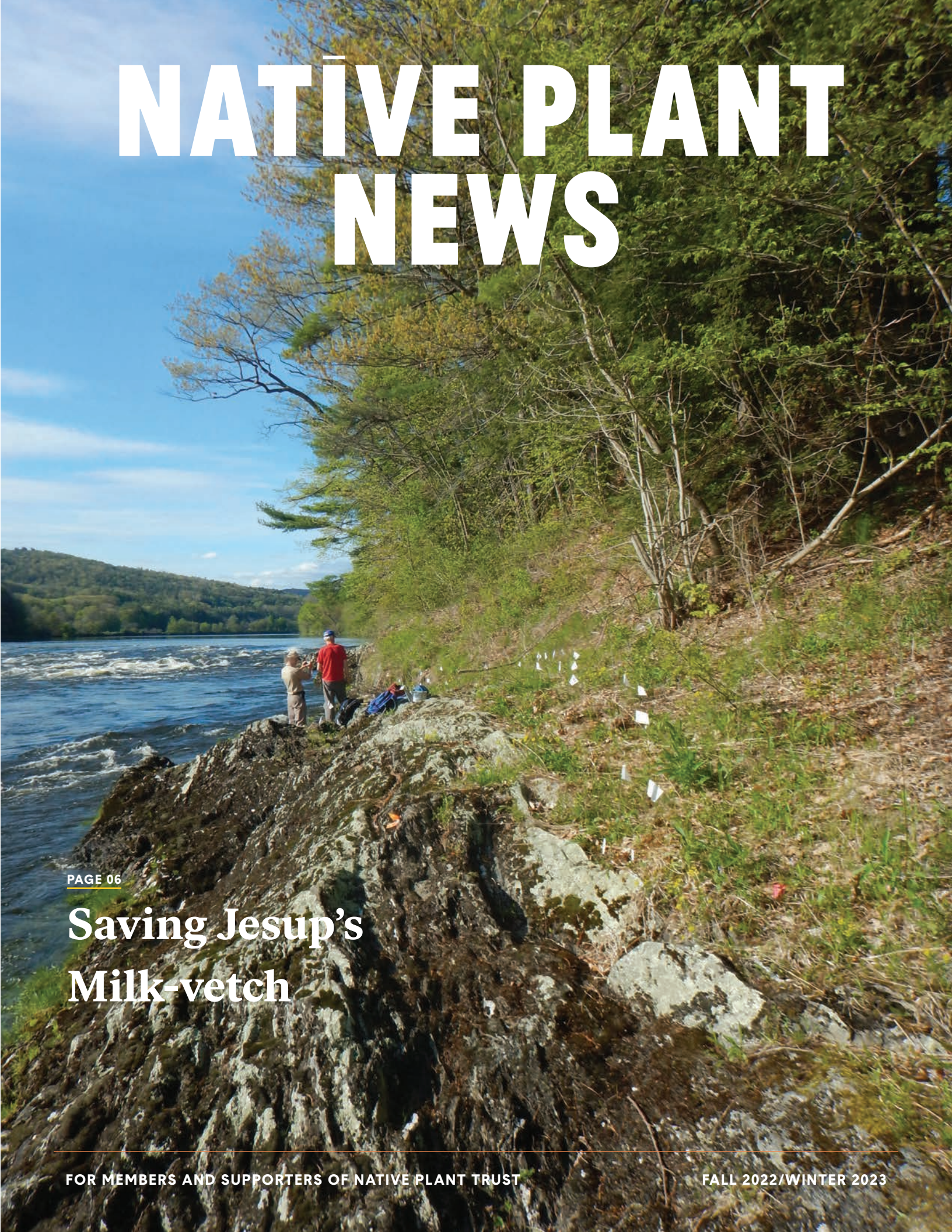
NATĪVE PLANT NEWS



PAGE 06

Saving Jesup's Milk-vetch

FOR MEMBERS AND SUPPORTERS OF NATIVE PLANT TRUST

FALL 2022/WINTER 2023

Fall 2022/Winter 2023

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New Seasons

In my previous letter, I noted that the latest international climate report came with the warning that we are "firmly on track toward an unlivable world."

DEBBI EDELSTEIN
Executive Director

A few months later, extreme heat and severe drought in much of the world quickly turned to catastrophic flooding in Pakistan and the devastation from hurricanes stretching from Puerto Rico to Florida to Nova Scotia.

With record-shattering weather events as the new normal, even the way we talk about seasons may be shifting. The names marking the equinoxes and solstices speak to what we celebrate in nature: the changing light, the cycle of growth and renewal, and altered rhythms of daily life. But we have another set of terms that speak to the power of nature to wreak havoc—fire season, hurricane season, monsoon season, flu season, and a more widespread drought season. And in every season, more wind. (Wind speed is up 5 percent worldwide since 2010, with extremely strong winds caused by storms up 10 percent, according to an Australian study.)

It can feel like the planet is fighting back—rebelling against millennia in which a large part of humanity sought dominion over nature but somehow forgot the "rule well" part. We need to learn again how to be part of nature and to act in ways that adapt to and sustain its complex balance. And if we think a reset is too difficult, just look at the human suffering of the last few months. Mother Nature always wins, so it's best to humbly join her team.

Native Plant Trust

VOLUME 9 | NO. 2

NATIVE PLANT NEWS

DESIGN
Moth Design
Rachel Wolff Lander

EDITORIAL
Jane Roy Brown;
jrbrown@NativePlantTrust.org

COVER
Monitoring Jesup's milk-vetch on the Connecticut River, Michael Piantedosi © Native Plant Trust

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Mass Cultural Council

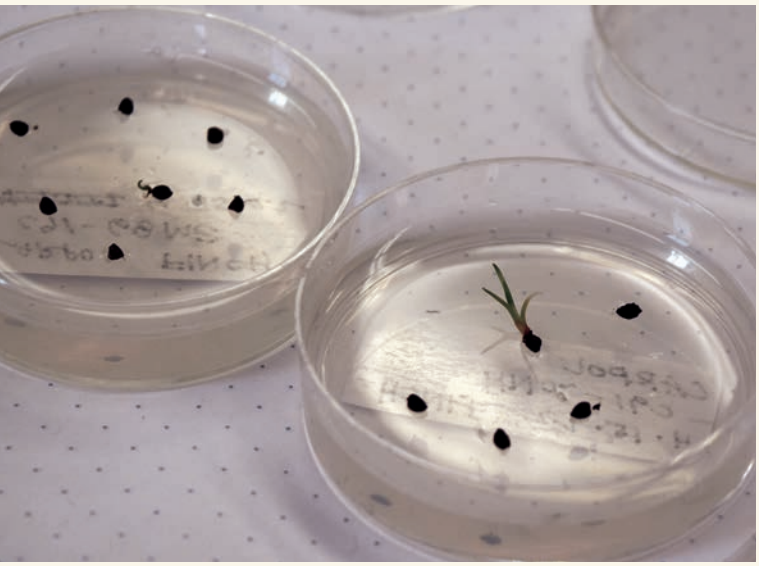
IN BRIEF

Germination Celebration

—Dr. Jessamine Finch, Research Botanist

Variable sedge (*Carex polymorpha*) is a perennial, rhizomatous sedge that grows in sandy, acidic soil. The species is globally rare, ranked as threatened or endangered in the five New England states—all but Vermont—in which it occurs. Like other sedges, *C. polymorpha* produces seeds in achenes: small, dry, one-seeded fruits that do not open to release the seed. To date, no reliable method exists for germinating achenes of this species.

Our seed-bank staff conducts regular germination trials to test seed viability. In 2020 we started germination trials of two collections of *Carex polymorpha* seeds from 1991. After we experimented with several methods, one seed in each collection recently germinated. The successful method involved exposing seeds to repeated warm-cold cycles and surgically removing part of the seed coat under the microscope. With such high stakes for this rare plant, our seed-bank staff is eager to see if we can stimulate more germination using this method.



01

02

Planning for Plant Migration

—Michael Piantedosi, Director of Conservation

In a time of rapid climate change, the pace of plant migration accelerates. We are starting to plan for the arrival of plants that may negatively affect the biodiversity of the region. This year we began working with the Vermont Fish & Wildlife Department on a proactive assessment of invasive plants likely to arrive in northern New England—Maine, New Hampshire, and Vermont—within the next decade. We have compiled data on their presence and abundance across the continental United States and in states abutting New England, ecological information on their growth and spread, and the plants' climatic preferences in the present and future climates of this ecoregion. We can then develop a consistent watch list and plan resources to manage particular invasive species before they spread.

We are also discussing how to categorize plant species that enter the region through a natural event or accidental introduction but are not currently recognized as part of the "native" flora. How to categorize such plants along the spectrum between native and nonnative is part of our discussions as we update *Flora Conservanda*, a publication we created to rank and prioritize plant species of conservation concern in New England. In the present climatic conditions, we must contend with a more fluid understanding of species' nativity and examine the conservation challenges throughout their historic and projected future range. With limited resources in conservation, we need to better understand this change to effectively serve the plants that live around us. We expect to complete both of these important documents in 2023.

01 Variable sedge (*Carex polymorpha*) germination, Dr. Jessamine Finch © Native Plant Trust

02 Invasive Japanese angelica-tree (*Aralia elata*) has migrated to Massachusetts. © Erik C. Sechler

03

Wild Seed Project Founder Honored at Symposium

—Jane Roy Brown, Writer-Editor

At the Need for Seed Symposium in November Heather McCargo received Native Plant Trust's 2022 Regional Impact Award, which honors exceptional leadership and achievement in native plant conservation, horticulture, or education of regional significance. As a lead plant propagator in the early 1990s, including at Native Plant Trust, McCargo witnessed how crucial it was to grow native plants from wild seeds in the face of biodiversity and habitat loss. In 2014 she founded the nonprofit Wild Seed Project in Maine to buck the prevailing wisdom that only scientists were qualified to propagate native plants from seed and "to build a movement of citizen ecologists to restore and transform our ecosystem." To date, she estimates that 1.8 million native plants have been propagated from seeds collected by the Wild Seed Project community. "Anyone, anyone can do this," she says.

Launching the Northeast Seed Network

—Debbi Edelstein, Executive Director

The recent surge in demand for New England native plants highlights a bottleneck in the supply chain: a shortage of locally adapted seed from sustainably managed sources. With funding from private foundations and the US Fish & Wildlife Service (USFWS), we are launching the Northeast Seed Network to coordinate with partners—including Northeast Organic Farming Association of Connecticut, Norcross Wildlife Foundation, and Smith College Botanic Garden—interested in farming seed for use in restoration projects and by nurseries to grow plants for sale. Staff at Nasami Farm will also collect seed sustainably from the wild to use in establishing these "founder plots," or seed-producing gardens, and will teach the technical protocols to others who wish to join the network. In addition, we are expanding seed-processing infrastructure and capacity at Nasami, so we can serve as the regional seed bank for the network. Our free, virtual "Need for Seed" symposium in early November, sponsored by USFWS, started the dialogue among key participants.

04

Meet Director of Public Programs Bess Paupeck

—Jane Roy Brown, Writer-Editor

Bess Paupeck's connections with nature started in her childhood. "Our house was set deep in a hemlock forest a short drive from the Connecticut shore," she says. "I spent most of my childhood outside."

An artist and curator who has previously worked chiefly in museums and universities, Paupeck enjoyed equally formative experiences with the arts. Her family, originally from New York, made frequent trips to the city to visit the MET and the Natural History museum. Early exposure to the arts awakened Paupeck to the artistic process and instilled an understanding that "solutions to big problems are as unique and numerous as the individuals roaming this earth."

As she developed as an artist, she grew passionate about bringing forth social issues through art. Her formal education reflects this progression, from a bachelor's degree in American studies, fine art, and art history at George Washington University to a master's degree in public humanities at Brown University. While living in Boston for the past 20 years, she has added graduate certificates in museum studies at Tufts University and nonprofit management at Harvard Extension School.

Since starting her job with Native Plant Trust in July, Paupeck has pondered how to engage more people with native plants, the larger natural environment, and related social issues. She launched one such discussion with the October screening of *Mardi & the Whites*, a documentary about Mardi Fuller, a Black outdoorswoman who grapples with often being the only person of color in the mostly white outdoors community as she explores New Hampshire's White Mountains. "Mardi's story is too typical." Paupeck says. "In nature, we know that biodiversity is essential, and in our own species, the same is true."

Please help keep our public programs accessible to all learners. Donate at www.NativePlantTrust.org/fundprograms, or call the Philanthropy Deparment at 508-877-7630 x3801.

03 Wild Seed Project Founder Heather McCargo, courtesy Wild Seed Project

04 Courtesy Bess Paupeck

Working on a New IDEA

—Debbi Edelstein, Executive Director

In May, Native Plant Trust was among the first 21 organizations selected for a year-long pilot project with the new IDEA Center for Public Gardens. (IDEA stands for inclusion, diversity, equity, and accessibility.) The pilot project offers trainings, resources, and opportunities to collaborate with colleagues who are members of the American Public Gardens Association. Each participating organization is also developing and implementing a project central to its efforts to expand IDEA. Native Plant Trust's project is developing a two-year plan to embed IDEA principles and actions into the organization's culture and work, with defined milestones throughout.

Native Plant Trust's IDEA Working Group, composed four board and five staff members, is leading an organization-wide initiative that acknowledges the need for respectfully incorporating into our work culturally diverse perspectives on plant life, scientific methods, and ways of interacting with plants. We are also committed to including people who may be disproportionately affected by a deteriorating environment but who have not had a voice within the conservation and horticulture organizations focused on solutions.

Native Plant Trust is developing a two-year plan to embed IDEA principles and actions into the organization's culture and work, with defined milestones.

05

Interns Investigated Plants, Living and Not

—Jane Roy Brown, Writer-Editor

Native Plant Trust's 2022 interns—three in Horticulture, four in Conservation—spent the summer researching topics that ranged from the causes and treatment of beech leaf disease (Farnsworth Horticulture Intern Caroline Campbell) to the need for a global rare plant conservation network (Lovejoy Conservation Intern Ella Moscia). Penelope Rose, Allen Native Plant Propagation and Horticulture Intern, continued a Nasami experiment to determine how smoke-germinated seeds of native New England plants respond to smoke generated by native and invasive species. Edward Petcavage Seed Conservation intern Amelie LeTierce investigated the requirements of rare species whose banked seeds have consistently failed to sprout. Sarah Nasif, Everett Conservation Intern, conducted habitat analysis for a native orchid. Horticulture Intern Whitney Troy added 25 new plants to the Garden Plant Finder database. Native Plant Trust's herbarium was the subject of Atkinson Conservation Intern Jemma Fisher's project, which established a timeline of its development and organized information about its collections and collectors going back to the mid-19th century. Near the end of their presentation, Fisher leaned forward, as if confiding a secret to the faces on the Zoom screen: "Rumor has it that Thoreau contributed a specimen, but so far it hasn't been found."

Please support these vital educational experiences. Visit www.NativePlantTrust.org/fundinterns, or call the Philanthropy Department at 508-877-7630 x3801.

05 From top: Specimens donated by Harvard University Herbarium include large-flowered bellwort (*Uvularia grandiflora*), mountain cranberry (*Vaccinium vitis-idaea*), and barren strawberry (*Waldsteinia fragarioides*). Jemma Fisher © Native Plant Trust

Sudden Limb Drop, Explained

—Jane Roy Brown, Writer-Editor

During this past parched summer, you might have pondered a healthy-looking leafy branch lying on the ground. This results from a phenomenon called sudden or summer limb drop, and it usually occurs in hot, dry weather. Oak, sweetgum, and ash are especially vulnerable, says Director of Horticulture Uli Lorimer.

"With insufficient water to maintain its biomass, a tree's survival mechanisms include early defoliation, slowing or stopping growth, and compartmentalizing resources to reduce their biomass," Lorimer explains. "In the latter case, the tree walls off nutrient and water flow to a limb or even part of the crown, eventually killing the extremity."

With the capacity for never-ending growth, trees need such mechanisms to respond to variable supplies of their essential resources: water, light, and soil minerals. But not all survival tactics involve shedding limbs. "Light is often limited when young trees are growing under a forest canopy," says Lorimer. "Some trees respond by producing larger leaves to capture more sunlight."

Although autumn rains alleviated the drought in much of the region, dry times will come again. When that happens, Lorimer advises watering trees deeply overnight—if permitted in your community—and using mulches and/or groundcovers to limit water loss. Water bags, drip lines, or plastic garbage bins with small holes drilled in the bottom enable water to seep slowly into the soil.

06

What does it take to save New England's rare plants?

You.

The threat is real. Today, 17 percent of New England's native plant species are on the brink of being lost, and another 5 percent have already disappeared from the region. We're racing to save New England's natural heritage.

Seed banking is a vital strategy for ensuring the preservation of genetic diversity and for reintroducing species to their native environments. On page 2, you can read about our recent germination breakthrough with variable sedge (*Carex polymorpha*) from the Seed Ark.

It's a long road, but we know we can reach the finish line with your help. A generous donor has stepped forward with an inspiring challenge to endow the Seed Ark and protect these precious species forever. From now through December 31, every donation you make to the Seed Ark will be matched dollar for dollar, up to $100,000.

Don't miss this opportunity to double your impact for rare native plants. Use the donation envelope in this magazine to mail your contribution, or put your Seed Ark Endowment Fund gift to immediate use by giving online: www.NativePlantTrust.org/SeedChallenge. For stock transfer information or other questions, contact the Philanthropy Department at gifts@NativePlantTrust.org or 508-877-7630 x3802. Thank you for your generous support.

06 Variable sedge (*Carex polymorpha*), © Arthur Haines

Chris Kane of New Hampshire Natural Heritage Bureau waters seedlings.

Saving Jesup's Milk-vetch

New Genetic Analysis Augments Field Observations

—By Director of Conservation Michael Piantedosi

For the past 33 years, members of Native Plant Trust's Conservation staff and our colleagues in the New England Plant Conservation Program have monitored the globally rare Jesup's milk-vetch (*Astragalus jesupii* var. *jesupii*), a member of the pea family that exists only at three naturally occurring locations in the world. All lie along a turbulent, 16-mile stretch of the Connecticut River, two in New Hampshire and one on the opposite bank, in Vermont. This summer, a team at Brown University performed a genetic analysis of plant tissue from each site, illuminating new perils as well as opportunities for conservation.

All photos by Michael Piantedosi

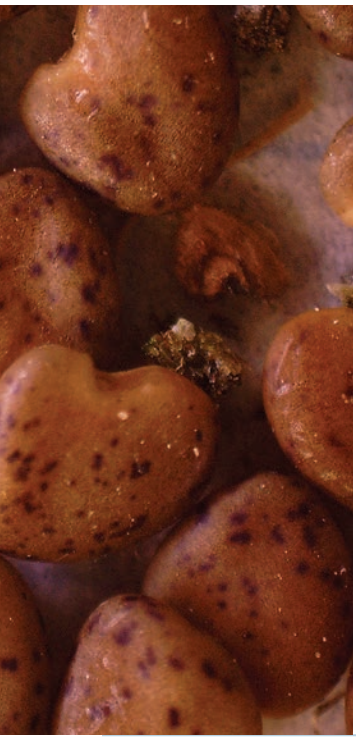
(Top) A Jesup's milk-vetch plug—a seedling grown in a deeper than usual container (cell) to enable root systems to develop.

(Bottom) Jesup's milk-vetch seeds are too dense to float.

The perils we knew about were bad enough: For any plant, a riverbank is a tenuous home, subject to storm surges and flooding; but Jesup's milk-vetch is well adapted to these cycles, which include scouring by chunks of floating ice in early spring. During this era of more rapid climate change, however, all such events are more extreme. The shoreline consists of steep bedrock ledges, which contain narrow crevices in which the river deposits small amounts of silt and soil. It is in these that Jesup's milk-vetch sprouts, though river-borne mud or debris can swamp them, smothering seedlings. Perils also invade from above. Poison ivy (*Toxicodendron radicans*) that grows at the top of the ledge has crept down the slope, threatening to shade out the seedlings. Invasive black swallowwort (*Cynanchum louiseae*) also casts shade down the ledge. The ledge is composed of calcareous bedrock, which has a higher pH than the acidic bedrock in most of the surrounding areas, creating a barrier to overland migration. Finally, the dense, heart-shaped seeds of Jesup's milk-vetch sink when they hit water—they don't bob in the current and wash ashore. This helps explain why the populations are confined to individual sites. The distance between sites also makes pollen exchange among them unlikely, limiting the genetic diversity of each population.

Conservation efforts have focused on stabilizing populations. A core team—Vermont Fish & Wildlife Botanist Bob Popp, Chris Kane of the New Hampshire Natural Heritage Bureau, and Native Plant Trust Director of Conservation Emeritus Bill Brumback—has monitored and conducted field experiments with Jesup's milk-vetch since 1989, two years after it was declared globally rare. (Bill still works on this project.) I joined the team in 2015. Our experiments have focused on augmenting existing populations and introducing seedlings to new sites where the plant has not existed historically, at least that we know of. All seedlings are grown from seed gathered on site.

Every year, we track which plants at all sites are in which phase of their three-year life cycle, including seedlings we have planted in existing and new sites. We also collect data about the river, the effects of weather and climate, canopy shading, and



A riverbank is a tenuous home, subject to storm surges and flooding; but Jesup's milk-vetch is well adapted to these cycles.

competing vegetation, including invasive species. We have recorded a gradual increase in temperatures on all the sites and are observing the effects of climate change on the plant's life cycle. Though the phenology—the timing of each phase of development—is still largely synchronized with the river's flooding and ice scouring, a trend of rising temperatures and more precipitation could prompt the overhanging canopy trees to leaf out earlier, and Jesup's milk-vetch seedlings could be shaded just when they need sun.

Jesup's milk-vetch was first reported in 1876, at one of the two New Hampshire sites. This original location contains the smallest population of the three, and the largest population—containing about 2,000 individuals—is at the second New Hampshire location. To conserve existing populations and ensure as much genetic diversity as possible, we collect seed from this largest population for introduction at new sites. We bank some of the seed, and we use some of the remaining seed to grow seedlings for our field experiments.

During the past eight years, we have successfully introduced plants in five places that are not part of the known historic range. One, in New Hampshire, is well protected by water, so it discourages encroachment by foot. Not only have our transplanted seedlings survived here, but new seedlings have also popped up, signaling the birth of a new population.

Other introduced populations are also surviving, but none is as well-established as this one.

We recently have set new goals, starting with permanently protecting the original three populations with conservation easements, supported by a grant from the US Fish & Wildlife Service (USFWS). (Most of the sites are on private land, and endangered plants, unlike endangered animals, are not automatically protected on private land in most states.) Second, we want to continue to establish new populations and maintain our intensive monitoring for the foreseeable future: counting the plants that occur on each of the naturally occurring sites, recording coordinates of where each plant occurs, noting transplants to augment populations, and recording every flowering stem to anticipate future seed production.

What the Genes Say

The idea of conducting genetic analysis of Jesup's milk-vetch started about seven years ago, when Brown University—specifically, Dr. Rebecca (Becky) Kartzinel, whose several titles include Director of the Brown University Herbarium—approached us about doing some early genetic sequencing of this plant. In this first phase, the goal was to see how difficult it is to do sequencing from leaf tissue. The extraction from plant tissues is standard, but no one

had yet done this for Jesup's milk-vetch, which is of genetic interest because of its disjunct populations. Becky did the initial sequencing of the genomes of plants we were growing for augmentation.

In 2020 we received funding from USFWS to conduct a more in-depth analysis to see how genetically distinct the three natural populations and the population at the most established introduction site were from one another. This would reveal, we hoped, each populations' genetic adaptations to its local site conditions, each disjunct from the next. Another aim of the genetic testing was to track changes in genetic diversity in each population over the past 30 years, drawing from collections in Native Plant Trust's seed bank. On the practical level, we hoped that the analysis could guide our future introductions; specifically, whether or not we should mix seed from the three natural populations. Although this would maximize genetic diversity, blending the populations is also risky, because it could dilute the fitness of the blended population without informing us which genetic strain(s) caused the damage. That is why, up to now, we've used only seed from the largest naturally occurring population in our introductions.

Results of the genetic analysis confirmed the expectations we had formed from field observations: First, each of the three natural populations of Jesup's milk-vetch is genetically distinct from the others. The findings also confirmed that the largest population, from which we collect seed to grow plants used in introduction sites, is the most genetically diverse. The introduced population sampled in the analysis remains genetically similar to the large natural parent population, even after almost six years. The second big take-away is that adaptability is a hallmark of this taxon, which inhabits terrain marked by minute but meaningful variations in topography and other conditions. This means that each population of Jesup's milk-vetch, being uniquely adapted to its environment, is at risk of extirpation. For these reasons, genetic analysis is crucial for any future introductions as well as ongoing augmentation, because we want to understand the affinity of each of the natural sites to that sites' ecology.

Adaptability is a hallmark of this taxon, which inhabits terrain marked by minute but meaningful variations.

Now, how to apply these findings in our field work: Should we continue using plants grown from the seed of only one natural population when introducing plants to a new site, or is there potential benefit in mingling the genetic stock? Other, more nuanced questions emerge from these, as well as how to augment struggling natural populations. Now that we are equipped with hard data from the deep dive into this species' gene pools, we will discuss how to proceed at our winter meeting with state and federal botanists. It promises to be a very interesting conversation.

Genetic analysis of Jesup's milk-vetch was funded by US Fish & Wildlife Service. Other research is funded primarily by Vermont Department of Fish & Wildlife.

01 Botanist Chris Kane waters newly planted seedlings.

02 Watered seedling

Crucial to all of this work is our seed bank. So much of what we do for Jesup's milk-vetch revolves around having the genetic material—seeds—on hand. We have seed collections from this plant spanning about 10 generations, which provides material not only to grow seedlings for introductions and augmentation, but also for the genetic analysis of this species. Please see page 5 to learn how to contribute to our seed-banking effort.

Thank you. —M. P.

(Top) Spongy moth caterpillars (*Lymantria dispar*); (bot.) Bagworm (*Thyridopteryx ephemeraeformis*) "bags"

Heat and Drought: Boon or Bane for Pest Insects?

It depends on—well, a lot of things

— Jane Roy Brown

This summer, residents of Connecticut, Massachusetts, New Hampshire, and Rhode Island sweated through their hottest August on record, compounding a region-wide drought. Constrained by watering bans, anguished homeowners wondered whether the same hot, dry weather that was stressing their trees and shrubs was also killing off tree-feeding insect pests—or giving them a field day.

Entomologists say that the answer depends on the interplay of many factors: the kind of insect, its predators and pathogens, the condition of the host plant, winter temperatures, and perhaps most crucially, phenology—the synchronization of plant, pest, and pathogen life cycles. That said, local experts suspect that the summer drought was likely a boon for the most common pests of woody plants in the Northeast: scale insects, certain species of spider mite, aphids, and foliage-munching moth caterpillars, among others. Hot, dry weather gives many pest insects a reprieve from the fungal diseases that plague them in wetter times. But on the plus side, the drought might have delivered a drubbing to white grubs, an umbrella term for several species of soil-dwelling beetle larvae, including Japanese beetles (*Popillia japonica*), that feast on turf-grass roots.

"If it's dry in July, when newly laid eggs and young grubs need moisture, that slows them down," says Heather Faubert, director of the University of Rhode Island Plant Protection Clinic. "But they'll bounce back if the next season is wet. The thing about insects is they're really good at surviving. Unless their food source dies off, insects are doing okay, even if they are not thriving. Many insects, such as spongy moths, have more of a problem in wet conditions, when the fungal pathogens that keep them in check usually thrive." (Spongy moth is now the accepted common name for *Lymantria dispar*, formerly called gypsy moth.)

Tawny Simisky, Extension Entomologist, Woody Plant Entomology at the University of Massachusetts Amherst, gives a similar assessment. "Consider that insects are small, cannot regulate their body heat, and lose a lot of moisture from the large amount of exposed surface area on their bodies," she says. "This would make low humidity and high heat troubling for some of them." But exceptions abound, including certain spider mites (*Tetranychidae*) and

All photos by Tawny Simisky

02

lacebugs (*Tingidae*), which thrive during extended dry periods. “Insect populations are extremely complex and not fully understood by science. We do have some evidence to predict certain trends, but insects never fail to surprise me,” Simisky says.

What is well documented is that trees under stress, whether from too much or too little moisture, attract herbivorous insects. “We see a lot of bark and wood-boring beetle attacks whenever their host plants are under stress,” Simisky says. “The insects pick up on chemical stress signals that the host plants put out and move toward the stressed hosts, which also lack their usual chemical defenses.”

Researchers at the University of Florida, Gainesville, and North Carolina State University, Raleigh, recently tested what is known as the “plant-stress hypothesis” with gloomy scale (*Melanaspis tenebricosa*), a sap-feeding insect that attacks red maple trees (*Acer rubrum*) in southeastern cities. The hypothesis proposes that drought-stressed trees not only attract sap-feeding insects, but also provide a nutritional boost that increases their fitness and reproduction rate. Many insect populations are kept in check by the inability to metabolize nitrogen, and a drought-stressed tree has increased sugar and nitrogen concentrations. With an abundant source of nitrogen available in the stressed trees, insects such as *M. tenebricosa* ballooned in size and population (Dale and Frank, “Warming and drought combine to increase pest insect fitness on urban trees,” *PLoS ONE*, 2017). A different researcher found similar results with elongate hemlock scale (*Fiorinia externa*), a species that preys on eastern hemlock trees (*Tsuga canadensis*).

Such findings have sharp implications at a time of climate change, when both temperatures and extreme weather conditions are on the rise, and entomologists generally expect tree-feeding insects to follow the same trajectory: “shorter generation time, higher fecundity and survival, leading to increased range expansion and outbreaks,” as one research article put it. But the same article—“Responses of forest insect pests to climate change: not so simple”(Jactel, Koricheva, and Castagneyrol, *Current Opinion in Insect Science* 2019)—and several others conclude that linear predictions can go sideways in the interplay of ecological and climatic forces.

The same unpredictable dynamics apply to populations of native herbivorous insects, Simisky says, pointing to bagworm (*Thyridopteryx ephemeraeformis*), a defoliating moth caterpillar, which has surged in Massachusetts over the past few years. “In the past, bagworm did not typically overwinter in Massachusetts,” Simisky says. “Lately, we’re getting increasing reports of bagworms overwintering in the state, especially in urban forests, which are warmer than rural areas because of the heat-island effect. This might give us a preview of how some insects will respond as the climate warms.”

Faubert agrees that climate change is the biggest factor influencing insect-related trends. “A warming climate means that insects will probably produce more generations during the year,” she says. “But there’s so much we still don’t know.”

LEARN MORE BY EXTENSION

State university extension services (a.k.a cooperative extension services) provide free articles, fact sheets, and even webinars for home gardeners. Just type any state university extension name into a search field of your browser to reach its website. Locate pest-insect information by following the sequence of pages given below.

University of Connecticut Extension - College of Agriculture, Health and Natural Resources/ Extension & Outreach/Extension Services/Home and Garden Education Center/Fact Sheets

University of Maine Cooperative Extension - Scroll down home page to Information and Research, choose Garden & Yard; choose Insect Pests, Ticks & Plant Diseases

University of Massachusetts Extension - Go to Landscape, Nursery, and Urban Forestry/ Publications & Resources/Fact Sheets

University of New Hampshire Extension - Go to Agriculture & Gardens/Yard & Garden/Insects in the Home, Yard and Garden

University of Rhode Island Cooperative Extension - Go to Services/Plant Protection Clinic

University of Vermont Extension - Go to Community and Consumer Horticulture Programs/ Gardening Resources/Insects & Pests

— J. R. B.

02 Emerald ash borer (*Agrilus planipennis*)

Rare Plant Spotlight

Entire-leaved skullcap

(*Scutellaria integrifolia*)

—Arthur Haines, Senior Research Botanist

This regionally rare species extends south from Massachusetts through the eastern states to Texas. In New England, this member of the mint family is known only from Connecticut and Massachusetts, though it is historical (i.e., no longer present) in the latter state.

Common to many species of mints, *Scutellaria integrifolia* has zygomorphic (i.e., bilaterally symmetrical) flowers with an upper and lower lip. The upper lip forms a hood over the pollen-bearing structures, and the lower lip is flared open with white markings near the center. The flowers of this species are larger than that of many mints in the Northeast. While it is insect pollinated, research shows that it can also produce fruit from self-pollination.

Despite having been collected at several sites in Connecticut, most with a history of human modification, *S. integrifolia* is known from only two extant sites in that state. Although it is at the northern limit of its range, its scarcity is still puzzling, given that it grows in old fields and other locations with a history of human disturbance, including roadsides and open rights-of-way. In other words, its habitat is not rare.

One possible explanation for its local rarity might be revealed by comparing land-use patterns, as suggested by the recent discovery of a new population in Connecticut. Present land uses often differ enough from past uses to preclude this plant from many locations. For example, today's more intensive use leaves little fallow land in the process of succession from field to forest. Neither cultivated and closely managed openings (e.g., tilled fields, mowed pastures) nor, at the other extreme, forests provide suitable conditions for this species. Old fields that have been left unused for several years and have begun to be colonized but not yet dominated by woody species appear ideal for this plant. Surveys that target such older clearings may reveal more locations for *S. integrifolia* in southern New England.

Please support the work of our conservation botanists with a donation to Native Plant Trust: www.NativePlantTrust.org/support. Thank you.

Entire-leaved skullcap (*Scutellaria integrifolia*) © Mary Keim

Message from the Treasurer

Despite the ongoing pandemic and its restrictions on operations, in 2021 Native Plant Trust continued its record of success in core programs and maintained a strong financial position.

The organization continued to attract support for key initiatives and ended the year with an increase in net assets of $1,537,157, for a total of $17,547,114. Net assets include $8.9 million in permanently restricted endowment funds, $3.6 million in accumulated earnings on endowment funds, and $755,345 in gifts restricted by donors to specific initiatives. Gifts to the endowment this year included the third $100,000 installment on a five-year pledge for the Seed Ark. In addition, the year concluded with a surplus in operations of $332,076.

Program successes included the publication of Conserving Plant Diversity in New England, a collaboration with The Nature Conservancy, and the conclusion of a five-year project to restore the summit of Cadillac Mountain in Acadia National Park. In addition, generous individuals and foundations supported important capital needs, including the development of a new database and website for managing our rare plant records and the Plant Conservation Volunteers program.

Thanks to the hard work of our Board, staff, volunteers, and the generous gifts of our many members and supporters, Native Plant Trust had an impressive year in 2021.

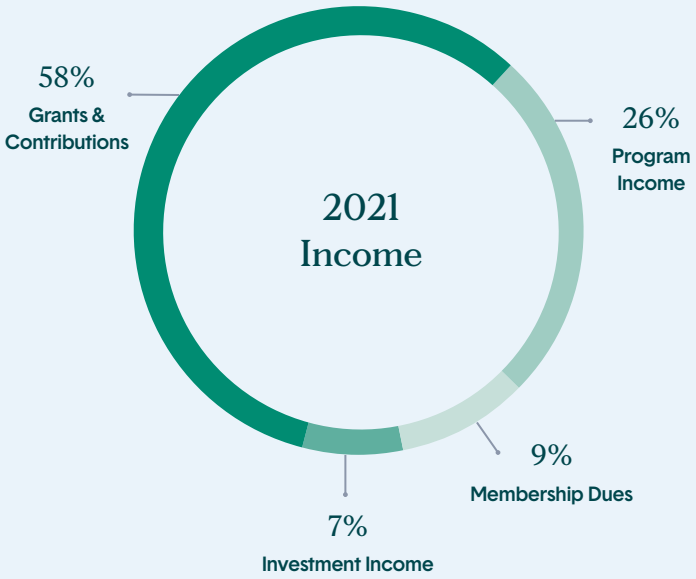
Sincerely,

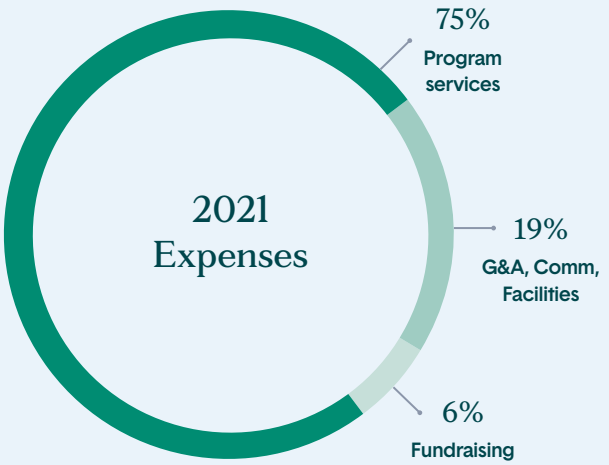
TONY WAIN

Treasurer

Fiscal Year 2021 Operating Results

INCOME	
Grants and Contributions	$2,416,089
Program Income	$1,071,447
Membership Dues	$394,988
Investment Income	$296,285
TOTAL INCOME	**$4,178,809**
EXPENSES / PROGRAM SERVICES	
Conservation & Sanctuaries	$1,188,718
Horticulture	$767,542
Education	$337,772
Member Services	$247,256
Retail Shops	$329,429
Total Program Services	$2,870,717
EXPENSES / SUPPORT SERVICES	
G&A, Comm, Facilities	$743,218
Fundraising	$232,798
Total Support Services	$976,016
TOTAL EXPENSES	**$3,846,733**
OPERATING SURPLUS (DEFICIT)	**$332,076**





A complete copy of the audited financial statements is available on our website or upon request by emailing development@NativePlantTrust.org.

PLAN FOR THE FUTURE

REGARDLESS OF WHERE YOU ARE IN YOUR LIFE JOURNEY, YOU CAN MAKE OR UPDATE YOUR WILL TO PROTECT THE PRECIOUS PEOPLE IN YOUR LIFE, AND EVEN ESTABLISH YOUR OWN NATIVE PLANT LEGACY. VISIT WWW.FREEWILL.COM/NPT OR SCAN THE QR CODE TO GET STARTED.

NATIVE PLANT TRUST GARDEN SHOP

2022 was another great planting season

Winter snows bring spring flowers. The 2023 native plants list will be posted in mid-January. Plan your preorder!

Online at:
www.nativeplanttrust.org,
For Your Garden/Buy Native Plants

Gift cards available

EVERY PURCHASE SUPPORTS OUR MISSION

HAPPENĪNGS

The cold winter months are the perfect time for garden rumination. Join us in December for "The Meaning of Gardens" to explore the conceptual meaning of gardens, then follow it up in January for a deep dive into the history of landscape design.

DECEMBER 9, 2022, 1-2 P.M

The Meaning of Gardens

For garden makers and visitors alike, the beauty or symbolism of a garden may kindle a sense of connection to a larger world, physical or imaginary. Garden creation begins in the imagination as a quest for meaning. We will explore the process of imagining a garden that holds personal meaning and look at examples of types of gardens that fulfill meaning-making for their creators or for visitors.

TUESDAY, JANUARY 10, 2023—TUESDAY, JANUARY 31, 2023

History and Principles of Landscape Design

As horticulturists and landscape designers, we need a strong foundation in the cultural history and theory of landscape to fully understand our work in the garden. In this course, we will explore Eastern and Western garden design, including long-practiced principles that encourage sustainable and ecological approaches in the landscape design field. This history survey will include visual presentations, readings, projects, and discussion.

Register at www.NativePlantTrust.org, Learn/Classes & Field Studies.

SIGN-UP

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Visit www.NativePlantTrust.org and click on eNews in the footer on any page.

Native Plant Trust

Conserving and promoting New England's native plants

HEADQUARTERS & GARDEN IN THE WOODS

180 Hemenway Road
Framingham, Massachusetts 01701–2699

CLIMATE CHANGE CAN-DO

Terminate Your Turf

In 2020 alone, Americans used about 3 billion gallons of gasoline to maintain their lawns. That's equal to nearly 6 million passenger cars running for a year. Replace your grass with native plants.
Source: *The Washington Post*