

NATIVE PLANT NEWS



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Fall 2020/Winter 2021 contents



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Cushion-plant (*Diapensia lapponica*)
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Native Plant News is published by Native Plant Trust, an independent, nonprofit, member-supported organization. Subscriptions are included in membership dues. For information, contact: membership@NativePlantTrust.org.

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Diversity in All Its Forms

As the pandemic marches on and colder weather sends us all indoors, we may find ourselves sitting by a fire reflecting on a tumultuous year (and hoping for a respite from thunderbolts hurled by mythic deities). We might also take solace from history: times of great disruption can lead to important, lasting change.



DEBBI EDELSTEIN
Executive Director

In the previous issue of *Native Plant News*, I expressed the hope that a virus-driven rediscovery of nature would lead to actions and policies focused on improving the health of our planet. In this issue, we present two possible directions for change—saving plant diversity in New England through strategic land conservation and improving biodiversity by acting on what research reveals about our management of our yards. I hope you enjoy reading about both initiatives.

But focusing on the fragile diversity of flora and fauna is only part of the challenge. We cannot heal natural systems, of which we are an integral part, without reforming our social systems. For many people, a clouded lens obscures the beauty of human diversity or hides the insidious bigotry of everyday life. It's beyond time to see racism clearly, eradicate it, and work toward a society that is a true rainbow coalition.

That work begins here and now. As Native Plant Trust develops a new long-range vision, we are committed to building an organization that embodies all the voices calling for systemic change.

IN BRIEF

A New System for Rare Plant Data

—Michael Piantedosi, Director of Conservation

A key part of plant conservation is managing data. Since November 2019, members of the Conservation staff have been working with Plant Conservation Volunteer (PCV) and tech wizard George Kocur to create a new database. Dubbed the Species Rare Occurrence Utility (SPROUT), it will house and organize our rare plant data, which now exist only as blocks of text in an antiquated database. SPROUT will enable those who conduct rare plant surveys to report data directly from the field, using the same standardized form throughout New England. Best of all—and a crucial reason for the database conversion—SPROUT will enable in-depth analysis of the field records, which was not possible in the text-based system it is replacing.

Simultaneously, volunteers are also transferring the reams of data collected over three decades into the new system. So far, they have transcribed more than 2,200 of approximately 12,000 handwritten field forms. Kocur also is redesigning the internal Conservation website.

This season PCVs and members of the New England Plant Conservation Program task force signed up to conduct 1,200 rare plant surveys throughout the region. We also are planning to collect and bank seed from 576 populations of 236 rare species. Our work on imperiled species continues, including research on germination requirements and storage viability and on augmenting and managing selected populations of globally rare species.



01



02

Practicing Conservation Horticulture

—Uli Lorimer, Director of Horticulture

Over the decades, species of conservation concern have found their way into the collections at Garden in the Woods. Growing rare plants in a public garden serves both conservation and horticulture goals, because cultivating these plants adds to the greater body of knowledge about the species and enables visitors to learn why they are threatened in the wild. As plant conservation has expanded its focus from individual species to entire habitats, it makes sense for horticulture to follow suit by incorporating rare plants into our habitat displays, placing individual species in the context of the natural plant communities in which they occur in the wild. We are achieving this by 1) dismantling the former rare plant garden and moving its rare species to appropriate habitat displays, and 2) placing new rare specimens directly into habitat displays.

For example, we transplanted specimens of great St. John's-wort (*Hypericum ascyron*)—which is rare or endangered in the five New England states in which it is present—from the rare plant garden into the meadow. We also grew more than 100 plugs of this species from seed collected in the rare plant garden and planted them this summer in the meadow, where next year's visitors will see a fall display of this imperiled species.

Online Programs Expand Audiences, Spark Innovation

—Courtney Allen, Director of Public Programs

This year COVID-19 and ensuing financial challenges have encouraged us to explore new ways of teaching virtually as well as new topics, including more plant science. This season we are offering 100 public programs, including more than 30 that are completely new. Most of the season's programs are offered virtually (or can be adapted to an online format), including programs about new research and the rare flora at Native Plant Trust's seven sanctuaries. And gardeners will find a variety of new workshops on principles of landscape design, site analysis, color and texture in the garden, plant nutrients, climate change, and other topics. The season also features a new, behind-the-scenes online series examining the collections at New England's top university herbaria (see inside back cover).

Offering more online programs ensures greater access for diverse audiences throughout New England and beyond, and also enables us to explore innovative long-distance collaborations. In September, for instance, we launched a virtual event, THRIVE, that featured plant-inspired visual art, poetry, and music, followed in October by a virtual plant diversity symposium focused on new conservation analysis by Native Plant Trust and The Nature Conservancy (see page 04). For more information and to register for programs, visit www.NativePlantTrust.org.



Choose Your Challenge

Will your matching gift go to online learning... or would you prefer to make a matching gift to save New England's rarest plants through the Seed Ark Endowment?

Are you up to the challenge of doing something great for the planet?

In this difficult year, two generous individuals seek to inspire you. They are stepping forward with challenge matches to support their favorite Native Plant Trust initiatives. They will match your contribution dollar for dollar, up to \$100,000 for each of the two challenges, for gifts received before December 31. So choose your challenge—and be proud of doubling your impact.

PUBLIC PROGRAMS CHALLENGE MATCH

Our pioneering work in online botanical education enabled us to transition rapidly to web-based learning when the pandemic hit. Your matching donation will help meet the rising demand for virtual classes and support our continuing innovation.

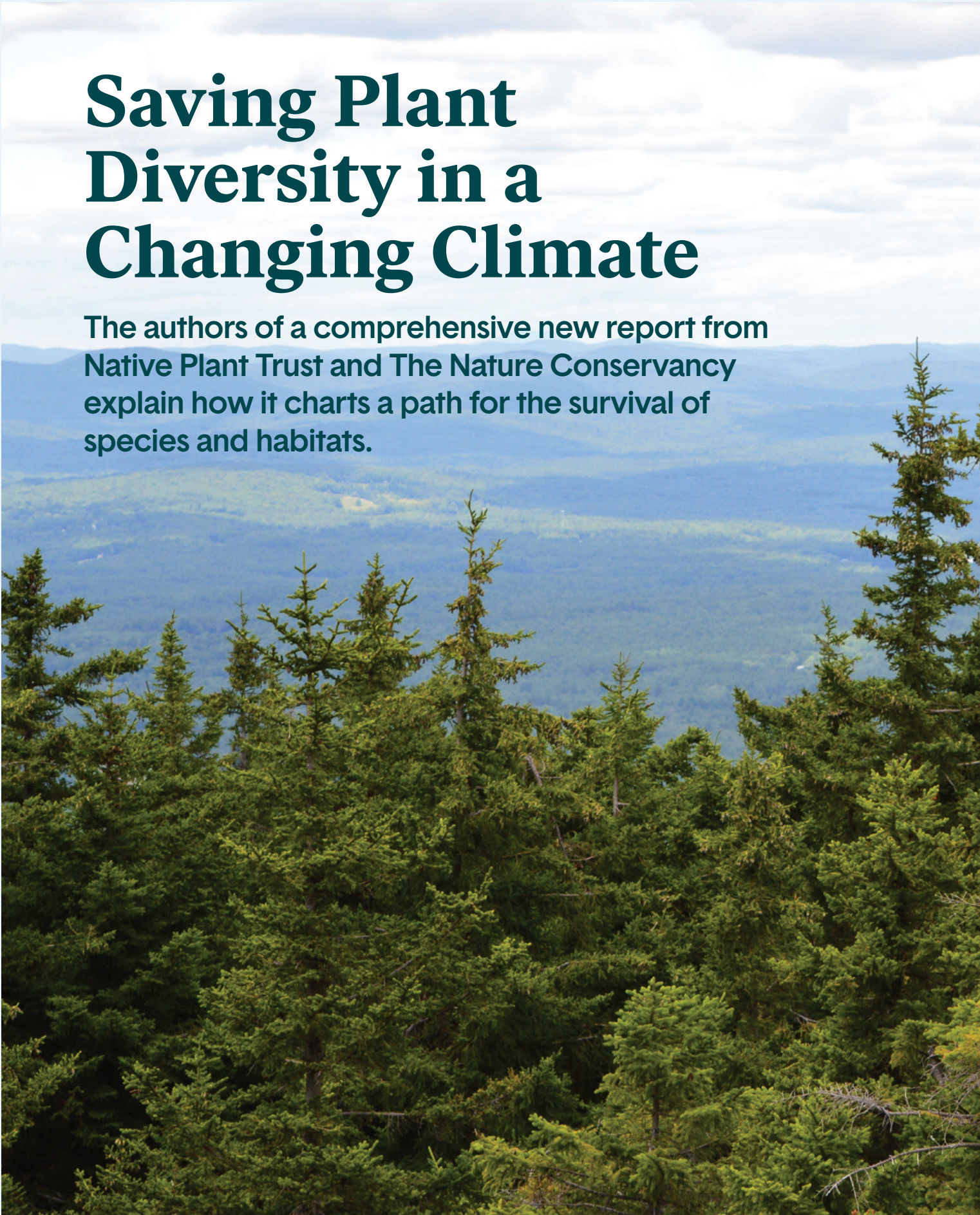
SEED ARK ENDOWMENT CHALLENGE MATCH

We are leading efforts ensure New England's rare plants survive in the face of increasing threats. We're banking their seeds, even as we restore populations of the most at-risk of our 389 globally and regionally rare plants. Your matching gift helps guarantee their future.

To donate to either challenge match and double your support, please use the envelope in this magazine, email gifts@NativePlantTrust.org for links to our online giving pages and stock-transfer information, or call 508-877-7630 x3802. Thank you!

Saving Plant Diversity in a Changing Climate

The authors of a comprehensive new report from Native Plant Trust and The Nature Conservancy explain how it charts a path for the survival of species and habitats.



ABOUT THE PLANT DIVERSITY REPORT

- The report focuses on the distribution, health, and conservation of plants at the species, community, and site scales. It provides interactive maps and strategic, science-based guidance for land trusts and other land-protection entities.
- We focus on the diversity and resilience of habitats rather than the number of species in a habitat. Conserving multiple intact examples of every habitat is a strategy for sustaining the natural benefits plants provide and maintaining the full diversity of species that depend on them.
- We assess conservation progress relative to global and regional targets. The Global Strategy for Plant Conservation, part of the United Nations' Convention on Biological Diversity, aims to protect at least 15 percent of each ecological region or vegetation type in every country by 2020. The regional targets are adapted from the Global Deal for Nature, a science-driven international program that seeks to preserve 30 percent of the world's ecosystems by 2030.
- We express global and regional goals in terms of three levels of conservation protection: (1) secured for nature and natural processes, (2) secured against conversion, and (3) secured against conversion but managed for multiple uses (e.g., recreation and timber harvesting).
- New England's plant populations are shifting in response to variation in temperature and moisture driven by climate change. Resilient land is that which provides buffering and refuge from a changing climate by offering many microclimates connected by natural cover, creating strongholds for current plants, and supporting diversity under different climates in the future.
- For all of New England, we mapped each habitat's most resilient land and assessed progress toward conserving those lands.
- The technical report and maps will be published later this year.



Featuring Michael Piantedosi, Director of Conservation; Bill Brumback, Director of Conservation Emeritus; and Mark Anderson, Director of Science for the Eastern United States, The Nature Conservancy. *Native Plant News* conducted separate interviews with the authors. The following comprises edited selections of their responses.

NATIVE PLANT NEWS: What prompted this report, and what is its goal?

BRUMBACK: We've been focused on meeting—for our region—the country-wide targets set by the Global Strategy for Plant Conservation, which is part of the United Nation's Convention on Biological Diversity. One target focuses on ensuring that protected lands capture sufficient diversity. We felt that an analysis of plant diversity and how to secure it in the face of climate change was the logical next inquiry after our "State of New England's Native Plants" report. And we wanted to provide a framework for land protection initiatives across the six states. We teamed up with Mark because of the wealth of data TNC collects, and over the last two years we've collaborated on a groundbreaking analysis.

NPN: Why is it important to measure plant diversity?

PIANTEDOSI: Plants translate the geology, soil, and topography of the landscape into life—into plant communities or habitats that support the diversity of other species. Right now, a changing climate adds to the threats faced by plants and other organisms in the wild. Humans continue to develop land in unsustainable ways, fragmenting



“Migration and adaptation are happening now, and it will take human intervention to enable these evolutionary processes to continue.”

habitats that connect to form migratory routes that organisms need to survive in a changing climate.

NPN: While framed around plant diversity in New England, the report focuses specifically on areas with climate-resilient habitats in need of conservation. What makes a habitat resilient?

ANDERSON: Resilient sites provide species that live there the most options for responding to climate change. Over time, as moisture and temperatures change, plant populations are likely to migrate following their preferred temperature and moisture levels. Plants are also sensitive to soil chemistry, so if a plant species is adapted to high-calcium soils derived from limestone, it will have to migrate to a connected or nearby limestone area in order to thrive. Also, plants experience climate at a very local scale. On a north-facing slope, for instance, lots of other micro conditions contribute to this local climate, such as moisture flowing downhill. Places with varied topography have the most microclimates—like a stream with a valley and little foothills with slopes—and these, in turn, have the highest resilience, because the microclimates provide many options for the plants to find suitable climates and persist, even if

the regional climate changes. Conversely, a big flat farm field is more vulnerable to climate change because its topographic sameness means there is nowhere for plants to find refuge if the climate becomes unsuitable.

NPN: What are some examples of climate-resilient habitats and habitats that might not survive in a changing climate?

PIANTEDOSI: In general, a lot of forest habitat types are resilient to changing climates, but some, like coastal hardwood forests, are also desirable as real estate and face significant development pressure. Our goal is to make clear the importance for biodiversity of conserving habitats resilient to climate change.

BRUMBACK: We’re heading generally toward hotter and drier conditions, and in that scenario, spruce-fir communities, which grow at higher latitudes and higher elevations, probably represent the most endangered habitat in southern New England. Here, according to at least one study, the spruce-fir community has moved 100 meters higher in elevation since 1964, and it will eventually run out of slope. So, in southern New England this habitat will be replaced by hardwood forests. In northern New England, however, spruce-fir forests will remain abundant.

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NPN: Does the report reflect a consensus among scientists that human intervention is required to enable flora and fauna to migrate and adapt in a changing climate?

ANDERSON: The growing consensus is more about how serious and pervasive climate change really is.

PIANTEDOSI: I don't see a consensus about moving plants around, as in assisted migration. But human beings intervene in natural processes all the time, such as when we develop and convert the uses of land. Choosing to conserve land to preserve the ecological processes present or possible over time is also human intervention. Migration and adaptation are happening now, and it will take human intervention to enable these evolutionary processes to continue, at the species or the habitat scale.

NPN: The report (1) identifies land areas in our region where migratory shifts can occur and (2) prioritizes their protection as conservation areas. How did you accomplish each?

PIANTEDOSI: We started with climate-prediction modeling and The Nature Conservancy's mapping of resiliency areas based on some of those predictions. Some of these specific land features and habitat types are not as susceptible to changes in climate, and therefore, plants and other organisms are likely to remain more stable, or resilient, there. Our conservation priorities were based on refining what we've termed the New England Targets based on the Global Deal for Nature and on the Global Strategy for Plant Conservation [see sidebar]. We recommend conserving a significant number of these resilient areas at the

highest level of protection, that is, for ecological health versus for human uses.

ANDERSON: We have spent many years working on how to map and estimate microclimates using a three-dimensional digital elevation system to model topography. The algorithms can pick out about 30 different landscape characteristics that indicate microclimates. For example, it can highlight a slope with a southern aspect, show all the places where water collects, or show all the places with granite bedrock. So if we want to find places where similar habitats exist, we start with these geological and other landscape attributes.

NPN: How does the report suggest conserving rare plant species that inhabit areas of low resilience?

PIANTEDOSI: In fragmented and vulnerable habitats where rare species exist, we recommend some level of conservation protection, even if the land is going to change, but a less-resilient site for a rare plant is a high candidate for *ex situ* conservation seed banking. More weight should be given to habitat management for populations of some rare taxa currently growing in a resilient habitat. It's likely we will also need to move species and collect seed to bank for the future, accepting that some species may not exist *in situ* for a long time in a rapidly changing climate.

BRUMBACK: Another way to frame our strategy is that if we conserve land to protect rare species, we won't necessarily protect their habitats. But if we conserve habitats, we also conserve species. The Nature Conservancy uses the analogy of players on a stage. If we conserve the stage, the players have room to move around.

04



05



NPN: Native Plant Trust’s “State of New England’s Native Plants” report (2016), reflected more than 30 years of conservation field research by our staff and colleagues. How does the plant diversity report build on that earlier report?

PIANTEDOSI: We really benefited from Elizabeth Farnsworth’s fundamental work in that report, which documented which rare plants inhabited which habitat. In this report we dug into those habitat types from the perspectives of land conservation, resiliency, and plant diversity.

BRUMBACK: Among other things, her work outlined threats to broad habitat types within New England and pointed to the need to conserve them—to look at all plants, not just rare species. The current report looks at the extent of the region’s habitats, whether they are going to exist under climate change, and where we should focus our land-protection efforts.

ANDERSON: That report also underscored the importance of plants to biodiversity in general.

NPN: If we could act on only one of the recommendations in your new report, what should it be?

PIANTEDOSI: We need to get as much land into the most protected conservation status as possible, so that we have macro land areas preserved for natural systems, barring any development for the foreseeable future.

ANDERSON: We really need to improve the conservation of low-elevation forests and floodplains. These are rich ecosystems that are poorly protected. We still have oak-pine forest in southern New England, but not many places where that forest has grown old and remains intact enough to provide territory and space for animals, so it’s depleted of fauna. We’ve been experiencing this trend for 60 years, and now we are seeing the fallout. A report published in *Science* last year estimated that North America has lost 3 billion birds during the last 40 years. This is the delayed effect of habitat loss. People are starting to notice. ■





“Forests cover 86 percent of the natural landscape, but only one of New England’s 10 forest types meets our global goal and only 3 meet our regional goal for conservation. Urgently in need of conservation are resilient examples of Oak-Pine and Coastal Hardwood forests of southern New England, which that are already challenged by fragmentation and predicted to lose up to 18 percent of their current distribution to development by 2050.” —From the report





Could We Manage Yards to Increase Biodiversity?

The Yard Futures Project Aims to Find Out

—By Christopher Neill

At dawn on a June morning in 2017, Megan Shave, a member of my summer field research team parked on a residential street in the leafy inner suburbs of Boston. She entered a previously chosen yard, set a timer for 10 minutes, and watched and listened for birds. When the timer beeped, she wrote down on a data sheet everything she had seen and heard, then drove to the next yard.

By the time people in the neighborhood had headed off to their workdays two hours later, Megan had joined up with three other team members for a day-long, intensive survey of a single yard in a nearby town. Like an eco-SWAT team, they noted every plant species and the lawn or garden feature in which they occurred. They measured the species and diameter of every tree, set traps to measure the diversity and abundance of bees and crawling insects, and took

soil samples. They deployed small strips of special resins, designed to capture soil nutrients, that they will collect on a future visit. Before leaving, they created a detailed sketch map of the yard.

Since then, similar teams have surveyed yards in exactly the same way in metropolitan Baltimore, Minneapolis-St. Paul, Phoenix, Los Angeles, and Miami. Teams in all six cities are part of a nationwide study nicknamed the Yard Futures Project, which continues through 2021. The project aims to measure—across yards and across large regions—how management of residential single-family house lots influences the structure, biodiversity, and function of residential ecosystems. By comparing our yard maps to our detailed inventories of species and ecological responses, we aim to make our ever-expanding data on yard structures a more useful predictor of

02

biodiversity across U.S. suburban regions. Our study is one of the most detailed scientific investigations into the broad ecological functioning of the suburban landscapes in which 51 percent of Americans now live.

This is critically important, because residential areas continue to expand, and their influence on biodiversity and what scientists call ecosystem services—such as conserving and filtering water, cooling hot spaces, and retaining carbon—is poorly understood. Yet suburban yards could play a vitally important role in supporting more biodiversity and ecosystem services, which also make suburbs enjoyable places for people to live. One goal of our project is to help suburban landscapes become more successful in all these ways.

Within each metropolitan region, research teams visit yards that fall into four main categories, or “treatments”:

- (1) typical or passive homeowner-conducted management without fertilizer or pesticides;
- (2) intensive management with fertilizer and pesticides and using a lawn-care company;
- (3) wildlife-friendly management that includes certification by the National Wildlife Federation; and
- (4) hydrological management that includes specific activities to reduce water use or water runoff.

Teams also compare the structure of yards with the structure of large natural areas in the region and the smaller remnants of natural areas that residential neighborhoods often abut.

We know that the way homeowners manage their yards in Phoenix might not have the same consequences as in Boston. We want to learn about those differences and to figure out how backyards might maintain more natural functions, over more of the country. The project grew out of previous work by the research team that tested how building suburban residential environments homogenizes ecosystems by pushing the landscape towards similar microclimates, plant communities, and nutrient cycling patterns.

“We set out to determine if this apparent ecological homogenization created by suburbanization was real,” says my colleague Peter Groffman, who leads the Yard Futures Project from the City University of New York’s Advanced Science Research Center. “In short, it is. Not surprisingly, residential yards in Phoenix and Baltimore were more similar to each other than were the Sonoran Desert and hardwood-forest native ecosystems that they replaced in terms of plant species, soil properties, microclimate, and the distribution of ponds, lakes and streams.”



03



03 Emily Tanner measures water vapor exchange in an oak leaf in Myles Standish State Forest in southeastern Massachusetts.

But other results were more surprising. “Of greatest interest was that in cities across the country, there are more species of plants in residential ecosystems than in the native ecosystems that they replaced,” Groffman reports. “Lots of birds and insects as well. It turns out that most of the native species in an area can find some place to live in suburban areas.”

The project team includes social as well as natural scientists, because we want to understand why people do what they do in their yards—what values and motivations literally shape the home landscape. Project scientists Kelli L. Larson and Melissa Fleeger, of Arizona State University’s multidisciplinary Global Institute of Sustainability and Innovation, used residential surveys to probe what people want in a backyard. They surveyed residents in the project’s three warm, Sunbelt cities (Los Angeles, Phoenix, and Miami) and the three cooler, northerly cities (Baltimore, Boston, Minneapolis-St. Paul). The surveys revealed that despite the disparate geography, homeowners overwhelmingly shared a common goal: a landscape that simply looks nice and is easy to maintain.

The story doesn’t end here. As we near the end of the project, we are collecting research from our scientists to illuminate our attachment to conventions like the lawn, so we can understand how to motivate change. We will be sharing those stories with you at www.NativePlantTrust.org, where you will also find a wealth of tools, classes, and other resources to help create eco-friendly yards.

Christopher Neill, Ph.D., is a Senior Scientist at Woodwell Climate Research Center in Falmouth, MA, and a co-principal investigator on the Yard Futures Project responsible for science in the Boston Metropolitan Region.



WHAT LIES BENEATH THE GREEN CARPET?

“The traditional neat, weed-free aesthetic—often associated with a green carpet of lawn—continues to be a staple for a majority of U.S. residents, regardless of where they live,” social scientists Kelli L. Larson and Melissa Fleeger report in their article for the Yard Futures Project. In a survey, the researchers found that “many residents do value biodiversity in their yards [including plants and wildlife] . . . However, we also found people do not prioritize plants that are native to local ecosystems, which are precisely the plants most likely to support local wildlife.”

Peter Groffman, the Yard Futures Project lead scientist, also dug into the turfgrass fixation. “The drivers of these human behaviors are complex, ranging from ideas about human evolution in savannah landscapes that have a mix of grasses, trees, and dwellings similar to suburban neighborhoods, to an idea of a European ‘manor,’ to the human desire to dominate over the natural world,” Groffman writes. “There are also more prosaic drivers. My favorites are simplicity and laziness. You have to have some vegetation around your house and the standard mix of grass, shrubs and trees is the easiest to maintain.”

*Geum ternatum**Geum fragarioides*

Rare Plant Spotlight



The *Geum* Switcheroo

—Arthur Haines, Senior Research Botanist

Appalachian barren-strawberry (*Geum fragarioides*) is a perennial plant endemic to eastern North America. (While previously known by the scientific name *Waldsteinia fragarioides*, phylogenetic studies demonstrate that this species is merely an unusual avens, a member of the rose family, that lacks the specialized, two-part styles typical of that genus.) *Geum fragarioides* occurs in a variety of low-elevation deciduous and mixed evergreen-deciduous forests, including cut-over tracts. While known from all states in New England except Rhode Island, this species is of regional conservation concern due to the low number of populations.

As it turns out, Appalachian barren-strawberry has a doppelganger, Siberian barren-strawberry (*Geum ternatum*), which is native to Europe and Asia. Commonly cultivated, this nonnative lookalike sometimes escapes the garden. These plants are so similar that they can be easily mistaken for one another, even by experts. (See correction.) To help distinguish the species and prevent the possible introduction of *Geum ternatum* to New England, I offer the following key:

1a. Epicalyx present, of 5 narrow-lanceolate to lanceolate bractlets that are usually up to 50% as long as the sepals; leaflets with the deepest sinuses extending usually more than 50% of the distance to the midvein when measured at the angle of the sinuses and veins; petals relatively broad, usually overlapping ***G. ternatum***

1b. Epicalyx absent; leaflets with the deepest sinuses extending usually less than 50% of the distance to the midvein when measured at the angle of the sinuses and veins; petals relatively narrow, usually not overlapping ***G. fragarioides***

Correction: A photograph of *Geum ternatum*, mislabeled as *G. fragarioides*, appeared in the Spring-Summer 2020 issue of this magazine (p. 8, top right).

Please consider supporting our research, which is vital to conserving New England's rare species, at www.NativePlantTrust.org/support.

HAPPENINGS



Join us for our inaugural Herbaria Series. Native Plant Trust has partnered with staff at university herbaria throughout New England to offer a special inside look at the region's most impressive plant specimen collections. All programs will be conducted virtually. Register at www.NativePlantTrust.org.

Brown University Herbarium

Wednesday, November 18, 2020, 1-2 p.m.

Instructor: Dr. Rebecca Y. Kartzinel, director

University of Connecticut George Safford Torrey Herbarium

Tuesday, January 12, 2021, 1-2 p.m.

Instructor: Dr. Sarah Taylor, collections manager

Harvard University Herbaria

Tuesday, February 9, 2021, 1-2 p.m.

Instructor: Dr. Michaela Schnull, director of collections

University of Maine Herbarium

Friday, March 12, 2021, 1-2 p.m.

Instructor: Dr. Jose Eduardo Meireles, director

NATIVE PLANT TRUST THE GARDEN SHOP

*Thank you for making 2020
a great planting season!*

Winter snows bring spring flowers.
The 2021 native plants list will be
posted in mid-January.

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CLIMATE CHANGE CAN-DO

Eat More Beans

That's right, legumes—including peas, beans, and lentils—are “climate smart” because they can adapt to rough weather and restore degraded soils, reducing the impact of agriculture on the land.

Source: The Food and Agriculture Organization of the United Nations

