Native Plant NEWS

FALL/WINTER 2018

FOR OUR MEMBERS AND SUPPORTERS

INTO THE WILD

The Fluttering Forest

NEW ENGLAND WILD FLOWER SOCIETY

Native Plant News

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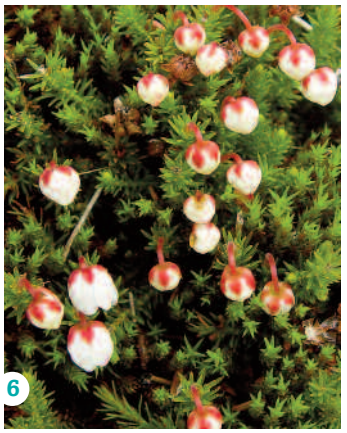
NEW ENGLAND WILD FLOWER SOCIETY


2


6


12

Contents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On the cover:
Arthur Haines at Depot Pond, Baxter State Park, Maine

Mass Cultural Council

Institute of Museum and Library Services

From the Executive Director

WE MUST ACT NOW

I'm writing this the day after 19 of the G20 nations reaffirmed their support for the Paris climate change agreement—and one, the United States, reiterated its decision to withdraw. Our government is denying the evidence in its own latest climate assessment, published the week before the G20 summit, as well as the October report by the Intergovernmental Panel on Climate Change (IPCC). Both detail changes observed with only 1°C of warming since preindustrial times and forecast grim impacts on human and natural systems if we fail to curb greenhouse gas emissions.

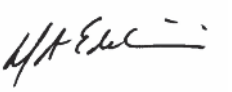
Here are just four key points from the substantial documents.

- "Of 105,000 species studied, 6% of insects, 8% of plants and 4% of vertebrates are projected to lose over half of their climatically determined geographic range for global warming of 1.5°C." At 2°C of warming, that percentage triples for insects and doubles for plants and vertebrates.
- At 1°C of global warming, "approximately 4% of the global terrestrial land area is projected to undergo a transformation of ecosystems from one type to another"; at 2°C it more than triples, to 13%.
- Scientists have observed that in most Northern Hemisphere ecosystems, spring phenology, such as the flowering times of plants, dates of bird migration, and emergence of butterflies, has advanced by 2.8 ± 0.35 days per decade. "The potential for de-coupling of species-species interactions," such as between plants and pollinators, "is well established."
- By 2035 the Northeast "is projected to be more than 3.6°F (2°C) warmer on average than during the preindustrial era," which is "the largest increase in the contiguous United States " and will occur "as much as two decades before global average temperatures reach a similar milestone."

Some of the predicted effects on New England's plant communities, such as the loss of spruce–fir forests, cited in our "State of the Plants" report are evident now. As the US report notes, "Birds dependent upon spruce–fir forests in the northern and mountainous parts of the region are already declining."

We cannot afford to ignore the scientists and the proverbial canaries. I urge you to read the reports—and then take action.

Sincerely,



Debbi Edelstein

What We Did on Your Summer Vacation: A Round Up of Conservation Field Work

By Bill Brumback, Director of Conservation

Michael Piantedosi © New England Wild Flower Society

Top: Invasive water chestnut plants proliferate at Great Meadows National Wildlife Refuge.

Bottom: Wild rice germinating in open quadrat, Sudbury River.

Wild Rice: The Plots Thicken

This summer the Conservation staff wrapped up three years of experiments to determine what could be causing a decline of wild rice (*Zizania aquatica*) in two Massachusetts locations managed by the US Fish & Wildlife Service: the Sudbury River and the Great Meadows National Wildlife Refuge Concord impoundment. Anecdotal reports had noted a downturn in the abundance of wild rice in these two locations. The plant is a crucial food source for many animals, including migrating waterfowl that rely on the Great Meadows refuge. The agency contracted with the Society for three years to research wild rice ecology, restoration techniques, and seed germination.

Initially, we designed an experiment to gauge the effects of wildlife on the growth and survival of wild rice. We constructed two types of exclosures, which are structures that function as fences. The first type was designed to limit access by fish, rodents, and birds. The second type of exclosure allowed fish passage but kept out rodents and birds. Preliminary data suggest that none of these animals' consumption of wild rice is a significant factor inhibiting wild rice germination and survival in our research areas.

Our hypothesis was that invasive plants were affecting wild rice germination and growth.

We then investigated the effects of invasive, non-native plants—water chestnut (*Trapa natans*) on the Sudbury River and American lotus (*Nelumbo lutea*) at Great Meadows. Led by New England Plant Conservation Program/Seed Bank Coordinator Michael Piantedosi, we constructed four open quadrats at each location. (Quadrats are square frames that isolate a sampling plot within a larger area. We located these randomly within potential wild rice habitat.) Our hypothesis was that invasive plants were affecting wild rice germination and growth. To test this, we sowed half the quadrats with wild rice and did not sow any in the other half, which served as control plots. In half the quadrats, we also regularly removed the invasive water chestnut and lotus. Our preliminary data strongly suggest that in the freshwater marshes and slow-moving rivers where wild rice thrives, the spread of invasive plants is the primary factor limiting its growth, although more research will need to substantiate these findings.

Michael Piantedosi © New England Wild Flower Society

Racing toward Target 8

For several years, our Conservation staff has focused on achieving Target 8 of the Convention on Biological Diversity's Global Strategy for Plant Conservation, which calls for 75 percent of rare plant species to be stored in seed banks by 2020. New England is home to 388 globally and regionally rare species, and we aim to collect from at least 2,000 of the 3,300 populations of these rare plants by the 2020 deadline. (See page 4.)

Each year, with consultation from staff in the Natural Heritage Program or the equivalent in each New England state, we select specific populations of rare plants from which to collect seed. To protect endangered plant populations, we make all seed collections under strict guidelines, obtaining necessary permits and landowner permissions in advance. By October, Plant Conservation Volunteers, New England Plant Conservation Program task force members, Society staff, and paid contractors had brought in 193 seed collections. These are being added to the seeds of 250 rare species, collected from 775 local populations, already in our seed bank.

But we need to move faster. The United Nations' report on climate change, issued in October, makes clear that plants in general are almost twice as likely to lose half their habitat if humanity does not cap temperature rise at 1.5°C (34.7°F) instead of the predicted 2°C (35.6°F) or higher rise over pre-industrial temperatures by 2030. The current temperature already has risen 1°C (33.8°F), the report says. We are racing against time to save rare plants.

Please help us meet our 2020 seed-banking goal by donating to the Society's Seed Ark campaign. Call the Philanthropy Department at 508-877-7630, ext. 3802, or donate online at www.newenglandwild.org/support/seedark.

Pollinate New England: Across the Region, Hundreds Turned Out, Dug In

By Courtney Allen, Director of Public Programs

After more than a year of planning, this summer we launched Pollinate New England, a suite of free public programs to raise awareness of the steep decline in the insects, birds, and other animals that pollinate all plants. Between April and September, we rolled out online resources, plus 12 free workshops and lectures, in all six New England states. All the programs focused on how homeowners can build beautiful gardens that create habitat for the region's crucial native pollinators.

With the support of local partner organizations that made their premises available (see list at right), we installed 12 public pollinator gardens across the region. Building the gardens was a hands-on activity for the 462 people who attended the workshops. The local organizations will maintain the gardens for many years to come, so they will continue to serve as models for homeowners.

Pollinate New England's digital offerings included "Gardening with ollinators," an online course that attracted nearly 500 people, and a new plant database that helps users select the best native plants for specific conditions. Our Nasami Farm Nursery also produced pollinator-plant kits for sale at our shops (www.newenglandwild.org/store/buy-native-plants). The initiative's final event, a pollinator symposium at the McLane Audubon Center in Concord, NH, in October, drew an enthusiastic crowd.

We are proud that Pollinate New England achieved its objectives: not only to open a region-wide dialogue about pollinator decline and how homeowners can help, but also to illuminate how native plants function in the ecosystem.

Pollinate New England was made possible by a matching grant from the Institute of Museum and Library Services, generous individual donations, and the participation of these local partners:
CT: East Haddam Land Trust, East Haddam; Friends of Goodwin Forest, Hampton
ME: Wells Reserve at Laudholm, Wells
MA: Springfield Triangle Park, Springfield; SYMCA / South Shore Natural Science Center, Norwell; Wellesley Natural Resources Commission, Wellesley Police Station
NH: Keene State College, Keene; Portsmouth Public Library, Portsmouth
RI: Wilcox Park, Westerly; Roger Williams Park Zoo, Providence
VT: North Branch Nature Center, Montpelier; Jericho Center Green, Jericho

The local organizations will maintain the gardens for many years to come, so they will continue to serve as models for homeowners.

Seeds for Uncertain Times

By Jane Roy Brown, Writer-Editor

Seeds are time capsules. So far, a Siberian wildflower called narrow-leaved campion (*Silene stenophylla)* holds the record for delayed germination. In 2007, scientists grew the plant from a seed dating back 31,800 years, plus or minus 300 years. This longevity points to why banking the seeds of rare New England plants is the Society's core conservation strategy. When the lastest United Nations report on climate change dropped in October, announcing that the pace of change is faster than previously predicted, we felt even more urgency to finish collecting and banking seeds of the region's 388 globally and regionally rare species. Securing seeds from at least 2,000 of the 3,300 populations of these rare plants will enable us to preserve the range of genetic diversity and each species' ability to adapt to changing conditions. This field season, Research Botanist Arthur Haines was given a historic opportunity to advance this goal in Maine's Baxter State Park, a rare-plant treasure trove. In this section, he reports what he found.

For three years, our Conservation staff scoured the New England coast to collect the seeds of common native plants to help restore coastal plant communities devastated by Hurricane Sandy. The ambitious project, the first large-scale, coordinated seed-banking effort in the eastern United States, was funded through the federal Seeds of Success program. The project, led by Michael Piantedosi, has made seeds available to local, state, and federal agencies to restore coastline and create more resilient coastal habitats in the face of worsening storms. We take a look at two of the projects that are literally sprouting from that work.

***Saxifraga paniculata* rosettes, The Chimney, Baxter State Park, ME. Since being photographed on an earlier expedition, this population has been scoured from its vertical rock face by extreme storms.**

Collecting Seeds of Rare Plants from the Roof of Maine

By Arthur Haines, Research Botanist

The Society's Conservation staff strives to conserve the region's rare plants, and a critical strategy for doing this is banking the seed of the region's 388 rare species.

Photos © Arthur Haines

Late this summer, I ventured into Baxter State Park, in north–central Maine, to collect propagules—seeds or fruits—of regionally and globally rare plants in the vicinity of Katahdin. At 1,605 meters, or just shy of a mile high, Katahdin is the state's tallest peak. Along with the St. John River, the mountain is also one of the two richest sites for rare species in the state. Because the Society has both local expertise and the facility to store the seeds, the park's governing body approved our request to collect seeds for the first time, creating a historic opportunity to preserve the park's flora in the face of climate change.

As the Society's research botanist, my task was to either document or collect the propagules from 44 rare plant species on the mountain and around ponds at its base. Staff and volunteers at Nasami Farm, the location of our seed-drying room, would then clean, dehydrate, and store the seeds at -7.8°C (18°F) to preserve their viability. I had seen almost all of the plants on my list on previous, noncollecting expeditions here, and the others were documented in historical records. Of the 44 species on my list, 8 produce propagules that do not survive in cold storage, so I would update the documented locations of these plants but not collect from them.

Because of the park's location and terrain, I faced daunting obstacles, even in the relatively hospitable weather of late summer. Baxter State Park is one of the few wilderness areas in the Northeast, and it occupies more than 800 square kilometers (309 square miles). The absence of roads throughout much of this territory meant that I had to backpack my supplies over steep trails. Some of the species on my list grew significant distances from trails and required extensive hiking over even more-rugged, albeit sublime, terrain.

Top left: Flower buds of moss-plant (*Harrimanella hypnoides*). This species, found only in the mountains of Maine and New Hampshire, is extremely rare. Bottom left: Kathahdin's formidable south basin, a glacial cirque where the author found several target species, often after navigating steep, sometimes wet terrain.

In some cases, I needed to do technical rock climbing to reach the steep cliffs where the plants were growing. Getting down was often harder than going up.

But the grueling effort was rewarded. In total, I either found or submitted records for 29 of the 44 plants on my list. Of the 36 collectible species, I was able to find and gather propagules from 23 and to document an additional 6, even those growing in areas no larger than a few square meters within this vast landscape. I was not able to collect some others because so many species matured simultaneously in dispersed locations that I could not get to all of them in time; so, I focused on collecting seed from the rarest and most difficult to find and/or reach. I found all but three species. Because I knew the exact location for two of them, I assume that these species, which have been observed for more than a century in the same place, have vanished from the park, perhaps scoured off their vertical habitat by extreme, torrential thunderstorms. I did, however, locate a new taxon for the park: *Huperzia* × *protoporophila*, a hybrid firmoss not previously documented here.

Although we have much more work to do, some of the rare plants of Baxter State Park are now part of the regional seed bank that preserves these species for future generations.

More of Baxter's rare species: Top left, glandular birch (*Betula glandulosa),* an imperiled species. Bottom left: Capsule of pimpernel willow-herb (*Epilobium anagallidifolium*), which occurs only in the mountains of Maine and New Hampshire. Top right: Lapland rose-bay (*Rhododendron lapponicum*), a rare, low-growing rhododendron, inhabits arctic and alpine barrens and cliffs. Bottom right: Proliferous fescue (*Festuca prolifera*) can reproduce from vegetative plantlets developed on the mother plant.

Seeds Secure a Rhode Island Salt Marsh—*for now*

On an August morning at Sachuest Point National Wildlife Refuge, in Middletown, RI, terns tilt into the onshore wind, which is piling the steely Atlantic into white-capped breakers. Scalding light picks out blades of salt-marsh hay (*Spartina patens*), the stems of black grass (*Juncus gerardii*), and the glossy leaves of bayberry (*Morella caroliniensis*) on dune-like uplands that rise out of a shimmering marsh edged with grasses, goldenrod, and other native plants.

As natural as it looks, this 11-acre salt marsh, including the uplands, is completely constructed by human hands—and big machines. The Sachuest Point refuge is one of dozens of coastal sites that is emerging from damage wrought by Hurricane Sandy and girding against future extreme storms and the rising ocean. On this sandbar peninsula threaded with tidal creeks, Sandy flooded roads and inundated this salt marsh, which, even before the storm, was already being nibbled away by the sea.

"As natural as it looks, this 11-acre salt marsh, including the uplands, is completely constructed by human hands—and big machines."

Nick Ernst, a biologist who manages Sachuest Point and four other national wildlife refuges for the US Fish & Wildlife Service, says that Hurricane Sandy's deluge made it clear that to save the marsh, it would be necessary to raise its elevation. So, he says, a fleet of "dump trucks and 'dozers'" laid down a new layer of soil and sand, an inch to a foot thick, and sculpted the upland mounds from former landfill—after removing the garbage. Then, with help from Save the Bay Rhode Island, they added plants—18,000 plugs (deep-rooted seedlings) of native grasses and rushes in 2016 and 20,000 more in 2017—grown from local seed collected by the Society's Conservation staff and interns. In spring 2018, the refuge staff experimented with sowing seed directly into the ground. Self-seeded native asters (*Aster* spp.), seaside goldenrod (*Solidago sempervirens*), and other species in this coastal plant community have filled in around the planted species, bolstering the food supply for wildlife.

The Society's seed collection was part of a three-year project to restore Atlantic coastal habitats damaged by Hurricane Sandy in 2012. Funded chiefly by the US Department of the Interior, it was the first large-scale, coordinated seed-banking effort in the eastern United States. The project also involved two partner organizations that collected seed on coastline south of New England.

"The goal for the seed collection was not only to restore damaged shoreline, but also to build the capacity for coastal habitats and infrastructure to withstand future storms," says Michael Piantedosi of the Society's Conservation staff. By the end of the project, the Society banked about 1,000 bags of seed—enough to fill a school bus—representing 868 collections and containing millions and millions of individual seeds. "Unlike the seeds in our rare-plant

Jane Roy Brown © New England Wild Flowerr Society

Nick Ernst supervised a fleet of "dump trucks and 'dozers'" to build the Sachuest Point salt marsh.

seed bank, these come from common species. We've labeled exactly where they came from, to ensure that locally adapted genotypes, or genetic characteristics, can be reintroduced in the places where they evolved," says Piantedosi.

Land scoured of plants by storms or doused by rising seas is especially vulnerable to colonization by invasive species like common reed (*Phragmites australis*), which favor disturbed soils and tolerate a wide range of conditions. The sea along the Rhode Island coast is predicted to rise 10 feet in the next 80 years (compared to just 10 inches during the last 90 years), according to a January 2017 report from the National Oceanographic and Atmospheric Administration (NOAA). Ernst explains that plants literally anchor salt marshes, and the lowest level of the marsh hosts species that tolerate both high salinity and regular flooding. This habitat normally experiences tidal flux, to which its plant and animal inhabitants have adapted. But higher tides and storm surges upset the delicate balance of salinity for the organisms that live there and causing plants such as grasses to die off, exposing the land to erosion risk.

Rising sea levels also make it likely that the entire New England coast will see more flooding, with effects varying according to geological factors. For instance, salt marshes in Rhode Island restore themselves at rates lower than those of Massachusetts, Connecticut, and New Hampshire, largely because the water carries less soil and sand onto the shore. When flooding outstrips the rate at which soils replenish, entire marshes can vanish, along with the animals they support.

"This habitat is crucial for migrating birds and insects like monarch butterflies," says Ernst. "It also serves as a nursery for winter flounder, striped bass, and about a dozen other fish species. And it was all going to be underwater soon."

The need for a more resilient coast is especially urgent in the northeastern United States, where, according to NOAA research, seawater may be warming almost three times faster than the global average. Warmer waters fuel hurricane intensity, and extreme storm surges are likely to worsen the effects of rising water levels.

"If we cannot stop sea-level rise, salt marshes are good buffers of flood energy, and they filter stormwater pollution," Ernst says. "But in just a few decades, we may have to rebuild this marsh again."

Photos Jane Roy Brown © New England Wild Flower Society

Top: In the newly established salt marsh, plants including bayberry (*Morella caroliniensis*) were grown from seed collected by the Society's Conservation staff during the Seeds for Sandy project.

Middle: Salt-marsh hay (*Spartina patens*)

Bottom: Native goldenrods (*Solidago* spp.), also grown from seeds collected by Society staff, thrive on the constructed salt marsh.

Seeds for Sandy: In Connecticut, Life After Dams Begins with Plants

Removing old hydroelectric dams from New England's rivers can make adjacent communities safer by reducing flood risk when the structures fail. It also restores habitat and ecological functions that build greater storm resiliency. Communities in at least three states seized the chance to remove old dams using federal dollars available for Hurricane Sandy relief and resiliency projects. Where dams came down, many communities planted the exposed shoreline with native plants grown from seeds collected by Society staff and interns, to prevent erosion and keep invasive plants from moving in.

Squeezed between a shopping center, the Merritt Parkway, and local streets, the Pond Lily dam on the West River in New Haven, CT, had powered various mills since 1797. In February 2016, workers started dismantling the dam, the second to come down in the aftermath of Hurricane Sandy. The previous November, in Mystic, the Hyde Pond dam came down, enabling Whitford Brook to run free for the first time in 350 years. Anna Marshall of Connecticut Fund for the Environment (CFE)/Save the Sound says that in both cases her organization was ready to plant as soon as the waters receded.

"It was important to our organization to restore critical ecosystem functions in the wake of dam removal, not only in the river, but also on the shore and floodplain," Marshall says.

Plants anchor the shoreline, filter stormwater draining from floodplains, cool the water for fish and other water dwellers, and compose the habitat for the

© Anna Marshall / Save the Sound

animals that live along rivers. So, in each of these sites, CFE planted immediately after the dam came down. The Pond Lily site presented a once-in-two-centuries opportunity to restore green space in a densely built community, and it is now a nature preserve owned by the New Haven Land Trust.

"To further increase access to nature and manage stormwater and flooding, CFE installed residential rain gardens within the West River watershed, using the seeds collected by the Society and grown locally," Marshall says. "We are monitoring invasives and tracking the plant communities year by year to see how the transition is taking place."

At both sites, nature has lent a spectacular assist: Seeds that had lain dormant in the mud under the dammed water have sprouted and filled in around the planted seedlings. They are mostly native, including Joe Pye weed, blue vervain, boneset, and asters.

"At Pond Lily, there are more woody species emerging—native cottonwoods, for instance—and wetlands plants too," Marshall says.

In Mystic, as in New Haven, CFE has worked with local partners, including the Edgerton Park GROWERS program and high school students at Ella T. Grasso Vocational High School, to grow native plants from seed and return them to the two watersheds. CFE also is involving community residents to help keep invasive plants in check and track which plant species are thriving. All these projects have sparked wider interest in native plants.

"We've noticed shifts in the language among our partners. They now talk about native plants. They know what a rain garden is and what species are beneficial to pollinators," Marshall says. "It has been cool for us to walk into a classroom near the Hyde Pond site and hear high-school students rattle off Latin names and identify plants, and know what benefits they have to their projects."

"We've noticed shifts in the language among our partners. They now talk about native plants. They know what a rain garden is and what species are beneficial to pollinators."

© Anna Marshall / Save the Sound

© Laura MacMillan / Save the Sound

Opposite: At the site of the former Hyde Pond dam, volunteers plant seedlings grown by students at Grasso Tech from seeds gathered by Society Conservation staff. Top right: Site of the Hyde Pond dam a year after its removal. Bottom right: Volunteers plant the Pond Lily site following dam removal.

The Fluttering Forest:

Native Trees and Shrubs Support the "Other Pollinators"

By Dan Jaffe, Propagator, and Jane Roy Brown

Ask most people to name a pollinator, and they are likely to say "bee." Perhaps some will know the name of a native bumblebee. More often, they will mention the less-efficient, imported European honeybee.

But the universe of pollinating insects is much larger than bees, including flies, beetles, and a plethora of moths and butterflies, which belong to the insect order Lepidoptera.

These nonbuzzing insects play at least three crucial roles in the ecosystem. First, as pollinators in their winged, adult phase, they flit among flowering trees, shrubs, and herbaceous perennials, feeding on nectar and spreading pollen from plant to plant. (Moths, most of which are active by night, are generally overlooked by gardeners, but they are abundant and important pollinators.) Second, in their larval or caterpillar phase, moths and butterflies serve as an essential food for birds and other wildlife, and in so doing, carry plant nutrients up the food chain. Finally, caterpillars of some species consume leaf litter on the forest floor, helping to break down organic matter and return its nutrients to the soil. So supporting lepidopterans is vitally important to help maintain these functions—and not as simple as it might appear.

Cecropia moths, whose caterpillars are an important food for birds, rely on a variety of common New England shrubs and trees as host plants.

Many butterflies and moths are obligate (specialist) feeders, requiring particular plant species, called host plants, during the caterpillar phase of their life cycle. While many native insects have evolved with native plants, the coevolutionary relationship between lepidopterans and plants is especially close. The well-known example is the monarch butterfly, which relies exclusively on its host plant, milkweed (*Asclepias* spp.), in its caterpillar phase. Adult monarchs, like many other obligate feeders, are generalists, sipping the nectar of asters, coneflowers, phlox, blue mistflower, and many other plants. Milkweed comes into play when the adult female lays its eggs, which it does only on the undersides of the plant's leaves—the sole food the caterpillars can eat. And eat they do: a monarch caterpillar increases its mass by 30,000 times before pupating within its green, gold-dotted chrysalis.

This entwined relationship is rooted in a coevolved defense mechanism. Milkweed sap is sticky,

which can trap hairy caterpillars and small insects, and it also contains a poison. Over millennia, the monarch developed a tolerance for the poison, which remains in its body and makes it dangerous to its predators.

While this illustrates the complexity of plant–lepidopteran relationships, in general, native woody plants—trees and shrubs—provide vastly more habitat for lepidopterans than do herbaceous species. (Notable exceptions include goldenrod [*Solidago* spp.], which support 125 Lepidoptera species; wild strawberry [*Fragaria virginiana*], 81; sunflower [*Helianthus* spp.], 58; and Pennsylvania sedge [*Carex pensylvanica*], 36.) Research led by entomologist Douglas W. Tallamy at the University of Maryland ranked all 1,385 plant genera that occur in the mid-Atlantic states by their ability to support lepidopterans. The findings: "[W]oody plants supported more species of moths and butterflies than herbaceous plants, native plants supported more species than introduced plants, and native woody plants with ornamental value supported more Lepidoptera species than introduced woody ornamentals." ("Ranking Lepidopteran Use of Native Versus Introduced Plants," Tallamy and Kimberley J. Shropshire, *Conservation Biology*, 13 July 2009.)

Why would anyone want to plant trees, knowing that a horde of voracious caterpillars will gnaw holes in their leaves, or even defoliate them completely? For one thing, nonnative, invasive gypsy and winter moths tend to be responsible for the outbreaks of widespread, catastrophic defoliation that sweep the region periodically. Only about 20 native species of native, Eastern forest caterpillars may reach high enough numbers to defoliate entire tracts of woodland, according to research led by David L. Wagner, a Lepidoptera expert at the University of Connecticut and author of *Caterpillars of Eastern North America*. Wagner also makes the point that on a landscape scale, most of the native trees will recover from the episodic blights of invaders.

The trees that compose the largest amount of habitat for lepidopterans include the iconic landscape species of the region—oaks, cherries, willows, birch, and aspen. These five provide food and shelter for 500 of the approximately 700 Lepidoptera species east of the Mississippi River. Oaks (*Quercus* spp.) top the list, but in New England, planting an oak often

means adding to an already oak-dominated landscape, so choosing a less-widespread species will bring diversity into the landscape.

Willows are the unsung heroes of the lepidopteran world, and the native black willow (*Salix nigra*) is a stellar example, acting as host plant for roughly 400 different lepidopterans, including sphinx moths, dagger moths, and New England buck moths. Black willow can reach its full height of 60 feet in wetlands, but can also be cut to the ground periodically and grown as a shrub to whatever height is desired.

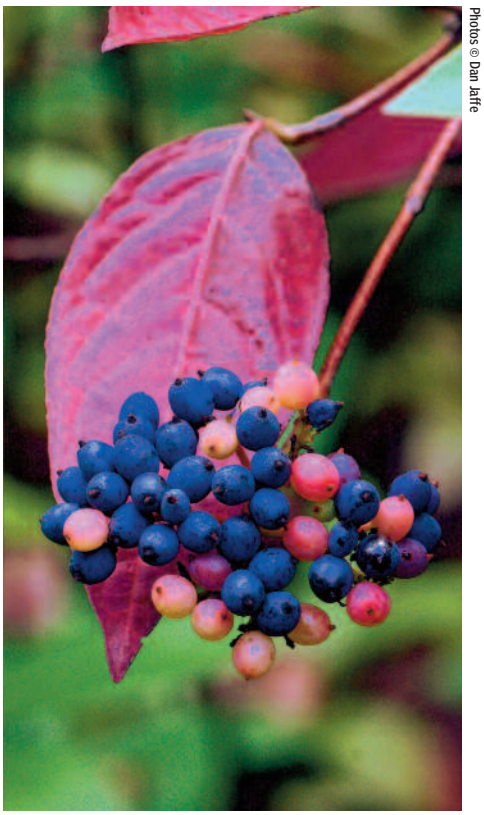
Cherries support nearly as many lepidopterans as willows do, and they make handsome additions to the landscape. Landowners often regard native cherries (*Prunus* spp.) as "junk" trees, because, in the wild, many are pioneer species that colonize old meadows and begin the process of returning them to forest. Although their life spans can be short in these conditions, many species, when cultivated, can mature into large, beautiful, long-lived trees. (The black-knot fungal disease common on young and stressed trees in the wild is rarely an issue in cultivated specimens.) Caterpillars of species including Cecropia moths, hummingbird clearwings, small-eyed sphinx moths, and red-spotted admirals love to munch the leaves of black cherry (*Prunus serotina*), which also provides tasty fruit for songbirds and humans. It's hard to find a more handsome landscape tree than fire cherry (*P. pensylvanica*), which could take its name for either its bronze-red bark or its fall color. Choke cherry (*P. virginiana*), a shrubby species with spring flowers and showy, bright-red berries, is capable of growing in some of the region's most inhospitable environments, such as sunny, dry roadsides.

Add several shrubs to the list of pollinator powerhouses that are also versatile, attractive landscape plants. Blueberries (*Vaccinium* spp.), especially high-bush (*V. corymbosum*), produce flowers that feed native bees, and the leaves provide a feast for 294 lepidopterans—more than any other shrub in New England. Raspberries, likewise, support bees with their flowers and caterpillars with their leaves. Hazelnut (*Corylus* spp.), a native shrub that provides delectable food for birds and other wildlife and displays vivid fall color, also supports a host of lepidopterans. Carolina and other native roses may not yield prize-winning blossoms, but their leaves feed the caterpillars of 282 moths and butterflies, and their foliage in fall is eye-catching. Viburnum may be the most diverse genus of all, with species that thrive in virtually every type of growing condition this climate contains. In part because of this diversity, each species of viburnum is valuable in supporting lepidopterans in conditions where few other plants do.

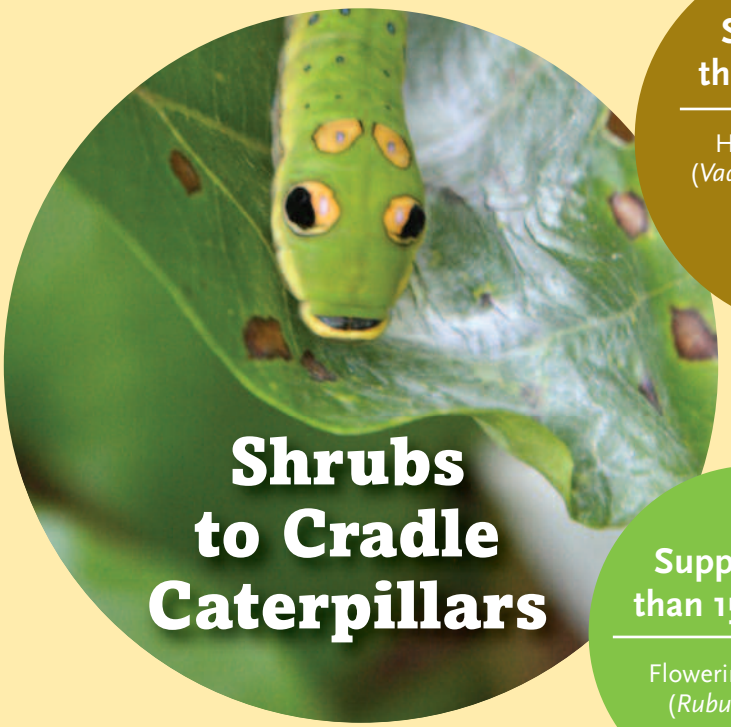
Turning one's home landscape into what some people would view as a caterpillar farm may seem a bit odd. But the point of using native plants is not only to bring their beauty into the yard, but also to maintain the functional relationships they have established with other plants and animals. The mature winged insects help to pollinate the very plants they consume (and too many other plants to count), and the caterpillars we curse for munching leaves for a short time in summer feed the birds we welcome all year round.

Left: Monarch butterfly on blue mistflower (*Conoclinium coelestinum*).

Top habitat plants for butterflies and moths include, top left: Lowbush blueberry (*Vaccinium angustifolium*); bottom, left to right: blackberry (*Rubus allegheniensis*); Eastern buckmoth; witherod viburnum (*Viburnum nudum* var. *nudum*).



Photos © Dan Jaffe



Shrubs to Cradle Caterpillars

Support more than 250 species

Highbush blueberry (*Vaccinium corymbosum*)

Pussy willow (*Salix discolor*)

Support more than 100 species

Virginia rose (*Rosa virginiana*)

Apple serviceberry (*Amelanchier grandiflora*)

Red twig dogwood (*Swida sericea*)

Witherod viburnum (*Viburnum nudum*)

Support more than 150 species

Flowering raspberry (*Rubus odoratus*)

Photos © Alexandra Touloupas

INVESTING IN INTERNS

Every August at Garden in the Woods, the season's interns step to the podium, one at a time, to present a project that showcases what they have learned during their three to six months with the Society. These college students or recent graduates come from all over the country to work and study with our conservation or horticulture teams. The audience for their presentations includes donors who have helped make their unique learning experiences possible.

In conservation, interns get to tackle professional field work such as rare plant surveys, invasive plant management, and seed banking. Interns in horticulture dig into a variety of hands-on projects, from designing gardens and propagating plants to collecting seeds and assisting visitors. All interns are guided by training plans designed to give them contact with professional networks and opportunities to take both field and classroom courses, in addition to working with expert staff.

"The internship here started to change me—I got interested in how people manage landscapes and how that influences ecological systems," says Anna Fialkoff, a former intern who is now a professional horticulturist at Garden in the Woods. After her internship, Fialkoff earned a master's degree from the Conway School, which specializes in ecological landscape design.

Alexis Doshas says that her experience as the Chester B. Allen Jr. Horticulture and Propagation Intern at Nasami Farm deepened her existing education in conservation biology. "It really opened my eyes to all the plants around me," Doshas says. "It gave me great skills in plant identification and cultivation, and in recognizing plant communities in the wild." Like Fialkoff, she now works for the Society, as propagator and facilities coordinator at Nasami Farm, where her internship project—an integrated pest management program—is still in place.

"Our interns function as another member of the team and have the opportunity to do a special project of their choosing," explains Director of Conservation Bill Brumback. "They do everything we on the staff do, including getting their feet wet in the field—often literally."

He notes that such opportunities are increasingly valuable because fewer universities are offering degree programs in botany. In those that do, the emphasis is more often on molecular taxonomy than on learning how to identify plants in the field. With about half of today's federal botanists due to retire in the next 10 years, knowing how to identify plants in the wild is a valuable skill.

The Society's benefactors have long recognized the importance of helping to train budding botanists. After the Society established its first internship, to honor Homer C. Lucas, in the 1970s, individuals and foundations have made gifts to set up several others. The Sudbury Foundation provided initial funding for the Atkinson internship in conservation. Westy and George Lovejoy created and endowed the Lovejoy Conservation Internship. Allen E. Everett honored his late wife, Marylee Everett, with an eponymous conservation internship. This was followed by the Chester B. Allen Jr. Horticulture and Propagation Internship.

"After I served as president of the Society's board [in 1982–83], I knew what good things the Society was doing," says Westy Lovejoy, explaining why she established the Lovejoy Conservation Internship. "No one else was paying attention to native plants, and I wanted to encourage young people to get involved."

Brumback agrees: "If botanists aren't being trained, who will be able to identify plants and understand complex communities in the face of climate change?" —*JRB*

To learn how to fund an internship, please contact Tracey Wilmott, Director of Philanthropy 508-877-7630 x3502

LEARN ONLINE WITH US!

Study botany and horticulture with New England Wild Flower Society, wherever you are! As the premier source of web-based continuing education about the region's native plants, we offer 4 self-paced courses and 25 expert-led webinars throughout the year. To register or read more about all our programs, visit www.newenglandwild.org/learn.

SELECTED ONLINE COURSE

Plants 102: Deeper into the Green World

Learn how plants change as they grow; how they interact with other species; and how geology, soils, land-use history, hydrology, and climate shape our plant communities. (Complements Plants 101 but is not a prerequisite.) Self-paced.

Class access: Friday, January 11, 2019 through Friday, April 5, 2019

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SELECTED UPCOMING WEBINARS

Plant Conservation Update: Connecticut

Learn about the Society's most recent work to conserve rare and endangered native plants in the southern-most New England state.

Tuesday, January 22, 2019, 1-2 p.m.

Instructor: Laney Widener, Botanical Coordinator, New England Wild Flower Society

Sanctuaries of the Society

New England Wild Flower Society owns nine plant sanctuaries throughout the region. Learn about their botanical treasures and the threats the sanctuaries face.

Tuesday, February 26, 2019, 1-2 p.m.

Instructor: Bud Sechler, Ecological Programs Coordinator, New England Wild Flower Society

Rain Garden Plants

Rain gardens can reduce groundwater pollution in urban landscapes by cleaning, cooling, and slowing stormwater. Learn how to maximize rain garden function by using the most durable native plants in some of the toughest spots.

Thursday, March 7, 2019, 6-7 p.m.

Instructor: Anna Fialkoff, Horticulturist, New England Wild Flower Society

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RARE PLANT SPOTLIGHT

Naked-bulbil small-flowered-saxifrage (*Micranthes foliolosa*)

The habit of *Micranthes foliolosa*.

The plant in flower, showing leafy bulbils in place of lower flowers.

In alpine zones, trees give way to a suite of plants adapted to high-elevation conditions that include intense environmental stresses: severe weather, wind-blown ice and sand, intense solar exposure, and extreme cold. These stresses make it less likely that some normal plant phenomena, such as flowering, can be reliably achieved because of the amount of energy required. Some species partly or entirely forgo flowering and fruiting, and produce vegetative propagules in place of flowers. Katahdin, Maine's highest peak (elevation 1,605 meters; 5,267 feet), is home to several species that at one time in their evolutionary history produced flowers and now produce bulbils—small, leafy plantlets that replace the flowers and are genetically identical to the parent plant. Naked-bulbil small-flowered-saxifrage (*Micranthes foliolosa*) is one such species.

This arctic and alpine herbaceous plant is usually shorter than 15 centimeters (5.9 inches), with a tuft of leaves at the base of the stem. It occurs in North America, Europe, and Asia. Within the lower 48 states, it is known only from Katahdin. It is noteworthy that all the flowers have been converted to leafy bulbils except for the apical (uppermost) flower. In some parts of the world, the uppermost flower of this species is capable of producing viable seeds. Katahdin's population appears to be unique in having lost the ability to produce any well-formed seeds. Therefore, its only method of reproduction and dispersal is by the bulbils, which are dispersed by gravity, water, and, to some extent, wind.

New England's highest peaks are known for a diversity of regionally and globally rare species. These tend to have interesting biological traits that create challenges for conservation biologists and highlight the importance of protecting the location itself from threats that put populations of rare plants like *Micranthes foliolosa* at risk.

—Arthur Haines is the Society's research botanist and author of Flora Novae Angliae.

We rely on your generous support for ongoing botanical research.