



ConWatch

A publication of the GCA Conservation Committee • Spring 2025



FROM THE EDITOR

“Across the globe, forest managers are challenged to consider climate change as they work to maintain healthy forests on the landscape.”

—Katie Frerker

Purely by coincidence, our feature article on assisted migration strikes a personal note. Author Katie Frerker highlights the work unfolding in the Superior National Forest in northern Minnesota. I lived in Minnesota for 34 years, and my many hikes and camping trips in this beautiful forest remain among my highlights. The boreal forest is a very special habitat, and highly threatened by climate change. Is assisted migration the answer? The jury is still out, but I take comfort knowing plant scientists are working on it, carefully considering all angles.

This brings us to our second feature article, which looks at the consequences of fewer and fewer people

entering plant-science fields. As the author Karen Mockler writes, “We rely on botanists to identify plants, keep them alive, and in so doing help keep us alive as well.” I am proud of how the GCA is encouraging more plant-based study: Several GCA scholarships focus on students interested in these fields, and the GCA is one of 72 distinguished organizations supporting the Botany Bill.

In addition, we have updates from several Conservation/NAL committee members, including an interesting look at the status of the electric-car industry by Sandra Law, Saint Paul GC, Zone XI.

—Lynn Steiner, Little Compton GC, Zone I, Vice Chair, Editor, ConWatch, Conservation Committee

ConWatch is produced three times a year by the Conservation Committee of The Garden Club of America. It is available online in July, November, and April. Submissions and comments are encouraged and welcome. Use this [link](#) to submit, or contact conwatch@gcamerica.org

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The purpose of The Garden Club of America is to stimulate the knowledge and love of gardening, to share the advantages of association by means of educational meetings, conferences, correspondence, and publications, and to restore, improve, and protect the quality of the environment through educational programs and actions in the fields of conservation and civic improvement.

Banner photo: The beautiful Superior National Forest in northern Minnesota. Photo by Lynn Steiner

On the cover: A US Forest Service tree-climber collecting seeds for planting in an assisted-migration program. Photo courtesy of Ryan Pennisi.



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FROM THE CONSERVATION AND NAL COMMITTEES

Our November virtual Conservation Study Conference, chaired by Janet Frantz (Mill Mountain GC, Zone VII, Vice Chair, Conservation Study Conference 2024), introduced us to the Greater Yellowstone Ecosystem, again opening our eyes to nature's wonders and the importance of protecting them. Janet and her team of Kimberly McMorow (Woodside-Atherton GC, Zone XII, Vice Chair, National Parks) and Dale Naylor (GC of Cleveland, Zone X, Board of Associates) organized *speakers* whose stories you can hear many times over and never tire of. It's not too late to gather some friends for that watch party you missed in November!

Learning of the migratory patterns of wildlife and the restoration efforts in Yellowstone and Grand Teton National Parks informed our advocacy efforts at the NAL Conference in March. Carla Passarello (Dolley Madison GC, Zone VII,

Vice Chair, NAL Conference), Nancy Ylvisaker (The GC of St. Louis, Zone XI, Vice Chair, Legislation), Stephanie Paine Crossin (Indianapolis GC, Zone X, Vice Chair, Policy), and the entire Conservation/NAL committees worked hard to ensure that our elected legislators on Capitol Hill know the GCA's urgent conservation priorities, including the protection of our national parks. Conference attendees learned that representing the GCA and advocating for protecting a beautiful, healthy planet with our legislators was empowering and, for some, even life-changing.

—Joy Flynn, Westhampton GC, Zone III, Conservation Committee Chair, and Carolyn Ross, Chestnut Hill GC, Zone I, NAL Committee Chair

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"We are living in a time when the work of environmental scientists is becoming increasingly important for the health of our planet and the people, animals, and plants that call it home."

—Rep. Mike Quigley (D-IL), sponsor of the Botany Bill

Above: Conservation Committee Chair Joy Flynn and NAL Committee Chair Carolyn Ross. Photo courtesy of Joy Flynn

WHAT WE ARE FOLLOWING

The Lost Coast Trail in northern California offers one of the few coastal wilderness hiking experiences in the U.S. Photo by Salah Ahmed, BLM

Updates and News from Conservation/NAL Committees Vice Chairs

Redwood Conservation Along California's Lost Coast Trail

It almost feels like flying while hiking along the wind-swept Pacific coastline on the rugged 58-mile Northern California Lost Coast Trail. New plans are being developed to provide public access to an additional 3,181 acres encompassing five miles of magnificent coastal redwood lands protected by Save The Redwoods League.

Tribal nations who have lived respectfully and abundantly within the Lost Coast Redwoods for millennia are developing a comprehensive cultural and land-protection program for this region. As part of a national Indigenous-led movement known as Land Back, the Sinkyone, Cahto, and Coast Yuki peoples are collaborating to reclaim, steward, and restore ancestral lands. They have formed a cultural and land-protection consortium: the **InterTribal Sinkyone Wilderness Council** will consolidate conservation lands while elevating traditional values, protecting and healing the ancient redwood ecosystem, and re-establishing cultural relationships with their traditional territories.

—Shelley Rolfe, Seattle GC, Zone XII, Vice Chair, Forests/Redwoods



Fighting Clothing Waste

There is so much waste everywhere! Focusing on clothing waste and what to do about it led me to Tiffanie Dark, fashion editor and author. Here are some horrifying facts from her book, *What to Wear and Why*, published in 2024.

- The fashion industry produces 100 billion items of clothing a year. The average garment is only worn 7 to 10 times.
- Fashion is responsible for 10 percent of world carbon emissions.
- The average American generates 82 pounds of textile waste annually.
- It takes 700 hundred gallons of water to produce one cotton shirt and 2,000 gallons to produce a pair of jeans.
- The Atacama Desert in Chile receives 39,000 tons of discarded clothing annually, causing huge piles of clothing waste visible from space.
- Approximately 200,000 trees are logged annually to

make viscose, rayon, lyocell, and cupro. Nearly half of those trees are linked to deforestation.

What is the solution? Darke says to “Restore, Upcycle, Reconstitute, Resell.” Buy natural materials, buy from second-hand shops, or rent clothes. (My 28-year-old daughter rents very nice clothes by the month.) Resell clothes. And know where your clothes are going before you recycle.

I recently found **Trashie**, where you can order their neon Take-Back Bag for \$20. Fill the bag with clothes, shoes, sheets, towels, etc., and return it to Trashie. You will receive \$30 in “Trashie Cash,” good for discounts on movie tickets, HelloFresh, Allbirds, and many more offers. Trashie promises to recycle most of the clothes.

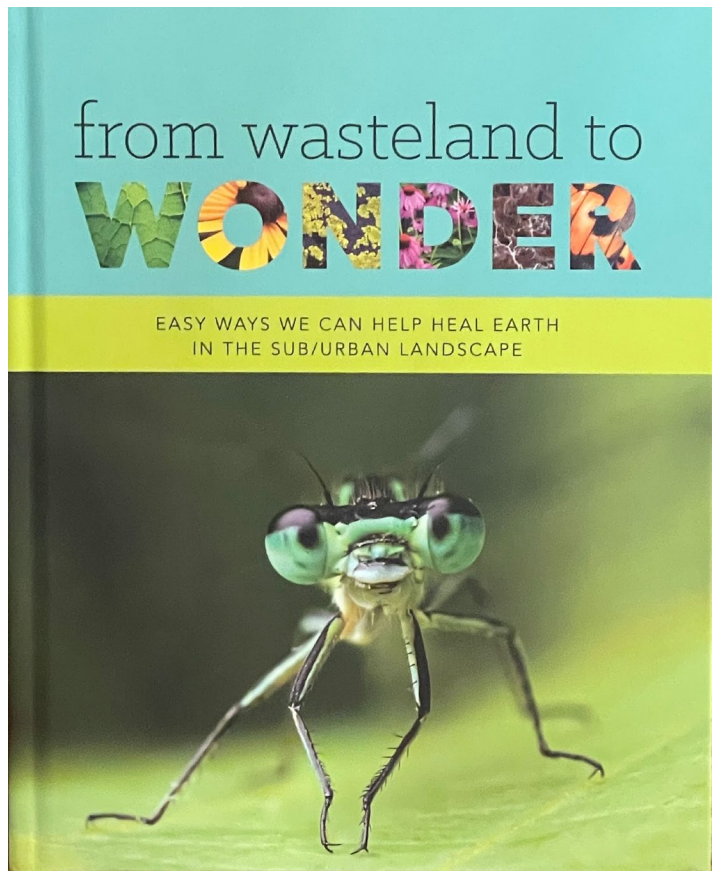
—Pamela Murphy, Perennial GC, Zone VI,
Vice Chair, Waste Management

Basile Camu, Tree-Care Specialist

Basil Camu, a dedicated “treecologist” and ISA board-certified master arborist, is renowned for his innovative approach to tree care and environmental stewardship in North Carolina. As cofounder of Leaf & Limb, a Raleigh based tree service, Camu transformed the company into a holistic tree-care provider prioritizing the health of trees and soil, and he stopped doing tree removals. This commitment reflects his belief in the critical role trees play in combating climate change and supporting biodiversity.

In 2017, Camu established **Project Pando**, a nonprofit organization dedicated to collecting native tree seeds, nurturing them into saplings, and distributing them to communities. This initiative empowers individuals to enhance their local environments by planting native trees.

Camu is also the author of *From Wasteland to Wonder*, a book offering practical guidance on revitalizing suburban and urban landscapes through sustainable practices. Entomologist and conservationist Doug Tallamy praised the book for its compelling and accessible approach to ecological restoration. You can download a



copy for free or order a hard copy at cost on his **Leaf & Limb website**. Basil Camu truly exemplifies a profound commitment to environmental conservation and promoting sustainable practices.

—Lydia Chambers, GC of Madison, Zone IV,
Vice Chair, Native Plants

Small-Particle Pollution

One way climate change, pollution, and public health intersect is the regulation of small-particle pollution. Burning fossil fuels for industrial purposes releases soot into the air. From a health perspective, the most dangerous component of this soot are the particles less than 2.5 microns. They migrate deep into the lungs and find their way into arteries and even the brain. Because of this, they cause increases in everything from asthma and lung cancer to heart attacks and increased rates of dementia.

In January 2023, the EPA lowered the allowed level of small-particle pollution. Removing these particles from the



Moving to sustainable energy sources like solar power will help decrease air pollution. Photo by QueenBarenziah, via Wikimedia Commons

air will also help prevent climate change. These particles circle the globe, get into polar ice, and cause less reflection and more absorption of solar rays. The slightly warmer temperature causes the tiny subarctic plants to grow a little bigger than usual, darkening the surface and causing more solar absorption.

The source of this small-particle air pollution is the same as the cause of climate change—burning fossil fuels. The global social cost of air pollution is over \$3 trillion annually, so there is a strong financial incentive to decrease air pollution by moving to sustainable solar and wind power.

—Diane Lewis, Bedford GC, Zone III,
Vice Chair, Climate Change

Chesapeake National Recreation Area

An idea that has been pushed since the 1980s—to create a Chesapeake National Recreation Area (CNRA)—came close to reality in the 118th Congress. The bill has bipartisan support and will be reintroduced in the House and Senate in 2025. The CNRA would create areas in Maryland and Virginia as part of the National Park Service “opening up more equitable public access to the bay... mobilize federal support for restoration, shine a light on the untold stories of its history, and support greater economic opportunity in the region,” to quote Senator Chris Van Hollen (D-MD), bill co-sponsor. The National Park Service would administer the Chesapeake Gateways and Watertrails Network. The CNRA designation would only acquire land through voluntary transfers from landowners bordering the bay.

The Chesapeake Bay is the largest estuary in North America. The watershed spans six states and is one of the world’s most biologically productive bodies of water. Many national park sites are within the bay’s watershed,



Wetland area in the Chesapeake Bay. Photo by Eric Vance, EPA

but none are specifically dedicated to the bay. Chesapeake Conservancy President and CEO Joel Dunn was recently quoted as saying, “The Chesapeake Bay is as spectacular as Yellowstone or Yosemite, as great as the Great Smoky Mountains, and as grand as the Grand

Tetons.... Establishing the CNRA makes it clear that the United States cherishes the Chesapeake, our nation’s largest estuary and the birthplace of American identity.”

—Jane Edwards, *The GC of Norfolk, Zone VII, Vice Chair, Oceans*



WHAT WE ARE DOING

Karen Cragolin Park in Asheville, NC, before flooding from Hurricane Helene. Photo courtesy of RiverLink

Founders Fund Project Update

On September 27, 2024, Hurricane Helene ripped through western North Carolina, causing devastation. The French Broad River flooded, destroying buildings, especially in the beloved River Arts District in Asheville. Karen Cragolin Park, a GCA Founders Fund project from 2009, has been a beacon of hope for residents. Thanks to the native plants, the park escaped the flooding quite well.

The park is named for Karen Cragolin, a leading advocate for a revitalized French Broad River beginning in the 1980s, following decades of neglect that had turned the banks of the French Broad over to auto graveyards, landfills, and other polluting industries. Karen had a vision of what a thriving river district could be, and she joined with others who shared that vision.

Although Karen died in 2022, her inspired love and imagination

for the French Broad River continues with the Karen Cragolin Park. The French Broad River GC Foundation is applying for a GCA Restoration Initiative Grant to further help the recovery after Helene. They will partner with a local conservation organization, RiverLink, which Karen founded and led for 30 years. It is leading the restoration efforts, with plans to use the park as a teaching laboratory for planting native plants.

—Monte Gaillard,
The French Broad River GC Foundation, Zone VII



*The devastating flooding of the French Broad River.
Photo by Colby Rabon*

New GCA Advocacy Award: The Ellen Harvey Kelly Medal

St. George's Garden Club, Zone VI, and family and friends of the late Ellen Harvey "Ellie" Kelly have established The Ellen Harvey Kelly Medal in her memory—the first GCA medal for advocacy. The GCA's Executive Board approved the award in September.

A member of St. George's GC from 1960 until she died in 2023 at age 94, Ellie was described by *The Baltimore Sun* as a "civic leader" and "trailblazer in environmental affairs." Her lifetime of work on behalf of a healthy planet was rooted in her childhood as witness to the encroachment of the suburbs into the Maryland countryside.

In an interview with Ellie in the Spring 2016 issue of the GCA's *Bulletin*, Ellie mentioned that she had testified before Congress in the 1970s to expand the number of plants protected by the Endangered Species Act of 1973. Subsequently, Ellie motivated GCA club members nationwide and worked with the Alaska Coalition and others to build grassroots support to protect Alaska's wilderness. She reported that "In a single week, more letters arrived in Washington from garden club members than from the NRA!" The 1980 Alaska National Interest Lands Conservation Act—the most significant land conservation measure in the nation's history—protected 104 million acres and created 10 new national parks. As an ardent opponent of billboard blight, she was one of three founding members of the Coalition for Scenic Beauty formed in 1982. The organization would later become Scenic America.

The Ellen Harvey Kelly Medal may be awarded to GCA club members and nonmembers, and recipients are not limited to those who advocate for legislative action. The honor is intended to be interpreted broadly and may be bestowed for exceptional advocacy in support of any cause related to the purpose of the GCA.

—Margaret Williams, Pasadena GC, Zone XII



Ellie was the third chair of the NAL Committee (1977–81) and cohost of the first committee meeting in Washington, DC, in 1983. She is credited with developing how the NAL and Conservation committees identify the GCA's priorities for legislative action. Photo by Molly Jones

"Ellie was a legend in our lifetime, and everyone who knew her knew it! She inspired countless people with her charm and tireless passion for the environment. This medal is a wonderful way to honor her achievements and her amazing advocacy for our great earth."

—Krissie Verbic, St. George's GC, Zone VI, Scholarship rep

Are Botanists Endangered?

As funding drops and institutions change, the study of plants appears to be withering on the vine. That's letting critical skills go extinct.

by Karen Mockler

Researchers at the University of North Carolina at Asheville are working with the U.S. Fish and Wildlife Service to learn more about rare pitcher plants. Photo courtesy of U.S. Fish and Wildlife Service Southeast Region



Researchers in Indonesia recently captured a surprising event on video: A wild orangutan named Rakus, with a deep gash on his cheek, harvested liana leaves, chewed them up, and rubbed them on his wound. His cheek healed without infection. As it turns out, the plants have anti-inflammatory, antibacterial, antifungal, and other chemical properties that help heal wounds. The great ape saw the plant, recognized the plant, and valued the plant because he knew something about a subject that few humans do anymore: botany.

At a time when our net knowledge about plants keeps growing, our individual understanding of plants is in decline. This is unsurprising, because while we still depend on plants for life, few of us need to know much about them in our daily lives—as long as someone else does. We rely on botanists to identify plants, keep them alive, and in so doing help keep us alive as well. It's a lot of responsibility for a group of scientists that isn't getting any bigger. And that has some people in the field worried.

Crunching Numbers

The National Center for Education Statistics triggered the first alarm about the future of botany in 2015. According to data released that year, the number of annual undergraduate, graduate, and doctoral degrees awarded in botany or plant biology in the United States had dropped below 400 for the fifth time since 2007. In 1988, the number of degrees was 545. The number soon rose again and so far has stayed above 400. In fact, it rose to 489 in 2023—the highest in decades. (By comparison, American universities gave out more than 45,000 marketing degrees last year.)

The definitive downward trend, though, remains in the number of US institutions offering botany or plant biology degrees—from 76 in 2002 to 59 in 2023.

"Botany PhDs are disappearing," says Kathryn Parsley, who got her PhD in biology, not botany, even though her dissertation focused on plants. "The number of botanists is declining rapidly and the people filling those spaces are not botanists." When a biology department has a job vacancy, she says, they tend to hire a professor who has

"nothing to do with plants. The department will have all kinds of scientists in it, with only one or maybe two botanists, sometimes only one or two plant scientists at all." Because she attended one such school, "a botany degree was out of the question," Parsley says.

While nobody has tracked the average age of botanists in the United States, students of "pure botany" do seem to be waning, according to Kristine Callis-Duehl, the executive director of education research and outreach at the Donald Danforth Plant Science Center in St. Louis. "Skills are shifting away from old-school botany. A lot of that's being driven by funding sources," she says. "More and more, just being a botanist is not enough in academia."

Follow the Funding

Experts agree that in recent years, most botany professors aren't being replaced once they retire. But why?

Money is one reason. The National Science Foundation, for instance, has shifted its funding away from natural history at herbariums and other museums, Callis-Duehl says. "It's harder to convince Congress that that work—pure botany—contributes to the economy. They prefer basic science that can lead into more applied science, where they can make a case that it fuels the US economy."

Applied plant science has more NSF options than botany. For example, agriculture is more likely to be funded by USDA, Callis-Duehl says. Those federal budget decisions shape university budget decisions, she says. The drop in research funding for pure botany has "tanked those programs at schools across the country," she explains, including two that she attended. "Both saw they weren't getting the federal funding to justify the existence of a botany department anymore. I see it over and over and over again."

But shifting funding still begs the question of underlying causes. Some degrees go away because the world no longer needs them, but the world still needs plants and plant knowledge. So why is pure botany in decline?

"A Green Curtain"

For many people, the world's flora registers as what Parsley calls "a green curtain"—a backdrop for more interesting objects of their attention such as animals or, better yet, other humans. By failing to really notice and distinguish one plant from another, we care less about plant knowledge or even plant survival, she says. And that lack of interest can be profound. "You can't talk about the decline in botanists without talking about plant blindness," Parsley says.

Plant blindness is a term coined in 1998 by two American botanists. They defined it as "the inability to see or notice the plants in one's own environment," leading "to the inability to recognize the importance of plants in the biosphere and in human affairs." Parsley wrote her dissertation on a related phenomenon called plant awareness disparity, which refers to the difference between how we notice and treat plants versus animals. She believes this difference is another reason botany degrees are disappearing. "People think plants are boring. Nobody wants to learn about them."

Across the Pond

This trend is not unique to the United States. As botany professors retire in the United Kingdom, many are not being replaced; fewer students are getting degrees in botany, according to Sebastian Stroud, a teaching fellow at the University of Leeds who, in a 2022 paper, coined the phrase "the extinction of botanical education."

As in the US, applied plant science attracts more funding there. Yet as the winds of restoration begin to blow, the UK has a growing need for people who can identify plants, a set of skills that Stroud says is currently lacking in favor of other plant skills. Early this year a law intended to reverse the UK's decline of nature took effect. Biodiversity Net Gain mandates that when developers undertake a project, they must provide a net gain of at least 10 percent biodiversity, either by creating or enhancing habitat. The idea is to leave the land in a measurably better state than it was before the development.

Restoring degraded ecosystems means many projects will need to hire botanists. These jobs are not in academia but industry, where ecological consultants with strong botany skills identify endangered plants on a site and deliver surveys of what they find. "They need competent ecologists to understand an area," Stroud says. "There are lots of jobs and not enough botanists, a real skill gap for the industry. That's where the real concern is, because if we want to restore nature, we need to have good baseline data."

At present, there's a gap between what the UK needs—students with a strong understanding of plant identification—and what its schools have been producing. Recent job candidates "didn't have the identification skills, practical skills, required for extensive surveying work," Stroud says. "The UK has multiple plant bio-tech programs, few on taxonomy and ecology, species identification, or conservation. Reviews by the UK House of Lords identified taxonomy as a science being in a critical state." A more recent report from the Royal Society of Biology found that "96 percent of organizations surveyed expressed concerns over gaps in the skills of UK plant scientists."

Plant taxonomy is the branch of botany that identifies, classifies, and names plants based on their similarities and differences. Increasingly, ecological consultants are taking Stroud's courses in plant ecology and identification, he says, "because they need to upskill for habitat survey. There are not enough places to accredit professionals in the industry. We can't meet the demand or deliver enough students and accreditations quick enough."

A Rose by Any Other Name

The world still needs botanists. In prior generations older botany professors were mostly training younger botany

Facing page: GCA Scholarships help support botany and other areas of plant-based study. Matthew Yamamoto, 2024 GCA Summer Scholar in Field Botany and master's student at Claremont Graduate University, conducted field research on patterns of plant diversity and how they relate to elevation and geology in a high-elevation watershed. Yamamoto's fieldwork in the Sierra Nevada yielded 1,518 specimens, including 26 rare plants. Of those, 23 were not previously known to occur in the area. "Ample snowfall from the previous winter," said Yamamoto, "meant that a high diversity of plants flowered, and spending more time in the field was critical to document this diversity."



The Botany Bill

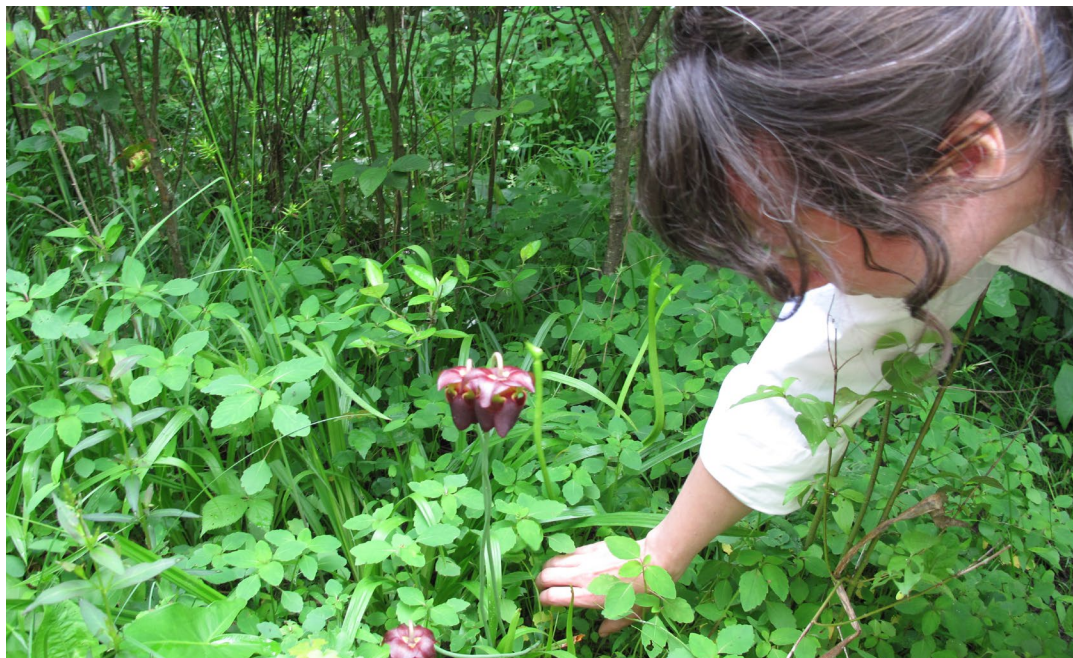
The GCA is one of 72 organizations supporting the Botany Bill, which promotes botanical research and sciences capacity, generates demand for native plant materials, and authorizes related federal activities. This bipartisan legislation allows federal agencies to act with the expertise required to preserve unique American landscapes and emphasizes the importance of protecting native plants and ecosystems.

Work on the Botany Bill began in early 2015. The Bill was first introduced in the 115th Congress, to the House of Representatives (H.R.1054) on February 14, 2017, by Representative Quigley (D-IL), cosponsor Ros-Lehtinen (R-FL), and to the Senate (S.3240) on July 18, 2018 by Senator Hirono (D-HI), cosponsors Duckworth (D-IL), Van Hollen (D-MD), and Whitehouse (D-RI).

WORTH REPEATING

"We aren't going to understand what we have in the world. By some estimates only 20 percent of the (plant and animal) species in the world have been identified."

—Joe Miller, program officer at the National Science Foundation's Division of Environmental Biology.



A service botanist examining a mountain sweet pitcher plant. Photo courtesy of Department of the Interior U.S. Fish and Wildlife Service National Conservation Training

professors. Today's students, however, are often migrating to other plant majors. That doesn't necessarily mean plant knowledge is being lost. It means, according to two 2023 papers, that there's a mismatch between the careers for which current graduate students are being trained and the careers they're more likely to end up with. One study found that few of those careers will be in academia. According to the second study, the jobs now are and increasingly will be in the private, nonprofit, and government sectors. For example, "government employers discussed skills they're looking for in new hires—plant identification was the number-one skill," says Callis-Duehl, one of the authors of both studies.

This trend has been growing for a while: In 2018 the National Park Service and Bureau of Land Management—which in combination control more lands than any other US agencies—indicated they can't find enough botanists to deal with invasive plants, wildfire reforestation, and basic land management.

In response to this need, dozens of US legislators have sponsored something called the Botany Bill, which has been introduced twice to the House of Representatives and the Senate. The bill is intended to promote botanical research, generate demand for native plant materials, and protect native ecosystems. It has yet to pass, but

its existence suggests a growing recognition that plant knowledge needs to be preserved. And although the emphasis on pure botany is decreasing, botany may be evolving rather than tapering off. "A lot of botany degrees are becoming joint degrees with, say, ecology," according to Callis-Duehl.

Stroud agrees. "Just because we don't have many botany students doesn't mean there aren't students of botany," he says. The same applies to teachers like himself. With his PhD in urban ecology, he isn't a botany professor by name. Yet he teaches plant content, including those valuable plant-identification skills. "You don't necessarily need to be professionally accredited to be a botanist," Stroud says. "Many people who we might describe as botanists might not identify as botanists. They might call themselves something else. Botany is a broad church."

Still, both Stroud and Callis-Duehl acknowledge that some skillsets like taxonomy are being lost as the botany field contracts. Plant knowledge lives on in some form, she says. But for now, the plant skills that employers seek—and that our planet needs—appear to be in short supply.

Karen Mockler is a freelance writer and novelist based in Tucson, Arizona. This article was first published in the September 23, 2024 issue of The Revelator and is republished here under a Creative Commons license.

Electrification of Cars:

A Path Towards Sustainable Transportation

By Sandra Law

According to the EPA, transportation is the leading economic sector contributing to greenhouse gas emissions in the US. As concerns about climate change intensify, the electrification of vehicles has emerged as a pivotal part of the solution.



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THE announcement of the new Bevel Gear Shaft Drive Baker Electrics has proved the sensation of the year—yet bevel gear shaft drive is only one of the many good features which have put the Baker Electric in a class by itself. The progressiveness shown by the development and adoption of this new drive is equally apparent in every detail of every Baker model.

The longer wheel base, new spring suspension, centered wheel bearings, non-sparking motor, continuous torque controller and cushioned steering connections, are all exclusive Baker improvements, and they all help to make the Baker Electric the smartest and most serviceable motor car ever built.

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History

EVs date back to the 1890s, when American inventor William Morrison developed the first electric car. Due to high costs, limited range, and low speeds, EVs fell out of favor and nearly disappeared by 1935 as they were eclipsed by gasoline-powered cars. It was not until 1997 that the Toyota Prius debuted as the first mass-produced hybrid EV. The landscape shifted dramatically in 2006 when Tesla announced its plan to produce luxury electric sports cars. By 2008, Tesla launched the Roadster, featuring a lithium-ion battery. This was followed by significant federal support, including a \$465 million loan to Tesla from the Department of Energy in 2010, which paved the way for more electric models like the Chevy Volt and others.

Editor's Note:
The information in this article was accurate and up to date when submitted in early January 2025. Some information has changed since then. Because it still includes a great deal of accurate, relevant information, we felt it was still a good idea to publish it as written.

Initiatives

Recent federal programs have played a crucial role in enhancing EV technology, particularly battery improvement and charging-station installations. The Inflation Reduction Act of 2022 allocated nearly \$370 billion for climate and energy investments, including the most significant investment in electrification in US history. This commitment to vehicle electrification became a launchpad for making EVs mainstream.

Understanding EVs

EVs are classified into two main categories: Plug-in Hybrid EVs (PHEVs) and All EVs (AEVs), also known as Battery EVs (BEVs). PHEVs have medium-range batteries with the ability for the gas engine to kick in as needed for power or to increase distance. These vehicles have the benefit of not causing "charge anxiety"—the fear that your electric charge will run out with no charging station nearby. AEVs

EVs date back to the 1890s, when American inventor William Morrison developed the first electric car. Photo courtesy of Wikimedia Commons

The Facts

As the market for EVs grows, so do misconceptions. Here are some prevalent myths debunked by the EPA.

Myth: EVs are worse for the environment than gas cars.

Fact: While the production of EVs can result in higher initial carbon emissions, they have zero tailpipe emissions and a smaller overall carbon footprint throughout their lifecycle. The EPA has a ***Beyond Tailpipe Emissions Calculator***, that helps estimate greenhouse gas emissions associated with charging and driving an EV or a PHEV based on your zip code. This allows potential EV buyers to compare emissions of EVs in a specific geographical area.

Fact: Mining for the minerals needed in EV batteries can harm the environment. However, technological advances in battery recycling of EV batteries can reduce emissions further by reusing materials and components.

Myth: EV batteries are unreliable and need frequent replacements.

Fact: EV batteries are designed to last the vehicle's lifetime, with failures quite rare. While the typical factory warranty on the battery is 10 years, they are projected to last much longer.

Myth: EVs threaten the stability of the power grid.

Fact: EVs have charging strategies that can prevent grid overload and, in some cases, support grid reliability.

Fact: EVs can be charged at off-peak times.

Fact: Charging consumes less electricity than water heating and air-conditioning.

Myth: There are not enough charging stations.

Fact: Over 68,000 charging stations exist across the U.S., and new stations are added regularly. Home charging options are readily available and cost less than many people realize.

Myth: EVs have limited ranges.

Fact: Most AEVs can exceed a 200-mile range, while the average American drives less than 50 miles daily.

Myth: EVs are less safe than gas-powered cars.

Fact: EV batteries must meet stringent safety standards, including features that mitigate risks in case of a short circuit or accident.

Fact: EVs are generally much heavier than gasoline-powered vehicles. While this provides some safety to the individuals in an EV, it can be more destructive to vehicles or properties involved in accidents with EVs.

offer a much longer range (some over 300 miles) but do not have a back-up gasoline supply; access to a charging station is imperative with AEVs.

As of 2024, the automobile market boasts 56 new electric vehicle models, with an average price of \$60,000, compared to \$34,000 for gas cars. The Nissan Leaf offers the lowest price for an electric vehicle at \$28,000, while the Nissan Versa is the least expensive gas car at \$18,000.

Tax Credits

Significant tax benefits, nationally (and in some states), make the option of an electric car attractive. The Inflation

Reduction Act has extended the EV tax credit through 2032, introducing broader eligibility requirements. New vehicle credits offer up to \$7,500, contingent on critical mineral and battery component requirements, vehicle pricing caps, and final assembly in the US. To qualify, the cost of the EV cannot exceed \$80,000 for SUVs and pickup trucks and \$55,000 for other vehicles. They must also weigh less than 14,000 pounds and have a storage capacity of 7 kilowatt-hours or more.

To qualify for the credit, adjusted gross income must be below \$300,000 for couples filing jointly, \$225,000 for heads of household, or \$150,000 for individuals. Used



Over 68,000 charging stations exist across the US, and new stations are added regularly. Photo courtesy of Wikimedia Commons

vehicles also qualify for tax credits. The current rule is that a used vehicle that qualifies for the credit provides the buyer the lesser of 30 percent of the sales price or \$4,000. These incentives have contributed to the wider adoption of EVs.

The electrification of cars represents a significant shift towards sustainable transportation, driven by

technological advancements, government support, and a growing commitment to reducing greenhouse gas emissions. As EVs evolve, addressing misconceptions and understanding their benefits will be crucial for fostering wider adoption. The road ahead is bright for electric mobility, paving the way for a cleaner, greener future.

—Sandra Law, Saint Paul GC, Zone XI, Conservation zone rep

An aerial photograph of a lush forest landscape. A winding river flows through the center, surrounded by dense green trees and marshy areas. The background shows rolling hills under a cloudy sky.

Giving Nature a Nudge: Climate Adaptation Through Assisted Migration

By Katie Frerker,

Climate Adaptation Specialist with USDA Forest Service Eastern
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All photos courtesy of Ryan Pennesi

Aerial view of Superior National Forest.

When you hear “assisted migration,” does it evoke any emotions? For some, these words trigger feelings of discomfort and anxiety because assisted migration has a wide variety of meanings not fully understood. What exactly is assisted migration? And is it something to be feared?

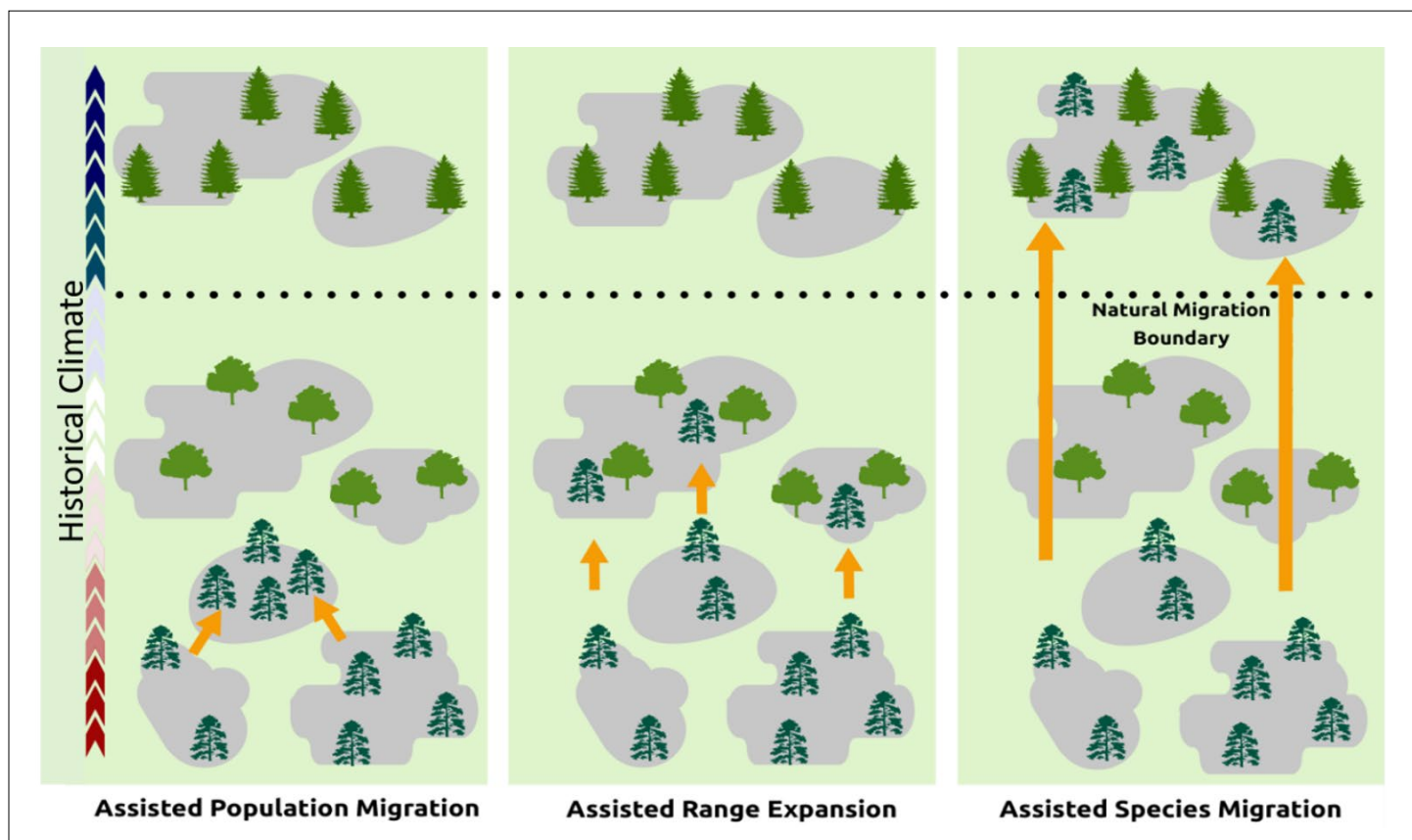
Assisted migration is a climate adaptation technique that, when implemented responsibly and respectfully on the landscape, can be a cause for celebration rather than for running and hiding.

Across the globe, forest managers are challenged to consider climate change as they work to maintain healthy forests. Individual tree species thrive in their local environments when adapted to that specific blend of climatic conditions, and natural migration to new areas occurs slowly for most species. Trees are long-lived organisms rooted in place, so they depend on mechanisms like wind or animals to disperse their

seeds to new areas. However, climate change is moving at a rapid pace. Depending on the site, conditions are becoming wetter, drier, and warmer—challenging for any established plant. With continued and projected changes, tree species simply cannot disperse their seed fast or far enough to keep up. This mismatch led to a rising interest in a climate-adaptation technique called assisted migration.

Assisted migration can be defined as the human-assisted movement of species, populations, or genotypes in response to climate change. However, the definition encompasses a variety of actions, each with its own associated risks, challenges, and opportunities. Assisted migration can be broken into three types:

Assisted-population migration involves moving seed sources or populations to new locations within the



The three assisted-migration types. Gray areas represent different seed zones or populations. Orange arrows represent the human-assisted movement of plant material to a new location. The historical climate bar on the left notes the movement of plants from warmer, drier climates (red) to historically cooler (blue), wetter climates.

current species' range. For example, you may choose to plant a tree species that is already present at your site, but instead of gathering the seed locally, you collect it from one seed zone to the south (See *Eastern Seed Zone Forum* as an example of seed-zone mapping.)

Assisted-range expansion involves moving seed sources or populations from their current range to suitable areas just beyond, facilitating or mimicking natural dispersal, but at a faster rate. There may be a tree species growing in the county just to the south of you that is at the northern extent of its current range. Planting that species on your site with the expectation it could eventually expand northward, given enough time, is an example of assisted-range expansion.

Assisted-species migration is the movement of seed sources or populations from their current range to suitable areas far outside their range, beyond locations accessible by natural dispersal no matter the amount of time that passes. This can be as extreme as planting a tree from another continent in your local woodlot or, as a less extreme example, moving a species across some migration barrier (mountain range, Great Lakes, large areas of agricultural or urban development) to your area.

* * *

Assisted migration can be a pragmatic tool for increasing climate resiliency in our forested landscapes, but weighing the challenges and opportunities associated with each type is important. For example, assisted-population migration maintains the same tree species on the landscape. Using seeds gathered from a slightly lower latitude or elevation, the trees will likely have genetic material that makes them adapted to warmer conditions. Many scientists agree this is a low-risk strategy for boosting climate resiliency on the landscape, although there are limits to how far you should travel to collect seeds. Some tree species have wide ranges across the US, and collecting seed from the opposite extent of a species' range could result in maladaptation to the site (e.g., damage or mortality from early and late-season frosts or other climate

extremes). A good rule of thumb is to collect seeds from one seed zone to the south or an elevation 500 to 1,000 feet lower than your planting site.

While assisted-population migration is appealing, maintaining healthy populations of the current tree species on a site is not always possible. For example, ash trees (*Fraxinus* species) across North America are affected by emerald ash borer infestations, sometimes resulting in 100 percent loss of the species on a site. Using assisted migration to bring in a new tree species that maintains the site's hydrology similarly to ash trees may be necessary.

In this case, assisted-range expansion could be used. A new tree species at the nearby edge of its range is introduced to the site. If, through field trials or a review of available silvics information, the new species appears to be adapted to the local site conditions, it is unlikely to become invasive or maladapted to current conditions. After all, it could have moved into the site on its own, given enough time. In this case, humans have fast-tracked the arrival of the species to the site. Assisted-range expansion is generally also considered a low-risk strategy. But it is important to recognize that current species assemblages on the landscape hold both cultural and ecological value, and these connections should be evaluated before



Planting a conifer seedling in the Superior National Forest.



Black spruces reaching for the sunlight in the Superior National Forest.

WORTH REPEATING

“Conservation has really been built around a static view of the world. Given that climate change is going to happen, we need a whole new suite of strategies that could complement the old ones. This could get more people thinking about the other strategies we need.”

—Dov Sax, Brown University ecologist and invasive-species researcher

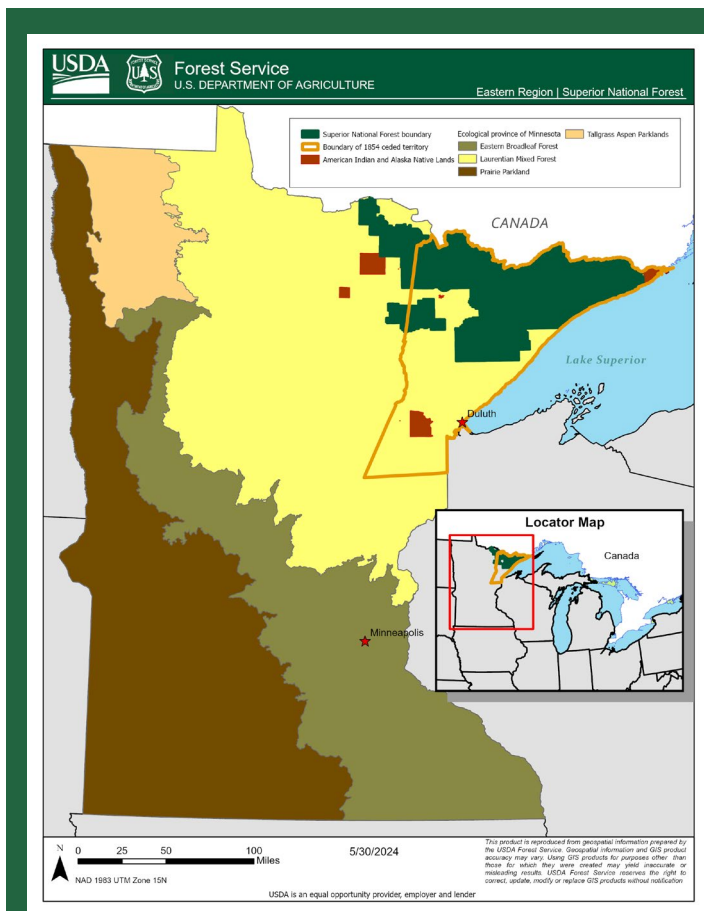


The Superior National Forest is the first National Forest to create and publish a formal assisted-migration implementation plan.

considering the introduction of a new species to the site (see the sidebar page 22).

The third type of assisted migration, assisted-species migration, also introduces new species to the site, but this time from farther away. Again, using emerald ash borer infestations as an example, a land manager may choose to replace ash trees on a site with a species from an entirely different continent or area of the country. While this may be necessary if no nearby species can replicate the ecological function of ashes, moving something very far from its range or across a major migration barrier can carry higher risks of maladaptation to the site or the potential for that species to become invasive.

While each type of assisted migration has unique challenges and opportunities, it is also important to



The Superior National Forest, located within the 1854 Ceded Territory of the Grand Portage Band of Lake Superior Chippewa, Fond du Lac Band of Lake Superior Chippewa, and Bois Forte Band of Chippewa, is near the edge of the Laurentian Mixed Forest ecological province.

Superior National Forest: Assisted Migration in Action

The Superior National Forest (Superior NF) is in northeastern Minnesota along the north shore of Lake Superior and the southern border of Canada. The forest is in an area of the continent where northern boreal species are meeting

boreal tree species, creating urgency in implementing assisted migration.

In 2023, Superior NF became the first National Forest within the USDA Forest Service to create and publish a formal **assisted-migration implementation plan**. The plan-

their southern range limits. It is currently dominated by jack pine (*Pinus banksiana*), black spruce (*Picea mariana*), paper birch (*Betula papyrifera*), and northern white cedar (*Thuja occidentalis*) as well as moose, Canada lynx, and other animals. These species provide important ecological benefits to the area, linking the cultural identity and way of life of the region's Indigenous people. Changing climate is shrinking the suitable habitat of these important

development process involved extensive tribal engagement to understand the cultural significance of these tree relatives and the need to maintain them to uphold **tribal treaty rights**, while also balancing the need to maintain ecosystem function and healthy, resilient forests in the face of a changing climate.

Superior NF's ultimate approach to assisted migration balances present-day treaty obligations and the reality of a climate-altered future. The plan focuses most efforts on assisted-population migration—planting the same species but gathering seeds from areas just south of the Superior NF boundary—to convert their entire reforestation program (about one million seedlings planted annually) to assisted-population migration stock by 2050.

While the Superior NF's plan acknowledges the importance in maintaining current species assemblages to protect tribal treaty rights, they know this may not be a viable option. Assisted-range expansion and assisted-species migration are not off the table. If ecosystem function and local livelihoods are threatened, the Superior NF has outlined a process for respectfully engaging local tribal bands and working with Forest Service geneticists to have the conversations necessary before planting a new species to fill the gap.

—Katie Frerker

consider the potential consequences of doing nothing. If native trees can't keep pace with our changing climate, landscape-level die-off, or rapid ecosystem conversion—like pine forest to prairie or forested wetland to marsh—could ensue. Dramatic changes like this would harmfully impact the species (humans included) that rely on forests to survive and thrive.

Understanding the three types of assisted migration and their nuances can hopefully stop the alarm bells from

ringing when those words are mentioned. With thoughtful, respectful planning and consideration, assisted migration can boost confidence in our actions, knowing we are doing what we can to keep healthy, resilient forests while honoring the ways of life and land relationships of those who call these forests home.

Katie Frerker is a Climate Adaptation Specialist with the USDA Forest Service Eastern Region and the Northern Institute of Applied Climate Science.



Above: The beautiful Superior National Forest in northeastern Minnesota is threatened by climate change.



Left: Tamarack cones ready for processing at a tree nursery.



CONSERVATION STUDY CONFERENCE

The 2026 Conservation Study Conference will be an in-depth look at the Everglades ecosystem. Photos by Lynn Steiner

2026 Conservation Study Conference The Everglades | January 25–28, 2026

“The River of Grass” is the largest tropical wilderness in North America, comprising 12 different biomes in 4.3 million acres south of Lake Okeechobee and west of Miami. Please plan to join us for informative speakers, airboat rides, ranger-led hikes, tram and boat tours, optional excursions, and more. Experience Everglades National Park’s wild beauty first-hand, while learning of the dangers facing this vast region of South Florida.

More information and registration details to come.

—Susan Smathers, Late Bloomers GC, Zone VIII, Vice Chair,
Conservation Study Conference



SAVE THE DATE



Everglades National Park is the first national park created to protect a threatened ecological system. Join us to learn about the continuing challenges facing the “River of Grass.”