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"Climate change will add stress on our forests. We have to adapt our approach. Traditional silvicultural treatments tend to reduce species diversity in mesic-hardwood forests, so we've implemented larger canopy gaps resulting in greater species diversity and an enhanced ability to adapt to a changing climate."

— Mark Jacobs, Land Commissioner, Aitkin County MN

Managed hardwoods in the Forest Stewards Guild Cornish Model Forest in Minnesota. Photo by Aitkin County Land Department.

Hidden Valley Nature Center co-founder Bambi Jones explains how and why to prune a tree during a Women and Our Woods workshop at Hidden Valley Nature Center. Photo by Amanda Mahaffey, Forest Stewards Guild.

Forest Stewards Guild
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To our Members and Supporters

Forestry in the Age of Climate Change: A Forest Stewards Guild Perspective

The opening paragraph in the 1990 National Academy of Sciences report *Forestry Research: A Mandate for Change* included an assertion that was startling to many in the forestry community: "Current knowledge and patterns of research on forest ecosystems will not result in sufficiently accurate predictions of the consequences of potentially negative impacts on forests, including forest management actions that lack a sound basis in biological knowledge. This deficiency will reduce our ability to maintain forest productivity . . . or ameliorate or adapt to changes in the global environment." For decades, sustained-yield forest management in the US has been guided by the Clementsian theory of predictable ecological succession following a natural or human disturbance. We now know that ecosystem response to major disturbances is far less certain. It is difficult to design timber harvests or other management interventions that "mimic natural processes" when these processes are, in fact, a highly unpredictable product of interactions among a dynamic array of biotic and abiotic factors.

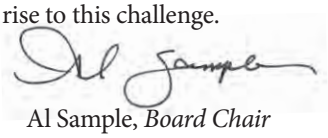
Thousands of acres affected by high intensity wildfire from the 2000 Vivash Fire, Cow Creek, New Mexico. Photo by Matt Piccarello, Forest Stewards Guild

Forest ecologists today seldom offer firm predictions about the pathways that ecosystems will follow in the aftermath of disturbances. They speak in terms of probabilities of outcomes, nested within a range of plausible scenarios. They recommend multiple simultaneous management approaches followed by intensive monitoring, to evaluate which of these approaches seems to produce a favorable outcome, and which potential climate scenario seems to be playing out.

The Adaptive Silviculture for Climate Change (ASCC) project described in this issue of *The Forest Steward* is a glimpse of forestry as it will be practiced in the future. It approaches the uncertainties and unpredictability of managing forests in the "no analog future" of the Anthropocene, not with a sense of hopelessness or resignation, but as a problem to be solved. It probably will not produce new answers or cookbook methods for future silviculturists to follow. More likely, it will teach forest managers of tomorrow not *what* to think but *how* to think. How to insightfully experiment with several different approaches to similar silvicultural circumstances, to hone their powers of observation and interpretation, and to respond in the more flexible and dynamic manner that current environmental change requires.

Attention to the effects of climate change on forests has focused largely on the increasing size and severity of wildfires, insect mortality, and other "megadisturbances." But many of the effects on forests will be more subtle, yet significant and cumulative. Science-management partnerships, for the "co-production" of actionable science, are giving scientists and forest managers new ways of thinking and acting together to strengthen the resilience of forests to the climate changes to come.

Forest management in the future will be much more demanding. It will require a greater personal perception and understanding of the changes taking place on the ground, and the ability to craft responses that utilize these changes to still achieve positive outcomes and maintain important ecosystem services from forests. Being closely attuned to the unique characteristics and dynamics of the forests they manage is one of the defining features of foresters who have come together as members of the Forest Stewards Guild. The conservation and stewardship of forests in the Anthropocene will be more challenging than at any other time in the history of forestry. Guild foresters will be among the most capable and best prepared to rise to this challenge.



Al Sample, *Board Chair*

Women Owning Woodlands

Forest stewardship, led by women

Written by Amanda Mahaffey

Tamara Walkingstick of the University of Arkansas Forest Resources Center models a teaching moment on timber values at the Women Owning Woodlands-Tools for Engaging Landowners Effectively workshop in Briarcliff Manor, NY. Photo by Esmé Cadiente, Forest Stewards Guild.

"Today was wonderful! What a great way to bring women from around the state together to explore topics related to the woods. It was a beautiful day to be outside and learn something new!"

"I had an incredible time. Loved the birding and discussion about managing with birds in mind. Loved the amphibians/vernal pool tracking – so rich with information and immersion. I will definitely look for a long chainsaw workshop with Tish. Glad I now know how to read a compass. I loved talking with and meeting so many like-minded women."

The quotes on this page are from attendees of an all-day workshop for women woodland owners and outdoorswomen. They left feeling energized by the community of women presenters and participants, empowered to act, and eager to learn more about forest stewardship. Wouldn't every extension specialist want their workshop participants to feel this way?

Participants ask questions on a field stop during a Women and Our Woods workshop at Hidden Valley Nature Center in Jefferson, Maine. Photo by Amanda Mahaffey, Forest Stewards Guild.

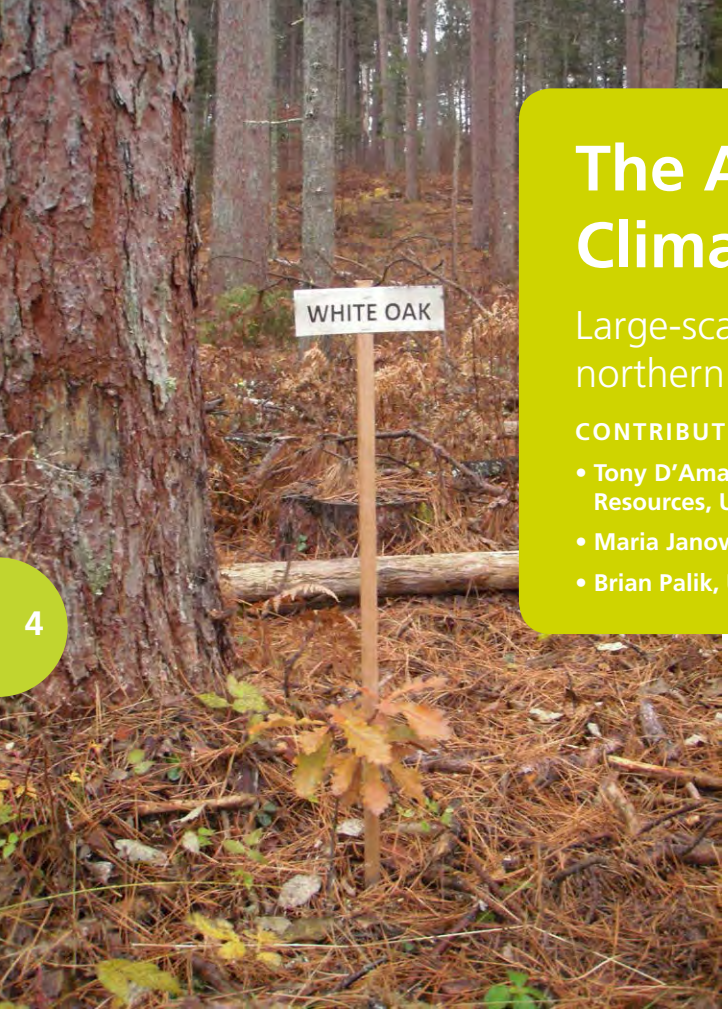
Across the country, more women are becoming primary managers or owners of farms and forests, yet these women often lack the social capital, knowledge, and access to resources that allow them to be successful. Women woodland owners have tremendous potential for shaping the future of America's 290 million acres of family forestland. However, women are underserved by traditional outreach efforts.

Workshops for women woodland owners create a comfortable learning environment that inspires deeper engagement and learning than these participants might experience in a mixed-gender program. Women share stories of their connection to their land, ask questions that, to their relief, others have as well, and tackle hands-on activities that empower them with knowledge and confidence.

The Forest Stewards Guild has been leading programming for women woodland owners in Maine since 2015, building on an initiative launched by the Maine Forest Service and partners a decade earlier. Similar efforts have arisen in Oregon, Arkansas, North Carolina, Minnesota, and elsewhere under various names. In Pennsylvania, it's "Women and their Woods." In Maine, it's "Women and Our Woods." In Oregon, it's "Women Owning Woodlands." In the American Farmland Trust, it's "Women for the Land." The common thread is the ownership women landowners take in stewarding their land.

In October 2017, the Guild helped launch a workshop for professionals in women's outreach. This effort was supported by the USDA Forest Service and led by the Sustaining Family Forests Initiative (SFFI) at the Yale School of Forestry and Environmental Studies. The workshop was infused with TELE (Tools for Engaging Landowners Effectively) techniques for understanding the audience and using strategic communications to engage groups of woodland owners. This event also sparked new connections and shared learning between leaders of well-established programs and leaders just getting programs underway.

The Forest Stewards Guild recently received a multi-year award from the USDA Forest Service to administer the national Women Owning Woodlands network and website, womenowningwoodlands.net. This came in recognition of the Guild as a national organization of forest stewards, including many strong women leaders, who excel in sharing ideas, creating partnerships, and generating collaborative solutions. The Guild looks forward to supporting existing networks, helping launch new efforts in places underserved by women-focused outreach, and connecting the strong community of natural resource professionals and women peer leaders working to advance forest stewardship – led by women – across the landscape.



Planted white oak at a Minnesota ASCC site. Photo by Tony D'Amato.

The Adaptive Silviculture for Climate Change (ASCC) project

Large-scale adaptive silviculture experiments in northern hardwood and red pine forests

CONTRIBUTORS:

- **Tony D'Amato, Forestry Program, Rubenstein School of Environment and Natural Resources, University of Vermont**
- **Maria Janowiak, Northern Institute of Applied Climate Science**
- **Brian Palik, USDA Forest Service Northern Research Station**

Invasive species, changing disturbance regimes, and extreme weather events, like droughts, are several of the current and emerging stressors managers must now account for when developing long-term management plans. Contemporary silvicultural strategies may be effective at addressing some of these changing dynamics; however, the novelty and uncertainty of future forest conditions has created a great need for a new era of silvicultural trials that can serve as the scientific basis for adaptive strategies for addressing changing climate and forest health conditions.

The Adaptive Silviculture for Climate Change (ASCC) project was developed in response to this need and is an excellent example of a Forest Stewards Guild-style approach to managing complex, ever-changing ecosystems. ASCC is a national, multi-site experiment centered on co-production and evaluation of forest type-specific adaptive management strategies that address projected changes in climate, forest health, and management constraints within a given region. Each site includes at least four, operational-scale (25-acre) replicates of strategies for achieving desired future conditions though the application of resistance, resilience, or transition approaches, respectively. Briefly, resistance involves actions to reduce impacts and maintain current conditions in the short-term. Resilience takes a mid-term perspective by allowing some change within the range of natural variation. Transition includes actions that promote change to a new, future-adapted state. Dr. Linda Nagel at Colorado State University leads this national effort in partnership with the Northern Institute of Applied Climate Science, with numerous scientists serving as lead investigators at the local ASCC installations. Guild members Tony D'Amato, Maria Janowiak, Brian Palik, Kevin Evans, and Riley Patry are among those supporting ASCC research in northern forests.

Two sites in the ASCC network, the Cutfoot Experimental Forest in Minnesota and Dartmouth Second College Grant in New Hampshire, have played a key role in Forest Stewards Guild activities over the past several years. The ASCC installation on the Cutfoot Experimental Forest is led by Dr. Brian Palik from the USDA Forest Service Northern Research Station and builds upon years of research examining the ecology and silviculture of red pine forests across the Great Lakes region. Experimental treatments at this site are designed to address the impacts of projected increases in drought, insect and disease issues, and fire on red pine forests. Treatments range from resistance strategies centered on traditional thinning regimes for red pine to resilience and transition approaches that apply variable-density thinning, and expanding gap irregular shelterwoods to increase structural and compositional complexity. These latter two approaches also include planting efforts focused on increasing the representation of a range of tree species projected to gain suitable habitat on the Cutfoot Experimental Forest based on Climate Change Tree Atlas projections. These species include northern red oak, black cherry, bitternut hickory, and eastern white pine. Adaptive silvicultural treatments were co-developed with resource management staff on the Chippewa National Forest and the experiment has hosted 400 tour participants since the project began in 2014, including a field tour during the 2016 Forest Stewards Guild national meeting in Duluth, Minnesota.

The ASCC installation at the Dartmouth Second College Grant is located on a Forest Stewards Guild Model Forest and is led by Dr. Tony D'Amato from the University of Vermont in close collaboration with Kevin Evans, long-time Director of Woodlands Operations for Dartmouth College, and Dr. Chris Woodall from the USDA Forest Service Northern Research Station. Forests at this location are largely dominated by northern hardwood species. Treatments for this ASCC installation focus on minimizing the impacts of increased prevalence of non-native insect pests, warmer temperatures, greater frequency of

Kevin Evans is a manager at Dartmouth Second College Grant (above left). Kevin Evans and UVM PhD Student Peter Clark at a resilience treatment at Dartmouth Second College Grant (above right). Photos by Tony D'Amato.

ice storms, and more extreme precipitation events on northern hardwoods. Similar to the Minnesota site, resistance strategies largely involved traditional silvicultural approaches, namely single-tree selection, whereas variable-density thinning and continuous-cover irregular shelterwoods were applied as part of resilience and transition treatments to increase ecosystem complexity and the number of pathways for recovery following future disturbance and climate change impacts. Deliberate retention and creation of deadwood legacies was also a common element in these treatments as a biodiversity conservation measure and a potential strategy to minimize runoff from future extreme precipitation events. Although not a common practice in northern hardwood systems, transition treatments include planting to increase representation of future-adapted species in these forests, including northern red oak, black birch, bitternut hickory, and American basswood. As with the other ASCC installations, adaptive silvicultural treatments for the Second College Grant were co-developed with local resource managers, including individuals from New Hampshire Fish and Game, Vermont Forests Parks and Recreation, the White Mountain National Forest, and Dartmouth College Woodlands.

Minnesota ASCC transition treatment (top). Photo by Tony D'Amato.
An example of field tours and learning that takes place as a core function at the Dartmouth Second College Grant Model Forest (bottom). Photo by Amanda Mahaffey, Forest Stewards Guild.

A myriad suite of organisms and ecosystem processes are being monitored at each site, ranging from native pollinator abundance to soil moisture dynamics, allowing for a holistic evaluation of the impacts of adaptive silviculture treatments on a broad range of traditional (e.g., long-term productivity) and ecologically-focused objectives (e.g., restoration of native biodiversity, carbon storage). This holistic approach, combined with silvicultural treatments that retain a diverse forest structure, are hallmarks of the Forest Stewards Guild principles in action. Likewise, the collaborative and long-term nature of ASCC echoes the Guild practice of engaging a broader community and grounding science in field-based observation.

These experiments are in their infancy relative to the long timeframes over which forests are managed. However, they represent a critical step forward in developing ecologically and operationally sound strategies for addressing global change impacts on several regionally important forest ecosystems. At the core of these experiments are strong scientist-manager partnerships that ensure both the treatments evaluated and their long-term outcomes are of relevance to the broader forest management community. To learn more about the ASCC network and the installations at the Cutfoot Experimental Forest and Dartmouth Second College Grant, visit: www.forestadaptation.org/ascc.

Students Becoming Professionals, Communities Becoming Land Stewards

A story of engaging community in restoration

Written by Leonora Pepper

Field workshop on landscape history, fire policy, and the fine points of the restoration prescription. Photo by Esmé Cadiente, Forest Stewards Guild.

What better way is there to round out a summer spent building new skills in conservation and natural resource management than trying your hand at making on-the-ground management decisions to shape a forest's future?

One morning last July, five crew members from the Guild's Forest Stewards Youth Corps (FSYC) had that opportunity. On the last day of the program, Guild staff members Esmé Cadiente and Leonora Pepper took the Española-based FSYC crew out to the Rio Trampas Collaborative Forest Restoration Program (CFRP) project site to participate in an initiative combining community stewardship with restoration thinning. The idea was to connect with members of nearby communities who were interested in firewood and enlist them in carrying out restoration thinning treatments to generate that wood.

To this end, we had selected a 3-acre unit and divided it into half-acre blocks. Since we intended to mark leave trees on these stewardship blocks according to the prescription, we decided it would offer a great opportunity to expose a youth crew to marking timber. Fast-forward to the morning in late July at the Rio Trampas CFRP, when five drowsy teens piled out of the program pickup to take stock of their piñon-juniper-ponderosa surroundings.

Before the crew members were given the go-ahead to start painting, we needed to provide them with the necessary tools and background to make informed management decisions. We gave a brief field workshop covering historic fire regimes and the evolution of national fire policy over the past century. Then, with printouts of the treatment prescription in hand, we carefully went over each guideline, what it meant, and its importance in the landscape. These guidelines included: 1) the desired spatial pattern (groups of trees and cleared openings between them), 2) the species to prioritize (ponderosa and healthy piñon pine), and 3) the elements to remove (ladder fuels, diseased individual trees). Armed with this important information and cans of fluorescent orange spray paint, our youth land managers set out to mark the stewardship blocks.

It was enormously satisfying to observe the crew members quickly get the hang of the prescription and develop an eye for how it should look on the landscape. They soon realized the importance of working off of each other's decisions and began calling back and forth as they moved across the unit, discussing which trees they were choosing to leave and therefore paint, and why, and how those decisions fit into a larger pattern of groups and openings. Even though the acreage marked was small, the implications are relevant on a much larger scale. We hope that is a lesson the Española FSYC crew can take with them into careers in natural resource management.

In late August, we sold permits for the first four blocks. We were already selling normal firewood permits at $15 per cord to people who wanted to collect wood felled by restoration contractors on a different section of the CFRP. It would require extra work of the community members to cut this wood themselves, so we sold these stewardship block permits at a third of the price.

When we followed up in October and spoke with the four community stewards, two had found that the tree size class in their blocks was too small to be worth going in to cut. The third person hadn't been in to harvest yet, and the fourth person yielded 2.5 cords from her half-acre. This fourth community steward found access into the block for her truck, so she cut consistently across the whole block. She also cut relatively heavily and as a result, that unit was a success in fulfilling the treatment prescription. She was very thorough in taking out all the unmarked trees, even the small-diameter trees that wouldn't have been attractive as firewood. This community steward was interested in cutting more, so we sold her a permit for the remaining acre as well.

This stewardship block initiative was a small one, but it ties in to a larger Guild objective to connect members of nearby communities with a source of firewood while furthering restoration thinning treatments. The Guild is working locally with The Nature Conservancy's Rio Grande Water Fund, the Carson National Forest, and coordinators of the Cerro Negro Forest Council to develop a model for community-based forest stewardship and firewood harvesting based on historical acequia governance. This initiative is in its beginning stages but has the potential to offer an innovative approach to accelerating restoration treatments on our national forests.

With luck and some hard work, this direction in the Guild's work will continue to support economic development in rural New Mexican communities, foster direct engagement in environmental stewardship, and provide training to the next generation of natural resource professionals.

An example of the small-diameter wood cut from the fourth steward's block. Despite the fact that wood this size is not of value as firewood, in making these cuts, the steward fulfilled the restoration prescription. Photo by Leonora Pepper, Forest Stewards Guild.

Forest Stewards Youth Corps members learn stewardship on the job in the forests of Northern New Mexico. Photo by Esmé Cadiente, Forest Stewards Guild.

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GUILD GATHERINGS and other events

Suggest a Guild Gathering near you and add to our growing list of events. Contact Colleen at colleen@forestguild.org or your Guild Regional Coordinator. Register at foreststewardsguild.org for these events:

Restoring Woodland Health With Shortleaf Pine
Date: April 14, 2018
Location: Forest of the Domain, Sewanee, TN
An overview of the ecology and economics of shortleaf pine and informaton about financial and technical assistance to help you steward your woodland, enhance wildlife habitat, and improve value.

Loving The Land Through Working Forests Conference
Date: May 19, 2018
Location: Floraroze Forest, near Girard, PA
A day-long field tour and presentations from Guild staff, members, and partners about women and working forests, restorative forestry, legacy planning for woodland owners, and practical ways to support wildlife on your land. Be empowered in forest stewardship.

Innovative Forestry Techniques Field Tour
Date: May 19, 2018
Location: Corvallis, Oregon
A field tour and discussion with Guild foresters, researchers, and managers. Featuring ongoing Douglas-fir management at Oregon State University's McDonald Forest and recently completed oak savanna and woodland restoration treatments at the City of Corvallis's Chip Ross Park.

Forestry for Lake States Birds
Date: June 22-23, 2018
Location: Long Lake Conservation Center, Palisade, MN
Join Lake States members at the Long Lake Conservation Center in Atkin County for a 1.5 day field tour and discussion. Site visits will focus on how birds relate to forest management practices and we will discuss silvicultural prescriptions that can be employed to increase their utilization of a stand.

Events to watch for (dates or locations yet to be determined)

Fire as a Silvicultural Tool in the Driftless Country
Date: Summer 2018
Location: Sauk County, WI
Join other foresters, biologists, and natural area specialists for a field tour to discuss how to assess when fire is an appropriate tool and how to combine it with other silvicultural practices.

Ecological Forestry and Bottomland Hardwoods
Date: Autumn 2018
Location: Brunswick, GA