NHC 2025
Northern Hardwood Conference

Proceedings of the 2025 Northern Hardwood Conference

Syracuse, NY
August 5-7, 2025

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Proceedings Introduction

The third biennial Northern Hardwood Conference was held in Syracuse, NY, from August 5th through 7th, 2025. The conference convened nearly 150 forestry professionals, researchers, students, and other stakeholders for three days of conversation and appreciation of our northern hardwood resource. The conference included two days of in-person scientific presentations, on August 5th and August 7th, as well as a full day of field tours on August 6th, 2025. Proceedings encompass content from the two scientific conference days.

The proceedings of NHC 2025 were developed as a supplement to the conference, including abstracts, speaker biographies, presentation slides, and extended articles submitted by conference presenters. Extended abstracts and papers were not peer-reviewed or edited, and readers are encouraged to direct any questions or clarifications directly to content authors. Proceedings were compiled by Sara Dreibelbis, NHC 2025 Conference Coordinator.

Northern hardwood forests occupy millions of acres across the northeastern United States and eastern Canada, serving as both ecological and economic drivers for the communities that steward them. The rich ecological diversity of these forests paired with changing forest dynamics throughout their region requires dedicated industry professionals, researchers, and others who are willing to embrace the complexity inherent in managing these systems.

Today's northern hardwood forests face a host of challenges, including threats from invasive species, herbivory stress, land use changes, forest degradation, reforestation challenges, and more - all of which practitioners must manage while facing the economic and practical difficulties of day-to-day operations.

The 2025 NHC theme, "Romanticism vs reality: balancing passion and pragmatism in northern hardwood management," invites us to consider the interplay between our love for these forest systems and the difficulties of managing them.

General Sessions - Presenter Bios & Presentation Slides

Day 1 - August 5, 2025

Approaches to Silviculture: Classical and Ecological

Ecological silviculture of northern hardwood forests
Steve Bédard - Research Silviculturist, Ministère des Ressources Naturelles et des Forêts du Québec (MRNF)

Steve's research focuses on understanding temperate forest dynamics to develop silvicultural systems adapted to promote forest productivity and resilience. His current studies aim to quantify forest dynamics in multi-aged, regular, and transitional silvicultural systems under experimental or operational conditions. He also collaborates on a cross-border research project on the resilience of northern hardwood forests.

Presentation slides (PDF)

Classical it is…
Chris Nowak, PhD - Professor, SUNY ESF

Classicist, ESF educated, steeped in the "Ralph Nyland School of Silviculture," tempered with over 40 years studying, applying, teaching, and researching silviculture in intensive and extensive systems across the eastern U.S.

Presentation slides (PDF)

The Tree Planting Dilemma - Panel Discussion

Jeremiah Auer - Forester/Regeneration Specialist, Wisconsin Department of Natural Resources (WDNR)
Jeremiah graduated with a Forest Management degree from the University of Wisconsin-Stevens Point. After a stint in FIA, he joined the WI DNR as a forester, eventually migrating into reforestation at the Griffith State Nursery. He's spent the last 18 years assisting landowners and foresters growing little trees into thriving forests.

Michelle Brown - New York Director of Natural Climate Solutions, The Nature Conservancy
Michelle Brown is the New York Director of Natural Climate Solutions for The Nature Conservancy. Her team focuses on the role nature plays in reducing greenhouse gas emissions while also benefiting biodiversity and people. Michelle has more than 20 years of experience with TNC and holds a PhD from the University of Vermont. In her free time, Michelle enjoys chasing her family through the mountains of the Adirondacks.

Sylvain Montpellier - Customer Support Representative, PRT

Based in Marathon, Ontario, Sylvain joined PRT in 2019, bringing nine years of forestry and silviculture project management experience where he directed tree planting of over 24 million seedlings. Today, he is the PRT customer support representative for Eastern Canada and the U.S. northeast, supporting customers' reforestation projects with seedlings.

Michael Piskur - Program Director, Great Lakes St. Lawrence Governors & Premiers (GSGP)
Mike Piskur leads the Great Lakes Trees Initiative, which aims to plant 250 million trees by 2033. He also manages GSGP's aquatic invasive species Task Force and previously led programs focused on green shipping and water use data.

Annabel Gregg - 25 Million Trees Initiative Coordinator, NYS Department of Environmental Conservation
As a New York State Excelsior Public Service Fellow and DEC's 25 Million Trees Initiative Coordinator, Annabel fills program implementation gaps to assure the Initiative's success: getting New Yorkers excited about trees and forests and analyzing the needs of the Agency to achieve the State's climate and forestry goals.

New York State Tree Tracker App Overview

Wildlife Management & The Deer Dilemma

Joshua Millspaugh - Camp Fire Conservation Fund Professor of Wildlife Conservation, SUNY ESF; and Professor and Director of the Boone and Crockett Program in Wildlife Conservation, University of Montana
Josh's research is focused on understanding how large herbivores interact with their environment and how they respond numerically and behaviorally to management activities such as hunter harvest, land management, and energy development.

Presentation slides (PDF)

Day 3 - August 7, 2025

Forest Operations: Economic Viability Dilemma

Traditional/ecological/climate adaptive silviculture? Whatever you call it, just make sure to consider the economic viability of the logging operation
René Germain - Professor, SUNY ESF

René is a professor of forest operations and management at ESF. His research interests include harvesting costs and the economic viability of loggers, impact of BMPs on logging costs, protection of riparian areas, and the impact of forest ownership fragmentation on forest management.

Presentation slides (PDF)

Tracking logger profitability in the New York City watershed
Kris Brown - Research and Evaluation Forester, NYC Watershed Agricultural Council

Kris has worked in the Watershed Agricultural Council's Forestry Program as a researcher and editor of the website MyWoodlot.com for the past 7 years. His research focuses on evaluating the effectiveness of Forestry Program efforts to protect water quality and support the economic viability of logging in the New York City Watershed.

Presentation slides (PDF)

Timber harvesting challenges on small family forests
Charlie Blinn - Professor Emeritus, University of Minnesota

Charlie Blinn is a Professor Emeritus with the Department of Forest Resources, University of Minnesota. During his career, his research, teaching, and Extension work focused on timber harvesting and forest operations. He is still active in assisting the public and private forestry sectors in Minnesota.

Presentation slides (PDF)

A logger's perspective
Larry Richards - Partner, Richards Logging LLC

Richards Logging LLC, based in Tupper Lake, NY, is a second generation family logging business that has been working in the Adirondack Mountains since 1977. They are a full-service contractor with three logging crews, a log yard, road crew, and their own trucking fleet and maintenance facility.

Importance of Applied Forest Research

Silviculture research - a 50-year perspective
Robert S. Seymour - Curtis Hutchins Professor Emeritus of Silviculture, University of Maine School of Forest Resources

Since retiring in 2017 after 39 years on the UMaine faculty, Bob Seymour has written 70 monthly columns for Maine Woodlands, and co-owns and manages 6 woodlots totaling 700 acres in Maine, including the 2020 Outstanding Tree Farm. Honors include SAF Fellow and SAF's Carl Alwin Schenck Teaching Award. He maintains a YouTube channel with 554 subscribers.

Presentation slides (PDF)

Applied research - does it still matter?
Dr. Susan Laurane Stout

From 1981 through 2024, Dr. Susan L. Stout worked with U.S. Forest Service Research in northwestern Pennsylvania. She is passionate about research/management collaboration. Research interests include natural regeneration, relative density, interactions of deer, people, and forests, and creation of an inclusive culture in forestry.

Breakout Sessions - Abstracts & Presentation Slides

Day 1 - August 5, 2025

Silviculture for Northern Hardwoods

Updating tree marking guidelines: effects on stand vigor, quality and value recovery
Adam Gorgolewski, Haliburton Forest and Wild Life Reserve

ABSTRACT. In selection-managed forests, tree markers select trees for harvest based on their vigor and quality, which are assessed based on the presence or absence of defects. Recent research has shown that trees that develop crown dieback decline in vigor, but not necessarily in quality, and prioritizing the harvest of these high-quality salvage trees may increase value recovery from harvests. We developed a tree marking prescription that prioritizes recovery of high-quality salvage trees and conducted a field trial to compare it to two prescriptions commonly used in Ontario. Few high-quality salvage trees were marked under the existing prescriptions, but most were marked under the new prescription, which also retained more high-vigor trees. The new prescription also recovered 15-16% more value, though this difference was not statistically significant. Our results demonstrate that prioritizing the harvest of high-quality salvage trees increases stand vigor while maintaining or potentially increasing value recovery under operational conditions.

Presentation slides (PDF)

LiDAR assessment of canopy and regeneration response to gap-based silviculture in a northern hardwood forest
Alexandre Morin-Bernard, Université Laval

ABSTRACT. Monitoring the response of northern hardwood stands to silvicultural treatments is particularly challenging under gap-based approaches, due to the spatial heterogeneity they introduce. Yet, accurate and spatially explicit information is essential to evaluate treatment outcomes and guide subsequent interventions. While LiDAR-enhanced forest inventories are widely used in silviculture, their application remains limited in the context of gap-based management in deciduous forests. In this study, we combine bi-temporal airborne laser scanning (ALS) and low-altitude remotely piloted aircraft system (RPAS) LiDAR to assess the response of northern hardwood stands to partial harvesting. We first used data from two ALS surveys to map and characterize changes in canopy structure over a 10-year period, using an automated gap delineation approach. Leaf-on and leaf-off RPAS LiDAR data was then used to estimate sapling densities in regenerating areas, using an area-based approach calibrated with data from 720 ground plots.

Presentation slides (PDF)

Strip clearcutting to regenerate northern red oak seedlings in a mixed Appalachian hardwood forest
Jamie Schuler, West Virginia University

ABSTRACT. Oak species (*Quercus* spp.) are difficult to regenerate on high quality sites. Successful oak regeneration is often linked to the availability of large advance seedlings. In undisturbed Appalachian hardwood forests, light levels are often too low (<5%) to allow oak seedlings to persist long enough to attain competitive sizes. As an alternative to traditional reproduction treatments (e.g., shelterwood) we used a strip clearcut regeneration harvest to create a light gradient in the residual strips to facilitate the development of advance seedlings into competitive sizes. After 10 growing seasons, the northern red oak seedlings showed significant and contrasting responses to the light gradients created by the harvest treatment relative to survival and height growth—higher survival within the shaded residual strips and greater height growth in the cut portions of the stand.

Transitioning conifer plantations to mixed forests
Peter Williams, Williams & Associates Forestry Consulting Ltd.

ABSTRACT. Starting in the early 1900s, plantations were established in southern Ontario to restore degraded land, natural and hydrologic functions, and generate timber revenue. In southwestern Ontario, intermediate-tolerant species like oaks and white pine have declined in natural forests. The presence of these species can be established during plantation management by controlling invasive plants and targeted planting. Sugar maple and black cherry establish well in managed plantations, but oaks and others depend on having a nearby seed source, canopy gaps, and limited understory competition. A successful process includes stand assessment, tree marking, and invasives control, followed by thinning and enhancement planting in canopy gaps. Enhancement plantings should occur just after the thinning, before competing shrubs recover. This scenario can be adjusted based on plantation conditions and owner's objectives and resources. Underplanting in white pine should start after a first thinning, anticipating elderberry establishment. In red pine, the process can start with subsequent thinnings.

Presentation slides (PDF) // Extended abstract

Pests, Pathogens & Invasive Species

Glossy buckthorn in northern hardwoods: invasion, impacts, and control mechanisms
Christopher A. Hohnholt, Michigan Technological University

ABSTRACT. We investigated the ecological challenges posed by invasive glossy buckthorn (*Frangula alnus*) across three different land use classes on a single site, including a northern hardwood remnant, an abandoned field undergoing change ushered by emerald ash borer (*Agrilus planipennis*), and a pine plantation (*Pinus sylvestrus*). We began by analyzing its invasion dynamics, specifically how its spread differed among these distinct land uses. Our investigation considered factors like overstory and understory composition and density, proximity to edges and roads, soil chemistry, and canopy light transmission. Next, we evaluated the efficacy and application of three primary control methods: targeted herbicide treatments using both glyphosate and triclopyr, and physical removal techniques. During our presentation we will present our findings regarding invasion dynamics associated with land use history as well as plant community response after treatment.

Extended abstract

Harvest-deer browsing effects on sapling recruitment in Michigan northern hardwood forests
Michael B. Walters, Michigan State University

ABSTRACT. Our aim is to further understanding of deer browsing-harvest joint effects on tree regeneration in northern hardwood forests using data on tree regeneration, deer use, and deer browsing damage from a 140-site experiment in Michigan that compares tree regeneration outcomes for four harvest options. Among highlights, there was a consistent browsing hierarchy among tree species: beech least browsed, early successional species most browsed. Regeneration density increased with harvest intensity (seed tree), due to additions of shade intolerant species. Deer use increased with harvest intensity, but so did unbrowsed stem density. For shade tolerant species 6-year sapling recruit density was driven more by pre-harvest regeneration density than by post-harvest browsing and harvest treatments. Results suggest regeneration outcomes in the face of high deer browsing pressure could be improved via partial harvest regimes focused on increasing vigor and density of advance regeneration, followed by high intensity final harvests.
Presentation slides (PDF)

The physiological ecology of transgenic American chestnuts - a pathway to restoration?
John Drake, SUNY ESF

ABSTRACT. The functional restoration of American chestnut (*Castanea dentata*) hinges on the development and successful reintroduction of blight tolerant trees. At SUNY ESF, we evaluated the growth, survival, and metabolism of transgenic American chestnuts (event "Darling 54") with a wheat-derived oxalate oxidase (OxO) gene that confers resistance to *Cryphonectria parasitica*. Using two well-replicated experiments, we compared transgenic (OxO^+) and non-transgenic (OxO^-) full-sibling trees under open and shelterwood conditions. Results consistently showed that OxO^+ trees exhibited reduced height and diameter growth and decreased survival relative to their OxO^- siblings. We evaluated the photosynthetic and respiratory physiology of these trees and detected occasional increases in leaf respiration OxO^+ trees, though root respiration and photosynthesis were generally comparable between groups. Direct impacts of the transgene on chestnut physiology are unlikely to explain the growth and survival declines. Our findings suggest that while transgenic trees demonstrate functional blight tolerance, growth penalties warrant further evaluation. These results underscore the need to integrate physiology, genetics, and ecological performance in the development of future restoration-ready chestnut lines.
Presentation slides (PDF)

The expanding tree conservation toolbox: considerations for the use of biotechnology in protecting native hardwoods
Andrew Newhouse, American Chestnut Research and Restoration Project, SUNY ESF

ABSTRACT. With increasing threats to native tree species, responsible application of a variety of conservation strategies is more important than ever. ESF's American Chestnut Research and Restoration Project has developed transgenic chestnut trees with enhanced blight tolerance, which are currently being reviewed by federal regulatory agencies. While no single approach will comprehensively address a complex issue like chestnut restoration, in this case biotechnology may offer unique benefits not possible

with traditional strategies. This presentation will include both successes and challenges faced over decades of developing a transgenic American chestnut tree, and ongoing research toward continually improving these trees for various restoration strategies. Our team is also investigating the use of related tools to start addressing threats such as elm yellows, beech leaf disease, oak wilt, and emerald ash borer. These diverse pests and diseases present helpful case studies to consider both traditional and modern management approaches for protecting valuable native hardwoods.

Presentation slides (PDF)

Tree Syrups: Maple & More

Growth and opportunity in the maple products industry
Aaron Wightman, Cornell Maple Program

ABSTRACT. The maple products industry has experienced a surge in growth over the past 20 years due to widespread adoption of new technology and increased demand in the marketplace. Sustained profitability in this sector requires an active response to challenges posed by climate change and market maturation. This presentation will discuss the state of the industry, scale of opportunity, current research priorities, and the role of forestry in maintaining a healthy resource base.

Sugarbush management in Vermont: investigating sustainability of a growing non-timber forest product sector
Kathleen A. Stutzman, University of Vermont

ABSTRACT. Vermont leads the growing U.S. maple industry, where forest conversion to maple production has steadily risen since 2010. Despite this increase, little is known regarding the management regimes and ecological conditions maintained across the northern hardwood forests used for maple production. We reviewed management plans for 99 sugarbushes in Vermont enrolled in the current use tax abatement program to develop an understanding of the current ecological conditions of Vermont sugarbushes, along with their management priorities and the role of third-party certification. Distinct patterns in sugarbush structure and composition and parcel configuration emerged when compared between sizes of maple production operations and the timing of tapping initiation, including greater species diversity in more recently tapped sugarbushes. Engagement with certification varied with operation size and aligned with differences in species diversity, suggesting the potential influence certification may hold for sustainable management.

Presentation slides (PDF)

Bird-Friendly Maple: integrating the maple industry with global bird conservation
Claire Mann, Audubon New York

ABSTRACT. Audubon's Bird-Friendly Maple program is a recognition program where maple producers agree to manage their sugarbush in a way that benefits forest birds, many of which are experiencing steep population declines. Bird-friendly maple producers strive to improve habitat quality in their sugarbushes to optimize breeding and foraging opportunities. Through the planning and implementation of sugarbush management activities that develop a structurally and biologically diverse forest, the maple industry can play a vital role in global bird conservation efforts while also enhancing the health and sustainability of

the sugarbush. This presentation will focus on the threats to forest birds and how the maple syrup industry can apply silviculture and forest management to their stands to support bird conservation efforts. The presentation will also highlight the program guidelines and how producers can enroll in the program.

Presentation slides (PDF)

Forest Carbon

Recent changes in the carbon cycle at the Hubbard Brook Experimental Forest, NH
Charles Driscoll, Syracuse University

ABSTRACT. Forest ecosystems are important sinks for atmospheric emissions of carbon dioxide. Understanding and quantifying the carbon cycle has been a focus of research at the Hubbard Brook Experimental Forest (HBEF), New Hampshire. The Hubbard Brook Ecosystem Study is a long-term investigation of a northern forest ecosystem. In the early 2000s a detailed carbon budget was developed for the HBEF. Since that time long-term measurements have revealed marked increases in atmospheric deposition of dissolved organic carbon (DOC), decreases in upper soil carbon pools, increases in soil respiration, and decreases in the mobilization of DOC from the forest floor coincident with increases from the lower mineral soil to streamwater. It is not clear what is driving these changes, but many are manifested through difficult to study belowground processes. Like many northeast forests, the HBEF has been impacted by acid deposition. These changes may in part reflect recovery from acid deposition.

Allometric uncertainty of forest biomass in Huntington Wildlife Forest
Sofia Arreaga, SUNY ESF

ABSTRACT. Greenhouse gas concentrations have increased dramatically since the Industrial Revolution, emphasizing the vital role of forest carbon storage in climate change mitigation. Quantifying forest carbon is essential to understand the link between carbon stocks and biodiversity, identify carbon and biodiversity hotspots, and guide conservation and mitigation policies. Reliable biomass estimates are particularly important for mechanisms such as REDD+, which depend on transparent reporting of uncertainty. However, while sampling variance is commonly reported, the uncertainty associated with allometric equations remains largely overlooked.

This study estimates live tree biomass for the Huntington Wildlife Forest (New York) by explicitly incorporating allometric uncertainty and comparing it with sampling variance. Using data from the Continuous Forest Inventory (CFI), a Monte Carlo approach is applied to quantify uncertainty from allometric equations, particularly in cases where raw data to estimate allometric error are unavailable. Forest compartments serve as strata for estimating sampling variance, enabling a direct comparison between both sources of uncertainty.

Presentation slides (PDF)

Disparities in above ground biomass estimation using allometric equations and actual volume delivered: a case study from Acadian Hardwood Forest
Harikrishnan Soman and Anil Raj Khiza, University of Maine Orono

ABSTRACT. Estimation of above ground biomass (AGB) is critical for resource evaluation, planning, revenue forecast, and carbon markets. Objectives of this study are to: 1) evaluate the efficiency and utility of existing allometric equations for estimating AGB; 2) identify the factors responsible for the variation between estimated and actual biomass delivered; and 3) model relation between diameter-at-stump height (DSH, 1 ft above ground) and diameter at breast height (DBH). A 100% stand inventory was conducted in a 2.5-acre hardwood forest in Old Town, Maine. The stand was clear-cut, then chipped for biomass fuel. Species, DSH, and DBH were recorded for all trees above 2 inches DBH. A mixture of local and generic allometric equations estimated AGB at 230 tons. Scale tickets indicated 260 tons delivered. Results of this study are expected to support better yield forecasting; relation between DSH and DBH could assist in settling disputes over cutting trees from abutting ownerships.

Presentation slides (PDF)

Where willow once grew: a study of soil aggregate stability
Reilley Peck, SUNY ESF

ABSTRACT. Shrub willow (*Salix* spp.) is a popular feedstock for biofuel due to its fast-growing nature and carbon sequestration potential, including increasing carbon below ground. However, repurposing land used for willow biomass production may lead to soil carbon loss that negates carbon gains. We investigated how transitioning from shrub willow to grassland affects soil aggregate stability, which is an indicator of soil health and carbon cycling. To explore potential methods of mitigating carbon loss, we incorporated biochar treatments with two feedstocks at two rates. We found that aggregate stability was greater in soils beneath undisturbed willow at 0-15 cm and 30-45 cm, and that no differences were found between biochar and control treatments. These findings indicate that disturbance can weaken aggregate stability throughout the soil profile. We anticipate that fields with disturbance will lose stored carbon, and that biochar-treated plots will have reduced carbon losses.

Ecological & Adaptive Silviculture

"Intelligent Tinkering" through ecological forestry - exploring a model of forest conservation and stewardship
Annie Socci Maloney, Foundation for Sustainable Forests

ABSTRACT. The Foundation for Sustainable Forests, a working forest conservation organization in northwestern Pennsylvania, is taking a holistic approach to management, using ecological forestry to restore high-graded stands, promote age and species diversity, and increase ecosystem resilience. Ecological forestry, the management of the timber resource to maintain, restore, or enhance ecosystem health and resilience, is increasingly recognized as a tool for landowners in the face of myriad stressors such as invasive pests, climate change, and a legacy of harmful land use. This session will explore ecological forestry principles and the Foundation for Sustainable Forests' conservation and stewardship model.

Presentation slides (PDF)

Ecological values of large tree retention in selection and reserve shelterwood systems
Gregory McGee, SUNY ESF

ABSTRACT. A growing body of research from northern hardwoods and other temperature forest systems indicates that keystone habitat features characteristic of late-successional forests support diverse biological communities. With age and size (>50 cm dbh), various substrates and microenvironments form on trees that support habitat-specific and dispersal-limited organisms. For instance, old sugar maples support unique assemblages of epiphytic lichens and bryophytes, not only in old-growth forests, but also in forests managed under selection and reserve shelterwood systems when such trees are retained. These epiphytes, in turn, support communities of invertebrates that may serve as natural biological controls, or support greater abundance and diversity of higher-order predators. The abundance of unique microsites increases with tree diameter and, in turn, microsite abundance is positively correlated with the taxonomic richness of arboreal insects. Opportunities exist to enhance structural complexity and biodiversity in managed northern hardwoods through the retention of large, old reserve trees.

Presentation slides (PDF)

Tools to inform climate adaptation strategies for northern hardwood forests
Samantha Myers, University of Vermont & NIACS

ABSTRACT. The uncertainty around the impacts of climate change and extreme weather events poses a significant challenge to sustaining forest ecosystems in the Northeast. In response to this challenge, numerous field applications and experiments have been developed over the past decade that are testing different adaptation strategies to maintain diverse forest values in the face of changing environmental conditions. We developed a manager's guide based on the outcomes of this work and broader manager input that outlines best adaptation practices for northern hardwood, mixedwood, and spruce-fir forests. This talk will describe how managers can use this guide to assess climate change vulnerability and develop adaptation strategies across diverse sites. Case studies will highlight adaptation tactics and outcomes from on-the-ground management to achieve multiple goals in northern hardwood forests. This guide adds to a suite of tools which provide guidance to managers on forest adaptation and enhance the region's capacity for implementing forest adaptation in practice.

Presentation slides (PDF)

Mycorrhizal-mediated silviculture: initial results and future research avenues
Eva Legge, Syracuse University

ABSTRACT. Although the myriad stressors on northern hardwood forests are leading to tree die-offs and resultant shifts in forest structure and composition, the benefits of root-hyphal networks can, in certain contexts, bolster a forest's adaptability to global change. In my talk, I will present preliminary results from a three-year field experiment in the Adirondacks, NY, which investigates how proximity to residual ectomycorrhizal (EcM) trees and cut severity within a climate-adaptive silviculture experiment affect white oak success. Initial results indicate that oaks may demonstrate higher success at intermediate distances from residual EcM trees. This talk will provide compelling evidence for the resilience of mycorrhizal symbioses to timber management and provide a framework for how mycorrhizal ecology can be integrated into silvicultural practices throughout our northern hardwood forests.

Presentation slides (PDF)

Managing Pathogens of Beech & Oak

The basics of beech leaf disease: understanding the signs and symptoms
Sophia Suriano, SUNY ESF

ABSTRACT. American beech (*Fagus grandifolia*) is a mast bearing canopy tree species that plays a vital role in northeastern North American forest ecosystems. Beech leaf disease (BLD) is an emergent forest disease affecting American beech trees. Since it was discovered in 2012, it has rapidly spread across eastern North America. BLD is caused by the invasive foliar nematode *Litylenchus crenatae* (LC). It induces drastic changes in beech leaf morphology, most notably dark interveinal banding. As the disease advances, there is a significant reduction of bud and leaf survival, leading to defoliation, reduction of the canopy, and eventually tree mortality. Currently, there are no set management practices to mitigate BLD. My research investigates BLD's facilitation in infected beech leaf litter by observing extracted nematode populations and LC survival in desiccated leaves over a year. These results can be used to develop effective disease management practices, and increase phytopathological knowledge.

Beech leaf disease updates
Kelsey McLaughlin, NYS DEC Forest Health Research

ABSTRACT. The NYS DEC has been surveying for and researching beech leaf disease (BLD) since it was first found in New York in 2018. This presentation will discuss beech leaf disease distribution in NY and public reporting. DEC also has several BLD research projects, including silvicultural trials for disease mitigation, calculating local spread rates of the disease, and mapping statewide disease severity changes. Recent academic studies by universities and tree care companies on potential dispersal methods, treatments, and physiological effects will also be highlighted. This will provide land managers with the most up to date BLD situation in New York, and a larger overview of new research about the disease's biology and treatment.

Managing beech regeneration in response to beech bark disease using cut stump application of herbicide
Adam Gorgolewski, Haliburtan Forest and Wild Life Reserve

ABSTRACT. Beech bark disease (BBD) poses a significant forest management challenge in northern hardwood forests. Extensive aboveground mortality in BBD-affected stands often leads to the rapid formation of high-density American beech thickets, primarily driven by vegetative regeneration through root sprouting. These thickets can outcompete desirable species, such as sugar maple, and negatively impact long-term forest structure and functions. This study evaluated the efficacy of post-harvest application of glyphosate to recently cut beech stumps to suppress vegetative beech regeneration. After five years, beech regeneration was approximately 50% lower in treatment plots compared to control. Additionally, glyphosate-treated plots supported higher densities of desirable tree species, such as sugar maple, indicating that the intervention shifted species composition by reducing beech dominance. By alleviating the competitive dominance of beech thickets, this treatment is likely to mitigate the ecological and economic impacts associated with BBD while promoting the regeneration of desirable tree species.

Presentation slides (PDF)

Fly like a beetle: a mark-recapture study of the nitidulids that vector oak wilt
Erica Culbert, NYS DEC Forest Health Research Lab

ABSTRACT. Nitidulid beetles vector the oak wilt fungus and contribute to the overland spread of this lethal disease. Capturing the beetles and testing them for the fungus can be an important early detection tool, but land managers need to know where to survey after a positive beetle is detected. The goal of our study was to observe how far marked nitidulids can be recaptured from their release point in a natural oak stand. Using a combination of baited funnel traps, intercept traps, and freshly wounded oak trees, we observed which species visited which attractant type, as well as the distances they had traveled. This proof-of-concept study provides preliminary data on nitidulid flight distances. Our hope is that future studies will expand this and find even farther flight distances for nitidulids. These findings may help inform land managers to prioritize where to look for new oak wilt infections.

Urban & Community Forestry

Tracking tree survival to evaluate urban forestry outcomes
Deb Hilbert, SUNY ESF

ABSTRACT. Urban trees have challenging lives, but how long do they live? Which factors cause trees to eventually die? How can we improve the survival of recently planted trees? This talk summarizes recent scientific research on urban tree mortality and provides some answers to these complicated questions. The audience will learn about monitoring programs that can help them assess tree survival and evaluate planting initiative success.

Strategizing science, education, and outreach about “climate-ready” urban trees
Alicia Coleman, University of Minnesota

ABSTRACT. Alongside expected changes to the structure of urban and community forests, it is equally important to consider where future-tolerant tree species can be planted and the site conditions that contribute to performance and longevity. However, existing data sources (e.g. tree inventories) can pose many difficulties to empirical study. An alternative approach begins with the tree selection decisions or trials made by managers that lead to unexpected instances of survival. A collaborative team of research and extension professionals are strategizing empirical and community-engaged research to improve tree selection decisions and social learning required for urban adaptation. We focus on 20 tree species with horticultural and urban and community forestry value in Upper Midwest cities and Eastern U.S. forests, including large-stature shade trees, medium-stature ornamental trees, hickory (*Carya* spp.), and oak (*Quercus* spp.). This presentation will provide an overview of initial results and scope of our investigation.

Restoration of a forested drumlin in the heart of Syracuse’s Northside
Steve Harris, City Arborist, Syracuse Parks

ABSTRACT. Schiller Park is large community park that sits in the heart of a densely populated neighborhood. Within it is a 10-acre forested drumlin characterized by 150- to 200-year-old white oaks. After two decades of neglect, these forests grew so thick with buckthorn that it was not possible to see 20 feet into them. The site became an ideal place to build homeless encampments and contributed to a feeling by users of an unsafe place. To address community concerns, Syracuse Parks secured multi-year funding to remove and control invasives and aggressively replant all layers of the forest working with

graduate student researchers, a conservation corps, volunteers, and contractors. This presentation will share the process for implementing a large-scale “forest gardening project,” assess the state of our work 4 years in, and share what we think it will take for our interventions to be successful.

Biogeochemistry & Nutrient Cycling

Carbon, nitrogen, and phosphorus pools and concentrations in the forest floor at Hubbard Brook: 1976-2023
Felix Grimberg, Syracuse University

ABSTRACT. A history of acidic precipitation in northeastern hardwood forests has depleted base cation content in soils, altering biogeochemical cycling and growth of above-ground biomass. To counteract these effects, calcium-rich minerals have been applied to restore soil fertility, though with mixed results on decomposition and nutrient dynamics. In 1998, calcium silicate was applied at the watershed scale to Watershed 1 in the Hubbard Brook Experimental Forest, a site with geologically young and base-poor soils. Forest floor decomposition rates have since increased, leading to substantial declines in organic horizon mass and associated pools of carbon, nitrogen, and phosphorus. These trends are presented in contrast with the untreated reference Watershed 6, which has shown similar but more gradual changes following the regional decline in acid deposition since the 1990s.

Multiple Element Limitation in Northern Hardwood Ecosystems (MELNHE)
Ruth Yanai, SUNY ESF

ABSTRACT. We began the first long-term experimental tests of N vs. P limitation in temperate forests in 2011, in 13 stands of successional and mature northern hardwoods in three sites that span a range of native soil fertility in the White Mountains of New Hampshire. After 4 and 8 years of treatment, we found aboveground growth responses to both N and P, with the greatest response to N+P. Surprisingly, this aboveground response was not associated with reduced allocation to root production; instead, root growth increased in response to N+P addition in successional forests and to N addition in mature forests. Many studies in the MELNHE experiment have revealed mechanisms supporting co-limitation of N and P, such as differential resorption of foliar nutrients, soil enzyme activity, the depth of root growth, and mycorrhizal communities. These findings are important because forest ecosystems on glaciated soils have been assumed to be primarily nitrogen limited.

Decomposition and nutrient fluxes of Acer saccharum wood stakes under long-term nutrient limitation
Jacob Beidler, SUNY ESF

ABSTRACT. Wood decomposition plays a key role in forest carbon and nutrient cycling, yet its response to nutrient limitation and microclimate remains unclear. We tested the effects of long-term nitrogen (N) and phosphorus (P) additions on decomposition and nutrient dynamics of standardized Acer saccharum stakes across three mature northern hardwood stands at the MELNHE site in New Hampshire, U.S. Stakes were incubated for 4 and 5.3 years and analyzed for mass loss and nutrient change in relation to fertilization and environmental variables. Nutrient additions alone did not consistently alter decomposition, but P significantly increased mass loss when litter cover was considered. Litter cover strongly predicted decomposition and nutrient concentrations, while summer soil temperature had weaker

effects. N and P additions altered wood chemistry, and total nutrient contents showed a net immobilization of most nutrients over decay. These results show that P can enhance wood decomposition under favorable forest floor conditions and highlight the importance of environmental mediators in nutrient-amended ecosystems.

Nutrient-driven shifts in belowground biodiversity and functional traits in northern hardwood forests
Caroline Plecki, Syracuse University

ABSTRACT. Nutrient availability is a key driver of belowground community composition, particularly among bacteria and fungi that mediate plant-soil interactions in forest ecosystems. This study examined how nitrogen (N) and phosphorus (P) additions affect soil microbial communities in northern hardwood forests in New Hampshire. We assessed responses of bacteria, mycorrhizal fungi, and saprotrophic fungi to a full factorial N and P addition experiment, evaluating changes in species richness, dominant taxa, and functional diversity. While fungal richness was not consistently affected, nutrient additions led to clear shifts in community composition and functional traits. Medium-distance foraging fungi such as *Cortinarius* and *Piloderma* declined under N addition, while short-distance foragers like *Russula* and *Inocybe* increased under both N and P. Analyses of bacterial communities are underway and will be presented. These findings highlight how nutrient enrichment reshapes microbial diversity and function, emphasizing the importance of belowground biodiversity in regulating nutrient cycling in temperate forests under anthropogenic pressure.

Day 3 - August 7, 2025

Forest Management & Planning

Adaptation silviculture at CERFO: cocreating meaningful solutions for and with forest stakeholders
Samuel Royer-Tardiff, CERFO

ABSTRACT. CERFO is an applied research center in Quebec City celebrating 40 years of activity. Its expertise, traditionally centered on northern hardwoods silviculture, is now expanding to address threats and opportunities arising from global climate change. To navigate future uncertainties while incorporating diverse stakeholder perspectives, we advocate shifting from prescriptive, top-down approaches toward collaborative, bottom-up methodologies. This presentation examines three projects demonstrating co-created adaptation solutions. The first monitors logistical and operational challenges associated with assisted migration of northern red oak at its distributional edge in eastern Quebec. The second builds upon existing silvicultural trials to identify viable adaptation strategies. The third presents co-developed adaptation silviculture scenarios for sugar maple stands in southern Quebec. These case studies illustrate how participatory approaches can generate context-specific solutions that balance ecological imperatives with stakeholder needs, offering a framework for climate-adaptive forest management in northeastern North America.

Presentation slides (PDF)

Northern Hardwoods Resilience Project: initial findings and tools in development
Claudia Bartlick, Aiden Morales & Parker Hopkins, Michigan State University

ABSTRACT. Conventional sustainable management of maple-dominated northern hardwood forests in eastern North America has long relied on natural regeneration. However, recent studies suggest that managed stands are increasingly understocked, dominated by undesired species, and at risk of losing essential goods and services. Major knowledge gaps for efforts to restore composition and productivity remain regarding the geographic distribution of these deficits and their causes, implications for the sustainability of multiple goods and services, and how alternative management strategies might change these trajectories. The Northern Hardwoods Resilience project aims to address these gaps through an integrated research approach. Our presentation will feature three presenters, each covering a different aspect of the project.

1. Claudia Bartlick will present findings from the initial project year, which focused on assessing the current state of maple-dominated northern hardwood forests over their full range by integrating federal, provincial, and state inventories with existing research data. Spatial patterning in stand structural characteristics relevant to sustainable management of resilient forests are being quantified, including identifying areas of concern such as low density and/or diversity in regeneration-class trees.

2. Aidan Morales will demonstrate an interactive web application currently under development. An important outreach component of our range-wide quantification of forest structural characteristics is sharing our findings to support informed decision-making. The tool allows users to summarize forest structure in user-chosen areas using publicly available or user-collected inventory data.

3. Parker Hopkins will share work beginning on quantifying management goals and methods across the resource. This includes a framework to understand the degree that management goals have been realized and the contributions of management variation to spatial patterning in forest structure. The accompanying methods will include management plan content analysis, manager interviews, and ground-truthing of management actions. Integrating this work into the final database should yield socio-ecological insights for northern hardwood systems.

Extended abstract

Agroforestry & Non-Timber Values

Extension approaches to supporting agroforestry adoption in New York state
Graham Savio, Cornell Cooperative Extension Tompkins County

ABSTRACT. Integrating trees in agricultural production systems (often termed ‘agroforestry’) offers myriad benefits and opportunities, but challenges also exist. Opportunities range from new markets for conventional non-timber products (nuts, fruits), to less conventional products (ecosystem services) and other services (shading for livestock). Key challenges include limited nursery stock for key species, and limited knowledge, time and capacity to plant and manage trees. This presentation will highlight extension-based approaches to educating stakeholders about these opportunities and addressing these challenges.

Presentation slides (PDF)

Rubus spp. in EAB ash stands relative to levels of disturbance as a framework for food forests.
Macy Carr, SUNY ESF

ABSTRACT. Emerald ash borer (EAB) invasion in Northeastern forests resulted in widespread ash mortality, overstory release and altered successional dynamics where invasive species proliferation and ecosystem service loss are common. This study examines effects of salvage timber harvest treatments of EAB-affected ash forests on the understory. Emphasis on *Rubus* spp. investigates the potential food forestry frameworks. There was no difference in plant richness or diversity between treatments. Harvested sites had lower non-native richness and abundance and higher Rubus abundance and yield. Rubus has positive implications for desirable tree regeneration, food production, and wildlife use. Acer saccharum, Prunus, and other food producing species were observed in these forests, supplementing potential food production. Results suggest positive outcomes from timber harvest on understory composition. EAB forests may constitute foundations for food forests by utilizing remnant mature trees and altered succession to create novel productive forests while addressing disturbance induced loss of structure and function.

From concept to implementation: opportunities and barriers in payment for ecosystem services systems
Mariela Cavo, SUNY ESF

This presentation summarizes several existing definitions of Payment for Ecosystem Services Systems (PES), discusses the critiques, evolution and revisions of these definitions, and introduces a consensus conceptualization developed with Latin American scholars/practitioners using the Delphi method. Furthermore, this work highlights case studies from Central America as well as a PES-like system in the Northern Hardwood Forest Region, addressing gaps and key takeaways regarding opportunities and barriers to their implementation.

Presentation slides (PDF)

Building farm health and profitability with silvopasture
Cole Gross, SUNY ESF; Brett Chedzoy, Cornell Cooperative Extension

Presentation slides (PDF)

Human Dimensions of Forestry

Forest structure and landowner decisions: key to managing tick-borne disease risk in northern hardwood forests
Jessica Leahy, University of Maine

ABSTRACT. Private woodland owners (PWOs) are at the forefront of both risk and management opportunity as hardwood forests in Maine experience rising challenges from the complex social-ecological system that includes blacklegged ticks (*Ixodes scapularis*) and associated tick-borne diseases (TBDs). We synthesize our recent transdisciplinary research that demonstrates that forest management practices, particularly timber harvesting, significantly influence tick habitat by altering forest structure and microclimate, thereby affecting tick densities. Across our two field-based studies, reductions in canopy cover and tree density were related to decreased nymphal tick populations, with understory

vegetation emerging as the strongest predictor of tick density. PWOs, managing over one-third of Maine's forestland, exhibited high awareness but varied in perceived vulnerability and willingness to adopt mitigation strategies. Motivations for adopting prevention measures are strongest among younger, newer landowners and those with high personal or familial risk concerns. Effective TBD mitigation requires targeted outreach that emphasizes habitat management over host-focused strategies.

Presentation slides (PDF) // Extended abstract

New York state family forest owners' engagement in forest-based climate solutions

Danielle Kloster, Annamarie Cross, and Elysia Palmieri, SUNY ESF

ABSTRACT. Under the 2019 Climate Leadership and Community Protection Act, New York State has mandatory greenhouse gas emission reduction targets, which will require greater carbon sequestration in the state's forests. Family forest landowners own around 55% of New York's forestland (Family Forest Research Center, 2021), so their participation in forest health, carbon, and regeneration activities is needed. However, family forest owner participation in New York's forest management programs remains low. Identifying which landowners are most likely to engage in management and finding effective ways to communicate with them about state programs supporting forest management are necessary for effective (and cost-effective) implementation of those programs. In this presentation, we will share about two in-progress studies, one in western NY and one in the Adirondack-North Country region of NY, on NYS's family forest owners and their decision-making related to management for forest carbon sequestration.

Presentation slides (PDF) // Extended abstract

Poster Session - Abstracts

Impact of forest harvesting on soil health and carbon storage in northeastern hardwood forests
Richard Awuah, SUNY ESF

ABSTRACT. The influence of harvest intensities on soil health remains poorly understood in Northeastern hardwood forests. We are using 15–35-year chronosequences to quantify the effect of harvest regimes on soil organic carbon (SOC), aggregate stability, and nutrient recovery in the Adirondack Mountains in New York State, comparing even-aged clearcut and shelterwood stands and uneven-aged (partial harvest) stands. Mature, unmanaged forests are used as a reference. We are sampling soil from the organic horizons, E horizon, and B horizon from 0–15 and 15–30 cm in depth. We hypothesize that 1) uneven-aged stand management practices will have less effect on soil health (including carbon and nutrient dynamics) than even-aged practices, including faster recovery times, and 2) managed stands will have a higher proportion of mineral-associated organic carbon than unmanaged forests. Our findings will inform sustainable forest management, helping to balance timber production, long-term carbon sequestration, soil health, and ecosystem resilience.

Experimental gap creation for early successional forest wildlife
Jonathan Cohen, SUNY ESF

ABSTRACT. Wildlife in the northeastern U.S. that depend on early successional forest or shrubland have faced a sharp decline in habitat availability since the start of the twentieth century. Some, like the New England cottontail, are now imperiled. We created experimental 1-ha gaps in mature forest to examine the response of wildlife in New York and Massachusetts. In New York, where gaps retained 25 to 75% canopy cover, New England cottontails immigrated within two weeks, while their competitor, the invasive eastern cottontail, rarely used the cuts. In Massachusetts, clearcuts attracted bats and eastern cottontails but not New England cottontails, which appeared only in one gap that maintained 25% canopy cover and in which boles were left on the ground. Bird diversity did not differ consistently among gaps and control plots in MA, but at one site bird diversity increased over three years in the general area of our experiment.

Impact of compositional variation in hardwood forest residues on hydrolysis yields for fermentative applications
Sushant Gawali, SUNY ESF

ABSTRACT. The present study focuses on investigating the hydrolysis yield of FRB from three common hardwood species in the Northeastern United States, sugar maple (*Acer saccharum*), cherry (*Prunus serotina*), ash (*Fraxinus americana*), and their equal-ratio mixture. Detailed compositional analyses will be performed to understand the chemical characteristics of individual species and their blend. FRB is lignocellulosic and can undergo various pretreatment methods to extract its structural polysaccharides. In this study, liquid hot water pretreatment at high temperature and pressure—a non-catalytic and chemical-free approach—is used to solubilize hemicellulose and reduce

lignin content, followed by three passes of disk milling to enhance cellulose accessibility for subsequent hydrolysis. Enzymatic hydrolysis will then be conducted to evaluate sugar yields and quantify inhibitors. By examining the impact of species variability and mixtures on sugar release, this work aims to optimize FRB as a feedstock for fermentative processes, providing valuable insights into its large-scale application.

The effect of forest harvesting on soil aggregate microbiomes in the northeastern U.S.
Amelia A. Jelic, SUNY ESF

ABSTRACT Forest soils host rich microbial communities that contribute to soil health, carbon storage, and nutrient cycling. Forest harvesting is known to impact whole-soil microbial communities, but its effect on soil aggregate microbiomes is not well understood. This study will examine changes in soil aggregate communities due to forest management practices by comparing soils from mature (unmanaged) forests to a 35-year chronosequence of even-aged clearcut and shelterwood stands and uneven-aged (partial harvest with varying intensity) stands in the Adirondack Mountains in New York State. We hypothesize that 1) younger even-aged stands will have the most dissimilar microbial populations compared to mature stands, while older uneven-aged stands will be most similar and 2) aggregate community composition will diverge more from bulk soil microbial populations in stands with higher aggregate stability. This study will provide insight into an understudied microbiome in forest soils and has implications for sustainable forest management.

Managing for compositional diversity in American beech-dominated stands: a tribal collaboration
Frances Killea, University of Maine

ABSTRACT. In the ancestral homelands and Sovereign Nation of the Penobscot in what is now Maine, American beech regeneration compromises management aimed at diverse compositions including cultural resource species. Yet beech is an important mast species valued by the Tribe for wildlife. To balance competing objectives, we are co-producing approaches to mechanical beech control that align with the Tribe's commitment as riverine people to managing without herbicides and protecting cultural resource species. Treatments include mechanical weeding and cleaning under different levels of retained overstory, with and without enrichment planting and seeding. We are implementing co-developed treatments in a multi-site experiment with Tribal foresters and interns supported by a capacity-building grant. We will evaluate near-term outcomes and extend results to larger scales and longer terms, sharing findings with the Penobscot and partners. This project is accomplishing silvicultural objectives while adhering to cultural mores, incorporating Indigenous ways of knowing, and protecting tribal sovereignty.

Improving bird habitat and forest health: use of small anthropogenic gaps in even-aged stands
Steven C. Latta, National Aviary

ABSTRACT. Large clearcuts provide habitat for early successional birds. Clearcuts also benefit birds that nest in mature forest; their fledglings can use early successional habitat for food and cover. Yet clearcuts are detrimental to other wildlife by creating even-aged habitat that persists through the forest's life. We test a sustainable forest management model that uses multiple stand entries for light timber harvests. We

hypothesize that creating <5 acre canopy gaps through group selections provides breeding habitat for early-successional species, and habitat for dispersing fledglings of mature forest species. We use mist nets to quantify bird use of gaps, and fecal and blood samples to identify food resources they use. Identifications of fruit, insects, and arthropods are made using DNA sequencing. We compare diet across species groups and time to identify forest management options to benefit birds. This approach may benefit early successional and forest interior birds while restoring structurally diverse forests.

Fire effects on hydrology in forest soils of the northeastern United States
Maria Loughran, SUNY ESF

ABSTRACT. Climate change is affecting precipitation patterns across the northeastern U.S., leading to more intense rainfall events that overwhelm soil infiltration and cause flooding. Concurrently, increased drought frequency and intensity, paired with high transpiration from robust forest cover, can deplete water reserves, heightening wildland fire risk. While fire effects on hydrologic processes in soils are well studied in western forests, they are less understood in the northeast. My research aims to explore how factors like forest type, landscape position, and fire affect soil's ability to absorb heavy rainfall. This project involves laboratory experiments on soil cores from ridges, mid-slopes, and toe-slopes in the Catskills, which will be tested for hydrologic behavior and subjected to different fuel treatments (unmanaged forest, resilient management, and current fuel compositions). The goal is to determine how forest management can mitigate flooding after wildfires, by understanding the ecology of fuels and their impact on soil hydrology.

Fire effects on the growth and survival of American chestnut seedlings
Maria Loughran, SUNY ESF

ABSTRACT. Though the pre-blight American chestnut's (*Castanea dentata*) historic relationship with fire is not fully known, many species traits – such as leaf curling, root sprouting, and its tendency prefer open, sunny sites – lead ecologists to believe that this species succeeded after low-intensity, litter-driven fires occurring once or twice a decade. As restoration efforts for the species continue in the eastern United States, it is important to understand what tools are available to land managers. Nearly three-hundred American chestnut trees were planted an open field, which is managed with prescribed fire by SUNY ESF fire ecology students. This field is divided into eighteen burn units, eight of which host chestnut seedlings. Six units will be subject to prescribed fire, two will be controls. Seedlings are being monitored for growth and survival before and after burning to better understand the role fire might play in the future success of the American chestnut tree.

Managing mixedwood forests for the future: outcomes from long-term silviculture
Dustin McCloskey, University of Maine

ABSTRACT. Mixedwood forests, e.g., hardwoods mixed with spruce-fir in the Northeast, provide unique resilience opportunities. Using 70 years of data from Penobscot Experimental Forest in Maine, we evaluated climate adaptivity potential of conventional silvicultural systems in northern conifers, including their influence on abundance of hardwoods such as red maple, birches, and American beech. Selection and short-rotation regular shelterwoods retained conifer dominance while increasing hardwood regeneration, enhancing structural and compositional diversity and suggesting future adaptation. Heavy

exploitative harvesting like diameter-limit and commercial clearcutting favored stump-sprouting red maple and accelerated transition, increasing climate-adaptivity potential but reducing stand quality and value. As these forests face increasing climate pressure, mixedwood composition may offer greater resilience, but species shifts must occur within a sustainable framework that maintains softwood-dominated conditions and avoids conversion to low-quality hardwood types dominated by sprouting red maple. We present treatment outcomes to inform adaptive management in hardwood-spruce-fir forests.

Soil microbial community dynamics across an organic matter gradient in shrub willow systems
Sophee Newbauer, SUNY ESF

ABSTRACT. Shrub willow (*Salix* spp.) bioenergy systems use low-disturbance land management practices, which promote soil health and carbon sequestration. Although healthy soils are considered to have diverse and abundant microbial communities—which drive soil organic matter (SOM) cycling—little is known about how microbial communities are affected by initial soil properties in bioenergy systems. Here we use metagenomic analysis to identify bacterial and fungal taxa across soil depth and an SOM gradient in commercial shrub willow systems in northern New York State. We hypothesize that 1) microbial biomass will increase but diversity will decrease with SOM content and 2) fungal biomass and diversity will increase with particulate organic matter content and decrease with depth. This work will inform our understanding of controls on SOM cycling in bioenergy systems.

Diameter growth and sap production associated with a thinning pole-sized red maple stand
Jamie Schuler, West Virginia University

ABSTRACT. Much of the maple syrup industry has traditionally focused on sugar maple. However, red maple is becoming a more prominent species in northern forests. As maple syrup operations look to increase production, more red maples are being tapped, though with limited experience on how to manage them. Our study compares diameter growth and sap yields between thinned and non-thinned red maple stands in northern West Virginia.

Using shrub willow as a nurse crop for hardwood regeneration
Jacob Whittaker, SUNY ESF

ABSTRACT. Commercial shrub willow (*Salix* spp.) is a hardy, short-rotation crop that produces renewable biomass and shows promise as a nurse crop for hardwood regeneration. To evaluate this potential, five willow sites (13–21 years old) in New York's Tug Hill and Lake Plain regions were surveyed for understory regeneration using point quarter sampling on 85 plots. Regeneration averaged 700 trees per acre (TPA), mostly hardwood seedlings (ash and maple) under 60 cm in height. Densities varied by proximity to seed sources, with stem counts often exceeding 600 TPA within 300 ft of viable sources. These findings suggest that planted willow could aid reforestation while sequestering carbon in the short term. Future research will explore factors such as soil and light availability to better understand conditions favoring regeneration and to develop management strategies that promote hardwood recruitment in willow systems.

Reforestation of marginal lands in New York as a technique for ecosystem service development

Edward John Zellar, SUNY ESF

ABSTRACT. Marginal and Transitional Lands are areas where forests are unable to develop past an “old field” successional due to presence of invasive woody shrubs within. They stand as an untapped source of real estate for reforestation efforts in New York State. This study will determine the estimated value of reforesting these lands in terms of ecosystem benefits while creating a framework for the prioritization of these lands for reforestation using the following: (i) Which services will be targeted and what will the impact of reforestation be on these services? (ii) Which barren lands should be prioritized first, what will be the prioritization criteria for marginal lands? (iii) Does New York State have the capability to reforest these lands, and how can failure in reforestation efforts be minimized? This study will be a guiding framework informing New York lawmakers and landowners on strategies to capitalize reforestation benefits in marginal lands.

Extended Abstracts & Brief Articles

NYS 25 Million Trees Initiative Tree Tracker

Annabel Gregg, NYS Department of Environmental Conservation

Whether you planted one tree or thousands since last year, the NYS Department of Environmental Conservation wants to know it. Every tree planted since January 1st, 2024, counts toward the statewide goal to plant 25 million trees over the next decade. Make sure your trees contribute to the statewide total by recording them to DEC's Tree Tracker, or if you're an organization that plants a significant number of trees every year, please contact the 25 Million Trees Initiative Coordinator (Annabel.gregg@dec.ny.gov) to set up your organization's tree tracking protocol to make sure you're represented in the statewide dashboard.

Governor Kathy Hochul launched the 25 Million Trees Initiative last year to get every New Yorker excited about tree planting, and to promote the myriad of benefits that trees provide the state, from combatting extreme heat in our urban communities to sequestering millions of metric tons of carbon in our rural forests. New York is scaling up the reforestation supply chain, harnessing technology and innovation, and investing in the next generation of environmental stewards to plant 25 million trees by 2033. Learn more about the Initiative and how to get involved at on.ny.gov/25milliontrees.

Transitioning conifer plantations to mixed forests

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Starting in the early 1900s, afforestation programs were developed in southern Ontario to stabilize land degraded by agriculture, restore natural and hydrologic functions, and generate timber revenue. These plantations have been generally managed by periodical thinning, with the eventual development of a natural understory/forest.

In southwestern Ontario, intermediate-tolerant species like oaks and natural eastern white pine (Pw) have suffered from high-grading or diameter-limit cutting in northern hardwood stands where dominant oaks and white pines were preferentially harvested. Ongoing health problems like spongy moth, oak decline, white pine blister rust and weevil, and regeneration challenges with the single-tree-selection system have contributed to their decline. Regenerating northern hardwood (NH) associates like oaks, white pine, and hickories is easier and more economical in plantations than in natural forests. Managing conifer plantations to encourage the regeneration of these species provides an excellent opportunity to increase their presence in the landscape.

Sugar maple and black cherry regeneration develops naturally in managed plantations as their wind- or bird-dispersed seeds establish as the canopy opens. However, oaks, hickories, and others require a nearby seed source. Under-represented species, often intermediate in shade tolerance, can be introduced after thinnings to provide opportunities for enhancement planting in gaps or under the thinned canopy.
The author has been successful for 25 years using a 3-year enhancement process to establish these species in gaps and the understory, centered around a thinning. It starts with stand assessment, tree marking, and invasive species control, followed by thinning and then enhancement planting in canopy gaps; repeat for subsequent thinnings. Enhancement plantings should occur just after a thinning, before competing shrubs dominate. This scenario can be adjusted based on plantation conditions, and landowner objectives and resources.

This process varies by plantation species, age, health, soil/site conditions, and successional dynamics as understory development differs among species and site conditions. Most soils in southwestern Ontario are glacial tills, windblown silts and sand, or water-deposited soils (sedimentary or lacustrine), with a relatively high pH because the parent materials are mostly limestone-based (Chapman & Putnam 1951). Pw and Norway spruce (SN) are better adapted to higher pH soils and a wide variety of soil conditions, while red pine (Pr) and white spruce (Sw) do well in a narrower range of site conditions. Successional dynamics are related to how well each species develops under partial canopy and site conditions with different dominant tree species and canopy closure characteristics (Taylor & Jones 1986).

Underplanting in Pw plantations can start after a first thinning, ahead of often-dense establishment of elderberry and other shrubs or small trees as the stands often start to open up early because of mortality from blister rust. Thinning early is also important in Pw plantations to salvage better trees infected with blister rust and poorly-formed trees that have been attacked by white pine weevil.

The process in Pr plantations usually starts with a second or third thinning, as these plantations tend to have a higher stocking density and narrower diameter distribution because of a narrower genetic base. They also grow better on a narrower range of site conditions and on more acidic soils (lower pH). Decline problems with Pr often occur where there is shallow soil depth to free carbonates or other rooting limitations where soils were eroded from agriculture or there is poor drainage. Pr plantations are also more susceptible to stagnation if thinnings are delayed, and may decline or collapse from Pr pocket decline in tight spacings. If the health of a Pr plantation declines prematurely, plantings should start as soon as possible.

Norway spruce is a European species that does well on high pH soils over a wide range of site conditions, with a site index range about 15% higher than Pw. While some users don't prefer SN wood, planting success is very good, volume growth seems to be about 50% higher than Pw, and the stumpage price is about the same as other species in southern Ontario. Williams & Associates incorporates SN into most afforestation plantings, often because its fast growth enables earlier thinnings (Gordon et al. 1988, Williams & Gordon 1990).

Example layout for afforestation project

Mixed plantations have been planted in alternating rows, pairs or groups of rows, or by mixing a variety of species across the area. The author has developed plantation layouts that facilitate economical thinning and diversification by alternating one or more rows of fast-growing species like SN with rows of mixed species that are desirable in a natural mixed forest (e.g., rows of white pine mixed with deciduous species, Figure 1).

Planting year	S S S M M S S S S S M M S S ...
Thinning 1, Year 23 [1]	S S ***S*** M M S ***S*** S S ***S*** M M S S ...
Thinning 2, Year 36 [2]	S S ***T*** M M S ***P*** S S ***T*** M M ***P*** S ...
Thinning 3, Year 50 [3]	S S ***T*** M M S _ S S ***T*** M M _ S ...

S - Norway spruce rows M - mixed species rows ***S*** - rows to remove
T - travel rows ***P*** - enhancement planting in abandoned travel rows

1 Remove spruce row on one side of mixed rows and one from within spruce block, thin between as appropriate, consider planting in openings. 2 Remove spruce row on other side of mixed rows, thin between as appropriate, underplant openings in thinned areas, control invasives as necessary. 3 Re-use travel rows from Year 36, thin between as appropriate, underplant openings and abandoned travel rows, control invasives as necessary.

Figure 1. Planting and management strategy for 68 acres of hay field. Row layout from field edge on left. 2 meter spacing within rows, 2.5 meters between rows. Norway Spruce made up 65% of total seedlings

planted. Mixed species rows consisted of 50% white pine, 23% Balsam fir, and 12% red maple, silver maple and bur oak. Enhancement planting in openings from thinnings, do not plant in travel rows.

The end goal of the process is to conduct commercial thinnings as early as feasible to foster the growth of mixed rows and underplanted seedlings. Near the planned maturity of the plantation, most of the SN would have been harvested, leaving a viable two- or multi-aged mixed stand of dominant Pw with other species.

Figure 1 shows an example layout for a 68-acre plantation, planted in 2011 on imperfectly to poorly-drained loamy soils. The layout considers planned thinning at ages 23, 35, and 50, removing rows of SN to release the Pw and mixed-species rows, while conducting improvement thinning on both sides of the harvested rows. Enhancement plantings could be started after the second or third thinning. depending on the arrangement of canopy gaps.

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Glossy buckthorn in northern hardwoods: invasion, impacts, and control mechanisms

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We studied the invasion dynamics, ecological impacts, and control mechanisms of glossy buckthorn (*Frangula alnus*) within northern hardwood ecosystems. We designed the research to answer three central questions: 1. Which site characteristics are most associated with glossy buckthorn invasion?; 2. What control methods are most effective?; and 3. How do these methods affect native plant communities? We conducted the research in Houghton County, Michigan, on a site with three different land-use histories: 1. a Scotch pine (*Pinus sylvestris*) plantation, 2. a remnant northern hardwoods woodlot, and 3. an abandoned agricultural field. These sites offered varying degrees of disturbance, which played a key role in influencing invasion patterns.

To evaluate treatment effectiveness and ecological impacts, we established fifty 150 m^2 plots. We randomly assigned plots to one of four treatments: 1. a control group with no intervention, 2 manual mechanical removal of buckthorn, or 3 and 4. herbicide application using either glyphosate or triclopyr. Both herbicides were applied using foliar spray and cut stump methods. Glyphosate foliar solutions consisted of a mixture of water and Rodeo herbicide forming a 7% solution, while the triclopyr foliar treatment used Garlon 3A at a 9% concentration. A surfactant and a dye were added to both herbicide mixtures. Prior to treatments, we conducted detailed assessments of understory plant composition, buckthorn density by height class, sunlight exposure, and soil chemistry. Following treatments, we monitored vegetation for two years.

We observed that land-use history was a major determinant of glossy buckthorn invasion success. Glossy buckthorn invaded the former agricultural field at higher densities than the remnant forest site, with buckthorn density highest in areas with elevated pH, nitrate, and calcium base saturation levels. Additionally, plots located closer to the current forest edge were more likely to experience higher buckthorn densities (see Hohnholt et al. 2025 for a more complete discussion).

In terms of treatment effectiveness, mechanical removal, glyphosate, and triclopyr significantly reduced the density of glossy buckthorn in the taller height classes, and these reductions persisted through the two-year post-treatment monitoring period. None of the treatments produced statistically significant reductions in the shortest height class, which included seedlings. This finding highlights the need for follow-up treatments to address regeneration and reestablishment from the seedbank.

When examining the broader impacts of these treatments on native plant communities, the results were mixed. We observed no lasting statistical differences in species richness, evenness, or Shannon diversity among the different treatment types. However, the Floristic Quality Index (FQI) declined significantly in plots treated with triclopyr. FQI incorporates coefficients of conservation, which refer to sensitivity to human disturbance; higher FQI scores are associated with high quality plant communities (Herman et al. 2001) This suggests that while triclopyr was effective in controlling glossy buckthorn, it also negatively affected species sensitive to human disturbance. Additionally, mechanical removal was associated with an increase in ruderal species—a group of plants that typically thrive in disturbed environments—after treatment.

Although herbicide treatments reduced glossy buckthorn, their impacts on native plant communities raise important concerns, especially in less disturbed areas. The study underscores the importance of considering the ecological context when selecting a management strategy. Caution is warranted in

remnant forests or undisturbed ecosystems to minimize unintended consequences.

Another important finding was the role of tree mortality—particularly the decline of white ash (*Fraxinus americana*) trees—in contributing to buckthorn invasion. As ash trees die and canopy gaps form, increased light availability can create favorable conditions for buckthorn establishment and growth. This factor, though not the primary focus of the study, reinforces the idea that canopy structure and disturbance play crucial roles in shaping invasion dynamics.

Ultimately, this research demonstrates that glossy buckthorn management requires a long-term, adaptive approach. Initial treatments, even when successful in reducing mature plants, often fail to eliminate the seedling layer, necessitating repeated interventions. Additionally, the lasting ecological impacts of certain treatments, such as the reduction in FQI with triclopyr use or the temporary rise of ruderal species after mechanical removal, suggest that one-size-fits-all solutions are inadequate. Effective management should be informed by a thorough understanding of the site's land-use history, soil conditions, current vegetation, and invasion stage. This level of contextual awareness allows land managers to forecast invasion risk more accurately and choose control methods that balance effectiveness with reduced impact on non-target species.

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Northern Hardwoods Resilience Project

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Background

Maple-dominated northern hardwood forests (NHF) in eastern North America are commonly managed with uneven-aged silviculture, such as single-tree or group selection with relatively short cutting cycles, or other types of partial harvesting. Even-aged systems, such as regular shelterwood, seed-tree, and clearcutting, are also used but less commonly. Whether even- or uneven-aged, these systems rely on natural regeneration in NHF, but recent studies suggest that managed NHF stands are increasingly understocked, dominated by undesired species, and at risk of losing essential goods and services. A major knowledge gap for efforts to maintain composition and productivity is understanding where and why these deficits are occurring and what the implications are for sustainability of multiple goods and services. In turn, little is known about how these trajectories might be changed by alternatives to current management practices. Projections developed from existing and emerging data can be used to predict values of goods and services, as well as their resilience and sustainability in terms of wood, carbon, and habitat values, under management alternatives and climate scenarios.

Forest Structure

During the initial year of the Northern Hardwoods Resilience project, our objective was to evaluate the current structure, including regenerating saplings, of maple-dominated northern hardwood forests over their full geographic range spanning parts of southeastern Canada (NB, ON, QC) and the northeastern United States (CT, MA, ME, MI, MN, NH, NJ, NY, PA, RI, VT, WI). For this assessment, we compiled and analyzed federal, provincial, and state forest inventories and monitoring data, along with datasets from long-term research studies. We found that across their range, most NHF had low density of sugar and red maple regeneration and showed low species richness and diversity in the sapling layer (trees 2.5-11.2 cm diameter at 137 cm tall). Moreover, the sapling layer was frequently dominated by species undesired by forest managers, predominantly American beech, a strong competitor of more desired tree regeneration (e.g. sugar maple). We further observed a spatial pattern in sapling species abundance: sugar maple is more dominant in the western part of the NHF range, American beech is more dominant towards the east. We also found that, in addition to NHF stands, other forest types support NHF regeneration, and these mainly fall into three stand types:

1. Oak-dominated hardwoods
2. Mixedwood forest types in the transition zone between temperate and boreal forests
3. White pine-dominated stands

Where we observed NHF regeneration in forest types not classified as NHF, the average sapling density of sugar and red maple was higher and average sapling density of undesired species was lower than in NHF stands. These findings suggest opportunities to help maintain the current extent of the NHF despite possible declines in the NHF type due to regeneration shortfalls via fostering NHF components in other

forest types in cases where this practice would be consistent with ecological and timber production objectives as part of a sustainable forestry.

Software Tools

An important outreach component of our range-wide assessment of NHF is to support informed decision-making in NHF management. To this end, we are developing an interactive web tool to enable users to analyze forest structure at multiple scales using pre-existing publicly available forest inventories and their own sampling data. To meet the needs of forest managers and researchers, we aim to develop a tool that is accessible, flexible, and supports ad hoc analysis. Recognizing the large spatial variation in NHF we observed and users' varying needs and scales of inquiry, we designed the tool to efficiently handle spatially explicit datasets of any extent. We chose to create a software tool based in R and R Shiny to efficiently handle the volumes of cover type-wide forest inventories (e.g. USDA Forest Service, Forest Inventory and Analysis) often containing millions of data points. The tool will be free, open-source, and accessible to researchers and managers. An R package (ForMAPL – Forest Management and Analysis Platform) will provide fast and efficient functions for data manipulation, metrics, and visualization, suitable for technical workflows. Additionally, we will publish a web-based Shiny application for non-technical users. Users will be able to upload their own datasets, consisting of forest plot measurements and, optionally, spatial polygon data, and quickly and accurately filter, aggregate, map, and visualize their data dynamically in real-time. The tool is currently beta tested by selected forest managers, to improve utility and performance. The code and documentation will be published in spring or summer 2026 before the R package and Shiny web application are released to the public.

Forest Management and Practice

As we move into the second year of the project, our focus will broaden to include quantifying forest management across the NHF range. This will include evaluating, and examining interrelations among, management plans/intentions, actual implemented management, and management outcomes. The degree to which structural goals are being realized, especially regarding the regenerating tree layer, will be assessed. Additionally, the contribution of management variation to spatial patterning in regeneration success and forest structure will be evaluated across the NHF. To accomplish these goals, we are conducting a range-wide assessment of forest management practices across a broad spectrum of landownership types using qualitative interviews, plan- and record-level document analysis, and on-the-ground inventory-assessment to capture stated goals and realized outcomes across ownership types and geographies. This approach allows us to identify relationships between plans, practices, and results. Findings will allow us to 1) understand the relationship between current forest management and NHF structure and 2) incorporate effective local tactics and emergent or effective treatments into regional guidance. While we welcome broad participation, our approach focuses on building a clear, comparative, evidence-based picture that helps balance competing goals and update silvicultural guidelines for today's conditions.

Forest structure and landowner decisions: key to managing tick-borne disease risk in northern hardwood forests

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Introduction

Tick-borne diseases represent a growing public health concern across the Northeast and northern forests, profoundly embedded within forest ecosystems. Addressing this complex issue requires a multi-faceted approach that considers both the natural processes and the human decisions that influence forest management. In our presentation, we highlighted research focused on the critical role of active forest management, particularly timber harvesting, in mitigating tick populations.

The challenge of tick management is best understood as a social-ecological system (Urcuqui-Bustamante et al. 2024). The tick life cycle involves eggs, larvae, nymphs, and adults. Ticks rely on vertebrate hosts, including small mammals, birds, and deer. Human actions, through forest management, influence habitat structure and composition, which in turn affects tick populations. Identifying a single factor, such as deer or mice, oversimplifies a system where all components interact with great complexity. Therefore, a holistic approach is necessary to understand and manage ticks and tick-borne diseases effectively.

Systematic Literature Review & Meta Analysis

We reviewed the current state of knowledge related to active forest management and ticks. A systematic literature review and meta-analysis explored the efficacy of three different kinds of active forest management practices on tick density and infection prevalence (Hurd et al. *In press*). The findings revealed:

Prescribed Fire - This practice was correlated with reduced tick density but did not affect tick infection prevalence (the percentage of ticks carrying diseases). Speculated mechanisms include the direct killing of ticks during burns and changes to deer and small mammal habitat, as well as microclimate alterations (drier conditions less suitable for ticks). However, inconsistencies in how scientists reported burn specifics (e.g., intensity, timing) were noted.

Invasive Plant Removal - Targeting plants like barberry and honeysuckle, this method was correlated with significantly reduced tick density. Notably, invasive plant removal was found to be three times the effect size compared to prescribed fire in reducing tick density. It also did not affect tick infection prevalence and likely impacts microclimate by removing dense understory vegetation.
Timber Harvesting - While only two studies met the criteria for inclusion in the meta-analysis both documented reduced tick density after harvest. This suggests timber harvesting holds significant promise for tick management. We turned our attention next to those two studies, both from the University of Maine.

Insights from Timber Harvesting Studies

We shared two research studies our team has carried out to be understand the impact on timber harvesting on tick density:

Initial Study - This early investigation used a paired study design, comparing partially harvested stands that were harvested within the last 5 years using irregular group shelterwood, a common silvicultural system used on small woodlots in Maine, with unharvested control stands (Conte et al. 2021). Adult tick densities were lower in the harvested stands. We suspected microclimate changes might be a key mechanism because harvested areas had higher mean temperatures and maximum vapor pressure deficits. There were fewer small mammals observed in harvested sites, possibly due to reduced cover and increased predators, leading them to avoid these areas. Deer activity initially decreased post-harvest but then increased in the second year, while predator activity (foxes, coyotes, bears) showed varied patterns.

Follow-up Study - Using these preliminary results, we designed a more quantitative study that focused on key forest structure characteristics (Hurd et al., 2024). The study sites had varied partial harvesting histories, leading to a gradient of sites along a spectrum of basal area and trees per acre. A crucial finding was that as the number of trees per hectare increases, the number of nymphs increases. This suggests that management of the overstory significantly influences the understory and microclimate, which in turn impacts tick, small mammal, and deer habitats. A random forest model indicated that understory vegetation cover, leaf litter cover, and leaf litter depth are highly important variables for predicting tick density, all of which can be influenced by managing the overstory.

These findings strongly suggest that timber harvesting could be an important way to manage tick densities, potentially more palatable to landowners than other methods like herbicides or increased deer harvesting.

Landowner Engagement

Our research team also built a large-scale citizen science program, engaging 315 small woodland owners in southern Maine in active surveillance over a two-year period (Ballman et al. 2023). These landowners actively collected ticks from their properties after receiving training and kits, providing valuable data. Citizen science results corroborated research findings: blacklegged ticks were found in higher densities on properties with invasive plants. Similarly, properties that had been harvested more recently (<15 years) had, on average, a lower density of nymphs compared to those harvested longer ago.

A separate study of 355 small woodland owners in southern Maine was carried out using mail and drop-off/pick-up administration (Urcuqui-Bustamante et al. 2024). This research revealed that small woodland owners were most supportive of additional education for landowners and timber harvesting as management strategies. Conversely, they were least supportive of pesticide/herbicide options and deer removal. This indicates that active forest management aligns with landowner preferences for tick mitigation.

Future Directions & Conclusion

Looking ahead, the team is developing an agent-based model to simulate the effects of timber harvesting and deer density on vegetation and tick populations (Urcuqui-Bustamante et al. *In review*), and is exploring social vulnerability (Olechnowicz et al. *In review*). A newly funded grant will enable us to

study the invasive plant, buckthorn, which is an understudied invasive plant, and test the effectiveness of peer-to-peer learning groups for landowners.

In conclusion, managing ticks and tick-borne diseases is a complex, social-ecological system problem. While specific results from active forest management practices can be inconsistent across studies, systematic review and direct research indicate that there is promise for prescribed fire, invasive plant removal, and timber harvesting as techniques to reduce tick density. The strong correlation between forest structure and tick populations, coupled with landowner support for timber harvesting above other options, positions it as a promising and practical tool for tick management in northern hardwood forests.

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New York state family forest owners' engagement in forest-based climate solutions

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The 2019 Climate Leadership and Community Protection Act (CLCPA) has emphasized the importance of private landowner participation in sustainable forestland management practices as a key strategy for addressing greenhouse gas emissions in New York State. Under this legislation, the state has set mandatory greenhouse gas emission reduction targets to achieve net-zero emissions by 2050, requiring an 85% reduction in net carbon emissions from 1990 levels, with the remaining 15% to be offset through carbon capture or sequestration. Among the strategies outlined across the various economic sectors, enhancing the carbon storage potential of New York's forests is recognized as an essential natural climate solution to reach these ambitious goals.

Forests absorb and store significant amounts of carbon dioxide through sequestration, helping offset emissions from other sectors. About 55% of New York's forested land is owned by family forest owners, who are unincorporated ownerships not tied to legal entities (Family Forest Research Center, 2021). Unlike other private landowners, family forest owners own forestland that varies widely in parcel size, use history, management objectives, and their connection to the land. Yet, together they represent a critical constituency for forest-based climate solutions. Therefore, their participation in management practices that promote forest health, regeneration, and carbon sequestration is needed.

Current family forest owner participation in management programs remains low, presenting both a challenge and an opportunity. As of 2018, the Family Forest Research Center (2021) reported that in New York, only 3% of family forest owners participated in property tax programs, and 1% participated in cost-share programs. Without meaningful engagement from this group, it will be challenging for New York to meet its climate targets. Understanding which landowners are most likely to participate in forest management and identifying the most effective ways to communicate with them to encourage program enrollment is essential for implementing state programs efficiently and cost-effectively.

In this presentation, we share two in-progress studies focused on understanding the decision-making processes of family forest owners in relation to participation in forest management programs such as 480a Forest Tax Law, RegenerateNY, and Establishing Large Forests (ELF). The first study, located in western NY, surveyed family forest owners following Dillman's Tailored Design Method. Using New York State 2024 tax parcel data provided by the Climate and Applied Forest Research Institute (CAFRI), a random sample of 1,500 family forest owners owning between 10 and 500 acres of forested land was selected. The questionnaire was developed using the Theory of Planned Behavior, assessing attitudes, subjective norms, and perceived behavioral control related to carbon storage and forest regeneration using a five-point Likert scale. Additional questions covered management activities completed in the past and next five years, familiarity with carbon storage and state management programs, barriers to management, sources of advice and trust, ownership history, reasons for owning, and likelihood of transferring ownership. Finally, we included questions about invasive species management and climate change.

The purpose of this study is to create a profile of family forest owners most likely to enroll their land in forest management programs. At this time, the second round of surveys has been sent to non-respondents,

and we are awaiting their return. Preliminary results will be presented at the 2025 Society of American Foresters conference. Furthermore, this study will also include semi-structured interviews as part of a master's thesis. The thesis will compare forest health perspectives between family forest owners and natural resource agency staff, and how these perspectives shape their management strategies, particularly in the context of invasive species.

The second study, situated in the Adirondack-North Country region of NY, will employ a mixed-methods approach starting with surveys, followed by focus groups. Participants will be selected from a stratified random sample of private non-industrial forest landowners owning between 20 and 500 acres, with a focus on disadvantaged communities. The survey will also be distributed following Dillman's Tailored Design Method. Focus groups will be conducted via video conference to generate comparative qualitative data. Focus groups will target four populations, including consulting foresters, DEC staff, and landowners with varying levels of program engagement.

The purpose of this study is to explore how Adirondack private landowners' sense of place and institutional trust influence their participation in sustainable forest management programs, and how these dynamics differ inside versus outside the Blue Line. Currently, the survey is approaching completion, and materials are scheduled for distribution in the upcoming weeks following the pretest.
Encouraging and enabling family forest owners to adopt sustainable management practices that improve forest health and increase carbon sequestration is not only desirable, but necessary for achieving the state's climate goals. Through both research studies, we aim to offer recommendations on how New York State can effectively collaborate with family forest owners to strengthen forest-based climate solutions and advance toward its climate objectives.

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Hosting Guide for the Biennial Northern Hardwood Conference

Version 3

NHC 2025 Biennial Meeting Development Committee[1]*

BACKGROUND

The northern hardwood type occupies millions of acres of forest land in the eastern United States and Canada, representing one of the most economically important and ecologically diverse forest types in eastern North America. Northern hardwood silviculture is diverse and complex, and has been the focus of extensive research for over 80 years. Today, managers continue to seek innovative sustainable management solutions to address the expanding challenges facing this forest type, including serious threats such as invasive species, inadequate tree regeneration, shifts in composition, herbivory, shifting weather patterns, nitrogen deposition, and forest fragmentation. Between 2018–2021, a group of research and management professionals developed a repeating conference concept to learn, share, and discuss cutting edge science and innovative management practices to sustain healthy and productive northern hardwood forests now and into the future. The first Northern Hardwood Conference (NHC) was held in 2021 and completed its third round as NHC 2025, bringing together professionals to discuss and summarize the current science and management of northern hardwood forests.

VISION

The Northern Hardwood Conference will be…

- An engaging and recurring biennial event where participants learn, share, and discuss ideas to sustain forest uses and values now and into the future.

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**Version 3 was drafted by the NHC 2025 Biennial Meeting Development Committee, which consisted of members from the Lake States U.S. (Christel Kern, Greg Edge, Mike Walters, Chris Webster), Northeast U.S. (Tony D'Amato, Laura Kenefic, Peter Smallidge, Kevin Evans, Robert McGregor, Sara Dreibelbis), and Southeastern Canada (Storm Robinson, Steve Bédard, Frédérik Doyon, Trevor Jones).*

- An event with an emphasis on applied management and silviculture.
- A welcoming event for all interested in the current and future status of northern hardwood forests.
- A go-to event where cutting-edge science and innovative management practices/uses are exchanged.
- A responsive event that highlights urgent and emerging needs in northern hardwood forest ecology and management.

GOALS

The Northern Hardwood Conferences will…

- Foster relationships among research/academia/management/industry/conservation sectors
- Present science syntheses and latest research findings
- Showcase conventional and alternative management practices
- Keep abreast on trends, issues, and opportunities in the products industry
- Identify knowledge gaps and future research needs

MISSION

- The Northern Hardwood Conferences will engage a wide variety of organizations and perspectives via a geographically rotating, biennial gathering to facilitate knowledge exchange and showcase applications and uses of northern hardwoods.

HOSTING GUIDE

To maintain the vision, goals, and mission of the Northern Hardwood Conference (NHC), a hosting guide was originally created by the Biennial Meeting Development Committee in 2020-21. This hosting guide update will aid host organizations in determining if they are able to host and aid the Biennial Committee in host selection if there are multiple hosts interested in the same conference year (Appendix A).

Hosting Principles

These fundamental principles will serve as guides for identifying and determining the conference location and host organization for NHC:

1. Since the primary function of NHC is to serve the full range of the northern hardwood forest type, the conference location will, in general, rotate biennially between Canada, Lake States U.S., and Northeast U.S to allow for full participation and reduced travel for each region to participate in-person every few years. The rotation pattern among the three regions can vary over time to meet the other hosting principles, but, on average, will rotate equally among regions to "cross-pollinate" knowledge and practice.

2. The hosting organization(s) will:

- Have one or more people dedicated to being conference chair during the 2+ years of conference planning.
- Develop committees for logistical planning, budget, program, and conference format. For example:
    - A planning committee plans the dates, venue, and proceedings publication. The planning committee may be composed of all or largely local members familiar with the area.
    - A budget committee works on sponsorships, registration, and marketing. The budget committee may be composed of all or largely local members familiar with the local and hosting organization's resources.
    - A program committee plans conference theme, speakers, presentation options (e.g., plenaries, concurrent sessions, flash talks, etc.), contributed abstract selection, conference day scheduling, and field tours. The technical committee may be composed of local and other regional representatives to develop the technical portion of the conference.
- Have potential resources to initiate planning (e.g., staffing, sponsorship, synergy, etc.), and then attain subsequent resources to carry out the planning and conference.
- Provide timely communications. Send save-the-date messages at least one year before the conference, website and general schedule at least 9 months before, and a more detailed program published 2-3 months before.
- Plan conference logistics, either through the host organization or other conference planning services. (Note - efficiencies may be gained by using the same firm as the previous host.)
- Target registration fees to an affordable price that is comparable to similar conferences in the local region. To reduce costs to participants, try leveraging expenses (e.g., facility fees) with sponsorships (and other grants, in-kind, etc.). The overall goal is to keep the conference as reasonably priced as possible for potential participants.
- Maintain a mixed format of 2 meeting days and 1 field day. The mixed format is essential, but the length and order may be influenced by the experiences at previous conferences and by the host.
- Aim for hybrid in-person and virtual options to encourage as much participation as possible across the northern hardwood range.
- Give funds remaining after conference expenses are paid (if available) to the next conference host to be used for student travel scholarships or as 'startup funds' to fulfill initial financial obligations to engage in contracts to reserve conference facilities and services (e.g., food, transportation).
- Share planning documentation and lessons learned with the next conference host.
- Announce the next host, year, and location on the current conference website and at the meeting.
- Disseminate evaluation surveys to participants and share results with the next conference's host. See Appendix A for the evaluation survey used at NHC 2023.
- Archive and document the information exchanged at meetings through proceedings, journal special issues, and other formats. The host will select the format(s).

3. Because the NHC is focused on exchanging knowledge and showcasing practice, the hosting location will aim for an in-person conference with these criteria.

- The conference facility:
  - can hold ~300 people.
  - has floor layout for concurrent sessions, posters, exhibitors, and other meeting formats as needed.
  - is convenient to amenities, such as lodging, food service, and airport.
- The nearby airport is mid-sized or larger in terms of number of airlines and flight options.
- The field sites are <2 hours from the conference facility for tours. (Optional pre- and post-conference tours/training can be arranged by host for field sites farther away.)
- Selected dates should avoid conflicts with other major conferences that are of interest for the northern hardwood forest science and management community.

4. If resources and technology are available for solid on-line live or recorded presentations, virtual options are encouraged to increase participation for those with travel restrictions.

5. Follow best practices to create a welcoming environment at the conference. Assign a committee member to ensure that broad values are upheld in planning and during the conference. To the degree possible, set a balanced agenda with varying representation, including but not limited to multiple regions, organization types, and disciplines, inclusion of indigenous people beyond ceremonies, and opportunities for early career professionals/scientists and students.

Hosting Schedule

Based on the above principles, NHC historical and upcoming schedule is as follows:

Year	Country	Province/State	City	Host Organization(s)
2021	USA	WI	Green Bay/Virtual	USDA FS NRS & WI DNR
2023	Canada	NB	Fredericton	NHRI & UNB
2025	USA	NY	Syracuse	SUNY-ESF
2027	Canada	QC	Gatineau	UQO & ISFORT
2029	*To be determined*			

NHC BIENNIAL COMMITTEE

The Biennial Committee selects hosts and reviews the hosting guide. The committee is composed of representatives from each region and the conference chair(s) of the most recent NHC. The committee chair will review and assume these tasks over this timeline:

- 2–3 months prior to NHC:

    - Biennial Committee Chair will send a call for host proposals (with the latest version of the hosting guide attached) to committee members.
    - Committee members can consider hosting themselves, circulate the call with their networks, and/or make targeted contacts to solicit proposals.
    - Chair will ask members at this time if they want to remain on the committee or suggest another person from their region to take their place.
- 1–2 months prior to NHC:
    - Chair will revise committee membership list.
    - Chair will send host proposals to committee members for review, ask for a completed scoring rubric by a due date, and send an availability poll to set up a meeting after the due date. See Appendix B for scoring rubric.
- 1 week to 1 month prior to NHC
    - Chair will host a virtual meeting for the committee to discuss the proposals and decide on a host.
    - Decisions should be made by majority rules and as needed, by informed leader (i.e. Chair).
    - Chair will share the selected next host organization and location information with the current NHC organizers.
    - Current NHC organizers will announce the next NHC host at the conference and on their website/media.
- 1 week to 1 month after NHC
    - Chair will facilitate a meeting between the current NHC organizers and the next NHC host to exchange information.
    - Chair will send committee and current NHC organizers the latest hosting guide for review by a due date and an availability poll for a meeting after the due date if needed.
- 1–2 months after NHC or follow the current NHC proceedings publication timeline
    - Chair will use committee reviews to revise the guide and, if needed, host a meeting to discuss these changes.
    - The committee will meet to discuss any conflicts of opinion in the guide changes such that the Chair can proceed with final revisions.
    - Chair will lead the new version of the guide through the publication process.
- 2 months after NHC or after publication
    - Chair will share published guide with committee when ready.

Appendix A. Example of a participant survey from NHC 2023.

ID
Start time
Completion time
Email
Name
Last modified time
Did you participate in some capacity in the Northern Hardwoods Conference in Fredericton NB August 1-3rd
What was the main reason you chose not to attend? (select all that apply)
Were you a sponsor or a vendor at the Northern Hardwoods Conference?
Of the 5 overarching conference themes, which would you say you were most interested in?
Of the 5 overarching conference themes, which would you say you were most interested in?
Select all of the days you attended for
Please rate your overall enjoyment of Day 1 - Workshops, Day 2 - Scientific sessions, Day 3- Field stops
If you selected dissatisfied on any of the above questions, could you provide a statement or two as to why and write it in the box below?
How far would you be willing to travel to attend this conference again in the future? (you can select more than one answer if you feel strongly; ex you prefer to attend virtually but would be will...
How satisfied are you with the networking opportunities presented at this conference? (1 not satisfied, 5 very satisfied)
What was your biggest takeaway from this conference?
What types of workshops would you like to see from NHRI or our partners in the future?
How relevant was this event's audience to your business, organization, and/or industry? (1 not relevant, 5 very relevant)
Optional: What do you feel was or will be the ROI of sponsoring this event? (not looking for a dollar value here, just thoughts)
Would you recommend sponsoring this event to someone you know?
What could we do to improve your ROI?
What could we have done better to improve your ROI with sponsorship?
Please select the most appropriate description of your participation in the NHC

Appendix B. Evaluation rubric for host proposals example from NHC 2025.

EVALUATION RUBRIC			
AREA OF INTEREST	RATING CRITERIA	RATING SCALE	RATING
Candidate Host	Conference Chair(s)	*n/a*	
	Organizing Institutions	*n/a*	
	Location (City, State/Province)	*n/a*	
Cross-pollination	Host region is different than current meeting?	*Yes=Continue to next criteria, No=Reject proposal*	
Leadership	Willing leader(s)/chair(s) named?	*Yes=Continue to next criteria, No=Reject proposal*	
Resources (10 points max.)	Resources (staffing, partners, conference planning, ...) are likely	*1-5; 1=disagree, 5=agree*	
	Budget narrative suggests that cost of facility and potential sponsors, grants, in-kind, etc. will likely be leveraged to keep participant registration fee reasonable	*1-5; 1=disagree, 5=agree*	
Logistics (10 points max.)	Airport service is mid-sized or larger in terms of number of airlines and flights or equivalent costs/accessibility explained	*1-5; 1=disagree, 5=agree*	
	Conference facility can hold ~300 ppl, allows for a range of meeting formats (concurrent sessions, posters, exhibitors, etc.), convenient to amenities (lodging, food service, airport,...)	*1-5; 1=disagree, 5=agree*	
	Field sites are < 2 hours from conference facility and include innovative silviculture demonstrations and cutting edge research	*1-5; 1=disagree, 5=agree*	
Conference Vision (5 points max.)	"An event with an applied management and silviculture emphasis" is likely	*1=Yes agree, 0.5=Possibly, 0=No disagree*	
	"An inclusive, welcoming event to all interested in the current and future status of forests" is likely	*1=Yes agree, 0.5=Possibly, 0=No disagree*	
	"A go-to event where cutting-edge science and innovative management practices/uses are exchanged" is likely	*1=Yes agree, 0.5=Possibly, 0=No disagree*	
	"A responsive event that highlights urgent needs in northern hardwood forest ecology and management" is likely	*1=Yes agree, 0.5=Possibly, 0=No disagree*	
	Potential timeframe does not likely conflict with other major conferences (e.g., SAF, CIF, NAFEW, etc.)	*1=Yes agree, 0.5=Possibly, 0=No disagree*	
Welcoming Values (5 points max.)	Leader selected or process for selection clear to represent broad values in conference planning	*1=Yes agree, 0.5=Possibly, 0=No disagree*	
	Potential agenda has mixed geographical region, discipline, and career stage represented	*1=Yes agree, 0.5=Possibly, 0=No disagree*	
SCORE (30 points max.)	**~33% Logistics, ~33% Resources, ~17% Vision, ~17% Welcome**	***Sum***	