SUMMARY REPORT

PUTTING RESEARCH INTO PRACTICE IN ADAPTIVE SILVICULTURE

SILVA21 4th Annual General Meeting – In Special Collaboration with Sustainable Forestry Initiative (SFI)

April 29 – May 1, 2025
Sherbrooke, QC

Introduction

The [Sustainable Forestry Initiative (SFI)](#) partnered with [Silva21](#) to sponsor the Silva21 [4th Annual General Meeting](#) (AGM) as part of the [SFI Climate Smart Forestry Initiative (SFI CSF Initiative)](#) focused on advancing the interpretation and implementation of Climate Smart Forestry (CSF) across Canada. Silva21 is a research program that provides data, tools, and practical solutions to improve the resilience of Canadian forests to various disturbances and sources of stress, thereby contributing to the health of these ecosystems and the well-being of the communities that depend on them.

Started in 2021 and led by Dr. Alexis Achim (Université Laval) and Dr. Nicholas Coops (University of British Columbia), Silva21 brings together researchers from five universities and 14 partners across federal and provincial government, forestry sector, and Indigenous partners. Silva21 research is conducted across 12 research sites in 5 different ecozones of Canada (i.e., coastal, dry inland, boreal, temperate hardwood, and Acadian forests). Silva21 has produced over 35 scientific publications in 18 journals, shared research at 15 conferences in 8 countries, and has dozens of technical reports that distill research for practitioners and landowners.

The joint SFI and Silva21 AGM brought together universities, Indigenous partners, forest sector, SFI certified organizations, and federal and provincial governments to foster collaborations and share research knowledge to adapt forestry practices to emerging challenges.

SFI led a "Putting Research into Practice" day on Climate Smart Forestry and Fire Resilience to:

- Learn from the latest research and collaborations
- Enhance adaptive forest management in a changing climate
- Support a research-to-practice exchange of knowledge for implementation
- Strengthen an understanding of the unique role of certification in advancing adaptation

SFI and Silva21 joint event: Putting research into practice in adaptive silviculture

As a central feature of the AGM, SFI partnered with Silva21 for a full day of programming dedicated to advancing the translation of research into actionable strategies for forest management decision makers in the areas of Climate Smart Forestry and Fire Resilience. SFI provided an overview of the SFI 2022 Forest Management Standard, under which the Climate Smart Forestry and Fire Resilience objectives have requirements for forest managers.

Figure 1. Dr. Nicholas Coops (University of British Columbia), Lauren T. Cooper (SFI), and Dr. Alexis Achim (Université Laval)
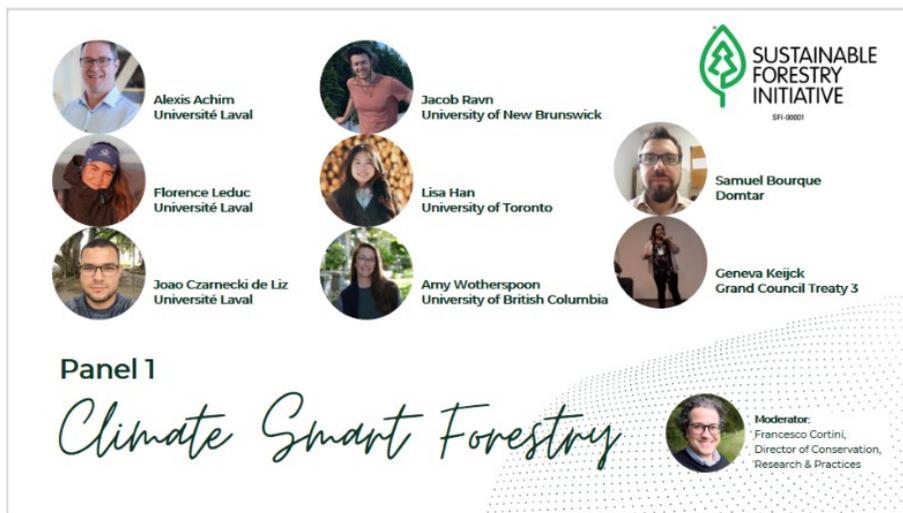
Panel 1: Climate Smart Forestry

The Climate Smart Forestry panel, led by SFI, featured researchers from Silva21 and representatives from the forest sector and an Indigenous leader. Dr. Alexis Achim, (Université Laval) introduced the emerging approaches to forest management under changing climate conditions.

Adding to the discussion, Silva21 researchers presented their work in the context of emerging approaches to forest

management in the areas of forest productivity, assisted migration, and ecosystem resilience under a changing climate. Florence Leduc (PhD candidate, Université Laval, project AN 1c: *Impact of climate change on growth of commercial forest species in Nova Scotia*) discussed innovative research on dendrochronology and remote sensing to monitor forest productivity across spatial and temporal scales. João Paulo Czarnecki de Liz (PhD candidate, Université Laval, project AN5: *Targeted assisted migration*) showcased spatial distribution modeling to identify future-suitable habitats for species like *Quercus macrocarpa*, contributing to more precise assisted migration strategies. Jacob Ravn (PhD candidate, University of New Brunswick, project AN 9b: *Assisted migration trials: early response*) highlighted results from the TransX experiment, addressing knowledge gaps in species selection and seed transfer guidelines for assisted migration. Lisa Han (PhD student, University of Toronto, project AD 10: *Adaptive silviculture for climate change (ASCC) trail*) shared insights from the Adaptive Silviculture for Climate Change (ASCC) project at Petawawa Research Forest, emphasizing practical silvicultural trials to test ecosystem resilience under future climate conditions.

From a forest sector perspective, Samuel Bourque (Domtar) outlined Domtar real-time data systems, hybrid vehicle technology, and biodiversity initiatives to operationalize climate smart practices. Geneva Keijck (Grand Council Treaty #3), emphasized Indigenous-led climate stewardship guided by Manito Aki Inakonigaawin and Treaty rights. Dr. Amy Wotherspoon (Postdoctoral fellow, UBC, project AN 1b: *Future climate envelopes*) outlined the need for integrated science, respectful co-production of knowledges, and scalable, field-ready solutions in climate smart forestry.

Figure 2. Climate Smart Forestry panelists from left to right, moderator Dr. Francesco Cortini (SFI), Dr. Amy Wotherspoon (Silva21), Samuel Bourque (Domtar), Geneva Keijck (Grand Council Treaty 3), Lisa Han (University of Toronto), João Paulo Czarnecki de Liz (Université Laval), Florence Leduc (Université Laval), Dr. Alexis Achim (Université Laval), and Jacob Ravn (University of New Brunswick)

Panel 2: Fire Resilience

The Fire Resilience panel, led by SFI, featured researchers from Silva21, representatives from the forest sector, and an Indigenous leader. Dr. Nicholas Coops (University of British Columbia) introduced the session by discussing novel remote sensing approaches that support informed forest management under increasing fire pressure.

Adding to the discussion, Silva21 researchers, presented their work in relation to managing forest landscapes under increasing fire pressure in a changing climate in the areas of fire risk and growth responses, fire mitigation and economic viability, and post fire recovery. The development of climate-sensitive timber supply models by Kirk Johnson (PhD student, UBC, project AN 8b: *Viability of climate-informed, landscape-level strategies*) showed fire risk and growth responses to climate scenarios in British Columbia's Quesnel Timber Supply Area. Rover Liu (Research Associate, UBC, project AD3a: *Silvicultural scenarios to promote resilience stand structures*) discussed operational-scale commercial thinning trials that incorporate biomass utilization and fuel reduction strategies in lodgepole pine forests, showing promising outcomes for both fire mitigation and economic viability. Sarah Smith-Tripp (PhD candidate, UBC, project OB 1a: *Regeneration after catastrophic disturbance*) presented remote sensing

research that identifies post-fire recovery trajectories in the sub-boreal zone, enabling more targeted interventions to prevent reburn and promote regeneration.

From an Indigenous communities perspective, Klay Tindall from Lil'wat Forestry Ventures LP gave an overview of how methods are currently being implemented on small areas of Indigenous lands with positive effects leading to a growing demand for their business. Élyse Tremblay from Domtar joined the panel discussion to share insights on Domtar's approach to fire resilience, including collaboration between provincial and private entities. Dr. Chris Mulverhill (Postdoctoral fellow, UBC, project OB 5a: *Continuous forest inventory framework*) concluded the panel by framing wildfire as a growing ecological and policy challenge, emphasizing the urgent need for integrated and adaptive management solutions. Collectively, the panel underscored the importance of proactive, scalable, and landscape-level strategies to support fire-resilient forestry in a rapidly changing climate.

Figure 3. Fire Resilience panelists, from left to right, Élyse Tremblay (Domtar), Dr. Chris Mulverhill (University of British Columbia), moderator Greg Cooper (SFI), Klay Tindall (Lil'wat Forestry Ventures LP), Sarah Smith-Tripp (University of British Columbia), Kirk Johnson (University of British Columbia), Rover Liu (University of British Columbia), and Dr. Nicholas Coops (University of British Columbia)

Figure 4. Silva21 attendees participate in engagement sessions on Climate Smart Forestry and Fire Resilience during the SFI-led "Putting Research into Practice" day

Panel 3: Translating Research into Practice

Facilitated by Lauren T Cooper (SFI), a concluding panel with Silva21 Principle Investigators Dr. Alexis Achim and Dr. Nicholas Coops synthesized ideas into priority actions. The panel agreed on the need for:

- Improved institutional mechanisms to align research design with operational realities, including utilizing data in new ways to support climate-informed decision making
- Expanded metrics for climate-informed management that includes social, cultural, and ecological outcomes
- Funding models that support long-term implementation in forest management, not just short-term innovation

Figure 5. Lauren T. Cooper (SFI), Dr. Nicholas Coops (University of British Columbia, and Dr. Alexis Achim (Université Laval)

Figure 6. Silva21 researchers demonstrate technology and share results with attendees at the show and tell session sponsored by Domtar and SFI

Takeaways

The joint SFI and Silva21 "Putting Research into Practice" event highlighted several key takeaways that will inform the SFI CSF Initiative and can support continued collaboration and advancement for forests and climate across Canada. The following are a series of recommendations and actions that emerged from the SFI sponsored sessions:

1. Strengthen the role of certification to drive change for CSF management in Canada
2. Bridge the science–practice gap in Canadian forest operations
3. Integrate Indigenous knowledge and ethical frameworks into forest decision-making
4. Scale Fire Resilience through policy, practice, and cultural knowledge

1. Strengthen the role of certification to drive change for CSF management in Canada

Canada's vast and diverse forest landscapes demand strong, long-term partnerships among governments, forest sector, researchers, Indigenous nations, and civil society. Canada's existing forest certification systems offer leverage points to drive innovation and support forest managers. In particular, SFI represents the largest certified footprint in Canada with over 120 million hectares certified to the Forest Management standard alone. Certification, along with the regulatory environment and public policy, can reward climate smart practices, incentivize implementation, and readily integrate non-economic values such as biodiversity, recreation, and cultural health. Actions include:

- Invest in long-term partnership with certification non-profits (e.g., SFI) and their certified network across federal, provincial, Indigenous, and private entities
- Leverage certification as a primary tool to advance best practices and pursue continual improvement across diverse landowners and in a changing climate
- Support inclusive models that balance timber and non-timber values, including Indigenous and ecological priorities, through certification

2. Bridge the science–practice gap in Canadian forest operations

Despite Canada's leadership in forest science, research often fails to reach operational decision-makers at scale and in a timely manner. Translating climate science into practical, cost-effective tools and policies requires alignment between research outputs and the operational realities of forest managers, especially in the context of large-scale, jurisdictionally complex forest systems. Actions include:

- Fund pilot projects and demonstrations that test and validate CSF at operational scales
- Build capacity for and invest in knowledge translation including plain language materials, decision support tools, and applied training
- Invest in and scale up innovative tools (e.g., fuel assessments, climate risk indexes) aligned with certification and regulatory frameworks to support consistency in decision-making

3. Integrate Indigenous knowledge and ethical frameworks into forest decision-making

Incorporating Indigenous Knowledge into forest management is essential for climate resilience in Canada. Beyond consultation, forest governance must respect Indigenous sovereignty, support ethical engagement, and embed traditional stewardship practices into operational planning and research. Actions include:

- Embed Indigenous-led monitoring and land-based practices, including cultural burning, into forest management policies
- Create formal roles for Indigenous Knowledge holders within research, monitoring, and operational teams
- Co-develop ethical frameworks for knowledge use, data sovereignty, and land stewardship in alignment with UNDRIP and reconciliation commitments

4. Scale Fire Resilience through policy, practice, and cultural knowledge

Canada faces escalating wildfire risks. Forest decision-makers must integrate scientific fire models with Indigenous knowledge and local realities. Cultural burning, community-led fire stewardship, and equity-based planning are vital for building scalable, landscape-level fire resilience. Actions include:

- Prioritize practical, scalable tools (e.g., risk mapping, fuel management zones) validated through operational pilots and in collaboration with research scientists
- Support new models of fire stewardship and integrate cultural burning into provincial and federal fire resilience strategies
- Leverage organizations certified to forest management standards as the largest forest decision makers available to implement strategies at scale

Contact

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Field visit to Domtar forests and highlighting Wabanaki stewardship

The 2025 Silva21 AGM featured a field tour to three forest sites managed by Domtar, a Silva21 forest sector partner, SFI Certified Organization, and one of North America's leading producers of paper-based products.

Before heading to the field, Eric Lapointe (Domtar) gave a presentation highlighting one of the company's most productive mills, the Windsor Mill. This mill, for paper and packaging, has been an important part of the operations in Québec for over 160 years. As the largest fine paper complex in Canada, the mill employs over 4,000 people (directly and indirectly) and processes 1.7 million m³ of pulpwood annually, making it Québec's top pulpwood user, particularly from private forests. Throughout his presentation Mr. Lapointe also highlighted:

- **Sustainable forest management** on Domtar's private lands, which have been continuously SFI-certified for 20 years and support a wide range of forest practices and long-term research

- **Innovative circular economy practices**, such as using mill residuals for steam and electricity, ash for soil amendment in maple stands, and by-products for hybrid poplar plantations

- **Afforestation and forest intensification projects**, including multi-species plantations near local communities, with social acceptability and biodiversity monitoring as guiding principles

- **Remote sensing innovations**, including enhanced forest inventory and productivity modeling using airborne LiDAR. A commitment to reducing the carbon footprint across its wood supply chain (spanning multiple provinces and U.S. states) and ongoing collaborations through Silva21 and other partnerships

The tour, organized with the help of Eric Lapointe (Domtar) and Lukas Olson (University of British Columbia), highlighted how applied research informs forest operations and fosters adaptive silviculture in a changing climate.

Site 1: Crown dieback assessment and drone applications

The first stop of the field tour demonstrated a newly developed stem classification system for sugar maple stands. The system, grounded in crown dieback assessment developed by Dr. Guillaume Moreau (Université Laval), helps forest managers identify low-vigour yet high-quality trees that should be prioritized for harvest during partial cuts, an approach that both increases stand vigour and improves harvest profitability.

This stop highlighted the use of drone-based photogrammetry to rapidly and reliably estimate crown dieback across stands, a Masters project taken on by Lukas Olson under the supervision of Dr. Nicholas Coops (University of British Columbia) (Project OB6: *New technologies for measurements within stands*). This application of high-resolution aerial imagery is revolutionizing forest diagnostics, allowing managers to make better-informed decisions about stand health and harvest selection, particularly when forest health is pressured by climate changes.

An additional in-field drone demonstration led by Dr. Alexandre Morin-Bernard (Université Laval) showcased how remote sensing technologies (e.g., the DJI M300) are increasingly able to provide efficient and robust data that can inform operational forestry.

Site 2: Long-term commercial thinning trials

At the second stop, Steve Bédard [Québec Ministère des Ressources naturelles et des Forêts (MRNF)] guided participants through an experimental thinning site. Established in 2009, this long-term study evaluates the effects of different thinning intensities on stand growth, tree quality, and resilience in even-aged sugar maple and yellow birch forests.

Findings from the study have critical implications for both climate adaptation and economic outcomes. Notably, plots treated with both thinning and soil amendments exhibited improved vigour and potential for structural diversity, key components of resilient forest systems under global change scenarios. This stop highlighted the value of long-term silvicultural trials as platforms for adaptive experimentation and evidence-based management.

Site 3: Wabanaki Nation and black ash stewardship

The final site was presented by Dr. Laurence Boudreault, (Project AD 6: *Culturally important species*) the forestry project manager at the Ndakina Office for the Wabanaki Nation. Boudreault discussed the cultural and ecological significance of black ash (*Fraxinus nigra*) for the Wabanaki Nation and as a vital species for Wabanaki basketry and cultural practices. Black ash is highly threatened by the emerald ash borer. Because of this, black ash is a focus of Indigenous-led climate adaptation and conservation efforts.

Participants learned about the Wabanaki Nation's territorial forestry approach, which integrates traditional knowledge, cultural practices, and scientific monitoring to sustain ecosystem functions and Indigenous sovereignty. The visit offered a reflection on the role of co-created knowledge and Indigenous leadership in sustainable forest management and emphasized the need to align forest science with diverse values and relationships to land in a changing climate.

Figure 7. Silva21 attendees visit SFI-certified Domtar-managed forests to learn about the importance of tree health assessment and future adapted species

Field tour reflections

Across all three sites, the field tour illustrated how innovative silvicultural strategies ranging from drone-based diagnostics to soil-enhanced thinning trials, and culturally grounded species conservation, can support climate to promote forest resilience, operational efficiency, and meaningful reconciliation.

Figure 8. SFI staff join Silva21 attendees on a field tour of three Domtar sites. From left to right, Kelvin Braun, Rachel Hamilton, Greg Cooper, Dr. Francesco Cortini, Lindsay Douglas, and Lauren T. Cooper

Silva21 4th AGM participants

A total of over 70 participants from 25 organizations attended the event (Table 1). Silva21 AGM attendees included research scientists and collaborators, and SFI extended the invitation to SFI certified organizations and Indigenous partners.

Table 1. Overview of Silva21 registrations by organization

Organization Type	Examples
Academic	University of British Columbia, Université Laval, and University of Toronto
Indigenous partners	Chippewas of the Thames, Grand Council Treaty 3, and Nazko First Nation
Governmental entities	Government of New Brunswick, Government of Nova Scotia, Government of Ontario (MNRF), Gouvernement du Québec (MFFP, DRF, Forestier en Chef), Natural Resources Canada	Resources Naturelles du Canada (CWFC/CCFB, CFS)
Private companies	SFI certified organizations Domtar, Smurfit Westrock, and GreenFirst