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Canadian Forest Service

CANADIAN WOOD FIBRE CENTRE

Fibre Connect n° 6

April 2024 to March 2025

This Is the Last Canadian Wood Fibre Centre eBulletin!

In this issue:

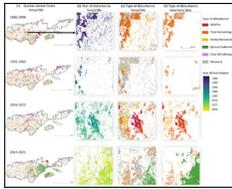
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The Canadian Wood Fibre Centre (CWFC), established in 2006 as a virtual centre within the Canadian Forest Service (CFS), was dissolved at the end of the day on March 31, 2025. Its employees are returning to their home CFS Research Centres, the Petawawa Research Forest (PRF), and Corner Brook. They will still develop knowledge, tools, and approaches aimed at reducing the risks and enhancing the use of the forest wood fibre supply in Canada.

Through the Innovative Forestry Solutions and the other CFS research programs, research will continue to support economic development, Canada's transition to a low-carbon economy, effective stewardship of forest resources, and the resiliency of forests to the impacts of climate change. Our innovative, sustainable evidence-based solutions will continue to directly meet the needs of our end users.



Canada



Evaluating deep-learning methods applied to Landsat time series subsequences to detect and classify boreal forest disturbances events: The challenge of partial and progressive disturbances. This paper was published by **Jean-François Côté** and others in **Remote Sensing of Environment**. In this paper, the authors present novel use of existing deep-learning networks and a subset of Landsat time series image sequences to improve the identification of progressive epidemics, partial harvesting, and recovery classes in the eastern Canadian boreal forest.

Full article: <https://doi.org/10.1016/j.rse.2024.114107>



Adaptive silviculture for climate change in the Great Lakes-St. Lawrence Forest Region of Canada: Background and design of a long-term experiment. This paper was published by **Nelson Thiffault**, **Jeff Fera**, **Michael Hoepting**, **Trevor Jones**, and **Amy Wotherspoon** in **The Forestry Chronicle**. In this paper, the authors present how the implementation of the Adaptive Silviculture for Climate Change initiative at PRF in Ontario will contribute to a deeper understanding of forest ecosystem responses to climate change and the development of adaptive management strategies for sustainable forest management.

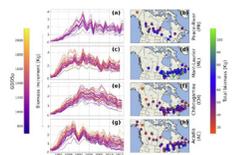
Full article: <https://doi.org/10.5558/tfc2024-016>



Opportunities and challenges to improve carbon and greenhouse gas budgets of the forest industry through better management of pulp and paper by-products. This paper was published by **Nelson Thiffault** and others in **Frontiers in Environmental Science**. In this paper, the authors illustrate how biosolids and other by-products produced by a pulp and paper mill can be used as fertilizers, contributing to greenhouse gas reduction and improving economic returns of forest operations.

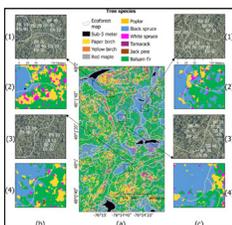
Picture credit: **Andréanne Legarde**

Full article: <https://doi.org/10.3389/fenvs.2024.1381141>



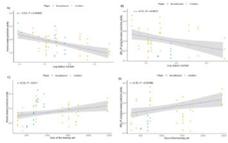
Future carbon sequestration potential in a widespread transcontinental boreal tree species: Standing genetic variation matters! This paper was published by **Patrick Lenz** and others in **Global Change Biology**. In this paper, the authors present how past high summer and autumn temperatures had a negative impact on growth and that there is a clear difference in response to climate change within and among genetic clusters of black spruce. The results show that intraspecific genetic variation, notably associated with the phylogeographic structure, must be considered when estimating the response of widespread species to climate change.

Full article: <https://doi.org/10.1111/gcb.17347>



Comparison of deep and machine learning approaches for Quebec tree species classification using a combination of multispectral and LiDAR data. This paper was published by **Jean-François Côté** and others in the **Canadian Journal of Remote Sensing**. In this paper, the authors present how the combination of aerial imagery and airborne light detection and ranging (LiDAR) data, using deep-learning approaches, can be applied to accurately classify tree species in the boreal forest of eastern Canada.

Full article: <https://doi.org/10.1080/07038992.2024.2359433>



A meta-analysis on the effects of marker coverage, status number, and size of training set on predictive accuracy and heritability estimates from genomic selection in tree breeding. This paper was published by **Patrick Lenz, Jean-Philippe Laverdière, Simon Nadeau,** and others in **Tree Genetics & Genomes**. In this paper, the authors present the results of a metadata analysis from 28 genomic selection studies (totaling 115 study traits) and how genomic selection can be efficiently implemented in many more tree-breeding programs, delivering less-biased genetic parameters and more-accurate estimates of breeding values.

Full article: <https://doi.org/10.1007/s11295-024-01653-x>



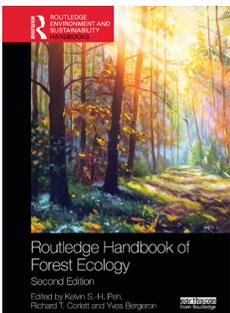
Radial distribution of heartwood extractives in second-growth western redcedar. This paper was published by **Cosmin Filipescu** and others in the **Canadian Journal of Forest Research**. In this paper, the authors present how faster growth, through active management of second-growth western redcedar stands, may lead to increased and more uniformly distributed content of heartwood extractives.

Full article: <https://doi.org/10.1139/cjfr-2023-0095>



Modeling the impacts of pest damage: case studies for conifers in British Columbia, Canada. This book chapter was published by **Mike Cruickshank** and others in Laroque G, editors. **Ecological Forest Management Handbook, second edition**. In this chapter, the authors (1) review the requirements that need to be considered when developing models that simulate tree and pest interactions, (2) explain how to evaluate pest damage to timber resources, and (3) describe case studies based on a suite of models that assist forest managers in British Columbia, Canada, to determine growth and yield and interact with pest damage.

Full article: www.routledge.com/9781032555171



Natural regeneration after harvesting. This book chapter was published by **Nelson Thiffault** and others in **Routledge Handbook of Forest Ecology, second edition**. In this chapter, the authors present how harvesting, by modifying stand composition and structure and affecting the soil, interacts with ecological factors and extrinsic elements to influence regeneration establishment.

Full article: <https://www.taylorfrancis.com/books/edit/10.4324/9781003324072/routledge-handbook-forest-ecology-kelvin-peh-richard-corlett-yves-bergeron>



Drought tolerance to overwatering, periodic underwatering, and complete withholding of water in interior Douglas-fir seedlings. This paper was published by **Mike Cruickshank, Cosmin Filipescu,** and others in **Canadian Journal of Plant Pathology**. In this paper, the authors present results suggesting that variation in family growth and survival to suboptimal watering partly relate to root and stem biomass partitioning in the interior Douglas-fir population of British Columbia.

Full article: <https://www.tandfonline.com/doi/full/10.1080/07060661.2024.2408676>



*Mixed stands of black spruce (*Picea mariana*) and tamarack (*Larix laricina*) offer high secondary growth in eastern boreal forests of Canada.* This paper was published by **Nelson Thiffault** and others in **Forest Ecology and Management**. In this paper, the authors present how black spruce stem size and density increases with an increase in tamarack proportion in mixed stands and conclude that landscape managers may consider the establishment of mixed black spruce and tamarack stands to favor secondary growth in eastern Canadian boreal forests.

Full article: <https://www.sciencedirect.com/science/article/pii/S037811272400567X>

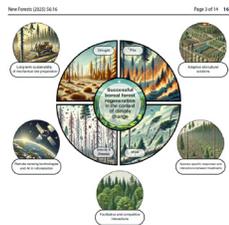


Fig. 1. Five components of research that address the four guidelines necessary to boreal forests due to climate change in order to ensure successful regeneration.

A trans-Atlantic perspective on successful plantation establishment in boreal ecosystems: lessons learned and research opportunities. This paper was published by **Nelson Thiffault** and others in **New Forests**. In this perspective paper, the authors identify research needs that will support the development of adaptive silviculture practices that enhance boreal stands resilience and productivity, helping to meet reforestation objectives and mitigate the impacts of climate change.

Full article: <https://link.springer.com/article/10.1007/s11056-024-10086-2>



Natural regeneration 18 years after experimental silvicultural treatments in Canadian boreal forests. This paper was published by **Nelson Thiffault** and others in **Forest Ecology and Management**. In this paper, the authors present the effects of silvicultural treatments on natural regeneration in stands of natural even-aged mature black spruce 18 years after cutting. They also highlight the potential of shelterwood systems as a silvicultural alternative to clearcutting for promoting black spruce regeneration in Canadian boreal forests.

Full article: <https://link.springer.com/article/10.1007/s11056-024-10086-2>

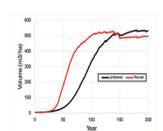


Figure 3. Mean stand volume over time from 10 individually simulated TAC stands that initially contained 100 trees each that were either subjected to conventional thinning or 50% or 70% basal area removal (black line). Simulations were run using C₁. Growth of individual trees was based upon site-specific, observed weather conditions, relative competitive value of individual trees, and the response to thinning in control. (doi:10.1371/journal.pone.0288882.g003)

Predictable overcompensation in post-thinning stand dynamics of Canadian forests: A synthesis. This paper was published by **Chao Li** and others in **Plants**. In this paper, the authors present a systematic investigation on overcompensation under the conceptual framework of compensatory growth in forest stands.

Full article: <https://www.mdpi.com/2223-7747/14/7/982>

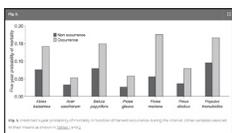
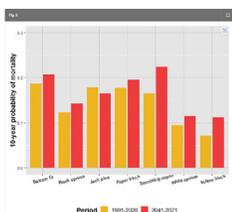


Figure 4. Relative sensitivity of tree mortality to climate variables for eight species in Ontario. (doi:10.1371/journal.pone.0288882.g004)

Climate-sensitive models of tree mortality based on lifetime analysis and irregular permanent-plot remeasurements. This paper was published by **Mathieu Fortin** and others in the **Canadian Journal of Forest Research**. In this paper, the authors develop a framework based on lifetime analysis to enable annual or average climate sensitivity implementations in empirical models of tree mortality for eight species in Ontario.

Full article: <https://cdnsiencepub.com/doi/10.1139/cjfr-2024-0205>



The effect of ontogeny, competition, site, and climate on background mortality for trees of nine species in Canadian boreal forest. This paper was published by **Mathieu Fortin** and others in **Canadian Journal of Forest Research**. In this paper, the authors develop models to quantify background mortality in the eastern Canadian boreal forest. They found that higher temperatures, less precipitation, and higher aridity index values increased background tree mortality for six of the nine tree species studied.

Full article: <https://cdnsiencepub.com/doi/10.1139/cjfr-2024-0179>



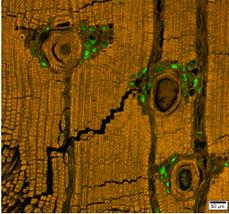
Spruce hybrids show superior lifespan growth but intermediate response to climate stress compared to their ecologically divergent parental species. This paper was published by **Patrick Lenz** and others in **Forest Ecology and Management**. In this paper, the authors reveal that hybrid spruce (Black × Red) exhibit hybrid vigor for lifespan, cumulative growth, and intermediate climate response compared with their parent species, potentially offering a valuable option for maintaining productivity in changing environments.

Full article: <https://www.sciencedirect.com/science/article/pii/S0378112725000581>



A comprehensive framework to evaluate the financial impacts of genetic improvement on wood products from planted forests. This paper was published by **Isabelle Duchesne, Patrick Lenz**, and others in **Canadian Journal of Forest Research**. In this paper, the authors present an integrated modelling framework to evaluate the financial impacts of tree genetic improvement scenarios of white spruce plantations in terms of quantity, quality, and revenues.

Full article: <https://cdnsiencepub.com/doi/10.1139/cjfr-2024-0057>



Zooming into refractory timber: Enhancing anatomical identification with confocal laser scanning microscopy and fluorescence. This paper was published by **Isabelle Duchesne** and others in **IAWA Journal**. In this paper, the authors present the results of an approach combining autofluorescence and confocal laser scanning microscopy that offers a superior resolution in observing axial parenchyma cells compared with traditional microscopy. This approach can be applied to increase confidence in wood species identification for combatting the illegal logging and trade of forest products worldwide.

Full article: <https://brill.com/view/journals/iawa/aop/article-10.1163-22941932-bja10176/article-10.1163-22941932-bja10176.xml>

New Technology Transfer



Logging and Sawmilling Journal. The Edge: Partial harvest systems to meet specific management objectives within boreal mixedwood and pure softwood stands. Written by Tony Kryzanowski with the help of **Derek Sidders**. This article presents how partial harvest systems (developed in collaboration with the CWFC) provide a few options to forest industry to address the current and anticipated consequences of a changing climate, as well as to help maintain a sustainable fibre supply as Canada continues to transition to managed forests.

Full issue: <https://issuu.com/forestnet2/docs/marchapril2024lsj-lr>



Silva21 Snapshots. Introducing: The Adaptive Silviculture for Climate Change experiments at the Petawawa Research Forest. Written by **Amy Wotherspoon** and **Nelson Thiffault**. This professional paper presents how the study aims to provide valuable insights into forest resilience and adaptive management practices that benefit researchers, forest managers, and industry members.

Full issue: https://www.silva21.com/files/ugd/066ab2_b7ba33a03345410ab43644d08d71e2d0.pdf



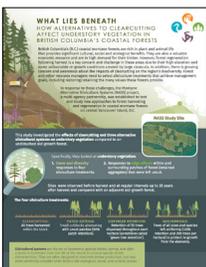
Logging and Sawmill Journal. The Edge: The history, results, and opportunities in reforestation of managed Canadian forests. Written by Tony Kryzanowski with the help of **Derek Sidders**. This article outlines how forest management and reforestation practices have yielded interesting results over the past half century.

Full issue: <https://issuu.com/forestnet2/docs/ljsj-mayjune-lr>



Logging and Sawmill Journal. The Edge: Innovative forest practices to adapt to the major issues arising from a changing climate. Written by Tony Kryzanowski with the help of **Derek Sidders**. This article presents how the CWFC and partners developed different management strategies to build greater forest resilience in tandem with potentially enhancing forest productivity in a changing climate.

Full issue: https://issuu.com/forestnet2/docs/ljsj_julyaugust24-lr



Canadian Conservation and Land Management Knowledge Network Portal. What lies beneath: How alternatives to clearcutting affect understory vegetation in British Columbia's coastal forests. Written by **Cosmin Filipescu** and others. This infographic provides an overview of the Montane Alternative Silviculture Systems project established to test and study new approaches to forest harvesting and regeneration in coastal montane forests on central Vancouver Island, British Columbia.

Full article: <https://www.cclmportal.ca/resource/what-lies-beneath-how-alternatives-clearcutting-affect-understory-vegetation-british>



Petawawa Post. *Climate change research at PRF aims to build resilience, hope for forests.* Written by Patricia Leboeuf with the help of **Trevor Jones** and **Nelson Thiffault**. This journal article presents the Adaptive Silviculture for Climate Change project at PRF.

Full issue: <https://www.petawawapostlive.ca/articles/2024/september2024/climate-change-research-at-prh-aims-to-build-resilience-hope-for-forests.html>



Le Progrès forestier. *Succès de la régénération forestière: Les facteurs écologiques priment sur l'intensité de la coupe.* Written by **Claudie-Maude Canuel** and **Nelson Thiffault**. This professional paper shows that natural ecological features have a more significant impact on site regeneration than woodcutting intensity.

Full issue (French only): <https://www.afsq.org/fr/articles-automne-2024/succes-de-la-regeneration-forestiere-les-facteurs-ecologiques-priment-sur-lintensite-de-la-coupe>



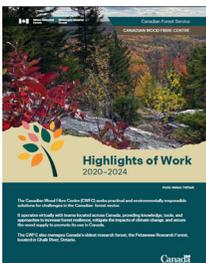
Canadian Forest Industries. *Adapting to the future: Silviculture strategies: Exploring climate-resilient forest management at Petawawa.* Written by **Nelson Thiffault**, **Trevor Jones**, **Mike Hoepfing**, and **Jeff Fera**. This professional paper presents the Adaptive Silviculture for Climate Change experiment, at the Petawawa Research Forest that aims to develop, test, and refine adaptive silvicultural treatments that can help sustain forest ecosystems in the face of changing climatic conditions.

Full article: <https://www.woodbusiness.ca/adapting-to-the-future-silviculture-strategies/>



Open Science and Technology Repository (OSTR). *2023–2026 Canadian Wood Fibre Center's Contribution Program.* Written by **Nancy Kingsbury** and **Samuel Fauteux**. This report presents a summary of the CWFC Contribution Program for the 2023–2026 period.

Full issue: https://publications.gc.ca/collections/collection_2025/rncan-nrcan/M4-182-2024-eng.pdf



OSTR. *Highlights of Work 2020–2024.* Written by **Nancy Kingsbury** and **Samuel Fauteux**. This report summarizes the work done by the scientists of the CWFC for the 2020–2024 period.

Full issue: https://publications.gc.ca/collections/collection_2025/rncan-nrcan/Fo4-233-2024-eng.pdf



The Forestry Chronicle. *Forest biomass for bioenergy as a tool to mitigate climate change: Implications for sustainable forest management in eastern Canada.* Written by **Claudie-Maude Canuel** and **Nelson Thiffault**. This professional paper presents ways to facilitate the development of the forest bioenergy sector within the sustainable forest management framework of eastern Canada.

Full issue: <https://pubs.cif-iffc.org/doi/10.5558/tfc2025-001>



Adaptive Silviculture for Climate Change. *Petawawa Research Forest.* Written by **Mike Hoepting, Trevor Jones, Nelson Thiffault, and Jeff Fera.** The Adaptive Silviculture for Climate Change Network website was updated in January 2025 to update the content related to the Petawawa Research Forest ASCC installation.

Website: <https://adaptivesilviculture.org/petawawa-research-forest/>



Logging and Sawmill Journal. *Site preparation and regeneration systems to adapt to a changing climate by Canadian Wood Fibre Centre/Canadian Forest Service and its partners.* Written by Tony Kryzanowski with the help of **Derek Sidder.** This article presents different considerations to adapt our well-developed site preparation practices to mitigate or reduce risk of wildfire, drought, and pests in a changing climate.

Full issue: <https://issuu.com/forestnet2/docs/ljsseptoct-lr>



Logging and Sawmill Journal. *Canadian Wood Fibre Centre explores a novel reforestation technique to address the increase in large-scale natural disturbances in Canadian forests.* Written by Tony Kryzanowski with the help of **Derek Sidder.** This article presents how unmanned aerial vehicles can be used to apply tree seed-loaded pods in evenly distributed patterns across wildfire sites or other sites identified as suitable for vertical direct application into natural or prepared microsites.

Full issue: <https://issuu.com/forestnet2/docs/ljsnovdec2024-finallr>



Logging and Sawmill Journal. *Legacy research ready to pay dividends as new planning tools become part of standard forest management practices.* Written by Tony Kryzanowski with the help of **Derek Sidder.** This article presents how the network of sites established by the CWFC and CFS can provide answers for alternative forest practices that can be evaluated because they are tracked and geo-referenced with compendiums.

Full issue: https://issuu.com/forestnet2/docs/logging_sawmilling_journal_-_jan_feb_2025

Recorded Webinars



CFS-LFC lectures. *Translocation of white spruce seed sources to new environments and its effect on wood quality.*

Speaker: **Isabelle Duchesne and Patrick Lenz**

Full webinar (French only): https://www.youtube.com/watch?v=bondr7mqn_c



Simply Science YouTube. *Helping forests adapt to climate change (Byte-Sized Science): Adaptive Silviculture for Climate Change at the Petawawa Research Forest.*

Speaker: **Trevor Jones**

Full webinar: <https://www.youtube.com/watch?v=75u38e3BCd0&t=447s>



Alberta School of Forest Science and Management seminar series. *Long-term silvicultural studies in the Great Lakes-St. Lawrence Forest Region.*

Speaker: **Trevor Jones**

Full webinar: <https://www.youtube.com/watch?v=dc6R0Sp3ykA>

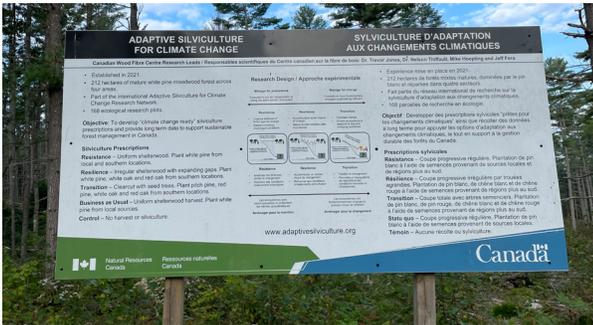


Reforest Canada Collective Conversation Series. *Reforestation success after wildfires: A case-study in northeastern Québec.*

Speaker: **Nelson Thiffault**

Full webinar: <https://www.youtube.com/watch?v=ZyWFysAPpgI>

Petawawa Research Forest



Managed by CFS, PRF contributes to the protection, sustainability, innovation, and economic development of Canada's forests. Established in 1918, this "living laboratory" continues to inform forest research and forest management practices in Canada and around the world.

Our mission is to enhance sustainable forest management practices by facilitating innovative research. We facilitate research by providing a safe and secure sustainably managed forest land base, accessible forest research data, and on-the-ground knowledge transfer experiences. [This infographic shows how.](#)

With more than 100 years of research history, PRF is in a unique position to develop, test, and validate the application of large data sets to meet current and emerging forest management challenges. As a [remote-sensing supersite](#), open access to PRF data stimulates innovation and enables further research and development.

The forest is available to scientists and collaborators from across federal and provincial departments, academia, and industry. For more details, [contact PRF.](#)

What's happening in the CWFC?



ELSEVIER

Elsevier Data Repository

In September 2024, the "[Updated science-wide author databases of standardized citation indicators](#)" was released. This list, made by Stanford University and Elsevier, shows the top 2% of the most-cited scientists from different research fields all over the world.

We would like to congratulate our research scientist, Dr. Peter Newton, on being included in Forestry on the list of the World's Top 2% of Researchers (career).

We also would like to congratulate the other CFS recipients that are René I. Alfaro, Pierre Bernier, Sylvie Gauthier, Arthur Groot, E. H. Hogg, David W. Langor, Guy R. LaRocque, Michael B. Lavigne, Steen Magnussen, Daniel W. McKenney, David Paré, Douglas Pitt, Jacques Régnière, Marc Rhainds, Bernard Roitberg, Kees van Frankenhuyzen, and W. J.A. Volney.



In January 2025, the Canadian Journal of Forest Research welcomed Dr. Nelson Thiffault as new Co-Editor-in-Chief.

After acting as Co-Editor-in-Chief for the previous year and with 18 years of experience as an Associate Editor with the journal, Dr. Thiffault will be an asset for the *Canadian Journal of Forest Research* and its publisher, Canadian Science Publishing.

If you would like any additional information or would like to discuss any of the highlighted projects, send us an email at fibrecentre@nrca-nrcan.gc.ca

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