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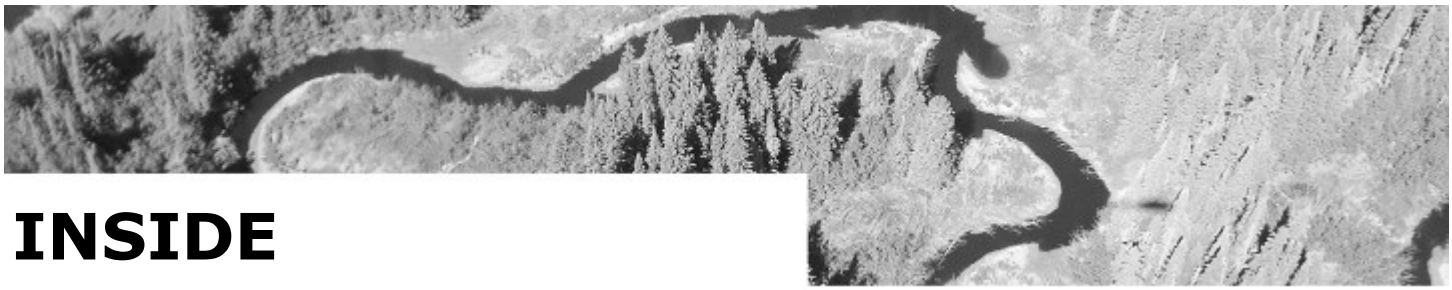
ALSO INSIDE



INSIDE

THIS ISSUE

EVERY ISSUE

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How vulnerable are Ontario's forests to global change?

Isabelle Aubin and John Pedlar, Great Lakes Forestry Centre, Sault Ste Marie, Ontario

Climate change is increasingly threatening the health and sustainability of Ontario's forests.

Forest vulnerability can best be assessed via three distinct components: exposure, sensitivity, and adaptive capacity. Exposure is defined as the degree of environmental change a species will experience, in terms of character, magnitude, and rate. Sensitivity refers to the degree to which a species might be affected by these changes, and adaptive capacity is the ability of a species to tolerate or cope with climate change impacts.

Climate change is expected to expose species to higher mean annual temperatures, increased variability in precipitation, and more frequent drought events. For instance, our models predict that sugar maple forests in Ontario will experience increasing temperatures that eventually exceed those experienced by this species in Canada. Trends in precipitation are much less pronounced, though most regions in Ontario are projected to experience modest increases over time. This combination of large temperature increases with modest increases in precipitation is expected to result in generally drier conditions across the province in the future, which may challenge forest sustainability in some regions.

We have developed a series of indices characterizing the sensitivity of the main tree species in Canada to climate change stressors – specifically drought, fire, and migration ability. These indices are built around the main mechanisms by which trees cope with each stressor. For instance, our drought indices assess the extent to which tree species can cope with drought via avoidance, resistance, and recovery. Trees may avoid drought by staying hydrated, either by maintaining access to water (e.g., through deep roots), or by limiting water loss (e.g., through rapid control of stomata). Other tree species exhibit drought resistance, typically via xylem resistance to embolism. Finally, trees can recover from drought at the individual level, through xylem recovery and/or large carbohydrate reserves, or at the population level, through strong vegetative propagation. In collaboration with the Forest Gene Conservation Association, these indices of tree sensitivity to drought, fire and migration are available at: https://sites.google.com/fgca.net/tree-climate-vulnerability/home.

By integrating knowledge on tree sensitivity and exposure, it is possible to assess the potential impact of climate change on tree species. To this end, we integrated climate change scenarios, exposure to drought, stand composition data, and sensitivity indices based on the traits of 22 tree species representing 88% of forest biomass in Canada. This allowed us to generate maps summarizing the potential impact of drought on Canadian forests, available at: https://glfc.cfsnet.nfis.org/fcvul/index.php

It is important to keep in mind that forest vulnerability to drought extends beyond mature tree mortality. The potential impacts of drought include reduced productivity, regeneration failure, increased fire risk, and reduced defenses against pests and diseases, leading to greater sensitivity to insect epidemics, both native (e.g. tent caterpillar, spruce budworm) and exotic (e.g. emerald ash borer, beech bark disease). We are currently finalising a project where we combined current and future distribution maps for 14 exotic forest pest species that are currently expanding in Canada with biomass data for the 37 most abundant tree species in Canadian forests. This will allow us to generate maps summarizing the potential impact of exotic pests on Canadian forests under climate change.

In conclusion, many challenges await Canada's forests, making it difficult to predict how these stressors might interact. There are many uncertainties, but we would like to outline two. First, will we, as a society, be able to modify our actions and reduce our emissions, choosing to reduce our immediate comfort to maintain longer-term quality of life? Second, what is the intrinsic adaptive capacity of individuals, populations, species, and ecosystems to adapt to new climatic conditions and survive? For individual organisms, this may include behavioral, physiological, or morphological changes that could help to dampen the impact of climate change. Such intrinsic adaptation is still not well understood, but will be a key component of how Ontario's forests respond to climate change in the coming decades.

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Available ressources

Via Natural Ressources Canada

https://glfc.cfsnet.nfis.org/fcvul/?&lang=en

https://natural-resources.canada.ca/climate-change/climate-change-impacts-forests/forest-change-indicators/drought/17772

http://planthardiness.gc.ca

https://cfs.nrcan.gc.ca/projects/3

Via Forest Gene Conservation Association

https://sites.google.com/fgca.net/tree-climate-vulnerability/sensitivity

Information and tools:

Drought - https://sites.google.com/fgca.net/tree-climate-vulnerability/sensitivity/drought

Migration - https://sites.google.com/fgca.net/tree-climate-vulnerability/sensitivity/migration

Fire - https://sites.google.com/fgca.net/tree-climate-vulnerability/sensitivity/fire

Scientific papers in open access

Migration capacity: https://doi.org/10.1111/ddi.13630

Tree sensitivity: https://doi.org/10.3390/f11090989

Evaluation of vulnerability: https://doi.org/10.1002/ecs2.2108

Adaptive capacity of trees: https://doi.org/10.1002/ece3.8024

Adaptation portfolio: https://doi.org/10.3390/f12030273

Impacts of climate change on eastern boreal forests: What we have learned from a regional integrated analysis

Yan Boulanger, PhD, Chercheur en écologie forestière / Research scientist Forest Ecology, Ressources Naturelles Canada, Canadian Forest Service

A profound understanding of the challenges and strategic responses is necessary to mitigate the effects of climate change on boreal forests, and thus to pave the way for sustainable forest management practices that align with the realities of a changing climate. In the presentation at the 2024 OPFA Annual Conference, we delved into the outcomes of a comprehensive regional integrated assessment carried out in Quebec, aimed at exploring the multifaceted impacts of climate change on forest ecosystems (Boulanger et al. 2023). This region-specific study, while centered in Quebec, offers critical insights into similar ecological trends observable in Ontario, hence broadening its relevance. The initiative brought together a diverse range of contributors from academia, various levels of government, and forestry sectors to forge a multidisciplinary approach to understanding and addressing the ecological challenges posed by climate change.

Climatic changes and their implications on forests

Documenting significant climatic shifts since the mid-20th century, the assessment highlighted a notable increase of 1.7°C in average temperatures across Canada—a rate of warming that is double the global average (Bush and Lemmen 2019). This rapid climatic change is casting a wide range of effects on forest landscapes. It has led to more frequent and severe forest fires (Boulanger et al. 2014), shifts in the populations and distributions of pests like the spruce budworm (Régnière et al. 2012), and heightened drought severity, all of which collectively contribute to stressed forest ecosystems. These changes that will be exacerbated in the future will reshape the forest composition and structure, particularly impacting species like coniferous trees that are traditionally adapted to colder environments. Indeed, these tree species will experience significant growth declines, especially at the southern edge of their distribution ranges (Boulanger and Pascual Puigdevall 2021).

Ecosystem goods and services are at risk

The alteration of forest ecosystems will directly affect the goods and services they provide. Changes in forest composition and increased natural disturbances, notably fires, are affecting wood production by altering the types and volumes of wood harvested. For example, increased wildfire activity will increase regeneration failures while decreasing the quantity of harvestable stands, meaning that the annual allowable cut may have to be strongly decreased to maintain a sustainable timber supply (Cyr et al. 2021). This not only impacts the forestry industry but also affects wildlife habitats, which in turn influences the distribution and population dynamics of species dependent on these forests, such as the caribou (Leblond et al. 2022). Additionally, the cultural values and practices of Indigenous communities, deeply intertwined with these forest ecosystems, are also being disrupted.

Adaptive strategies to mitigate impact

Adaptive strategies are needed to counter the adverse effects of climate change on forests and the ecosystem goods and services they provided. These strategies encompass a spectrum of approaches designed to enhance forest resilience, resist further detrimental changes, or facilitate ecological transitions to new climatic conditions. These include promoting forest management practices that enhance the forest's natural resilience to disturbances like fires and pests, maintaining existing forest conditions despite the evolving climate, and introducing species or altering practices to adapt to anticipated future conditions. These strategies can be conducted through forest conservation, a reduction or intensification of the current management strategies or be a mix between all these strategies. For example, plantations, as an intensification strategy, could be used to enhance forest resilience through reducing regeneration failures although such strategies might be costly. Planting deciduous trees could help the forest to resist to climate-induced increases in fire activity. Furthermore, conservation approaches could improve carbon balance in the boreal forest and also improve forest resilience to climate change. Also, reducing logging rates could favor caribou, birds and First Nations values.

(Continued on page 6)

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Regional implementation and collaboration

Implementing these adaptive strategies necessitates a regionally tailored approach, acknowledging the diverse forest types, varying impacts of climate change, and different capacities across regions. We advocate for robust regional collaboration, involving stakeholders from local communities to national policymakers to ensure the strategies are effectively adapted to local conditions. This involves not only the sharing of knowledge and resources but also a comprehensive analysis of each strategy's potential benefits and costs to determine their feasibility and effectiveness.

Concluding thoughts

The comprehensive findings we presented underscore the pressing need to rethink and revamp traditional forest management practices in the face of rapidly changing climatic conditions. Our study concludes that maintaining the status quo is not an option, highlighting the necessity for proactive adaptation measures that are scientifically informed and collaboratively implemented. Such measures are crucial for sustaining the health of forest ecosystems and the myriad of services they provide, thereby ensuring the resilience of these landscapes and the communities that depend on them.

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Régnière J., St-Amant R., Duval P. 2012. Predicting insect distributions under climate change from physiological responses: spruce budworm as an example. Biol. Inv. 14:1571-1586.

Ontario's Forest Policy Framework: Foundation for action

Olivia Hele, Policy and Program Assistant, Ministry of Natural Resources and Forestry

At the 2024 Ontario Professional Foresters Association (OPFA) annual conference, Ministry of Natural Resources and Forestry (MNRF) representatives described Ontario's Forest Policy Framework, including the interconnected system of laws and policies that guide sustainable forest management in Ontario.

Sustainable Forest Management Framework

Peter Henry, R.P.F., Director of the MNRF Crown Forests and Lands Policy Branch, presented 'Ontario's Forest Policy Framework: Foundation for Action,' emphasizing how Ontario's forest policy framework is an inter-connected system of laws, regulations and policies, based on science, continual improvement, and public and Indigenous engagement and consultation. The policy framework supports actions to address the many pressures impacting forests, forest management and society.

Policy tools

At the heart of Ontario's Forest policy lies the Crown Forest Sustainability Act (CFSA). Its provisions govern various aspects, including forest management planning, harvesting, licensing, operations, and enforcement mechanisms. Key manuals including the Forest Management Planning Manual, Forest Information Manual, the Forest Operations and Silviculture Manual, and the Scaling Manual provide direction on developing a forest management plan, information exchange and reporting, and wood measurement.

Complementary to the CFSA and the Manuals are a series of forest management guides that enhance Ontario's forest management practices. These guides provide information for forest managers developing plans for sustainable forests. The guides are a suite of tools to achieve healthy sustainable forests and help managed forests look and function like natural forest ecosystems while minimizing adverse impacts on other values.

Guide approach

Ontario has adopted an approach that uses multiple layers of direction referred to as coarse and fine filters. The coarse filter focuses on maintaining biodiversity at multiple scales by emulating natural disturbances. The fine filter is implemented when the habitat requirements of a particular species are not sufficiently addressed by the coarse filter, or when local societal and economic considerations necessitate a habitat provision different from

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that provided by the coarse filter. The CFSA highlights the importance of emulating natural disturbance patterns to sustain ecosystem diversity. By managing forests within a natural range of structures, compositions, and patterns, and employing both coarse and fine filters, ecosystems are equipped to remain resilient in the face of climate change.

Adaptive management

Ontario's forest policy framework is designed to support long term forest health using a 'learning by doing' approach that is informed by the best available information.

This approach involves regularly incorporating new data, information and science into forest policies, standards, and guides. By supporting adaptive management, the MNRF acknowledges the unpredictability of forest ecosystems, allowing for flexible and informed decision-making that can respond to challenges effectively.

As changing climate and forest pest dynamics impact our forests, the question arises: How can we ensure that our forests not only withstand these challenges but also thrive?

Pest management

Jim Saunders highlighted the MNRF's approach to forest pest management. In his presentation 'Policy Perspectives on Forest Pest Management in Ontario' Saunders explained: forest insects and diseases play a role in the sustainability of Ontario's forests, so forest pest management is an integral part of Ontario's policy framework. Native insects and diseases play an essential ecological role renewing forests, recycling nutrients, and providing new habitat and food for wildlife. In some situations, when infestations cause a decline in ecosystem health, or damage available wood fibre, then insects and diseases are labelled "pests." Forest pests impact tree mortality, tourism and recreation opportunities, quantity and quality of wood supply, global trade, socioeconomics, cultural values, fire hazard, and biodiversity.

The MNRF's responsibility extends to managing forest pests on public land across Ontario, guided by the Crown Forest Sustainability Act and the Invasive Species Act, and in collaboration with key partners.

(Continued on page 9)

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Climate Change

Maara Packalen presented "Policy perspectives on managed forest and climate change" highlighting opportunities to consider climate change in Ontario's forest policy framework. Climate change adaptation and mitigation inform the province's forest policy framework in a manner that is evidence based, compatible with the management of other values and using best available information. The framework enables flexibility to adapt local forest management actions to resist and respond to potential climate change impacts and integrates climate considerations into forest management planning. Planning teams are encouraged to leverage climate change expertise. Supporting climate change mitigation opportunities through sustainable forest management practices can influence the amount of carbon that is released into the atmosphere or stored in trees and harvested wood products. Management decisions that maintain healthy and diverse forests are a key strategy for retaining a climate-resilient forest. Ontario's climate-based tree seed transfer policy supports decisions that conserve genetic diversity while ensuring that seed used to regenerate forests has a good chance of producing trees that are adapted to both current and future growing environments. Consideration of climate change in forest management planning is supported by a range of data and information, including the following linked resources: Managed Forest and Climate Change and Forest Explorer.

DID YOU KNOW?

Practices and behaviours to reduce vulnerabilities and risks associated with climate change can help forests adapt to a changing environment.

For more information on how sustainable forest management is guided by Ontario's forest policy framework, the following linked resources are available on Ontario.ca:

- https://www.ontario.ca/page/sustainable-forest-management How Ontario's forests are managed to ensure forest health.
- https://www.ontario.ca/page/forest-management-policies Laws and policies that guide forest management in the province.
- https://www.ontario.ca/page/forestry-reports Reports on forest health, management, resources, wood supply and other topics.

Do you see forest fuels through the forest?

Matthew Corbett, R.P.F.

All wildland fire management activities carried out by Aviation Forest Fire and Emergency Services (AFFES) will be in accordance with the approved Wildland Fire Management Strategy. The direction set out in the Wildland Fire Management Strategy provides the foundation for daily wildland fire response decisions for the protection of human life and values. It is recognized that AFFES must support land use/resource management planning as wildland fire has an important role in achieving resource management objectives. The *goals, objectives and actions* outlined in this strategy strive to balance the needs for public safety and economic protection, the ecological role of wildland fire, and the capacity of the fire management program within the MNRF.

Ontario Crown forests are managed to meet social, economic, and environmental needs of present and future generations. This action is steered by Registered Professional Foresters who are required to consider many variables to minimize adverse effects on plant life, animal life, water, soil, air, and social and economic values, including recreational and heritage values.

Optimizing silvicultural and harvesting systems requires increased consideration of wildland fire prevention and mitigation actions alongside forest sustainability practices. Working collaboratively through a 'whole of society' approach, will develop strong integrative wildland fire prevention and mitigation activities capitalizing on a diversity of subject matter expertise, experience, and multiple ways of knowing. Different practices may include integrating fire management planning as part of the forest management planning process with increased use of prescribed fire and forest fuel management techniques adopted as forestry practices that will be a vital piece of the 'whole of society' approach.

Through a legislative and policy lens there are many informative pieces that provide direction to prevent the occurrence of forest fires; however, there is no direction pertaining directly to mitigating the impacts of wildland fire through the effective use of forest fuels management. Wildland fire is an inevitable ecological process essential for restoring and maintaining ecosystem integrity and sustainability. Forest planning must consider how forest management practices may increase or decrease wildland fire risk, especially in areas around the wildland urban interface. There is a need for forest fuel management to be embedded into adaptive forest management trials. Strategic designs are necessary to prioritize fuel reduction treatments in configurations to mitigate wildland fire behaviour impacts to social, economic, and environmental values.

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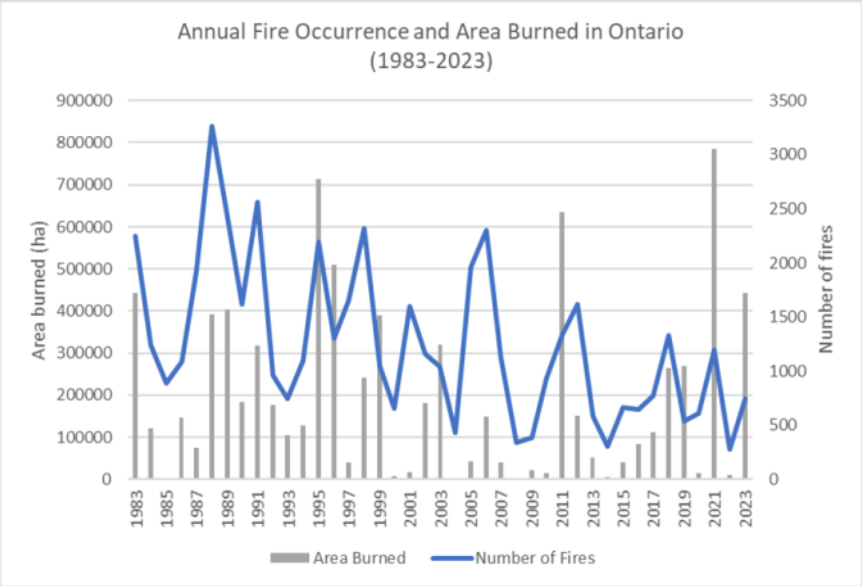


Figure 1. The variability of fire occurrence and area burned in Ontario from 1983-2024.

In any year, the number, size, and intensity of wildland fires is highly variable (Figure 1) because they are significantly influenced by local weather. Most wildland fires are kept small through wildland fire fighting suppression actions. In a few cases, fires grow large and complex primarily due to strong winds and dry forests, requiring sustained efforts over multiple days.

This variability presents challenges when managing a wildland fire program. No wildland fire is ever the same and it occurs at different times under different conditions and the effects and impacts can differ greatly. We have the proactive opportunity to foster the landscape resiliency through the practice of professional forestry and apply adaptive sustainable forestry practices to reduce fire intensity in areas close to assets and resources through fuel mitigation techniques supported by adaptive forestry practices.

As wildland fire becomes more prominent, we as professional foresters must more meaningfully consider forest fuels management in forest management planning. Early efforts associated with wildland fire mitigation in other jurisdictions are commencing with addressing forest fuel management in disturbed areas with accumulated fuels on the surface, mature dry dominated conifer forests or mid aged stands that require tending. Most treatments are happening within 2 km of assets and resources to reduce areas with the greatest fire risk exposure. Beginning with these steps we can mitigate wildland fire impacts and proceed in a proactive direction to fostering landscape resiliency.

Integrating wildland fire management planning into forest management planning is a viable option to ensure information needed to support wildland fire management is transparent. We must learn to live prudently with fire and wisely use mitigation efforts to reduce the risk and accept the tradeoffs this requires. Let’s continue to build on collaboration and listen to each other to build a safe sustainable future for those living, working, and relying on values from fire prone ecosystems.

Forest health monitoring update 2023

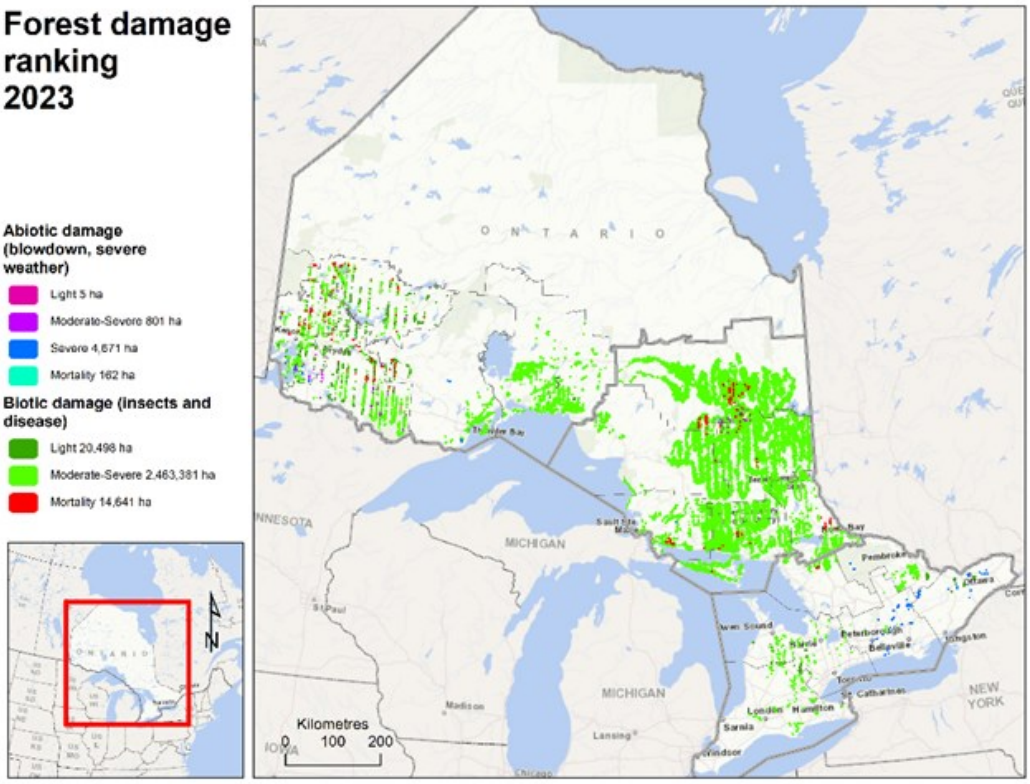
Dan Rowlinson, Provincial Lead, Ontario Forest Health Monitoring, Ministry of Natural Resources and Forestry

Introduction/Summary

This interim report is documented in a more formalized document (2023 Forest Health Conditions in Ontario) that is available on-line (https://www.ontario.ca/page/forest-health-conditions) and includes verified areas and forecasts.

This season the forest health monitoring program within the biodiversity and monitoring section (BAMS) consisted of 12 field personal and one program lead coordinator. The 2023 field program was not without out its challenges due to the extreme dry conditions in the northeast resulting in many forest fires to work around.

The focus of the monitoring program was on the major forest disturbances and their delineation through aerial surveys. In 2023 forest health staff logged approximately 120 aircraft hours and delineated in excess of 2 million hectares of damaged forest. The bulk of that was made up of the persisting spruce budworm outbreak in the northeast and an increase in forest tent caterpillar defoliation.



Biotic/Insects and Disease

Forest tent caterpillar, *Malacosoma disstria*

- On average in Ontario, forest tent caterpillar outbreaks have occurred every ten to 12 years, with each outbreak continuing for three to five years.
- In the south forest tent caterpillar feed primarily on sugar maple and oak, and in the north this pest is found mostly on trembling aspen but also feeds on several other deciduous species.
- The area of moderate to severe defoliation in the province saw an increase compared to 2022. There was a noted increase in the outbreak across mainly the northeastern region of the province this season.
- Friendly flies (*Sarcophaga aldrichi*), a native parasite of forest tent caterpillar, was observed at moderate numbers within the core infestation however the outbreak is expected to continue into 2024.

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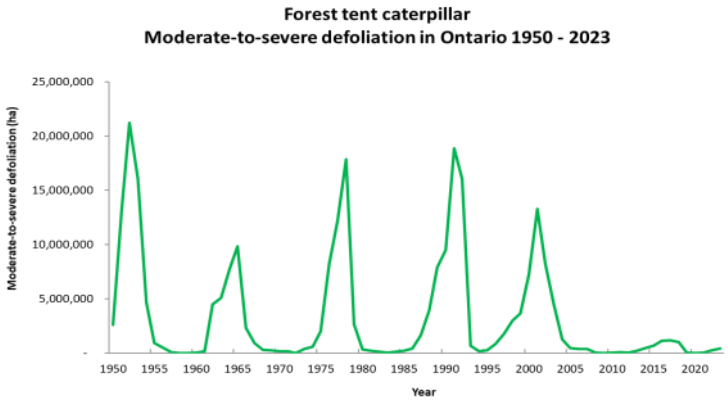

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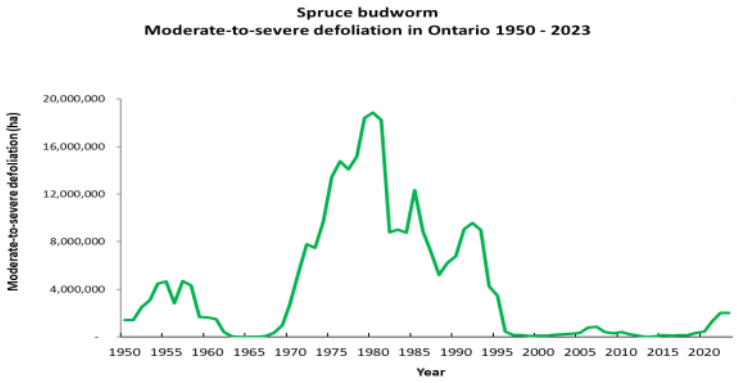
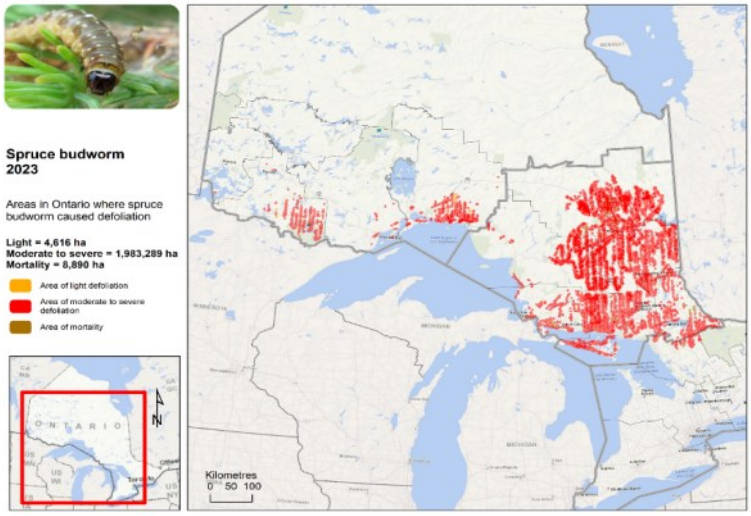
Spruce budworm, *Choristoneura fumiferana*

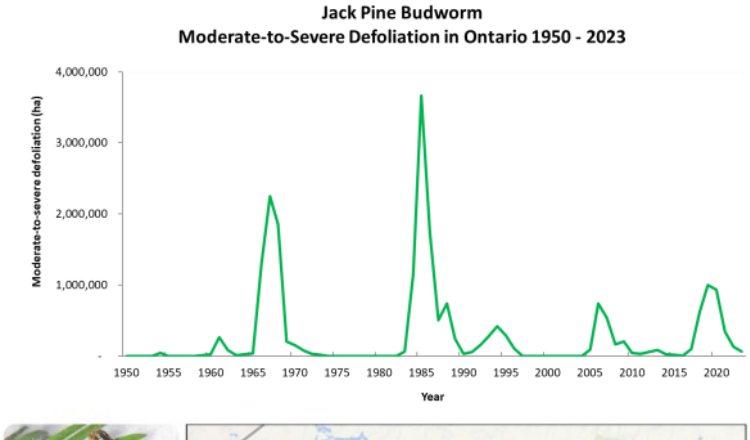
- Spruce budworm is one of the most damaging native insects affecting fir and spruce in Ontario.
- Spruce budworm outbreaks occur periodically when the primary host, balsam fir, reaches 40 years of age.
- Outbreaks can last several decades and can result in extensive mortality to balsam fir and spruce.
- In 2023, moderate to severe spruce budworm defoliation in the province decreased to 1,983,042 ha from 2,029,039 ha in 2022, with most of the defoliation mapped in northeast region and some in southern region.
- The northwest region noted the first year of moderate to severe defoliation with 119,018 hectares of spruce and fir mixed stands being infested.

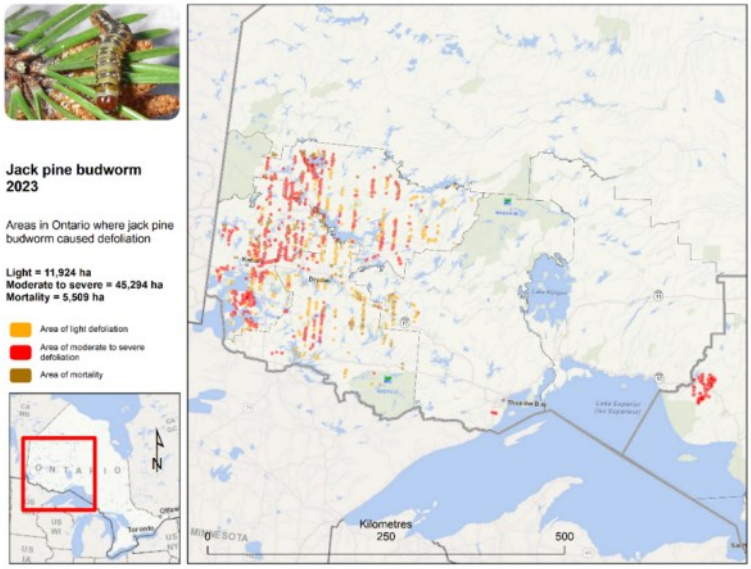




Jack pine budworm, *Choristoneura pinus pinus*

- Jack pine budworm outbreaks occur in Ontario about every 8 to 10 years.
- In the past, large-scale control programs have been undertaken to protect high value jack pine stands during an outbreak.
- For the fifth consecutive year, the area of moderate to severe jack pine budworm defoliation has decreased in Ontario. In 2023, 45,294 ha of moderate to severe jack pine budworm defoliation were aerially mapped. Of that, the majority of defoliation was mapped in Northwest Region with a small area of new infestation in Northeast Region.
- In 2023, 5,509 ha of mortality were aerially mapped in the northwest region.





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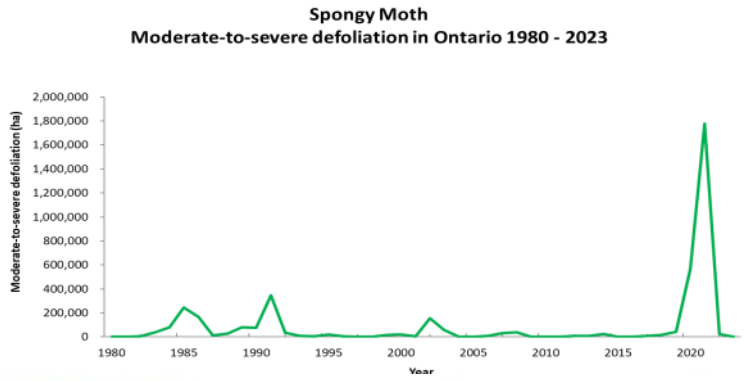
Spongy moth, *Lymantria dispar*



- Spongy moth was discovered in Ontario in 1969, with the first incidence of severe defoliation recorded in Kemptville District in 1981.
- Spongy moth outbreaks are cyclical, typically occurring every seven to 10 years. In Ontario, major outbreaks have peaked in 1985, 1991, and 2002. The most recent outbreak, which peaked in 2008, was much less severe than previous ones.
- Spongy moth hosts range from oak, birch, and aspen in the north to hardwoods such as oak, sugar maple, and American beech and softwoods such as eastern white pine and Colorado blue spruce in southern Ontario.
- Cool, wet conditions provide an ideal environment for the proliferation of *Entomophaga maimaiga*, a fungus known to cause gypsy moth populations to collapse. Nuclear polyhedrosis virus (NPV) is a viral infection that is also known to kill spongy moth larvae.
- Moderate to severe spongy moth defoliation decreased substantially from 1,779,744 ha in 2021 to 22,427 ha in 2022 and 2,529 ha in 2023. This decrease indicates a population collapse in northeastern Ontario and parts of southern Ontario, particularly in southeastern Ontario.
- In 2023, defoliation was aerially mapped only in Aylmer Guelph District. No mappable defoliation was reported elsewhere in the province.

Cedar leaf miner complex,

- Cedar leafminer complex is a group of similar insects that mine cedar foliage, including:
  - *Argyresthia aereoargentella* (Brower)
  - *Argyresthia canadensis* (Freeman)
  - *Argyresthia thuiella* (Pack)
  - *Coletechnites thujaella* (Kft.)
- The last widespread cedar leafminer outbreak occurred in Southern Region from 2002 to 2007, resulting in high amounts of crown dieback and whole tree mortality.
- In 2023, 16,594 ha of moderate to severe and light cedar leafminer defoliation were aerially mapped in Southern Region, an increase from 14,296 ha in 2022.

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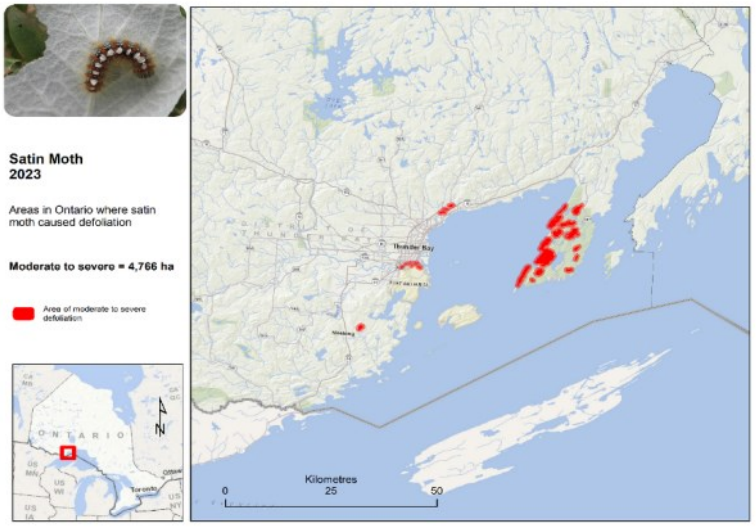
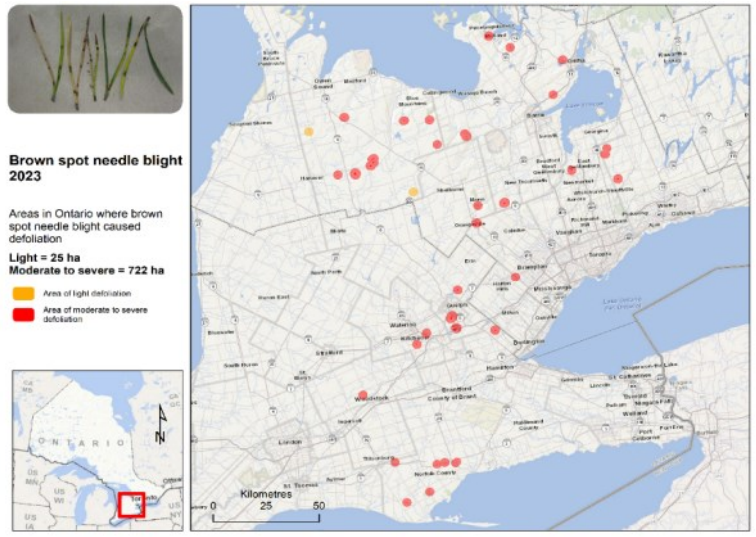
Satin moth, *Leucoma salicis* (L.)

- Satin moth is found across North America, including most of southern Ontario. This pest continues to expand its range in Ontario, spreading from the south and reaching Sault Ste. Marie in 2011 and Thunder Bay in 2016.
- Satin moth normally infests individual or small groups of ornamental poplar trees, especially European white and Carolina poplar, but will occasionally defoliate poplar and aspen stands.
- In 2023, 4,766 ha of satin moth defoliation were aerially mapped in Northwest Region.



Brown spotted needle blight, *Lecanosticta acicula* (M.E. Barr)

- This disease affects Scots and Austrian pine of all ages but is most damaging to seedlings and smaller trees.
- Several years of infection by brown spot needle blight reduces tree growth. Coupled with other factors, such as drought and secondary insect attack, this blight may result in branch and tree mortality.
- In some affected locations, previous years' needles turn brown and drop in June, leaving only current years' shoots on trees.
- In 2023, scattered areas of new brown spot needle blight damage were observed in Southern Region.



Blowdown

- Blowdown, damage to trees caused by high winds or extreme weather events, is a natural disturbance process in forests. The extent and frequency of such damage is sporadic.
- Less blowdown was recorded in 2023 (4,332 ha) than in 2022 (10,563 ha). In 2023, localized areas of blowdown were found in all three regions, with the most area (3,117 ha) in Southern Region.

Forest insect pests of Ontario: Risk status, historical dynamics, and management challenges

Barry J. Cooke, Research Scientist, Great Lakes Forestry Centre, Sault Ste Marie, Ontario

The boreal forest of Ontario is home to several indigenous forest insect pest species; however, the invasive insect species that have done so well on the ash, oak, and maple of the Great Lakes-Laurentian forest have fared poorly on the spruce, pine, and poplar of the boreal. The most significant threats therefore continue to be the same species we've always had to manage around: spruce budworm (SBW), jack pine budworm (JPBW), and forest tent caterpillar (FTC). Focusing on just SBW and FTC, I show that we have recently come to learn some new and important things about the inner workings of the cyclic-eruptive dynamics of these "clockwork-catastrophes", including the roles of climate change, forest structure, and natural enemies in precipitating major forest losses. The next 10-20 years will be marked by heavy impacts by these two species, but it's important to understand the hard limits that currently exist on our ability to forecast impacts with any kind of precision. There will be an ongoing need to adapt to area-wide damage and impacts after the fact, because much of the uncertainty in pest risk forecasting appears to be intrinsic and irreducible.

Aerial insect pest surveys from Ontario and Minnesota indicate outbreaks of FTC occurring every 13 years for the last century (Cooke et al. 2022). Tree-ring data from neighbouring Quebec over the past 450 years reveal irregular cycling of SBW, with outbreaks occurring every 40-50 years. The patterns in southern Quebec (Boulanger & Arseneault 2004) and eastern Quebec (Boulanger et al. 2012) are qualitatively similar: statistical modeling with ARIMA (autoregressive integrated moving average) leads to a lack of forecast precision over the interval 2000-2050 in either case (Figure 1).

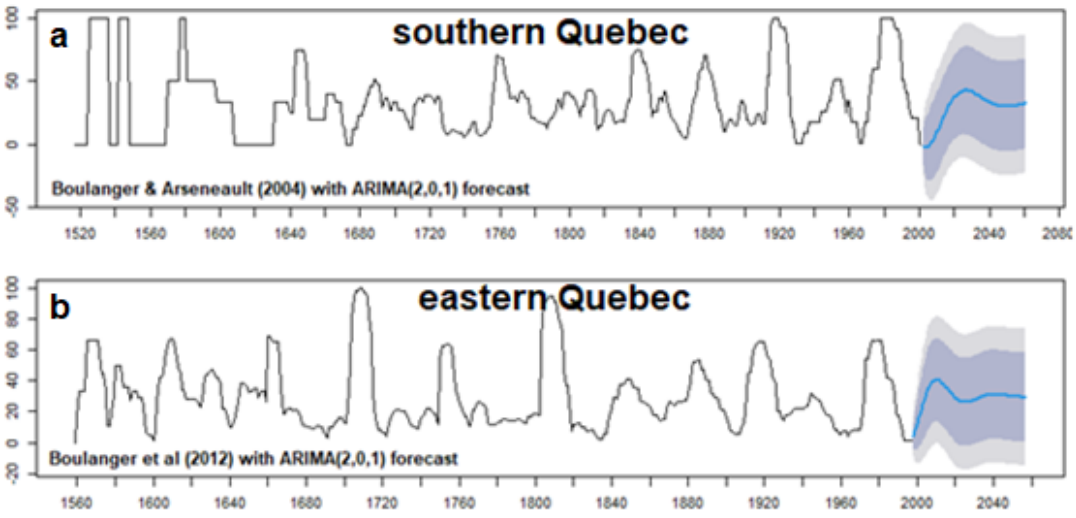


Figure 1. A simple ARIMA forecast model of spruce budworm in southern Quebec (a) and eastern Quebec (b). Based on data ending in 2000, the model predicts a population cycle peak in the 2010-2030 interval (blue line); however, the 80% and 95% confidence interval on the forecast (dark grey, light grey) is so wide that there is no basis for guessing whether the cycle will be a low-intensity event of no material concern, or a high-intensity event triggering a provincial-scale wood supply crisis.

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Curiously, the intensity of SBW outbreaks in Quebec appears to be modulated at the slowest of time scales in opposite patterns in the two regions. In fact, the same opposing pattern of cycle amplitude modulations is observed in FTC in Quebec 1938-2002, with higher intensity outbreaks in the middle of the record, in the 1960s -1980s, in the maple-dominated region of southern Quebec, versus higher intensity-outbreaks on the ends of the series, in the 1950s and 2000s, in the aspen-dominated region of northwestern Quebec (Cooke & Lorenzetti 2006). A new national-scale analysis shows that FTC outbreaks are actually as irregular as SBW, with weakly synchronized cycles that occasionally erupt into non-recurring regional-scale spike anomalies (Cooke 2024b) – these anomalies being the cause of infrequently episodic patterns of large-scale host forest decline (Cooke 2024a).

Focussing on Ontario, the "Border Lakes" project has sought to determine (a) whether host abundance is what regulates the intensity of cycle peak intensities at slow time scales, and (b) whether SBW and FTC in mixedwoods are indirectly coupled to one another through their respective roles in shaping forest species successional dynamics. Robert et al. (2018, 2020) found evidence for (a), and Cooke et al. (2024) found evidence for (b). These inter-dependent patterns of insect disturbance succession – introgressive "see-saw" cycling – suggest that even without fire, the boreal forest in the cross-border region of Ontario and Minnesota is extremely dynamic (Figure 2).

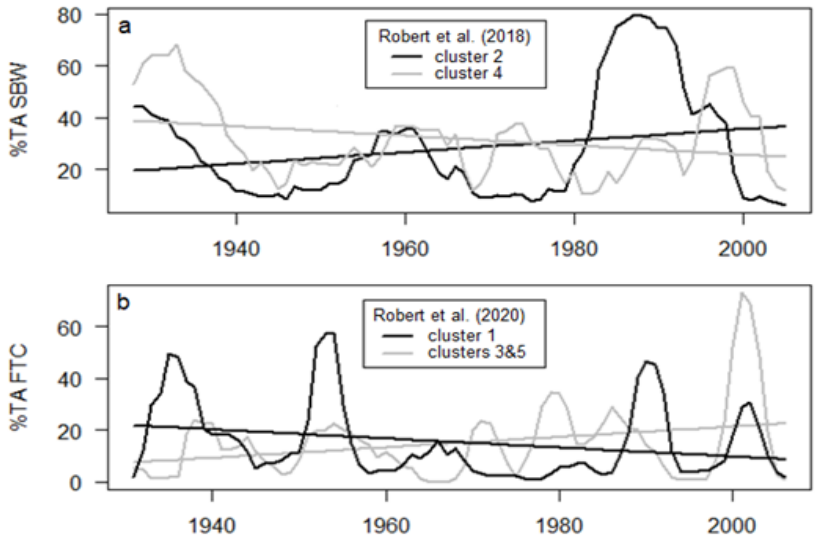

Figure 2. Opposing trends in percent trees affected, %TA, by (a) spruce budworm, SBW, and (b) forest tent caterpillar, FTC, in the Ontario-dominated (black) versus Minnesota-dominated (grey) time-series clusters reported by Robert et al. (2018) (their clusters 2 versus 4) and Robert et al. (2020) (their clusters 1 versus 3+5). All four fitted trend lines are significant at p<0.05. The crossing over of the grey and black trend lines between species and jurisdictions indicates "see-saw" introgression, as one cycling pest slowly comes to dominate the other, as its host gradually comes to dominate the landscape, through pest-driven host-forest collapse and succession to a major competing forest tree species.

These complex results have us questioning the simple and attractive idea of the "clockwork" theory of synchronized insect population cycling (Royama 1992) and reconsidering the older "catastrophe" theories of outbreak occurrence (Ludwig et al. 1978) and forest resilience (Holling 1973). Sturtevant et al. (2015, 2023) have suggested that a hybrid theory of "clockwork-catastrophe" may help explain the unpredictable intensity of periodic insect outbreaks. According to this hypothesis, the probability of catastrophe in any one forest-pest system (say, SBW) depends on what happened a century earlier in other forest-pest systems (say, FTC). But because the two systems fluctuate according to a "strange" attractor – not a Royamian single-point attractor – the timing of forest collapse in response to pest cycling is not predictable (Figure 3). Indeed, this could be the ultimate source of extreme irregularity in SBW cycle intensity in Quebec (Figure 1).

What this all means for the practising forester is that (1) Miller & Rusnock (1993) were wrong; mixedwoods do indeed tend to be more pest-resistant than forests of pure conifer or hardwood (Kneeshaw et al. 2021), and (2) outbreak intensity is sufficiently unpredictable that we are going to have to continue to take a reactive approach to pest mitigation and an adaptive approach to pest risk management, much as we've been doing for the past 50 years. If patch clear-cutting leads to species mixed mosaics (Figure 4), this is going to be more pest-resilient than a commercial forestry model that is reliant on homogeneous species and age structures, such as overmature pure spruce-fir or overmature aspen. This only adds to the allure of mixedwood management as a generalized integrated forest and pest management philosophy.

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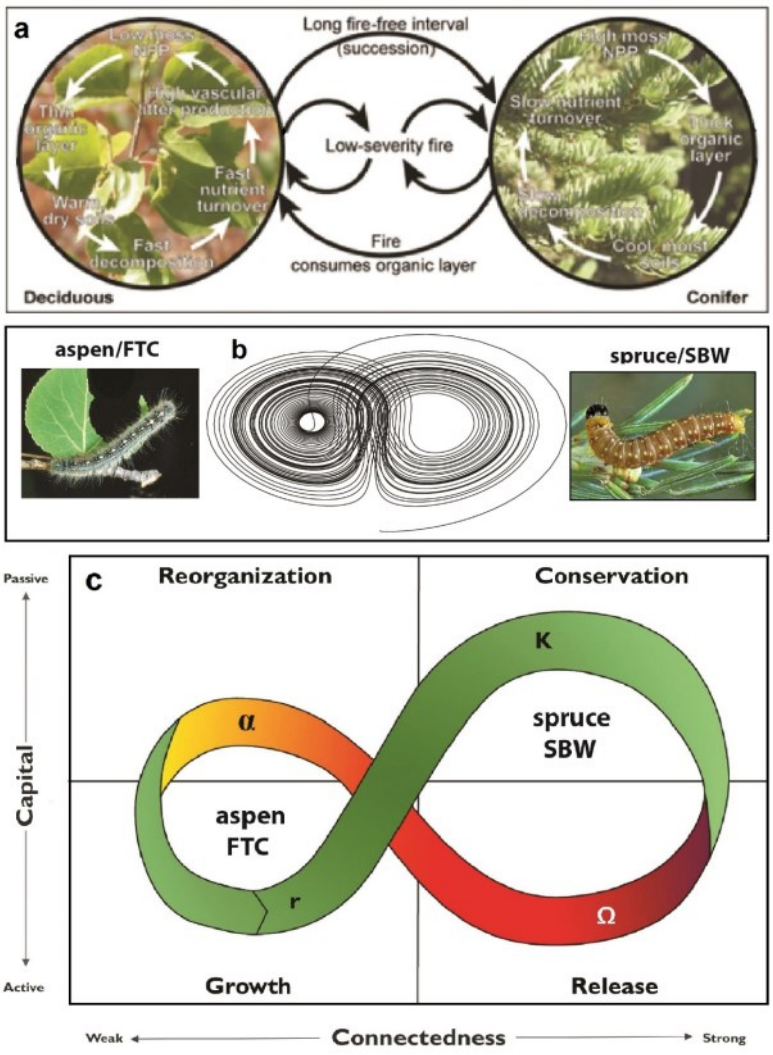

Figure 3. The theory of alternative reciprocal stable states in the boreal forest, as mediated by herbivorous insects and fire and nutrient cycling, resulting in a community-level forest resilience, despite episodic catastrophe arising from periodic outbreak of any one herbivore species. Credits to (a) Johnstone et al. (2016), (b) Lorenz (1963), and (c) Holling (1973).

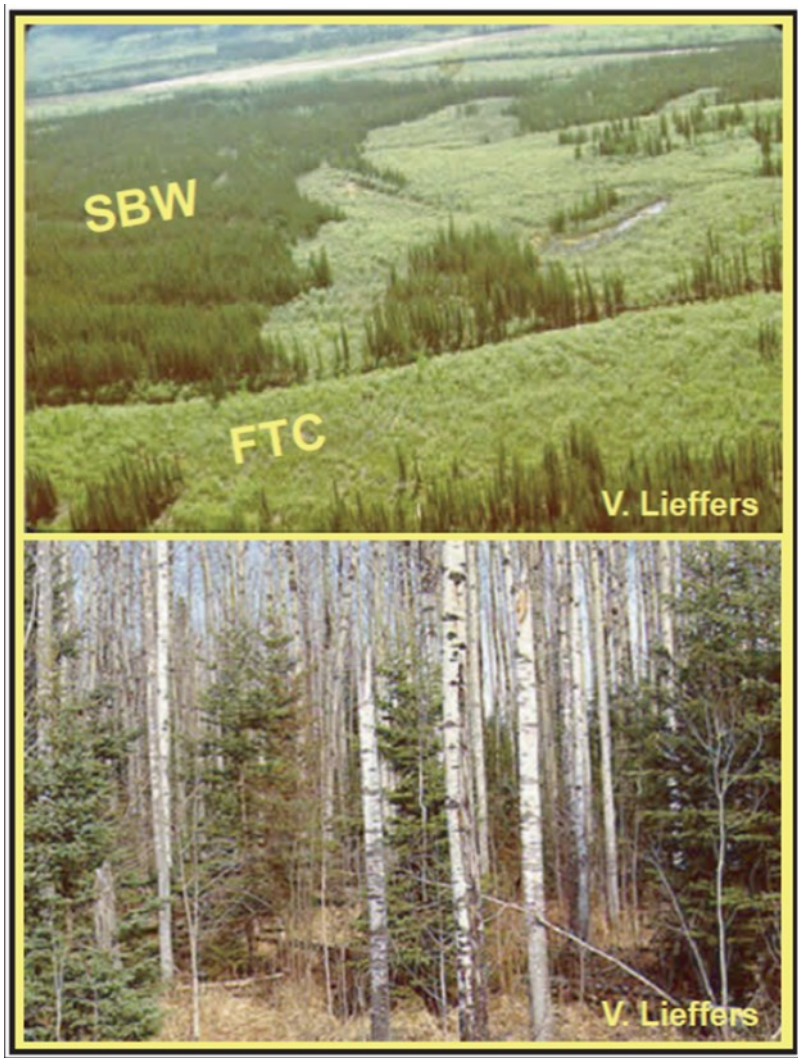

Figure 4. Mixedwood management, where the scale of species mixing may be clustered (top) versus inter-mingled (bottom). "SBW" indicates spruce budworm-prone host-forest. "FTC" indicates forest tent caterpillar-prone host forest. (Photo credit to Vic Lieffers.)

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Hemlock Woolly Adelgid Monitoring Network

Derissa Vincentini, Community Science Coordinator and GIS Lead, Invasive Species Centre

Native to Japan, hemlock woolly adelgid (HWA) has been spreading across eastern North America since the 1950's when it was first discovered in Virginia. HWA can now be found in 22 eastern states and two eastern provinces. In Ontario, HWA has infested hemlock stands in the southeastern portion of the province (Niagara Gorge, Fort Erie, Wainfleet, Pelham, Hamilton, Haldimand County, Lincoln and Port Colborn) as well as one known infestation north of Lake Ontario in the Grafton area. HWA continues to approach the full range of its host, eastern Hemlock, and Ontario's contiguous hemlock forests. As such, there is a need for increased monitoring on the landscape to better prepare land managers for HWA's potential arrival and to protect this ecologically important tree.

Hemlock woolly adelgid is an aphid-like insect, that attacks and kills hemlock trees by feeding on nutrient-rich sap at the base of the needles, causing mortality within 4-15 years. While the insect itself is barely visible to the naked eye at 1.5mm in length, they are identifiable by their white, fluffy ovisacs that resemble mini cotton balls. In addition to the movement of firewood and nursery stock on the landscape, HWA has the potential to spread long distances through the migratory bird pathway. As a result, HWA is often first introduced to a new stand in the crown of the trees allowing it to go undetected until the hemlock begin to decline. Typically, once HWA can be identified on the lower branches of a tree, it is too late to treat.

Hemlock woolly adelgid can be identified by its white, woolly ovisacs on the underside of branches, at the base of the needles. Photo credit: Invasive Species Centre

The HWA Monitoring Network was created to increase the likelihood of an early detection by training a network of community members. Coordinated by the Invasive Species Centre (ISC), in partnership with the Natural Resources Canada (NRCan) and the Canadian Food Inspection Agency (CFIA), the Network provides municipalities, conservation authorities, and NGO's, as well as woodlot owners/managers and general members of the public with the tools to monitor their hemlock stands for this pest.

While traditional monitoring methods for HWA such as ball sampling, sticky traps and visual inspections are important and useful tools, the HWA Monitoring Network has added a new tool to the toolbox. Referred to as the 'Microscope Slide Trap' or 'eDNA Trap', the trap was developed out of Grand Valley State University. Much like the traditional green sticky trap, the eDNA Trap intercepts HWA in its environment. The eDNA Trap, however, consists of four microscope slides dipped in petroleum jelly that can collect both the insect itself or part of the insect, such as wool fragments. The slides can then be visually assessed under a microscope for HWA crawlers, the mobile stage in its lifecycle, before the jelly is scraped off and sent for molecular analysis. Molecular analysis is able to pick up DNA from the presence of the insect itself on the jelly and/or environmental DNA (eDNA) which is genetic material shed by the insect into the environment without the presence of the organism itself.

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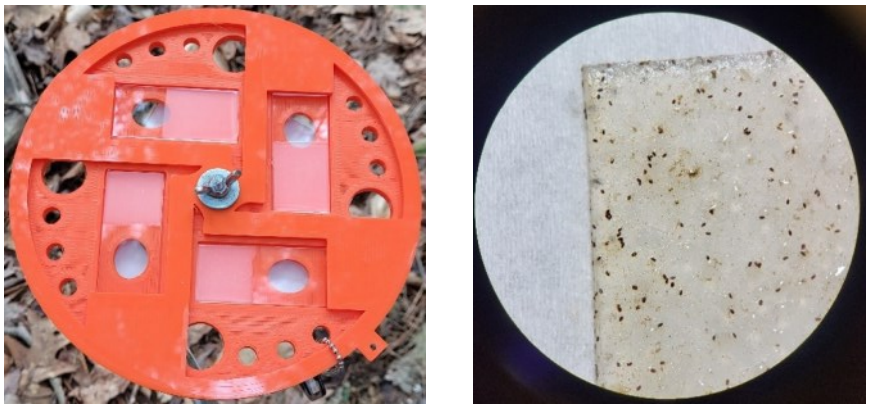

Novel 3D eDNA microscope slide traps for detecting hemlock woolly adelgid. Left: 3D printed trap. Right: Adelgid infested microscope slide. Photo credit: Natural Resources Canada.

In 2023, this method was piloted in Ontario by 50 volunteers in areas at high risk of HWA introduction and in areas complimentary to ongoing government surveillance. Each equipped with a kit to deploy their trap in their woodlots across southern and eastern Ontario. *The bad news first*, HWA is spreading. One new detection of HWA was made as a result of this Network that may have otherwise gone unnoticed. *The good news?* This helped determine the effectiveness of these traps at detecting HWA in the field, and for use in a broad scale community science program. This highlighted the need for more HWA monitoring to better understand its distribution. In 2024, the HWA Monitoring Network expanded to include an additional 50 volunteers targeting southwestern Ontario, totaling 100 traps set up in the province. With the success in Ontario, the Network has also expanded to deploy traps in Prince Edward Island, Nova Scotia and Quebec by working with partners within the new jurisdictions.

With multiple tools in our toolbox, and by working together, we have the best chance at understanding the distribution of HWA on the landscape as more management options are becoming available to protect our hemlocks.

Anyone can monitor for HWA by visually inspecting your hemlock by:
(1) checking the underside of the branch for white woolly ovisacs at the base of the needles,
(2) checking the branches that have fallen on the ground and
(3) report your findings (both negative and positive) to CFIA's Survey 123 Form or if positive, contact your local CFIA office.

For added precautions when monitoring hemlock stands, following phytosanitary protocols to prevent accidental spread. Lint roll clothing and hair, wipe down gear with ethanol wipes, and scrub boots in soapy water. It is also recommended to change and launder clothing and visit sites of known infestation last. These protocols become especially important when travelling to multiple stands over a relatively short period of time.

For more information on hemlock woolly adelgid, the HWA Monitoring Network or for protocols to monitor your hemlock stand, check out our webpage or contact Derissa Vincentini (dvincentini@invasivespeciescentre.ca) at the Invasive Species Centre.

Foresters: Allies in the fight against invasive plants

Abby Obenchain and Bill Cole, Clean North

Since we retired in 2019, we've become warriors in the fight against invasive plants in Ontario. And we're hoping to enlist professional foresters in this battle as well. Make no mistake about it—invasive plants threaten forests. You may not have seen them in action yet, especially if you work in northern Ontario, which is further behind on the invasion curve (Figure 1). But the risk is real.

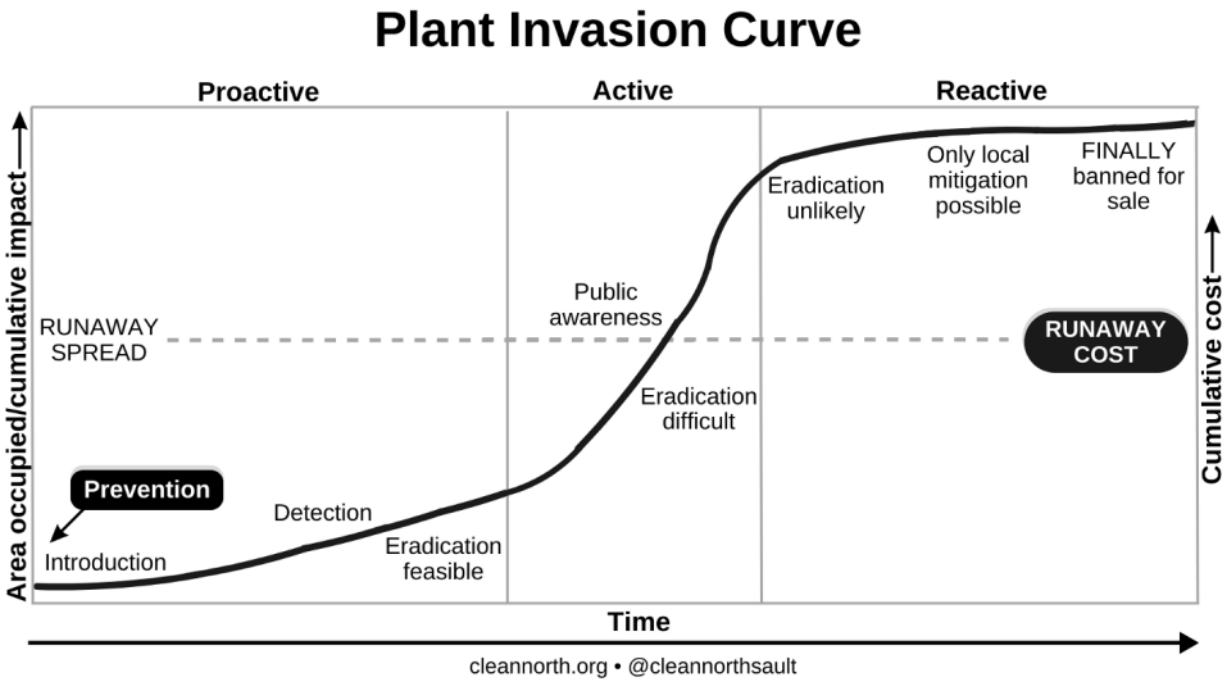

Figure 1. This invasion curve illustrates how prevention and early eradication of invasive plants is far more effective and a lot less expensive than waiting until populations have exploded. Most of Ontario's forests being early in the invasive curve for most species is an opportunity. Graphic credit: Clean North.

How we got involved

After the pandemic began, when we visited other cities like Toronto, London, and Hamilton, we found ourselves spending more time in urban natural areas rather than malls and restaurants. And we quickly noticed that invasive plants are affecting every urban forest. Plants like periwinkle, goutweed, yellow archangel (Figure 2), lily of the valley (Figure 3), non-native honeysuckles, and Japanese knotweed are spilling out from people's backyards and spreading aggressively, killing off native wildflowers like trillium and trout lilies and suppressing forest regeneration.

We became so alarmed that under the auspices of our local environmental group, Clean North, we applied for an Invasive Species Centre microgrant. Our goal was to create an education program for Sault Ste. Marie/Algoma District, including a "grow me instead guide" to invasive plants and native alternatives.

Figure 2. Yellow archangel smothering yellow trout lilies in a forested area in Sault Ste. Marie. Photo credit: Abby Obenchain.

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We wanted a guide for our area because the invasive species we wanted to highlight are not necessarily the greatest concern elsewhere, and not all plants native to other areas are native here. This work has snowballed into our spending many hours a month on educating others.

Both of us are deeply concerned about effects on forests, as invasive plants can disrupt ecosystems on a broad scale. A recent U.S. study showed that 70% of U.S. eastern national parks studied had imminent or probable forest regeneration failure, with invasive plants being a key factor (read journal article). We do not want to go there!

And yet, Canada is failing to prevent invasive plants from entering Canada through retailing or e-commerce. We regulate way fewer garden plants than the U.S. Many damaging plants like periwinkle are still widely available. And many garden centres say if a plant is legal, they will keep selling it.

Herbicide restrictions are another issue. We understand the potential harm from widespread use of herbicides for cosmetic purposes. But without herbicides, controlling a species like Japanese knotweed, which responds to physical disturbance by launching exponential lateral root growth, is almost impossible.

Creeping purple bellflower is another tough one, especially if it gets into your lawn, as it has long carrot-like roots that can extend down 18 inches! If you don't get every bit of root, it will grow back. Some people get so frustrated with bellflower that they decide to move, because they see no point in living on a property where gardening is impossible. There are Facebook groups devoted to eradicating both knotweed and bellflower, which is telling.

Figure 3. Lily of the valley overwhelming Huron Natural Area in Kitchener. Photo credit: Wendy Janzen.

How can you help?

- **Follow best practices** for preventing spread of invasives during forestry operations (check out the Clean North forestry and invasive plants fact sheet, which includes links to guides/other resources
- **Educate others in your organization**, partners, and stakeholders about preventing spread of invasives
- **Influence family, friends, and your community** to learn about invasives, to not share or move them, to remove them, and to grow more native plants (share grow me instead guides relevant to your area)
- **Sign on as a supporter of the Canadian Coalition for Invasive Plant Regulation** and ask your employer to do likewise
- **Advocate for governments at all levels to address shortfalls in policies/regulations** and resource prevention, management, and education (FYI, the Ontario Invasive Plant Council has only two staff members and has had big funding cuts!)

We hope we've convinced you to join us in protecting forests by fighting invasive plants. Questions? Email us at info@cleannorth.org.

Abby Obenchain is a retired science communications specialist, and Bill Cole is a retired forest research scientist. They live in Sault Ste. Marie.

Landscapes of the future: AI tools in landscape management

Maxime Turgeon, PhD, Data Scientist, Tesera Systems Inc. max.turgeon@tesera.com and **Jeff Boisvert**, PhD, PEng, Professor, Department of Civil & Environmental Engineering, Faculty of Engineering, University of Alberta. jbb@ualberta.ca.

Recent advancements in artificial intelligence (AI) and machine learning (ML) have revolutionized numerous industries, including forestry and landscape management. AI tools are increasingly being integrated into workflows, offering innovative solutions to many challenges that are difficult to address with traditional methods. In this article, we first define AI and then explore how these tools can enhance efficiency, precision, and sustainability of forestry and landscape management practices. We also highlight potential roadblocks and opportunities for a wider uptake of AI in forestry.

What is Artificial Intelligence?

Artificial intelligence refers to the capability of a computer to perform tasks that typically require human intelligence, such as pattern recognition, problem solving, and decision making. The most popular and effective algorithms for AI today are data-driven and rely heavily on pattern recognition. For instance, computer vision algorithms for land cover classification are trained on thousands of images, enabling them to detect patterns of pixels that distinguish between treed, non-treed, grass, built-up, and water areas over a given landscape. In recent years, a subset of AI algorithms, known as generative AI, has seen a lot of public exposure with the popularity of one specific model: ChatGPT. These generative AI models are trained on vast datasets, and they can generate realistic images, text, or even speech.

Domains of application

In forestry, AI can be leveraged for tree detection and classification. Remote sensing data can be processed by AI algorithms to estimate tree location, size, species, and height. This information is invaluable for forest management and fire management, as it allows precise assessments of timber volumes and fuel loads. Drones and satellites can also be used for rapid change detection at small and large scale, respectively.

AI can also be used for stand-level estimation of forest attributes. By combining LiDAR and multispectral imagery, we can derive estimates of gross and merchantable volume, aboveground biomass, and crown closure. It is also possible to develop accurate and fine-grained growth models that incorporate multiple sources of information (e.g., soil, terrain, climate).

The possibilities for using AI in land management are immense. Other examples include road detection using LiDAR, early warning system for forest health using hyperspectral imagery, and digital twin creation using drone imagery and structure-from-motion algorithms.

Figure 1. Drone imagery with tree species detection and classification overlay. Values are the model confidence. This specific model can identify spruce, larch, poplar, pine, and snags/dead trees from consumer drone imagery.

Roadblocks and opportunities

The integration of AI in forestry presents both significant opportunities and notable challenges. A significant roadblock is the lack of confidence in AI models among forestry professionals. This skepticism is certainly not limited to forestry, and it often stems from a lack of understanding of how AI algorithms work and concerns about their reliability. AI models, while powerful, can sometimes produce results that are difficult to interpret or seemingly counterintuitive, leading to distrust. Building trust requires transparent AI systems that provide explanations for their decisions and demonstrate consistent accuracy. There is an entire field dedicated to explanatory AI, and forestry practitioners are encouraged to connect with experts from this field.

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It is crucial to keep humans in the loop to help mitigate the lack of confidence in AI systems and ensure decisions made autonomously are reasonable. Human oversight ensures that AI recommendations are validated by experienced professionals who can contextualize, interpret, and judge the quality AI outputs. This collaboration between AI and human expertise enhances decision-making and mitigates the risk of errors that could arise from reliance on AI systems. To ensure the accuracy of AI estimates, these applications should involve extensive calibration of the models to ground truth plot data.

There is another opportunity to improve AI algorithms by sharing data. High-quality, diverse datasets are essential for training robust AI models. However, data sharing is often hindered by privacy concerns, proprietary restrictions, and the lack of standardized data formats. Encouraging collaboration and data sharing across organizations and institutions would enhance the performance and generalizability of AI models, leading to better forestry outcomes. For example, government agencies at all levels could make some of their data available through open-access initiatives. Similarly, private landowners and academic groups can strike partnerships to develop AI models that can solve problems foresters encounter in their daily practice.

In summary, AI is transforming forestry and landscape management by providing tools that enhance precision, automate repetitive tasks, and improve decision-making processes. From tree detection and classification to stand-level estimations of forest attributes, AI offers innovative solutions that promote sustainable and efficient landscape management practices. As AI technology continues to advance, its applications in this field will likely expand, leading to even more sophisticated and effective management strategies.

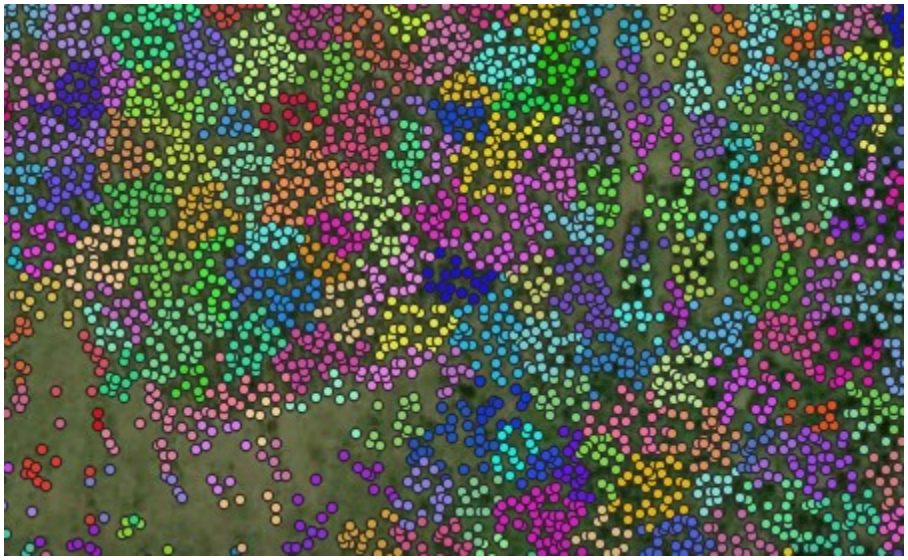

Figure 2. Individual trees can be detected using LiDAR and multispectral imagery, and attributes (e.g., height, diameter, species) can be predicted for each tree using AI.

The applications of AI in landscape management

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FSOS (Forest Simulation Optimization System) is a cloud-based forest modelling platform (https://fsos.ca) with visual interfaces (Figure 1), GIS tools and self-learning growth and yield stand dynamic tools for spatial forest modelling. The data, projects, scenarios, reports, documents can be available online. All parties work on the same projects and on the same pages. Sustainable forest management has to consider many functions such as wood flow, watershed condition, carbon storage, wildlife habitat, biodiversity, recreation, visual quality and economic contributions. The resilience to fires, insects and diseases is also a management objective. The sustainability of so many forest functions make forest management complicated and difficult.

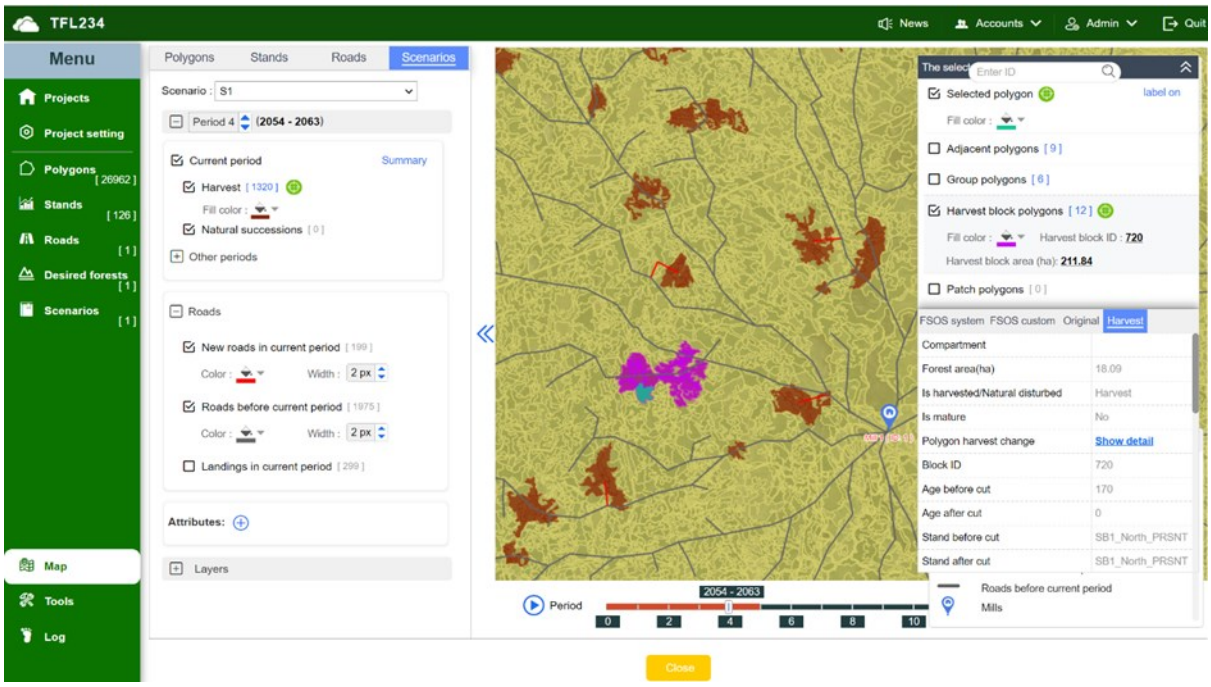

Figure 1. Interfaces of cloud-based digital forests https://fsos.ca.

In Canada, modeling software has been developed and adopted to analyze and maximize wood flows of the forests for over thirty years. Forest planning has been divided into three levels: strategic, tactical, and operational because of the limitations of computing power thirty years ago. Linking the three levels is difficult and the tradeoffs between the three levels are extremely limited. The patches for wildlife and fire resilience cannot be included in the strategic objectives spatially. Post-processing can be used to report the spatial indicators; however, the plan quality will be discounted. The integration between the strategic plan and tactical plan can make forest management easier and better because the cut blocks, roads and patches are dynamic and optimized simultaneously.

Developers in Canada are producing leading edge technologies in forest landscape modeling in the world, however, there is still no strategic forest landscape planning in Canada. A lot of effort is spent to write good-looking strategic analysis reports. However, the only number used from the strategic analysis report is the Annual Allowable Cut (AAC), and the tactical plan cannot allocate the wood amount of AAC on the ground because of the missing spatial information in the strategic analysis. The accumulated potential problems will continue to increase because of the gaps between strategic analysis and tactical plans.

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Artificial Intelligence is also called Machine Intelligence (MI), MI is different from Human Intelligence (HI). HI is process-based, every step must follow human logic strictly; while MI is result-based, and the steps are not clear. We classify MI into two types: pre-trained MI and real-time MI. The pre-trained MI is Machine Learning (ML) which is trained with historical data. The real-time MI is solving the complicated problems in real time without training and historical data. Both MIs use the same heuristic search algorithms, and each has advantages. Pre-trained MI is good at solving classification problems when the responding time is limited. The real-time MI is good at solving complicated problems when the historical data is limited.

In FSOS, we use both MIs. Pre-trained MI (ML) is used to predict the future stand dynamics, and the real-time MI is used to generate strategies to sustain, balance and optimize multiple functions of the forests. The cut blocks, roads, patches for the entire planning horizon are dynamic and optimized to create desired future forests in terms of wood flows, economic contributions, carbon storage capacities, wildlife habitat, biodiversity, visual quality, and the resilience of forests to fires and insects (Figure 2).

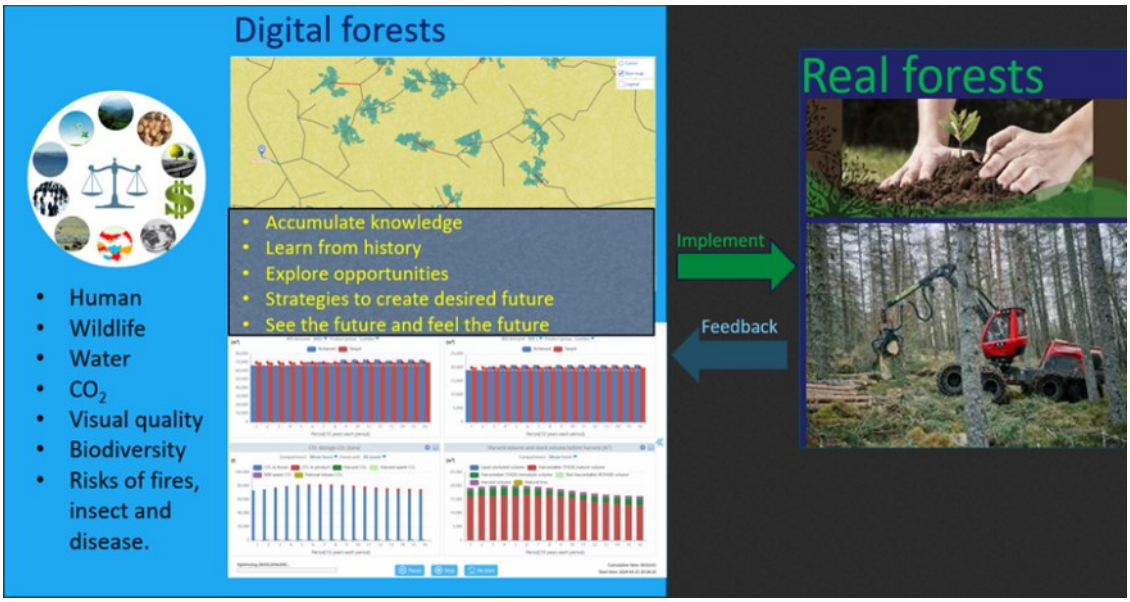

Figure 2. Digital forests https://fsos.ca and real forests.

Forest models become digital forests in FSOS (Figure 2), you can build digital forests for the real forests in the cloud or on your own network. The digital forests accumulate knowledge, learn from history, explore opportunities, and generate management strategies to create desired future forests. The real forests follow the digital forests to implement on the ground and provide feedback. The digital forests adapt and rebalance automatically. The digital forests and the real forests work together shoulder to shoulder, and the forest landscape management is automated.

With digital forests in FSOS, forest management decisions can always be made based on balancing the interests of all users of the forests. Any interests can be considered in decision-making. The digital forests never forget the interests of any parties and always work toward balanced objectives. The objectives can be achieved surely and slowly because people can see the future results and roadmaps of different management scenarios through digital forests. Forest management will have fast adaptive abilities without rebuilding models when new information is available because the smart digital forests are standing behind the real forests all the time.

Youth panel: Realities of the forest sector from the perspectives of young foresters

Ritikaa Gupta (author), R.P.F., Contributors: **Shane Gray**, R.P.F., **Ying Hong**, R.P.F., **Adam Solomon**, R.P.F in Training, **Temitope Moses Ojo**, R.P.F in Training and **Ngaire Roubal**, R.P.F in Training

For the first time, an inspiring youth-focused panel discussion took center stage at the 2024 Annual Conference and AGM of the Ontario Professional Foresters Association (OPFA) in Sault Ste. Marie. Conceptualized and orchestrated by Registered Professional Forester, Ritikaa Gupta—a young advocate for the forest sector—this panel spotlit perspectives of young and emerging forest professionals. It generated an engaging dialogue, allowing young registered forest professionals to share their insights and observations on the realities of the forest sector.

Young forest professionals positively contribute to the sector's sustainability in various ways, as exemplified by the three dynamic panelists: Shane Gray, Ying Hong, and Temitope Moses Ojo. In Ritikaa's unplanned absence, Ngaire Roubal, a professor at Sault College, adeptly facilitated the discussion, fueled by her passion for working with youth and educating them about forestry.

Panelists, from left to right: Adam Gray, Ying Hong, Temitope Moses Ojo and moderator, Ngaire Roubal.

The panel demonstrated the critical role of youth inclusion and engagement in driving the sector's sustainable growth and evolution. Youth of the forest sector can serve as role models and counter outdated perceptions of forestry as a sun-set, male-dominated, old-technology industry. Beyond their fresh perspectives, youth contribute practical solutions and strategic insights to enhance experiences within the forest sector—an aspect prominently emphasized during the enlightening panel discussion.

As the forest sector faces skills shortages and an aging workforce, Temitope, a Regional Supervisor at the Ministry of Natural Resources and Forestry, highlighted the importance of creating entry-level positions and internships to reverse this issue. These programs can be a vital bridge for young people looking to gain skills and knowledge to enter and succeed in the sector. Additionally, providing youth with assistance in relocating to Northern remote regions (where the sector is mainly feeling the lack of skills and labor shortage) could make their transition easier, especially for those originating from southern cities such as Toronto.

Temitope and Ying, who studied forestry outside of Canada, faced challenges entering the sector. They both noted that the forestry sector is still very much dominated by "seasoned foresters" with established contacts, which can be challenging for young people and newcomers to navigate.

Despite having studied forestry in Nigeria, Temitope had to start from scratch when he arrived in Canada. He noted an absence of information on relevant forestry organizations, companies, types of jobs and key players of the sector. He had to build his forestry network from scratch. A central resource with information about forestry jobs, companies, and how to get started would make it easier for young people and immigrants to enter the forest sector.

(Continued on page 29)

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Further, as illustrated by Ying, originally from China with a Bachelor of Science in Forestry, who after completing her Masters in Forest Conservation in Ontario, still did not have a clear understanding of what the Canadian forest sector was all about and how to navigate it post-graduation. Nor did she have a good understanding of the different types of jobs and career paths that exist within the sector. It was only until she landed her internship at the Ministry of Natural Resources and Forestry where she met mentors and had a better grasp of the sector as a whole.

Drawing from Temitope and Ying's insights, it is vital the forest sector proactively leverage the power of social media and strategic marketing to enhance understanding and appreciation for the sector, especially among youth. Capitalizing social media can allow the sector to reach diverse audiences and present a comprehensive view of the sector - from forest stands to wood products.

The panel discussion also highlighted a division within the forest sector between "traditional foresters" and younger forest professionals, many of whom may not have gained their positions through field or industry experience. Shane Gray, a forest industry professional, advocated for amplifying the influence of youth through forest sector discussions, decision-making bodies, and industry associations. Youth bring fresh and diverse backgrounds, cultural perspectives, and technological fluency. But what does this mean in practice? It translates to embracing new ways of thinking and working.

"An interesting reflection for myself, though, was that as differentiated as we all were in our careers, we all shared the same passion and pride in our work and investment to position the industry to be successful well into the future. This level of investment and culture within an industry is, in my opinion, very unique to forestry. It is also why the industry must continue to invest in young foresters. Hence, they have the opportunity to experience the path and install the values our industry has to offer. It's a great time to be a forester as our industry continues to be challenged to evolve" Shane Gray

For example, established ways of doing things in the forestry sector may not always be the most efficient or sustainable. Young voices can challenge the status quo and encourage a reevaluation of traditional practices. This could involve rethinking forest management strategies or exploring alternative technologies for harvesting and processing wood products.

The forest sector still has progress to make in terms of achieving gender and racial equality, as well as meaningful inclusion of immigrants. Collective effort and investment is required to promote sustainable forest management and attract the next generation of forestry professionals. By working together, the older generation can transfer their knowledge while embracing the fresh ideas and curiosity of youth in the sector. This intergenerational exchange will cultivate new ways of thinking and doing in forestry.

In addition to intergenerational exchange, the integration of Indigenous knowledge systems, often referred to as Traditional Ecological Knowledge (TEK), is equally crucial. Adam Solomon, Forestry Coordinator for Garden River First Nation (who could not attend the panel), emphasized this point. Traditional Ecological Knowledge (TEK) encompasses a deep understanding of local ecosystems, species interrelationships, and sustainable resource use practices. Incorporating TEK into forest management can enhance biodiversity conservation and ecosystem resilience. During prior discussions leading up to the panel, Adam highlighted that Indigenous communities are often overlooked and not recognized as equal contributors to Ontario's and Canada's forest sector. Additionally, lands departments within First Nation communities struggle with hiring strong local talent for building capacity internally. They also have difficulty retaining experienced workers for long term employment.

The Indigenous perspective on the forest industry highlights the importance of viewing forests as more than just economic resources. By respecting Indigenous knowledge and land rights, and integrating sustainable practices, it is possible to create a forest industry that supports both ecological health and Indigenous communities' well-being. This holistic approach not only benefits Indigenous peoples but also contributes to global efforts in biodiversity conservation and climate change mitigation.

Youth involvement has the power to amplify their influence, and when engaged, young forest professionals can become true champions for the forestry sector. By raising awareness about its importance and inspiring others, they can positively contribute to reshaping and revitalizing the sector's image.

First impressions: Diversity and innovation at the OPFA conference

Temitope Ojo, R.P.F in Training

As a newcomer to both the Ontario Professional Foresters Association (OPFA) and Canada, attending the OPFA conference was a welcoming and enriching experience. The atmosphere of inclusion and professional camaraderie was palpable as soon as I entered the conference hall. One of the first people I met was Doug Reid, Past President of the Canadian Institute of Forestry, who was engagingly discussing forestry trends with young foresters. His welcoming demeanor immediately put me at ease and set a positive tone for the event.

A memorable moment was when the Executive Director & Registrar of the OPFA, Fred Pinto, praised the cultural significance of my traditional attire and suggested a photograph together. This recognition was not only a personal honor but also underscored the Association's commitment to diversity, alleviating my initial concerns about acceptance.

Throughout the conference, I engaged with professionals from various sectors, sharing experiences and discussing career prospects. I met a local attendee who shared my passion for outdoor activities and offered to introduce me to new experiences, such as using his boat, reflecting the friendly nature of the conference. Meeting my fellow panelists in person was another highlight. These face-to-face interactions added a personal touch to our discussions, enriching both our panel session and the relationships we built.

The conference's theme, "Forestry Fired Up… Professional Foresters Fostering Landscape Management Excellence," highlighted the need for innovative forestry practices amid global changes. I participated in a panel on the significant issue of youth out-migration from forest regions, exploring its implications for the future of forestry.

Our discussions explored various innovative strategies to attract and retain young professionals in forestry, from enhancing engagement at educational institutions, modernization to adapting recruitment practices. The audience, comprising members of the OPFA and other stakeholders, engaged actively with the panelists, posing insightful questions about educational reforms, community involvement, and the integration of modern technology in forestry practices. This interaction underscored the collective commitment to evolving forestry practices to be more inclusive of and driven by youth.

Leaving the conference, I felt inspired by the shared passion and ideas, and optimistic about our ability to transform challenges into opportunities for growth in the forestry sector. Let us continue this vital conversation and work together to ensure that forestry not only survives but thrives in the hands of the next generation.

Left to right: Temitope Ojo, Fred Pinto, Ying Hong, Shane Gray.

Changes to Canada's drone regulations: Expanded opportunities for forestry

Luke Klages, R.P.F in Training, Remote Sensing Specialist, Klages Forestry Consulting

Hear that buzz above your head? It's not a wasp nest you stepped on, it's a drone. In recent years, drone use has become more common for recreation and for business. Forest professionals now have drones with increasingly advanced technologies and are using them for a variety of tasks. Drones have been adapted for tasks where time is of the essence, where a traditional aircraft would be cost prohibitive, or where a more traditional method would be impractical. In Canada, drone operations really took off in 2019, when new regulations were introduced, establishing a licensing system for low-risk drone operations.

Advancing drone technology means regulations must keep up with the times, and a series of proposed regulatory changes are under review. These changes will make a big difference in the ways drones can legally operate, opening opportunities for foresters. Currently, there are several key restrictions drone operators must abide by; drones have an upper weight limit of 25kg, a maximum altitude of 400 ft above ground level, and must remain within Visual Line Of Sight (VLOS) of the pilot or crew. These can only be breached with Special Flight Operations Certificate, a permit reviewed by Transport Canada on case-by-case basis.

Vertical Takeoff and Land (VTOL) drone getting ready for flight. Photo credit: Resolute FP Canada Inc.

The new regulations propose changes to two of those - the requirement to maintain VLOS, and the weight limit. The requirement to always maintain line of sight to a drone is being lifted, replaced with a procedure for flying beyond visual line of sight. Drones below 25 kg will be allowed to operate beyond visual line of sight, within restrictions (drones 25-150 kg cannot fly beyond line of sight). The procedure, while restrictive, will be easily applied to most Forest Management Units where population density is low. This means that people already holding an advanced license will be able to operate drones more readily.

As featured in September's Council Corner, drone seeding operations are taking off in northwestern Ontario (NWO). Several forests in NWO have been fully or partially seeded with drones as of this year. These machines are one of the first that can benefit from the increased weight restrictions, as heavier machines with the ability to fly longer and carry more payloads will make seeding more efficient. Increased payloads could also lead to development of precision spray applications with drones, an area where agriculture has surged ahead.

Drone seeding isn't the only area where drones make sense in forestry. Resolute FP Canada Inc. has also utilized an advanced Vertical Takeoff and Land (VTOL) drone to collect imagery used for deletion mapping and Free-To-Grow on their Sustainable Forest Licenses. These types of drones are sophisticated and optimized for one thing: collecting imagery, and lots of it. The resulting products mean foresters have more control over the type of imagery they receive, and can have imaging done quickly, with turnaround times on critical jobs measured in days. To date, Resolute has collected more than 10,000 ha of high-quality drone imagery to inform planning.

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For drone operators, these regulation changes will mean enhanced operating efficiency, a wider range of platforms available, and fewer barriers to innovation. There is a steep cost associated, however; fees for all services are rising by significant margins, and will be tied to inflation in the future. There is also a framework for drone businesses that has a number of requirements that must be met before carrying out commercial Beyond Visual Line Of Sight (BVLOS) operations, and for operations with drones weighing more than 25 kg.

To reiterate, the above changes are *proposed*, and have not yet been implemented. New amendments are expected to come into force in 2024-2025. Expect changes to legislation, and you may even see a few more drones over the forest.

Further Reading

For more information on proposed changes to drone regulations, please visit the Canada Gazette, Part I, Vol 157, No, 25. "Regulations amending the Canadian Aviation Regulations", at https://gazette.gc.ca/rp-pr/p1/2023/2023-06-24/html/reg6-eng.html.

Scot Ruben's article on drone seeding can be found in The Professional Forester, no 251, p23. https://opfa.ca/members-area/events/newsletters/

Year-round data capture. Photo credit: Resolute FP Canada Inc.

Global timber and lumber trends

Russ Taylor, President, RUSS TAYLOR GLOBAL – Wood Business & Market Consulting, Vancouver, BC

Overview of global log and lumber trends

The major softwood timber (log) and lumber producing countries or regions in the world are Europe (as a whole), USA and China. Collectively, these three regions account for more than 50% to 75% of global softwood consumption and production. When Canada and Russia are included, these five countries/regions account for over well over 80% of global softwood consumption and production of logs and lumber.

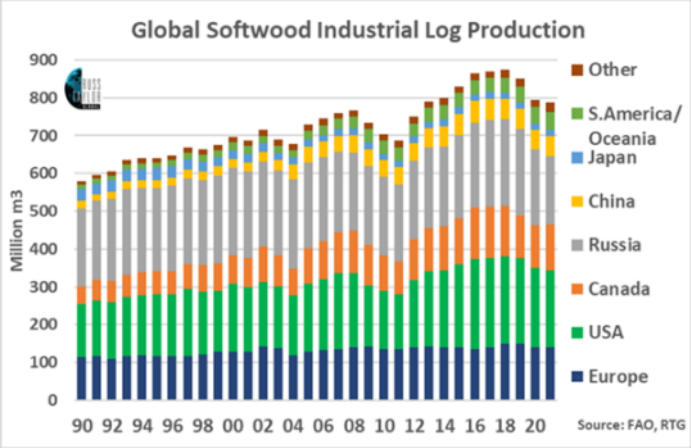
Global Softwood 2021

CONSUMPTION	Lumber	Timber
Europe, USA, China	75%	55%
+ Russia, Canada	83%	82%

PRODUCTION	Lumber	Timber
Europe, USA, China	62%	54%
+ Russia, Canada	87%	87%

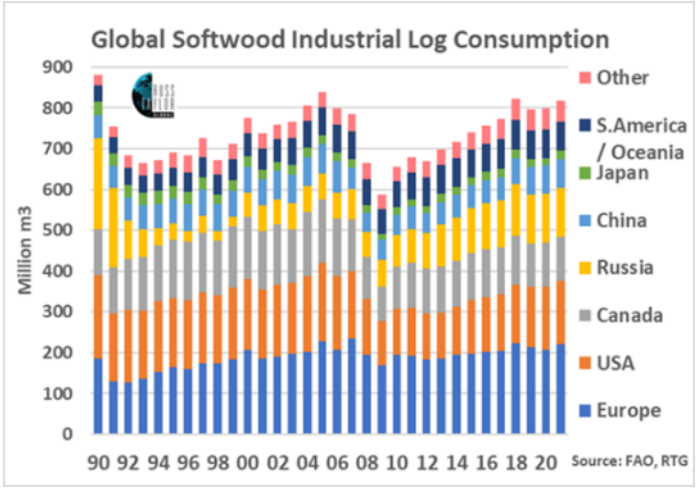
Source: FAO; RTG

Global softwood log trends



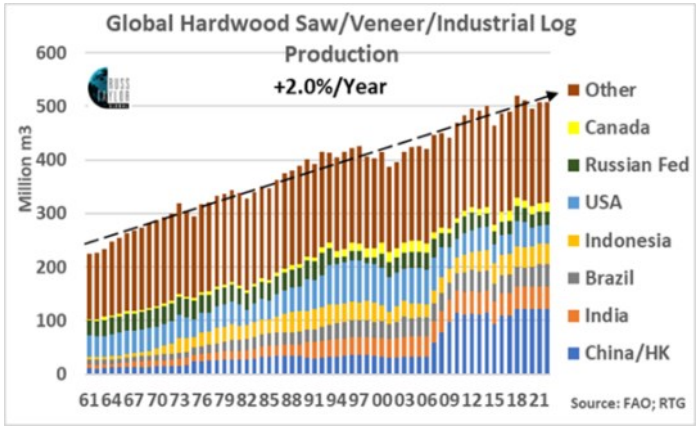
Global softwood industrial log demand & supply have been growing at about 1.0% per year. Total global production peaked in 2017-2018 at 875 million m3 and was trending lower to 2021 (787 million m3) and moved lower in 2022 and 2023 from the global pandemic and rising interest rates. It also appears that the world is starting to run out of "cheap" logs when demand continues to grow again. The major producers of softwood industrial logs are Europe (as a whole), USA, Canada, Russia and China.

Global softwood industrial log consumption shows similar trends to production with the same leading five countries/ regions.



Hardwood production

Hardwood production of saw, veneer and industrial logs, including temperate and tropical hardwoods, has seen higher growth (about 2% per year) as compared to softwoods. China, India, Brazil and Indonesia represent about 50% of output.



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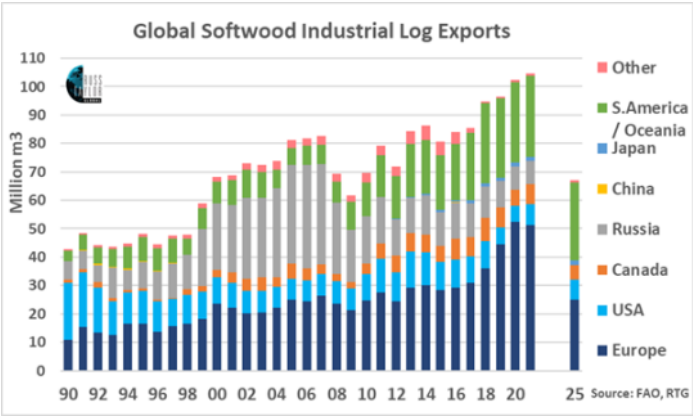
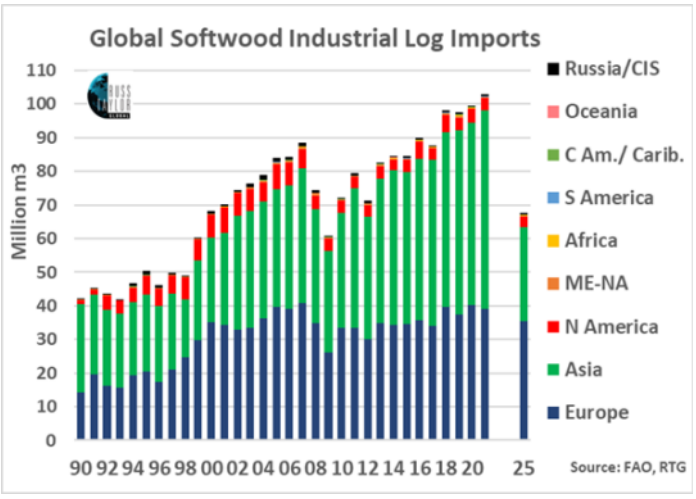
Global softwood exports and imports

Global softwood industrial log exports are relatively small at up to 100 million m3 per year. Some structural changes have occurred to some exporting countries:



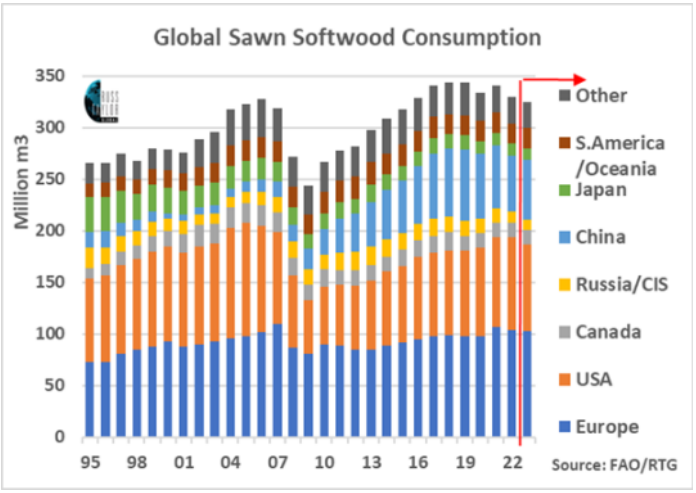
- Ukraine implemented a log export ban in 2015. It was a major supplier to China.
- Russia implemented a log export ban in 2022. It was the largest supplier to China until 2012.
- Australia log exports were banned by China from 2021 to 2023 (blamed on phyto-sanitary issues) but have seen resumed at a lower pace.
- European offshore log exports, mainly to China (peak of 16 million m3 in 2021), surged starting in 2016 following the massive salvage program caused by the spruce bark beetle epidemic that impacted Central Europe. Offshore log exports were minimal in 2015 and are forecast to be less than 5 million m3 by 2025, falling further to 2030 and beyond. The bulk of European log exports and imports are trades between European countries, and these have normally been in the 20 to 25 million m³ range.
- By 2025, the impact of reduced Russian and European log exports is expected to result in much lower volumes of offshore exports.



Global softwood industrial log imports have been led by China which imported 50 million m3 in 2021 before consumption plunged from COVID and a property market collapse. China's softwood log imports were 27 million m3 in 2023.

As mentioned, the bulk of European imports were between European countries with some import volumes from Russia ending in 2022.

Global demand



The overall global demand for wood products has steadily rebounded from the global financial crisis in 2009 until the 2020 global pandemic commenced. Wood products demand was negatively impacted at the onset of COVID-19, but a steady and remarkable rebound occurred in the second quarter of 2020 up to mid-2022. As a result of the Russia-Ukraine war and subsequent retaliations of economic and trade sanctions by western countries on Russia, oil and natural gas supplies tightened and became expensive and surging inflation and energy costs raised production costs and impacted demand. Global economies shrank the second half of 2022 and reduced demand from high inflation has increased the possibility of recessions in 2024 in many countries, including Europe, USA and Canada. As a result, global wood products consumption slowed in 2022 and into 2023 is forecast to be flat to lower in 2024.

Europe (as a region), the US and China represented 75% of global softwood lumber consumption in 2021. Normally when these three consuming regions are positive, the demand and prices remain favourable. This was not the case in most of 2018 through the first half of 2020 and again starting in 2023 and into 2024 as sluggish demand resulted in generally weak prices.

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Following the onset of the global pandemic in 2020, most major softwood lumber consuming regions saw increases in demand in the second half of the year and this continued almost unabated in 2021 and into the first half of 2022. Global softwood demand decreased by 2.9% in 2020, increased 2.3% in 2021, and declined by 3.3% in 2022 to 336 million m³.

Global supply

Total global softwood lumber production trends to 2022-almost mirrored the pace of consumption growth — down by 5.1% (more than the 3.3% decline in consumption) to about 333 million m3. Europe (as a region), the US and China represented 62% of global production in 2021. When Russia and Canada are added, this increases to a whopping 87%.

Starting in 2022, global production became heavily influenced by the geopolitics of the Russia-Ukraine war with lower demand resulting in lower production from the key producing regions. Canada's timber supply reductions and ongoing mill closures in BC have reduced Canadian production.

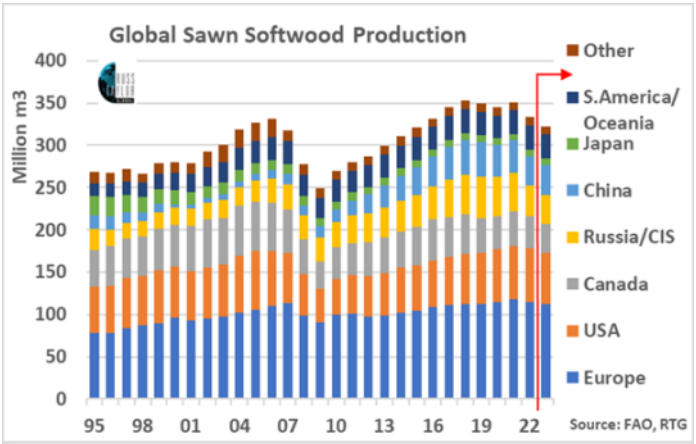
Supply increases in Central Europe due to the spruce bark beetle salvage program peaked in 2021 as lower volumes of dead timber resulted from less infested forests in 2021 from wet and cool weather. COVID has continued to limit the supply of skilled labour to add any additional sawmill shifts. In combination with soaring energy costs, there was an estimated 2.9% increase in 2021 to European lumber production and a decline of 2.6% in 2022. Smaller changes are most likely to occur in other regions, but all regions are expected to see eventual increases by 2025.

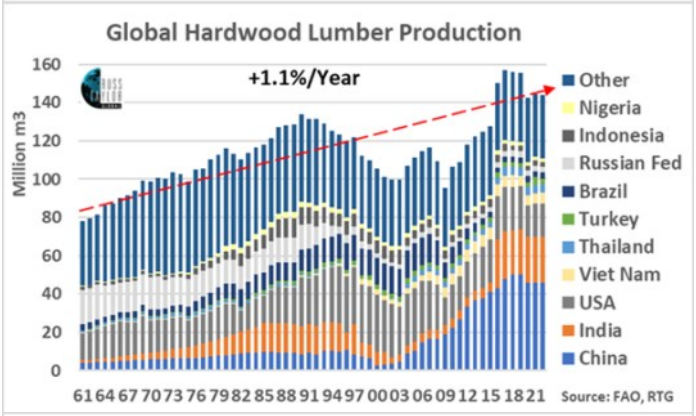
The trends in global hardwood lumber production show a growth rate of 1.1% per year, or like that of softwood lumber. The leading producers are China, India and the USA.

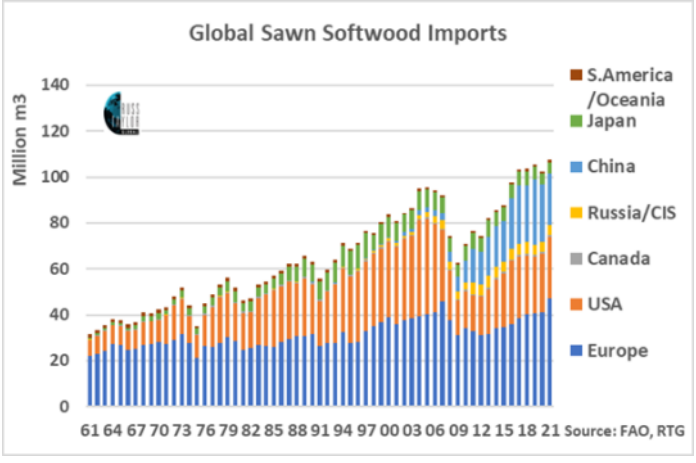
Overall global lumber production (hardwood and softwood) is increasing by 0.75%/year.

A summary of the global softwood lumber imports is profiled. The largest importers are China and the USA (European imports are mainly between neighbouring countries).

A summary of the global softwood lumber exports is profiled. The largest exporters are Canada and Russia (European exports include neighbouring countries).







Additional information

Mr. Taylor has a forestry degree (BScF) and an MBA, both from the University of B.C., and is also a B.C. Registered Professional Forester (RPF-Ret). He has just co-published an outlook on the demand for China logs, lumber and wood chips in the China Outlook to 2035 multi-client report. He is co-organizing an international conference in Vancouver in October, the Global Wood Summit. **E-Mail:** **russtaylor@russtaylorglobal.com** **Web:** **www.russtaylorglobal.com**

Council corner

Lacey Rose, R.P.F., Vice-President

Council Corner provides members with insight into the happenings of the OPFA Council and Committees.

It's been my pleasure to return to OPFA Council in December 2024, after a hiatus from serving two terms as Central East Councillor from 2016-2022. I learned a lot about the OPFA during that time, and continue to learn now.

As a strong advocate for forestry in Ontario, at the beginning of my career I was under the impression that the OPFA should be stepping up and advocating for all things forestry too. It didn't take me long on Council to understand that this isn't a role the OPFA can play. Not because they don't have time or resources, but because it's not legally appropriate for a regulatory agency to be a lobbyist. The OPFA does have a role to play on educating the public and employers about the role of the Association and its members, but most of the mandate of the Association surrounds making sure the public's interest in Ontario's forest is protected, by ensuring that Professional Foresters meet the code of ethics set by the provincial government, and have the knowledge, skill and judgement required for the job.

Here's where you come in. It's been surprising to me to hear that so many members faced penalties this year because of unpaid dues and incomplete reporting. In case this is a communication issue, I wanted to take this opportunity to chat about why we all have to do this, and give you the lowdown on how I've refined this process for myself over the past 15 years.

1. The OPFA sends out letters and several emails outlining our responsibilities as members come annual reporting and dues payment time. These aren't optional – we are a regulated profession, like doctors, engineers and lawyers, and we can't practice professional forestry unless we meet these annual requirements. The OPFA isn't a "club" to belong to, but if that's what you're looking for, Forests Ontario and the Canadian Institute of Forestry offer a great sense of comradery!
2. I set a calendar reminder for a few weeks before the deadline reminding me to get a move on. Personally, I like to just log into the OPFA website and follow the steps to ensure I don't miss anything.
3. Most of the steps are really quick. I confirm/update my personal information and pay the annual fee online. I've gotten in the habit of marking "CEC" for Continuing Education Credit in my Outlook calendar next to things that count to make it easy to search and fill in the spreadsheet I use to track my 3-year rolling credits. This is also a good opportunity to revisit my Personal Practice Focus and Learning Plan, check in with my progress and update as necessary.
4. Complete the Good Character Declaration. I learned an important lesson to this past year to make sure to select the correct word from the drop-down menu instead of relying on the default! Realizing my error, I promptly emailed Priscilla to let her know I didn't do time in 2023.

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Using this method, it takes less than a few hours and we only have to do this once a year to maintain the privilege of managing forests in Ontario. Easy! I understand that this seems like a hassle at times, but every regulated professional in Ontario has to go through this process and most pay much higher fees than we do. Our fees are what keeps the Association running, allowing us to maintain our Professional Forester status and remain employed to do our jobs. The alternative costs OPFA staff time, you money in late fees and worst case, a permanent note on your public-facing profile with the OPFA that you were not in good standing or suspended for administrative reasons.

Let's do this! In November, if you find yourself unsure about how to navigate the process, reach out to OPFA staff or your local OPFA Councillor for help. That's what we're here for. See Fred's article in this newsletter for more information.

Lastly, I wanted to give a shout-out to the up-and-coming generation of OPFA members – welcome! From what I've seen, you're keen, smart and dedicated to the profession. Thank you for choosing forestry as your career path, and keeping us moving along with changing technology. The OPFA is growing, and it's an exciting and challenging time to be a Professional Forester in Ontario.

Training resource for the OPFA Indigenous Peoples, Lands and Resources Standard is now available to all members

Fred Pinto, R.P.F. Executive Director and Registrar

As all forestry in Ontario is conducted on lands that are covered by treaties with First Nations or are unceded, the OPFA started to develop a new standalone professional standard on Indigenous Peoples, Lands and Resources in 2017. This was done with the help of several Indigenous members of the OPFA. The standard was approved by Council in 2019.

As the standard was being developed the OPFA sought to develop the training and testing resources needed to ensure members could obtain their competency in the standard. The training resources plus the test to evaluate a member's knowledge for the first competency is now available. All members have been sent an email with a link through the member's portion of the OPFA website where they can register and access the training resources.

All Full, Associate and Provisional Members with scope and those returning to or working towards a practicing membership category will be required to meet this standard within two years after the official implementation in 2025. However, the training and exam is open to members in other membership categories to complete voluntarily should they choose to do so. We recommend that student and provisional members work to obtain this competency as it will be required before you are licensed to practice. Note that there is no cost to members for this training.

Not for Profit Organizations and Statutory Regulators, are they the same?

Fred Pinto, R.P.F. Executive Director and Registrar

At the 2024 Annual General Meeting (AGM) I was asked if the OPFA is registered under the Ontario Not-for-Profit Corporations Act (or ONCA). As time is limited during an AGM I gave a short answer to this question telling those gathered that the OPFA is excluded from the Ontario Not-for-Profit Corporations Act.

The question provides an opportunity to help OPFA members better understand the role of a regulator and how it differs from other entities that register as not-for-profit corporations. Any person can register an organization as a not-for-profit corporation under the terms of the Not-for-Profit Corporations Act. Statutory regulators, on the other hand, are created through provincial or federal legislation specific to the regulator. This is called an "enabling statute".

The OPFA is not a profit-making organization so some may believe that the Association is governed by the Ontario Not-for-Profit Corporations Act. In fact as I stated during the 2024 AGM, the OPFA is specifically excluded from the Not-for-Profit Corporations Act, and the Corporations Information Act by Section 4(3) of the Professional Foresters Act.

Let me explain why. The OPFA is the regulator of professional foresters in Ontario and is created and governed by the Professional Foresters Act. The Professional Foresters Act describes two major functions delegated to the OPFA by the Government of Ontario. One is the registration of members. Other not-for-profit corporations can also admit members as part of their organization. The second function is the ability to enforce a code of ethics described by Regulation. Other not-for-profit organizations may have voluntary codes of ethics for their members.

Statutory regulators such as the OPFA have been given the legal authority to deal with complaints only against their members (or against their past members for conduct that occurred when they were members). As such the Discipline Committee of the OPFA is an administrative tribunal similar to other tribunals such as the Human Rights and Labour Tribunals. If a regulator has a complaint against a person who is not a member, for example a person who may be holding out to be a registrant, the regulator must seek an injunction against the person in question from a court of competent jurisdiction such as the Superior Court of Ontario.

There are some other similarities and differences between statutory regulators and other not-for-profit corporations. Like other not-for-profit corporations, the OPFA is required to file a Non-Profit Organization Information Return annually with the Canada Revenue Agency. However, not-for-profit corporations with more than $30,000 in annual revenue must charge HST on their services or products. The OPFA, a statutory regulator, does not charge HST for services related to the licensing of its members.

Not-for-profit corporations must submit the names, functions, and contact information of members of their board of directors to the appropriate federal or provincial agency that oversees them. Statutory regulators are overseen by a provincial or federal Minister named in the legislation that governs the regulator. In the case of the OPFA, we send an annual report (that includes the names and functions of members of its Council and various committees, working groups, and task teams) and an audited financial statement to the Minister of Natural Resources and Forestry who administers the Professional Foresters Act.

The OPFA is also overseen by the Fairness Commissioner of Ontario, an officer of the Ontario Legislature, pursuant to the Fair Access to Regulated Professions and Compulsory Trades Act. Other not-for-profit corporations and organizations such as educational institutions, municipalities, government ministries, and for-profit corporations are not overseen by the Fairness Commissioner of Ontario for fairness in the hiring of their employees or acceptance of their members.

(Continued on page 40)

(Continued from page 39)

An annual report plus other ad hoc reports are submitted by statutory regulators to the Fairness Commissioner. These reports are posted on the websites of both the regulator and the Office of the Fairness Commissioner. The Office of the Fairness Commissioner evaluates the annual reports and assigns a level of risk of not being in compliance with regulations that govern the registration of regulated professionals in Ontario. The OPFA has been categorized as low risk since the risk-based evaluation of a regulator's registration processes was instituted.

Letter to the editor: Silviculture without herbicides? – Only in Quebec

Michael Rosen, R.P.F., Adjunct Professor, UBC

Follow-up response (see September issue for the initial letter)

This is a letter from the Chief Forester of Quebec providing a review of the success of regeneration in the post herbicide world:

https://forestierenchef.gouv.qc.ca/wp-content/uploads/fec-avis-04-2015.pdf

The Ministry in Quebec do these studies on an annual basis, Forestry monitoring of silvicultural treatments carried out in Quebec and profitability of investments. They are 5-year post harvest assessments grouped on a provincial basis:

https://mffp.gouv.qc.ca/les-forets/amenagement-durable-forets/suivis-forestiers-traitements-sylvicoles-rentabilite-investissements/ (2020/2021 with a link to 2019/2020)

Other studies on the Quebec program of mechanical tending:

https://mffp.gouv.qc.ca/our-publications/without-herbicides-quebec-historical-context-current-strategy-research/?lang=en https://www.researchgate.net/publication/226588002_Living_without_herbicides_in_Quebec_Canada_Historical_context_current_strategy_research_and_challenges_in_forest_vegetation_management

https://pubs.cif-ifc.org/doi/10.5558/tfc2024-007

sml-law.com/resources/grey-areas/

SML's Grey Areas newsletter has been in publication since July 1992 and discusses the latest developments in professional regulation. New issues are published monthly.

Recent articles:

March 2024, No. 288 – Learning from Other Regulatory Systems

Canadian policy makers and regulators have been looking to other countries for insights into, and alternative ways of, regulating professions. Generally, the systems examined are from the United Kingdom, Australia, New Zealand, and the United States. To a lesser extent, regulators have looked to the European Economic Community. Rarely have regulatory systems elsewhere been examined in detail.

April 2024, Issue No. 289 – A Critique of Policy Governance

Regulators of professions have adopted several different approaches to governance. Popular with some is a variation of the Policy Governance model created by John Carver. A recent governance review (Report) prepared for the College of Dental Hygienists of Ontario (CDHO) by Harry Cayton and Deanna Williams has challenged the suitability of this approach for professional regulators (at least without significant modifications).

May 2024, Issue No. 290 – Policy Making for Regulators

Surprisingly little has been written about policy making by regulators. Thus, the UK's Professional Standards Authority's (PSA) consultation paper on the topic is a welcomed introductory read.

In Memoriam

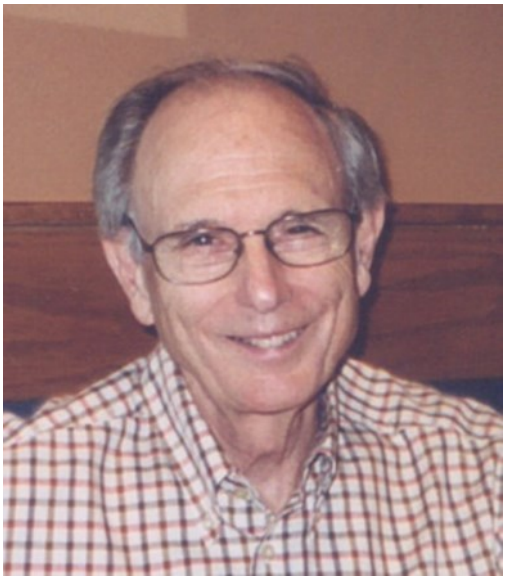


Photo credit: MacCoubrey Funeral Home

Robert D. Carman, R.P.F. (Hon.)

1932 – 2024

Many people in the forestry profession and beyond were saddened to hear that Bob Carman passed away on January 7, 2024. Bob was born in Chatham, Ontario on July 13, 1932, and was the only son of Ralph and Minnie Carman. His introduction to forestry no doubt came from his father, following his footsteps to graduate from the University of Toronto with a Bachelor of Science in Forestry in 1954.

Bob's distinguished public sector career with the Government of Ontario commenced as a Forester for the Department of Lands and Forests in 1954. He worked for 35 years in the Ontario Public Service with progressively responsible positions in the Department of Lands and Forests before moving to Management Board of Cabinet from 1972 to 1977. Bob served as Deputy Minister for Community and Social Services from 1978 to 1981, returning as Secretary of Management Board until 1985. He was appointed Secretary to the Cabinet and Clerk of the Executive Council from 1985 to 1989, and as Special Advisor to the Premier of Ontario from 1989 to 1990.

Bob's private sector career in forestry included a four-year term in the mid-1960s as Chief Silviculturist at Northwestern Pulp and Paper in Hinton, Alberta. He also worked as a consultant and served on many Boards including MMM Group, Bridgeport Hospital, Niagara Institute and Cobourg Hospital.

Bob was repeatedly celebrated for his exemplary public service by way of the Vanier Medal in 1988; a Member of the Order of Canada in 1995; recognition by the Public Policy Forum in 1989; the Queen's Silver Jubilee Medal in 1977; and the Queen's Golden Jubilee Medal in 2002.

He will be remembered by many foresters as the person who led the effort to revise Ontario's Crown Forest Sustainability Act in the mid-1990s to establish the Forest Renewal and Forestry Futures Trusts, which dedicated revenues from stumpage fees to the renewal of Crown forests. This reversed decades of uncertainty in funding forest renewal in Ontario.

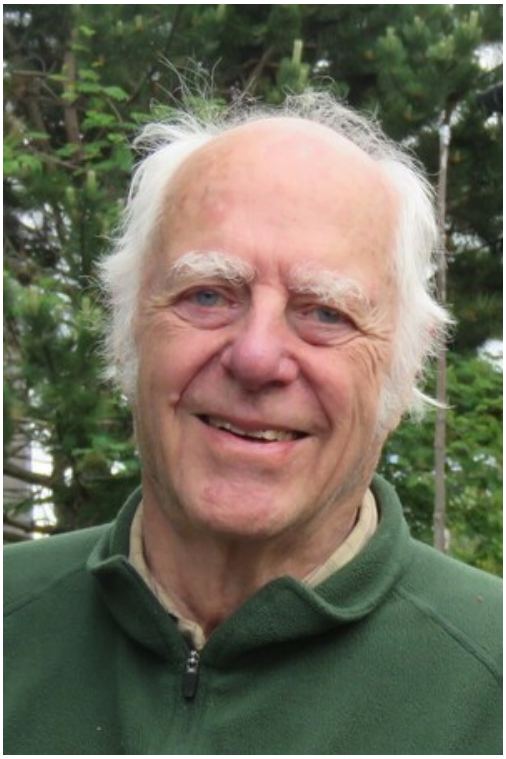
Bob never forgot his connection to forestry and the people associated with the profession. His later years included time spent at his 100-acre tree farm in Colborne, Ontario where he would happily engage in conversations about woodlot pests and forest management plans.

Bob was appointed as an Honourary Member, R.P.F. (Hon.) in the Ontario Professional Foresters Association in which he served on the Blue Ribbon Panel, a senior advisory committee to Council and the Registration Committee, from 2001 to 2016. He was a valued member of Forest History Society of Ontario until his final days.

Bob Carman was a remarkable man, whose accomplishments never stood in the way of the compassion and interest he showed for other people. He is survived by his wife Beverly and is missed by all who knew him.

https://www.legacy.com/ca/obituaries/theglobeandmail/name/robert-carman-obituary?id=54121704

In Memoriam



Paul Leet Aird, R.P.F. (Ret.)

1930 – 2024

Paul left this Earth on February 18, 2024, at age 94, after a long illness. His soul is flying with the loons. He was much loved and cherished by his wife, Linda Pim; previously his wife, the late Margaret Aird; his daughters, Lyn Barsevskis (the late Paul) and Diana Aird; his grandsons, Mark Barsevskis (Leanna Turchet) and Peter Barsevskis (Sarah Hirschfeld); and extended Leet, Aird and Murray families; as well as Linda's sisters, Barbara Gay, Elizabeth Pim and Carolyn Pim and extended family. Paul was the beloved son of the late Maiben and Pearle Aird and cherished brother of the late David Aird (Barbara) and the late Joan Aird Jacobsen (the late George Jacobsen). He grew up on the Aird dairy farm in Hudson Heights, Québec, on the shores of the Ottawa River. Paul was a person of diverse interests and passions, and great intellectual curiosity and accomplishments, most of them focused on conserving nature, especially forests. He graduated from Macdonald College of McGill University with a B.Sc.Agr. in 1952 (Soil Conservation), from Cornell University with an M.S. in 1953 (Forest Soils, Conservation) and from Cornell University with a Ph.D. in 1957 (Forest Soils, Conservation, Biometrics). He was a forest research scientist in the Québec forest industry from 1952 to 1974 (Canadian International Paper Ltd. and the Pulp & Paper Research Institute of Canada). From 1974 to his 1995 retirement, he was Professor of Forest Conservation Policy at the University of Toronto's Faculty of Forestry. Paul was a Registered Professional Forester in both Ontario and Québec. Paul was a member of the University of Toronto Governing Council 1984-87 and a Commissioner on the Niagara Escarpment Commission 1993-96. Paul continued his involvement at U of T for several years after retirement as a Professor Emeritus, for example taking new forestry graduate students, during orientation week, on a "Walking Tour of the University of Toronto from a Forester's Perspective." Also after retirement, he did freelance work as a Plan Approver under Ontario's Managed Forest Tax Incentive Program, helping private landowners manage their forests for conservation. Paul became a well-recognized expert on the natural history and distribution of the Kirtland's Warbler, a bird species regulated as endangered in Ontario. He searched suitable habitat (young Jack Pine stands) in the wilds of Ontario and Québec for the presence of the species for 40 years until 2016. His discovery of a singing male at CFB Petawawa, Ontario, in the late 1970s led to the species being listed in Ontario as endangered. He served for many years on the Kirtland's Warbler Recovery Teams of both the United States and Canadian governments. Paul was a prolific writer about nature and conservation right through to 2021. He was the author of both scientific and popular papers, reports and commentaries on forestry and nature conservation issues. He authored the book "Loon Laughter: Ecological Fables and Nature Tales" in 1997 and the book "Butterfly Beautifly Beautiful: Nature Poems" in 2021, which collected his best poetry written over a 60-year period. Two of his poems became songs recorded by Canadian musical artists. Paul received several awards, including the J.A. Bothwell Award from the Canadian Pulp & Paper Association "for the most meritorious work of the year on behalf of forest conservation in Canada" (1971), an Endangered Species Stewardship Award from the Ontario Ministry of Natural Resources (2008) and a Conservation Pioneer Award from the A.D. Latornell Conservation Symposium (2011). Paul loved to walk, hike, skate, ski, snowshoe, paddle a canoe and camp in Canada's wild places. Sharing these experiences with family, friends and students stimulated his writing of fables, stories and poems. Special thanks to Nicole Robitaille (PSW) for her help with care of and companionship for Paul in the last year and a half of his life. A gathering to celebrate the life of Paul Leet Aird will be held at 2:00 p.m. on Saturday, May 11, 2024, at the Inglewood Community Centre, 15825 McLaughlin Road, Inglewood, Ontario, his home with Linda for the past 28 years. In lieu of flowers and according to Paul's wishes, the family requests that you consider a donation in Paul's memory to Macdonald College of McGill University, the First Nations University of Canada, or any organization that promotes literacy (such as United for Literacy, formerly Frontier College). Published online February 24, 2024. https://obituaries.thestar.com/obituary/paul-aird-1089410853

In Memoriam

Robert J. Burgar, R.P.F. (Ret.)

1932 – 2024

Bob passed away peacefully with his family at his side at the Southlake Regional Health Centre on Thursday, March 21, 2024, at the age of 91. Beloved husband and best friend of the late Elsie Burgar (nee Hill); loving father of Robert (Daphne) of Richmond Hill, Catherine of Aurora and Aileen Gail (David) of Mono; devoted Grandpa of Taryn (Nigel) and Keelan; delighted Poppop of great-grandson Remy, dear brother of the late Edward (Barbara), uncle to the late Eric (Maddalena), Heidi (Peter) and fondly remembered by relatives, his poker buddies (Board of Directors), 5T4 classmates, MNR lunch companions (Chowderheads) and other friends.

Born and raised in Toronto, Bob was an accomplished sportsman in his youth, winning numerous awards, and began a 35-year association with Scouts Canada. Scouting introduced Bob to the outdoors and the importance of teamwork, which significantly impacted his future. Wishing to continue this relationship with the environment, Bob graduated from the Faculty of Forestry at the University of Toronto in 1954, worked briefly for McFadden Lumber and had a long and successful career with the Department of Lands and Forest and the Ministry of Natural Resources, retiring as the Assistant Deputy Minister in 1990. Post-career, Bob was active with the Ontario Professional Foresters Association and the University of Toronto's Faculty of Forestry. He also continued to support the important work of the Ontario Conservation Authority program by serving with the Toronto and Region Conservation Authority Foundation. Bob's long service to these organizations has been recognized publicly by Scouts Canada, the OPFA, Conservation Ontario, and the University of Toronto. Bob admired Indigenous art and culture, was an avid reader with a life-long passion for history and Canadian politics, and travelled to far-off lands to explore on family trips to England, Scotland, Orkney, Belgium, the Baltic and Israel and travelled solo to Egypt and China. In their retirement, Bob and Elsie were enthusiastic vacationers with a fondness for cruising, hot islands, and particularly Las Vegas and doting on their grandchildren when not travelling. Bob was loved and respected by many. His energy, humour and loyalty touched all who knew him and he will be missed. As he would say," It was an excellent journey."

The family would like to thank the MACU staff at the Southlake Regional Health Centre for their compassionate and supportive care during Bob's illness.

A visitation for Bob will be held on Saturday, April 27, 2024 from 11:00 AM to 1:00 PM at Thompson Funeral Home, 530 Industrial Parkway South, Aurora, ON L4G 6W8 followed by a memorial service at 1:00 PM. A reception will follow at Thompson Funeral Home.

While Bob loved flowers, in lieu of them, he would appreciate donations in his memory to a charity of your choice. If you wish to send flowers they may be ordered through Bob's favourite florist Luda Flower Salon at ludaflower.com.

https://www.dignitymemorial.com/en-ca/obituaries/aurora-on/robert-burgar-rpf-11721917

Member News

New Associate Member-Associate R.P.F.:

William Eccles

New Full Member-R.P.F.:

Juliana Vantellingen

Please welcome and support the following people who have been admitted into the OPFA but are not yet entitled to practice professional forestry in Ontario:

New Provisional Members (R.P.F. in Training): (may practice if under the direct supervision of a qualified member)

Andrew Avsec
Jaako Crawford
Ricardo de Oliveira Antunes
Dele Idowu
Carly Jackson
Frédéric Larocque
Stevie Luzzi
Maria O'Sullivan
Taylor Sigouin
Udeshika Wedamesthrige
Yingying Zhu

New Student Members:

Devan-Cash Allard
Opeyemi Aroso
Elham Ashrafizadeh
Mathieu Bissonnette
McKenah Floyd
Liam Henderson
Curtis Holomek
Meg Quigley
Esther Tang
Rory Wise

The following registrants are not entitled to practise professional forestry in Ontario:

New Inactive Member - R.P.F. (Non-Practising):

Kelly Pike

The following people are no longer registrants of the OPFA and are not entitled to practice in Ontario:

Resigned, Full Members:

Ildiko Apavaloae
Bert Hennessey
William Wiltshire

Resigned, Non-Resident Member:

Robert Maxwell

Resigned, Provisional Members:

Rachel Bowery
Prashant Kanwar
Donovan Parenteau
Abigail Williams

Revoked Due to Expiration of Certificate, Provisional Members:

Ryan Adams
Ariel Ilic

The following people remain registrants of the OPFA but are currently suspended:

Membership Suspended for Administrative Reasons:

Jake Chalmers, R.P.F. in Training
Kellie Chippett, R.P.F. in Training
Lisa Clark, R.P.F.
Nick Courtney, R.P.F. in Training
Garth Kayes, R.P.F.
Mitchell Lindsay, R.P.F.
Scott Macdonald, R.P.F. in Training
Cole Miller, R.P.F. in Training
Hunter Roberts, R.P.F. in Training
Dave Wiley, Associate R.P.F.

Deceased Members:

Paul Aird, R.P.F. (Ret.)
Robert Burgar, R.P.F. (Ret.)
Robert Carman, R.P.F. (Hon.)

Continuing Education

Webinars and Other Resources

Websites that offer free webinars to earn CEUs for your membership maintenance.

- Canadian Institute of Forestry (CIF-IFC) - Offers considerable resources and ongoing lecture series
  https://www.cif-ifc.org/e-lectures/
- Ontario Ministry of Natural Resources and Forestry. MNRF Science Insights, contact Kristy Mckay, Science Transfer Specialist at Kristy.McKay@ontario.ca
- Forestry and Natural Resources Webinars
  http://www.forestrywebinars.net/
- Conservation Webinars
  http://www.conservationwebinars.net/
- Urban Forestry Today
  http://www.urbanforestrytoday.org/
- Climate Webinars
  http://www.climatewebinars.net/
- Cornell University
  http://blogs.cornell.edu/cceforestconnect/subscribe/
- Forestry Chronicle
  http://pubs.cif-ifc.org/journal/tfc
- Canadian Journal of Forest Research
  http://www.nrcresearchpress.com/journal/cjfr
- FPInnovations
  https://web.fpinnovations.ca/blog/
  https://wildfire.fpinnovations.ca/index.aspx
- Tree Research and Education Endowment Fund (TREE Fund)
  https://treefund.org/webinars
- Eastern Ontario Model Forest LDD Moth Webinar Link to the recording on YouTube Channel: https://youtu.be/U4BZOM8GtyU
- Ontario Woodlot Association Oak Wilt Webinar Link and passcode to the recording: https://us06web.zoom.us/rec/share/1xAH8qHGgwVV9ki-78A83oQMbcIlZKbH5uHqHtP7xLfEJ8l8mNJE7U4iGx2nZuFp.3LYLtY_SIGeCzRor
  Passcode: 8Mnwb+@J
- Ontario's Centre for Research & Innovation in the Bio-economy (CRIBE) - Forest EDGE. Decision support tools, projects and case studies.
  https://www.nextfor-forestedge.ca/
- Canadian Partnership for Wildland Fire Science (Canada Wildfire). Partnership members include: the Canadian Forest Service, Alberta, BC, Northwest Territories, Saskatchewan and the University of Alberta. Originally focused on western Canada, it has expanded and includes information and research of interest to forest managers elsewhere in Canada.
  https://www.canadawildfire.org/
- Invasive Species Centre webinar series
  https://www.invasivespeciescentre.ca/learn/webinar-series/
- PlaniIt Geo Urban Forestry Webinars

  https://planitgeo.com/urban-forestry-webinars/
- Our beautiful forests of Ontario, were featured in an interview from full member, Arben Pustina, R.P.F., by multicultural TV Channel OMNI 1. Topics such as, how to become an R.P.F. in Ontario, forests of Canada and Ontario's forest regions, acts and by laws that regulate forest land use and forest conservation in Ontario, as one of the best in the world, are part of this segment. See Interview with Mr. Arben Pustina, a R.P.F. in Ontario - https://www.youtube.com/watch?v=l6Eq2KsKd2U

Coming Events

2024 CIF-IFC National Conference & 116th Annual General Meeting
September 15-18, 2024
St. John's, NL
https://www.cif-ifc.org/conference-agm/2024cif/

Global Wood Summit
Timber, Forest Products and Trade
October 29-30, 2024
Vancouver, BC
https://globalwoodsummit.com/

Please send any upcoming events to opfanewsletter@gmail.com