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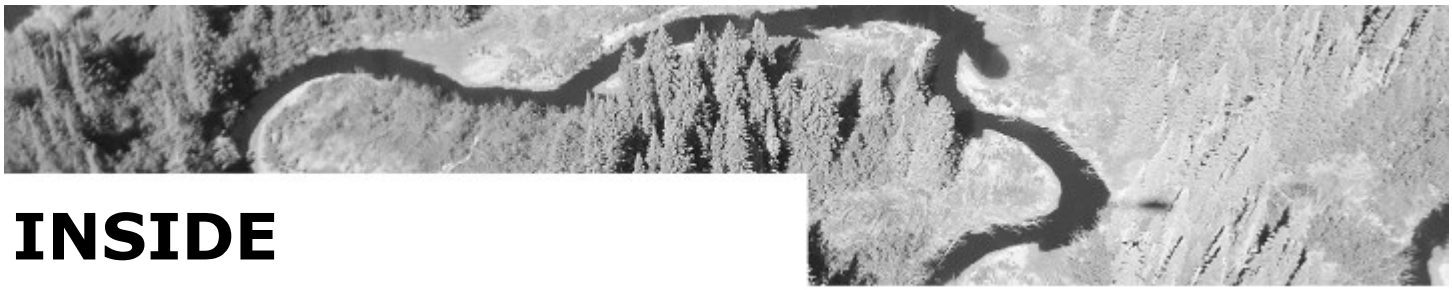
Developing innovative solutions to address the multiple complexities facing forest management



INSIDE

THIS ISSUE

EVERY ISSUE

The Professional Forester is published quarterly by and for members of the Association, as well as those interested in the profession of forestry in Ontario.

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Using multi source remote sensing data to develop and implement living forest inventories in Ontario

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With the increasing occurrence and severity of forest disturbances, inventory update has become a critical component of sustainable forest management. Research teams from UBC and Laval University have partnered with the Ontario Ministry of Natural Resources and Forestry and GreenFirst Forest Products to develop and implement the concept of 'living' forest inventories in Ontario. Our approach consists of developing the knowledge base that will facilitate the development of practical tools and solutions for both the spatially explicit identification of forest cover change and integration of sampled or modelled components like growth and regeneration.

In recent years, the integration of advanced remote sensing data such as airborne laser scanning (ALS) has led to the development of enhanced forest inventories (EFI). Targeted acquisitions of ALS data, followed by the province-wide Single Photon LiDAR dataset have helped deliver EFIs as a practical tool for forest managers. The key challenge we are now addressing is how to maintain and update these next-generation inventories as they age. Of particular interest is the identification of readily available remotely sensed data that can be applied cost effectively, as well as establishing frameworks to integrate these datasets to produce updates of forest condition in near real-time, predict future growth and yield, and integrate information to facilitate forest management or silvicultural decisions.

A framework for forestry inventory update has been developed that contains the critical components of a living inventory. This includes inventory and growth monitoring, change detection and error propagation. Using the Romeo Malette Forest as a case-study site for the implementation of this framework, we have used 7-day Harmonized Landsat Sentinel-2 composites along with the aptly named 'BEAST' algorithm (Bayesian Estimator of Abrupt Change, Seasonality, and Trend) for change detection. Our results demonstrated the efficacy of a continuous change detection and monitoring framework for severe disturbances such as wildfires or clearcuts. Depending on the timing of the disturbances (our long winters are periods when we cannot extract much information), we believe we can detect and characterize the full extent of severe disturbances—and thus update the existing inventory—within approximately a year.

Figure 1. From left to right: Robin Timms, R.P.F. (MNRF), Lindsay Russell, R.P.F (MNRF), Gordon Kayahara, R.P.F (MNRF), Liam Irwin (IRSS, Silva21), Michael Hoepting (CFS/CWFC), Tommaso Trotto (IRSS,Silva21) and Chris Mulverhill (IRSS,Silva21).

Several avenues are also being explored to characterize recently disturbed areas. We are currently testing the use of ALS-equipped drones to assess forest regeneration following wildfires as well as to monitor forest condition and structure in young stands past the free-to-grow stage. We recently traveled to the Romeo Malette Forest to acquire LiDAR and multispectral imagery over a large complex of regenerating stands within the Enhanced Forest Productivity site, Block 18 (Figures 1 to 3). With such acquisitions, the inventory updates will also directly assist silvicultural decision-making and operational planning.

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Figure 2. Aerial view of the field crew getting ready to make drone data acquisition.

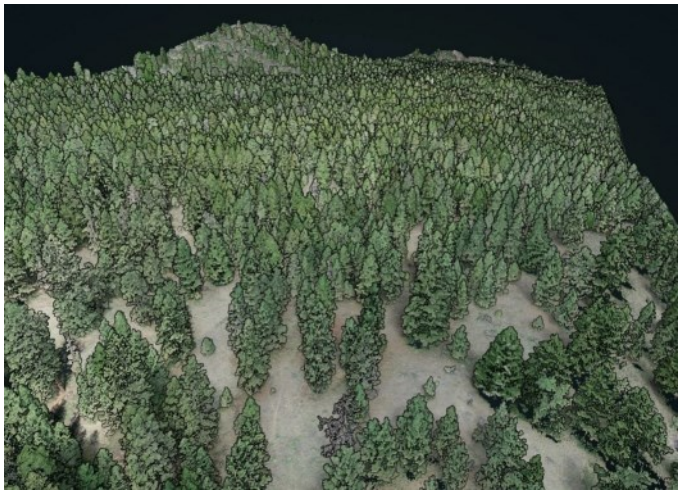


Figure 3. The crown delineation algorithm helps us derive metrics for each individual tree in the surveyed area.

Finally, another key component of a living inventory will be the monitoring of forest growth using satellite imagery. We have recently coupled Landsat times series of satellite images with the data from ground-based permanent sample plots in the Romeo Malette Forest and the surrounding area. Using vegetation indices based on the different spectral bands available in Landsat data, we were able to produce estimates of the net growth (growth minus mortality) of the forest over recent decades (Figure 4). When applied at the landscape level, such estimates allow us to identify areas of the forest where growth has stagnated, either as a growth response to environmental stressors or through recent mortality induced by non stand replacing disturbances. We believe such information can help management decisions through an improved ability to identify stands that have reached maturity.

These research efforts were mainly supported by the Canada-wide Silva21 project, which aims to provide data, tools and practical solutions to improve the resilience of Canadian forests to various disturbances and sources of stress, thereby contributing to the health of these ecosystems and the well-being of the communities that depend on them. To learn more about the project, please visit www.silva21.com.

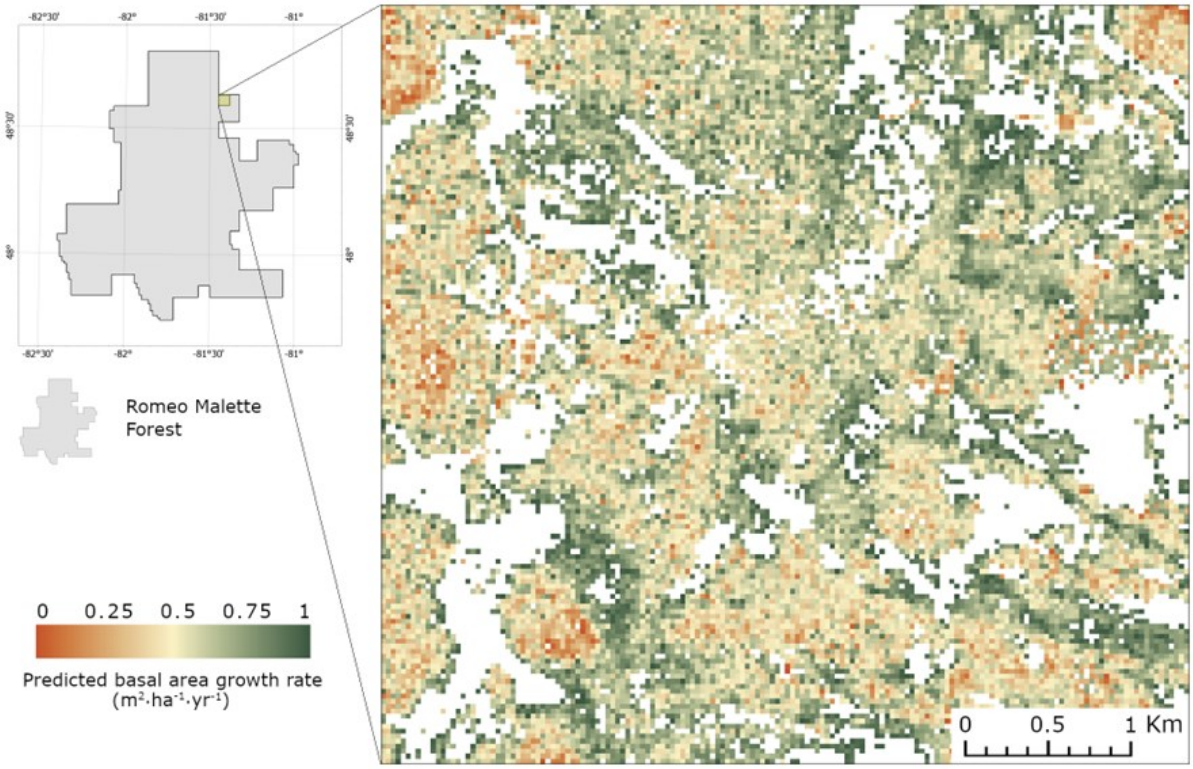
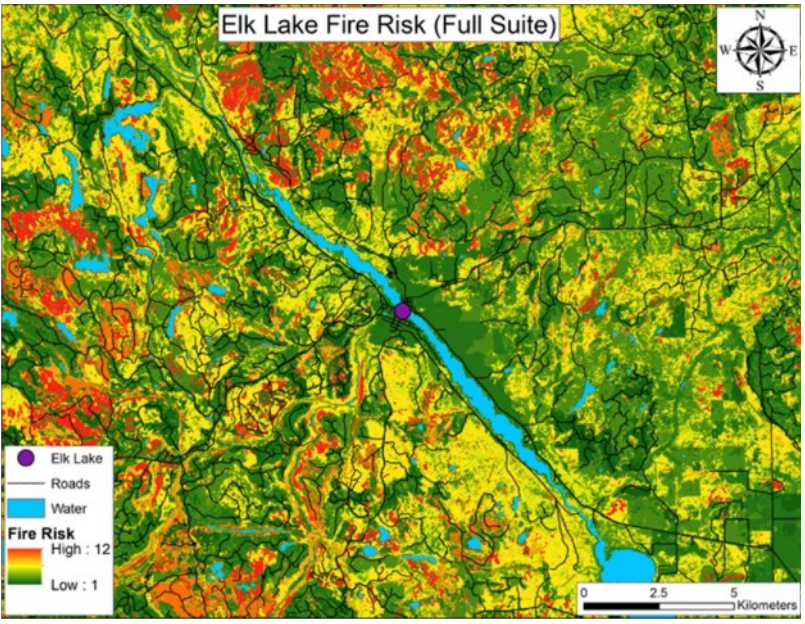


Figure 4. Estimates of the net growth (growth minus mortality) of the forest over recent decades.

Is wildland fire management a forest management activity?

Paul Fantin, R.P.F., Forestry and SkyForest Business Development forester, First Resource Management Group

"It's not about *if* it will happen … it's about *when* it will happen". This is always my initial response when asked if a particular area of the boreal forest adjacent to someone's home or cottage could burn in a wildland fire. While it's not my complete answer on the matter, I'm not beyond letting the words hang in the air for a moment to further underpin a teachable moment. Depending on the audience, my follow-up is usually centered around what should be expected if you place a bell-jar over a dynamic and growing system; one where fuel levels continue to build until the pressure is released by fire. Containing a system with a bell-jar is not a perfect analogy, but it's a good segue to the discussion about how this "pressure" can be moderated using small-scale fuel modifications in the area surrounding the cottage – basic FireSmart instruction for everyone that is widely available from government websites. At its best, the application of FireSmart principles is an effective, but local, short-term play in a landscape management game we've been playing for a very long time.



The public conversation about wildland fire is changing. Prior to the start of this record-breaking fire season, our company was approached separately by representatives from both a local municipality and a First Nation requesting help to better understand the wildland fire risk to their communities. Since the start of this summer another First Nation community has made a similar request for this information. In all cases, their stated concerns extended beyond town boundaries, and included questions about the risks originating from the broader landscape that they rely on for their economic and cultural wellbeing. Concerns about their preparedness and emergency response planning were primary, however, they also wanted to adopt a pro-active fuel-management approach to lessen their risk and exposure to wildland fire. Essentially, they wanted to be more FireSmart.

The professional conversation needs to keep up with the public one. This is imperative. By the start of August of this year, numerous provincial and national records for the size, duration, and intensity of wildland fire were shattered, further escalating concerns in both the public and in the forestry profession about wildland fire risk to communities. Concurrently, Indigenous people in Canada are (correctly) demanding that their specialized knowledge and past fire management practices inform our wildland fire policy. If there is to be any silver lining that emerges from the clouds of wildfire smoke that persisted over the heavily populated regions of eastern North America and Western Europe, it may be that the voting majority will demand that something is done to mitigate against a similar future scenario and will support spending tax dollars to do so. This change of perspective will be a game changer.

The topic of creating forest resilience in the face of a changing climate is demanding more space beyond just scientific discourse. For example, the genetic adaptation and assisted migration of tree species is moving from an academic discussion to a plausible tool available to forest managers. If we look forward at the coming decades and consider the current emerging consensus of climate scientists that both the frequency and intensity of wildland fire will continue to increase, it's logical to conclude that the term "forest sustainability" will be influenced by the more pressing goal of "forest resilience." However, history demonstrates how our profession has continuously adapted to provide the benefits demanded from the forest (from providing fuelwood to the King to providing multiple socio-economic and biodiversity related benefits), so it is more likely that the term will remain, and instead evolve to incorporate wildfire resilience.

(Continued on page 6)

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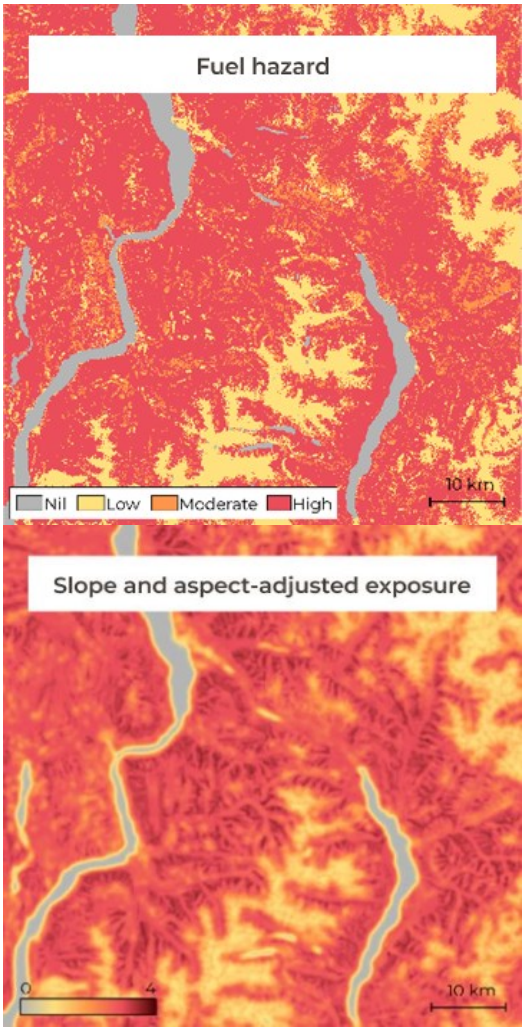
The Federal government has adopted this approach, stating that "… Just as fire is an integral part of the forest, fire management is an integral part of forest management."[1] The provinces, who have the responsibility for the management of the majority of forested area in Canada, are at varying stages of acknowledging the role of fire management within their forest management planning processes. For the most part, the provincial fire management organizations are better described as wildland fire and disaster response organizations; a role that they have proven very adept at fulfilling.

Next to wildland fire itself, our sustainable forest management plans produce the most visible changes across our forested landscapes. As professional foresters, we should anticipate questions about how our planned activities in the forest can be modified to reduce catastrophic wildland fire. Demonstrating progress in creating a more fire-resilient landscape must become a recurring objective within our forest management plans, complete with measurable indicators of achievement that show we are making a difference. There are a number of definitions for resilience that speak to the capacity of a forest and/or ecosystem to adapt to changes or to restore itself to its original state after a disturbance. However, in the context of forest management planning, perhaps directing the manipulation of forest cover to reduce the likelihood of a future fire growing from a smaller, manageable size to a major conflagration, particularly in the vicinity of identified values and infrastructure, would be an objective to include.

To support forest-level wildland fire resilience objectives, modifications to the forest management planning process could start by identifying additional considerations such as changes to factors that influence harvest eligibility criteria and the strategic location (or decommissioning) of access roads. As well, acceptable silvicultural treatments that promote the conversion of spatially targeted, high hazard fuel types with high exposure indices to a less fire-prone future forest condition should be emphasized. Without doubt, forest managers will need to embrace modern technology and modernized forest inventory information that provides the high-resolution spatial forest fuel hazard information needed to assess and mitigate the exposure of identified areas to wildland fire.



The scientific and applied research needed to guide forest managers in developing a more fire-resilient future forest can be optimistically described as being in the early stages, and some may view the goal as unachievable. It is certainly daunting, and we will need to understand and communicate the limits that forest management actions can have on mitigating catastrophic wildland fire. It must be noted however, that such an undertaking will have strong precedents in Ontario. The past application of moose habitat management principles or the landscape guide trajectory that we are currently adhering to are equally ambitious. Simply put, if we can accept the intentional goal of creating large landscape patches in the boreal forest that maintain or enhance natural landscape structure, composition and pattern through time, then adopting new policies that create a more wildland fire resilient future forest is equally obtainable.

This isn't a call for an immediate or wholesale change to our forest management planning process. Change does need a highly adaptive framework; one that welcomes and incorporates new science and knowledge and that anticipates that existing policy must cede space to allow the establishment of a more resilient future landscape. This is a call for the patient and determined application of well-established forest management principles while incorporating fire science informed with Indigenous knowledge into our forest management plans. I'm optimistic that we can make a substantial contribution to landscape-level wildland fire resilience because our profession always does its best work when we play the long-game.

[1] https://natural-resources.canada.ca/our-natural-resources/forests/wildland-fires-insects-disturbances/forest-fires/fire-management/13157

Herbicide reduction – economic, ecological, and silviculture impacts

Janet Lane, R.P.F.

Author note: This article represents my opinion from over 30 years of experience in four major forestry provinces.

Abstract

Forestry has trodden lightly into the realm of chemical herbicide use for vegetation management. The treatment has not been applied without careful consideration of the alternatives. Although a small proportion of the forest is treated usually once during a 70 – 100-year rotation, the social pressures have continued to keep the focus on herbicide reduction. This article will scratch the surface of the ecological, economic and silvicultural impacts of reducing herbicide use and the potential to lessen the impact by taking a precise approach to herbicide use.

Herbicide reduction – ecological, economic, and silviculture impacts

While herbicides have been used in Canadian forest management since 1945 (Malik and Vanden Born, 1986), the use of herbicide for forest management is still controversial. Herbicides and the alternatives have been studied extensively (Thompson, 2003) One might think it is perverse that herbicide, used extensively on products we eat every day, is a major social concern when applied once in an 70-100-year rotation on a small portion of the forest. The un-naturalness of using a chemical treatment in a forest environment is not widely accepted by the public. Non-government organizations (NGOs) and First Nations communities (Kayahara and Armstrong, 2015) have been calling for the ban of herbicides since their first use. Certification systems require justification for its use and evidence of judicious use of herbicides. Provinces are under pressure to reduce or eliminate the use of herbicides; however, the reduction will have ecologic, economic and silvicultural impacts.

Ecological Impacts

Forest management at the landscape scale in Ontario has a primary goal to maintain the natural range of variability. The goal is to maintain the spatial arrangement of stands of the age and species composition that natural events would have created. This, it is reasoned, will provide the habitat for the flora and fauna that is naturally occurring. However, harvesting cannot completely emulate natural events. A fire effects more than the above ground forest structure – it may affect soils and the natural regenerative response. After a forest harvest, hardwoods if in the pre-harvest stand increase substantially and grass and shrub, seeds and rhizomes tend to regenerate quickly. Without intervention hardwood, shrubs and grass out compete conifer seedlings especially on richer, mesic sites.

Some alternatives like site preparation have been found to alter a site by decreasing biodiversity of plants, deceasing abundance of small animals and may even increase the presence of invasive species (Newmaster et al., 2007).

Herbicide is the least invasive to the site as it has a very short effective window and does not disturb the site (Lautenschlager and Sullivan, 2002). Herbicide has been used very effectively to ensure planted and naturally regenerating conifer seedlings have a fighting chance to form part of the future stand canopy and provide habitat for flora and fauna to the extent they have in the past.

Economic Impacts

The application of herbicide has been a very effective and relatively inexpensive treatment, especially with aerial applications. (Bell et al., 2011) The cost of herbicide and the application has risen in recent years but it is still by far the most cost effective and efficacious treatment. Alternatives have been extensively explored over the past 40 years. Harvest timing, manual brush saws, pre-harvest girdling, large conifer seedlings and intensive site preparation are a few of the methods explored.

(Continued on page 8)

(Continued from page 7)

The economic impact of herbicide reduction would be two-fold, in the short term expensive alternate treatments could be used and in the long -term the loss of valuable conifer dominated stands. A reduction of herbicide may require an acceptance of a longer rotation to achieve conifer dominated stands, causing a recalculation of available harvest area in all forest management plans. The natural range of variation will be difficult to achieve or unachievable.

Photo credit: Amy Wildhaber

Silvicultural Impacts

The art and science of growing forests is complex. The USDA (2023) has a comprehensive definition of silviculture "***Silviculture is the art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society such as wildlife habitat, timber, water resources, restoration, and recreation on a sustainable basis.***"

This is complex business.

The harvest sets the stage – legacy seed sources, shade level, and site disturbance effect the natural regeneration. Initially, it is imperative that established seedling crops are not suppressed and are able to reach crown closure and form a portion of the future mature stand.

Alternatives to herbicide application include intensive site preparation, prescribed burning, immediate planting of large nutrient loaded seedlings, manual tending and perhaps alternate harvest systems to name a few. While there has been an enormous amount of effort given to competition and species composition, there is more to be learned about the optimal time to carry out the steps of forest vegetation management. It is not easy to apply results from one study as the system is so complex – soil moisture, preexisting condition, competition and crop dynamics. Any alternative to herbicides to date has not been as cost effective and most are cost prohibitive on a large scale (Little et al, 2006). Without an effective treatment, fewer seedlings will be planted on rich sites and in the future less conifer will be present on the landscape and available for harvest.

Herbicide Reduction Strategies

Herbicide reduction strategies include detailed site planning, more specific application timing and highly controlled application rates. Reducing the area of herbicide application could involve detailed mapping of critical competition and precision application of herbicide. Reducing the amount of herbicide used could entail using the lowest possible concentration to achieve the desired effect. Often a light application is best. The longer it takes for the competition to perish the more it has spread through the plant system and connected competition.

In socially sensitive highly visible areas herbicide alternatives may be used. The expanse of Ontario's forests and their productivity does not lend itself to broad use of these techniques.

Herbicide reduction strategies will entail tailored herbicide applications and, perhaps, a combination of alternate silviculture treatments. Foresters are, and have always been, creative. The pressure to reduce herbicides and to use them carefully will continue to drive innovation.

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Oak wilt: the newest threat to oak trees in Canada

Madison Sturba, Invasive Species Centre

Oak wilt is an invasive fungal pathogen that spreads in the vascular system of oak trees, limiting the upward flow of water and nutrients. Leaves that lack these resources can wilt and drop prematurely, reducing overall tree health. While all oak trees can become infected with oak wilt, some are more susceptible than others. Species in the red oak group tend to succumb to oak wilt much more quickly than those in the white oak group, often dying within a single season or as early as a few weeks after infection. The disease has killed millions of oak trees throughout the Eastern and Southern United States, resulting in serious economic, ecological, and social impacts.

Left: Leaf from tree infected with oak wilt. Right: Impact of oak wilt to natural forest. Photo credits: Invasive Species Centre.

The disease was confirmed in Canada for the first time in May 2023 on a residential property in Niagara Falls, Ontario and was later found in the township of Springwater and the town of Niagara-on-the-Lake. It's not known exactly how oak wilt got into Canada or how it spread in Ontario, but there are a few possible explanations for its movement.

Naturally, oak wilt can spread aboveground via beetle vectors. Nitidulid beetles, also known as sap or picnic beetles, can carry fungal spores from infected trees to new healthy hosts as they move in search of food. These beetles are attracted to sweet foods and odors, like the fruiting bodies of an oak wilt pressure pad or the sap at a fresh tree wound. Raised pressure pads form on the fungal mats of dead red oak trees and push against the bark as they grow. The pressure against the bark will eventually cause it to crack, creating a wound that attracts hungry sap beetles. If a spore-covered beetle leaves to feed on the fresh sap of a newly wounded oak tree, it can transfer those spores and start a new infection.

(Continued on page 11)

Bark crack created from underlying pressure pad

Raised pressure pad in the middle of a fungal mat

(Continued from page 10)

Oak wilt can also spread belowground through root grafts. Neighbouring trees of the same species can fuse their roots together to form an interconnected vascular system. This system is great for sharing resources and adding stability, but it can be exploited by vascular diseases like oak wilt.

There are a few things you can do to prevent the spread of oak wilt and protect oak trees in Ontario:

- **Know what to look for.** Some of the common signs and symptoms of oak wilt include dull green, brown, or yellow leaves; early and sudden leaf drop; sudden decline in overall tree health; vertical bark cracks in the trunk; white, grey, or black fungal mats and pressure pads growing beneath the bark that can sometimes smell fruity (like juicy fruit gum); and vascular brown streaking in sapwood.
- **Report any signs or symptoms of oak wilt.** Reports can be made to the Canadian Food Inspection Agency (CFIA) immediately through their website or via email to OakWiltReportingOntario-Fletrissementduchene@inspection.gc.ca. A good report includes an accurate location and photos of the tree (i.e., leaves, trunk, and crown).
- **Do not prune oak trees between April 1st and October 31st when sap beetles are active.** Wounds caused by storms or other events should be covered immediately with wound paint or shellac to prevent the aboveground spread of oak wilt via beetles.
- **Do not move firewood.** Invasive pathogens and pests, like oak wilt fungal spores, could be present under the bark of firewood and be unintentionally spread to new areas. Buying and burning local firewood can help prevent the human-mediated spread of oak wilt.

Early detection and rapid response are critical steps for the eradication or containment of a new invasive species. Having more eyes on the ground monitoring oak tree health really increases the likelihood of finding and managing oak wilt early before it spreads further throughout Ontario.

Oak wilt response in Niagara Falls

Charlie Smith, ISA Certified Arborist, Supervisor of Forestry

In early June of 2023, the City of Niagara Falls was faced with the first confirmed case of oak wilt in Canada. A local arborist who was on site in a residential area to give estimates for the removal of three dead oak trees noticed some cracking in the bark and suspected the trees may have oak wilt, they immediately notified the City of Niagara Falls and Canadian Food Inspection Agency (CFIA). Both City and CFIA staff attended the site to assess and sample the trees. The tests did conclude that three large red oaks (*Quercus rubra*) were infected with oak wilt. Through collaboration between the CFIA, the City of Niagara Falls and with support from the Invasive Species Center (ISC), a plan was quickly created for the removal of the three infected trees. Additional cooperation and planning with property owners and two local tree care companies played a key role in the removal and disposal of the three infected trees. By mid-June the trees were removed and disposed of through a deep burial process at a local landfill and stumps were ground out and reinstated. Now that the dust has settled from those first infected trees what is next?

The City of Niagara Falls continues to survey their oak trees throughout the city and respond to public enquires about oak wilt on private property. The city has over 1200 oak trees in their inventory and is utilizing that inventory to monitor where the oaks are and to detect any change of condition that may be happening. A few trees initially showed minor signs of bronzing and were monitored weekly for changes, but to this point the city has not confirmed any additional cases of oak wilt. The monitoring will continue yearly from leaf out till the end of August for new signs of infection.

The City of Niagara Falls did have a previous suspected case of oak wilt in 2020 where testing had come back negative. At that time, the city started to scale back any oak pruning to the winter months. The city is only allowing pruning outside the high-risk period of April to October. Any emergency requiring pruning is permitted but must be done by qualified staff and wound dressing must be applied to all open wounds immediately.

Workshops and training have been provided to everyone in the forestry department on the identification of oak wilt and sanitization of tools and equipment, if pruning is required. In preparation for the summer maintenance programs, staff that perform grass mowing in parks and along rural roadsides that may come across low oak limbs, have been familiarized on the importance of not pruning or injuring any oak trees throughout the summer months and to notify the Forestry Department if there was an emergency. They were also trained in different identification characteristics of white oaks and red oaks, because it is important to be able to tell the difference between the two and how the fungus affects them differently.

The City of Niagara Falls is using the CFIA's Oak Wilt Response Framework and resources provided through the ISC as a base for their oak wilt management plan and procedures. The management plan will outline the cause of oak wilt, the vectors through which the fungus is spread and preventive measures that will be taken such as restricting pruning time frames. It will also outline appropriate steps to take if a tree is suspected of being infected as well as what procedures should be taken if a tree is positive for oak wilt. The management plan will be supported with procedures that will guide staff through the processes of tree removal and job site control, sanitation of tools and equipment, and the disposal of the infected material. By having the management plan and procedures in place it will allow for a consistent response to any additional oak wilt cases that may be found throughout the city.

White-nose Syndrome in bats: Another blow to biodiversity and the economy

Dana Kinsman, Biologist

The white-nose syndrome (WNS) epidemic is considered the worst wildlife disease outbreak in North American history and shows no signs of slowing down. WNS is an introduced fungal disease of hibernating bats, which are particularly susceptible to infection due to suppressed immune function associated with winter torpor (Grider et al. 2022). The fungus thrives in cold, damp places where bats hibernate for the winter, and it can be lethal.

In 2007, dead and dying bats were found in caves near Albany, New York. Photographs taken in the area from the previous year showed bats with what appeared to be a white powder on their noses. The fungus was unknown to science until 2008 and was ultimately classified as *Pseudogymnoascus destructans (Pd)*. Once it was identified in North America, scientists looked for it elsewhere and found it in Europe and Asia. Bats in Europe and Asia appear to be adapted to, and unaffected by the fungus. Genetic evidence suggests it was unintentionally introduced to North America from Europe, most likely by cave explorers carrying spores on their clothing or gear.

Since its discovery, WNS continues to spread rapidly across North America. As of 2023, it is present in all ten Canadian provinces and most of the contiguous United States, from coast to coast. https://www.whitenosesyndrome.org/where-is-wns

WNS was estimated to have killed 6.7 million bats from 2006 – 2012 in the U.S. (USFWS 2012). The hardest hit species in North America are the northern myotis (*Myotis septentrionalis*), little brown myotis (*Myotis lucifugus*), and the tri-colored bat (*Perimyotis subflavis*). These species are all small-bodied bats. At many affected hibernation sites greater than 90% of the bats have died.

WNS impacts the physiology, water balance and arousal patterns of hibernating bats (Silvis et al. 2016). It rouses bats during hibernation and burns through their fats stores faster causing mortality generally due to starvation and dehydration, likely the reason that small-bodied bats have been the most affected by WNS. Abnormal behaviour has been observed such as bats flying outside in the daytime during winter. *Pd* can persist in the hibernation area outside of the hibernation period when no bats are present. *Pd* spores can also last a long time on clothes and equipment.

The spread of WNS is caused by contact with infected bats, their environments and by people who carry the *Pd* spores from one cave to another on their clothing and equipment. Bats group together not only during hibernation periods but also during fall swarming, when mating occurs, just prior to entering the hibernation site (s).

There are eight species of bats native to Ontario, they are all insectivores, and five of those species hibernate in Ontario. Of the five species that hibernate in Ontario, three species (northern myotis, little brown myotis and tri-colored bat) are listed both federally, under the *Species at Risk Act*, and provincially, under the *Endangered Species Act*, as endangered, and one species (eastern small-footed myotis (*Myotis leibii*)) is only listed provincially, as endangered. The listing of these species was done on an emergency basis, due to the devastating impact of WNS. The bats native to Ontario that are not listed as endangered are the little brown bat (*Eptesicus fuscus*) which hibernates in Ontario, eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*) and the silver-haired bat (*Lasionycteris noctivagans*).

Northern myotis and little brown myotis can live up to 30 years and the tri-colored bat can live up to 15 years (COSEWIC 2013). Females of these species have one pup (potentially 2 for the tri-colored bat) annually. Survivorship is low in the first year.

A bat can consume its body weight in insects in a day. Many of those insects can be damaging to forests and crops. A U.S. study in 2010 estimated the value of bats' pest-control services ranged from $3.7 - $53 billion per year. This is one of the reasons that bats are such a critical component of a healthy balanced ecosystem.

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No other animals or humans have been known to get WNS. There is no known cure for WNS but scientists world -wide are working together to study the disease and what can be done to control it. Several options have been considered to limit the spread of the fungus such as irradiation, fungicides, and biological agents. Fungicides do not seem to stop the growth of the fungus and may cause harm to the bats and the cave ecosystems. Research on biological agents, that inhibit spore germination or stop reproduction and growth, under appropriate conditions, appear to have provided better results. All work is in the early stages and no large-scale applicable solution has yet been proposed.

The best things we can do for bats is to stay out of caves or known bat hibernation sites, especially in the winter months. If you do access these sites outside of the hibernation period, decontaminate your clothing and equipment. Protect hibernation sites and known maternity roosts during forestry operations.

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Little Brown Bat with the characteristic 'white nose' in centre of photo. Photo credit: Lesley Hale, MNRF.

Non-invasive fecal DNA sampling as a tool for monitoring of woodland caribou populations

Dr. Ashley Thomson, R.P.F., Lakehead University and **Mr. Peter Hettinga**, MNRF

Traditionally, monitoring of boreal woodland caribou and other ungulate species has been conducted using winter aerial surveys to estimate population size. However, in recent years jurisdictions such as Alberta have begun using fecal DNA sampling as a tool to estimate population size of threatened woodland caribou populations.

Lakehead University, in collaboration with industry and government partners, applied for and received government funding to complete a fecal DNA survey of woodland caribou in the Brightsand Range of Ontario. The sampling was conducted in the Winter of 2020, involving first a fixed-wing aircraft flying the entire range at 5 km-transects to identify signs of caribou (i.e., tracks, animals, or cratering sites). A crew following one to two days behind used a helicopter to access the previously identified sites to collect fecal DNA samples. Sampling involved collecting approximately 10 pellets from distinct pellet groups for at least 1.4X the estimated number of animals at each site. For example, for a site with 10 estimated individuals, 10 pellets would be collected from each of at least 14 distinct pellet groups. This strategy was designed to ensure that all unique individuals at a site would be represented by the sampling. Two sampling occasions, one in February and one in March, were used to enable estimation of caribou population size using mark-recapture analysis. Following completion of the surveys, DNA analysis, including DNA extraction and individual genotyping, were used to estimate the total number of animals in the Brightsand Range. In total, we found 337 unique genotypes, equivalent to a minimum animal count (MAC) of 337. Population size estimates calculated using mark-recapture analysis ranged from 791 to 794, depending on the model, with an across-model average of 792 (95% CI = 619 to 966). Gender-specific population size estimates were 314 (95% CI=224 to 405) for males and 475 (95% CI = 362 to 589) for females.

Compared to the previous population size metrics available for the Brightsand Range (MAC of 224 reported in the *Integrated Range Assessment for Woodland Caribou and their Habitat, Brightsand Range 2011* – Ministry of Natural Resources and Forestry, 2014), we found many more unique genotypes, suggesting that fecal DNA analysis can provide a better means of assessing population size compared to traditional aerial surveys.

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In addition, our analysis provided an estimate of the total number of animals present in the range, which was not previously available through the Integrated Range Assessment. Our results illustrate the power of fecal DNA studies for estimating population demographic parameters of threatened species. In addition, this study has helped to develop collaborations between government, industry, and academic partners, and has contributed to the training of students in the forestry program at Lakehead University.

Acknowledgements

We are grateful for the participation of local Indigenous peoples, including the Ojibway Nation of Saugeen, in the fieldwork for this project. Funding for the fecal DNA sampling was provided by Environment and Climate Change Canada (ECCC). Funding for the DNA analysis was provided by the Species at Risk Stewardship Program (SARSP) administered through the Ontario Ministry of Environment, Conservation, and Parks (MECP). Industry partners, including Resolute FP, Domtar, Weyerhaeuser, EACOM, and the Forest Products Association of Canada (FPAC) contributed funds to all components of the project.

Empowering Ontario's woodlot owners: The evolution of the Ontario Woodlot Association

Glen Prevost, R.P.F., Program Manager, Ontario Woodlot Association

At the heart of the Ontario Woodlot Association (OWA) lie our members: a diverse community of woodlot owners, each as unique as their forests. From harvesting to tourism entrepreneurs to wildcrafters to municipal and conservation authority forests, our members embody a spectrum of aspirations that converge in their dedication to the stewardship of Ontario's private forests. Over the past three years, the OWA has experienced remarkable growth and transformation, reflecting our collective drive to reinvigorate private land forestry while adapting to new challenges and remaining true to our core values. With membership numbers soaring from 1,600 to nearly 3,000 in just three years, it's clear that the OWA resonates with woodlot owners across the province. Our chapters collectively run over 100 events, such as tours and workshops for woodlot owners each year in addition to the activities and initiatives run by the Provincial OWA office. These includes webinars, advocacy, The Ontario Woodlander magazine, and many projects, some of which are detailed below.

Union with the Eastern Ontario Model Forest

The OWA's union with the Eastern Ontario Model Forest (EOMF) has been very impactful. This marriage fortified the future of both organizations, enabling increased promotion of forest stewardship on private lands. Each organization retains its core programs, while benefitting from the resources of the other. For example, the EOMF Forest Certification Program is now managed by the OWA and has grown and benefitted from the resources of the OWA. Core EOMF events, such as the Winter Woodlot Conference and December Seminar continue to run. The OWA benefits by tapping into the International Model Forest Network, of which the EOMF is a member. This international organization helps elevate the OWA profile on an international level.

Varied Skill Sets and Staff Changes

We have experienced a noteworthy expansion in our team. From a modest staff of one full time administrator and a part time executive director, our staff has grown to a team of eight professionals. This includes a full-time executive director, communications coordinator, program coordinator, private land inventory analyst, agroforestry coordinator, and forest technician. We also share a part-time sustainable forestry coordinator with the Kawartha Land Trust. The OWA is well-equipped to address a wide spectrum of challenges and opportunities.

The OWA is grateful to have student placements for two weeks again this year, from the Algonquin College Forestry Technician Program! Our contingent of seven enthusiastic workers is already busy collecting LiDAR calibration plot data for the Private Land Forest Inventory Project! The students will also participate in a number of other activities during their time with OWA staff including an FSC audit, photogrammetric data collection using our drones, MFTIP plan development and tree marking.

Another great weekend with students from the Forestry Tech Program at Algonquin College and our OWA Inventory Team.

(Continued on page 18)

(Continued from page 17)

Private Land Inventory For Ontario

The Ontario Woodlot Association (OWA) has embarked on an ambitious journey to create a comprehensive and detailed inventory for all private forests in Ontario by 2027. In the past year 844,600 hectares of land has been inventoried in eastern Ontario with work underway in the North and southwest. The OWA uses existing LiDAR and remote sensing data to develop an inventory with attributes foresters and land managers are familiar with. The project includes boots-on-the-ground quality control measures and the development of primary products (digital elevation models, crown height models) and secondary products (basal area, volume, complexity). The OWA will offer training on the use of these products as part of the project. This knowledge will serve as a foundation for informed decision-making for landowners, researchers, and policymakers.

Climate Change Adaptation Training

This winter the OWA will begin equipping our members with the training they need to develop resilient forests in the face of climate change. This six-week course builds on work from both the Canadian Forest Service and the United States Forest Service and will be catered to Ontario's forests. The OWA has partnered with the Climate Risk Institute (CRI) to develop this training. CRI has a background in developing and delivering adaptation training for engineers and land use planners and bring valuable expertise to the table. Students taking the course bring their own plot of land and develop a practical adaptation plan for that land.

Harvesting Co-ops

The OWA's harvesting co-ops enable members to pool their small, economically unattractive (mostly) conifer plantations together to market them as a more attractive block. By sharing costs and ensuring responsible logging practices, the harvesting co-ops empower woodlot owners to thin their plantations, improving biodiversity, supplying jobs and sustainable timber to the local economy, and provide a modest profit. This project is being piloted in the Kawartha and Huronia (north Simcoe County) areas. The OWA has several harvests completed with positive results. Plans are to expand elsewhere in the province.

Conclusion

The Ontario Woodlot Association remains dedicated to woodlot owners and the promotion of sustainable forest management on private lands. Our growth over the past three years in both membership and programming is a testament to our relevance and impact. As we continue to evolve, we stand united with our members—true stewards of the land—who embody the best of Ontario's woodlot community.

For More Information about the OWA, please visit Ontariowoodlot.com or contact Glen Prevost at 705-358-7913 or glen.prevost@ontariowoodlot.com

Recently harvested logs from our Fleetwood Community Forest Owners Cooperative Pilot. The thinning went very well and the OWA is collecting data pre and post treatment to monitor natural regeneration and improved biodiversity.

Staff photo

A pre-harvest woodlot tour at an OWA Members Woodlot in Oxford County.

Musings on the OPFA's 66th annual conference field tour...

Ernie Demuth, R.P.F., and **Joel Martineau**, R.P.F.

After years of pandemic distancing, it was time to get the OPFA's 66th annual conference field tour underway! With a lot of excitement, and admittedly some trepidation knowing the high expectations for this year's conference, we started planning the field tour event months in advance.

The Keep It Simple approach was our mantra - don't overload the site visits, arrange for different perspectives, keep things somewhat on time, and everything will fall into place...hopefully. Feeling welcomed and comfortable throughout the field tour was our objective to allow for interesting and candid discussions.

We focused on the Ganaraska Forest Region, a unique area in southern Ontario, to highlight the challenges and joys of forest management in the region. These lands are on the traditional territory of Indigenous communities and treaties. How foresters can learn and create connections with these communities was an important part of the conference, but more on that later. This is an area where conservation authorities, private landowners, community forests, cooperatives, and woodlot associations, interplay for an interesting dynamic when practicing professional forestry.

Our hosts for the three field sites within the Ganaraska Forest provided an excellent overview on how collaboration and innovation play a crucial role in this often-overlooked landscape.


Photo credit: Gord King

Gus Saurer, R.P.F. and Lindsay Champagne (Watershed Biologist) from Ganaraska Forest Conservation Authority (CA), touched on multi-use forest management, including the authorities' history as the birthplace for southern Ontario's CAs and its reforestation movement. We took a deep dive into red pine plantation management and the various treatments and options for management, including economic considerations between recreation and sustainable forestry. Lindsay described a tallgrass prairie restoration project, sharing what Ganaraska has learned when it comes to trying to manage these rare habitats. We briefly visited a salvage harvest and discussed the logistics involved with harvesting woodlots impacted by the May 2022 Derecho Storm Event - a large scale windstorm event. Of course, it can't be Southern Ontario without invasives. We discussed managing invasive species across an entire forest within the principles of integrated pest management, and how to pick your battles when dealing with landscape-level infestations.

David Puttock, R.P.F. and Chris Gynan, R.P.F. from Silv-Econ, managers of the Peterborough County property in the Ganaraska, invited some attendees on the county's 90 hectare block - one of three parcels totaling 2,000 plus hectares of county forests under Forest Stewardship Council (FSC) certification under Silv-Econ's Group Certificate.

The block consists of 77-year-old red pine plantations, each with a cohort of polewood size hardwoods and two stands of mixed hardwoods. We looked at past thinnings in the red pine and a white pine underplanting project as well as a hardwood stand with no previous silvicultural management that was tree marked for a selection thinning in 2021.

(Continued on page 20)

(Continued from page 19)

Photo credit: Ken Elliott

Fraser Smith, R.P.F. and Dan Beausoleil, R.P.F. in training from FSmith Consulting Inc. walked us through a private woodlot located on the Oak Ridges under stewardship of the same family since 1987. The property boasts red and white oak stands, mixed woods, and plantations from the Woodland Improvement Act in 1970 and the 50 Million Tree Program project in 2018, and also includes open areas of historical agricultural use. To no surprise amongst the silviculturists in the group, we discussed the difficulties of establishing red oak regeneration. A highlight of the tour was the coordination amongst adjacent forest managers and owners in a heavily partitioned forest to undertake aerial spraying to address spongy moth infestations.

The conference and most of the field tours were in Treaty 20 territory. This treaty is also known as the Rice Lake Purchase and is part of the traditional territories of the Mississauga Anishinaabeg, Williams Treaty First Nation — comprised of 7 First Nations. We were honored to have Elder Lorenzo Whetung and Knowledge Keeper Gary Pritchard, CEO & Indigenous Conservation Ecologist at 4 Directions Conservation Consulting Services, from the Curve Lake First Nation.

From the onset, learning and relationship building were important to the planning committee. During lunch, we smudged and had a question-and-answer period with Elder Lorenzo and Knowledge Keeper Gary Pritchard. Many in attendance had not participated in a ceremonial smudging to cleanse the mind and foster openness, attentiveness, engagement and understanding. Although over 80 people were in the room, no audio speakers or mics were needed as we openly discussed the concerns and teaching from our Curve Lake First Nation guests - all were respectful, attentive, and engaged, and it can be likened to a conversation around the dinner table. This was certainly a highlight of the tour for us, and for others as well.

The complexities for a forester in these woodlands stem from managing comparatively small forests in a heavily fragmented landscape with competing interests. Foresters need to work with mills, loggers, conservation authorities, community forests, municipalities, and landowners, to name a few, while engaging and consulting with the Indigenous communities, to make the social, economic and environmental pillars of sustainable forestry a reality – a perfect embodiment of our conference theme “Professional Foresters Adapting through Collaboration and Innovation”.

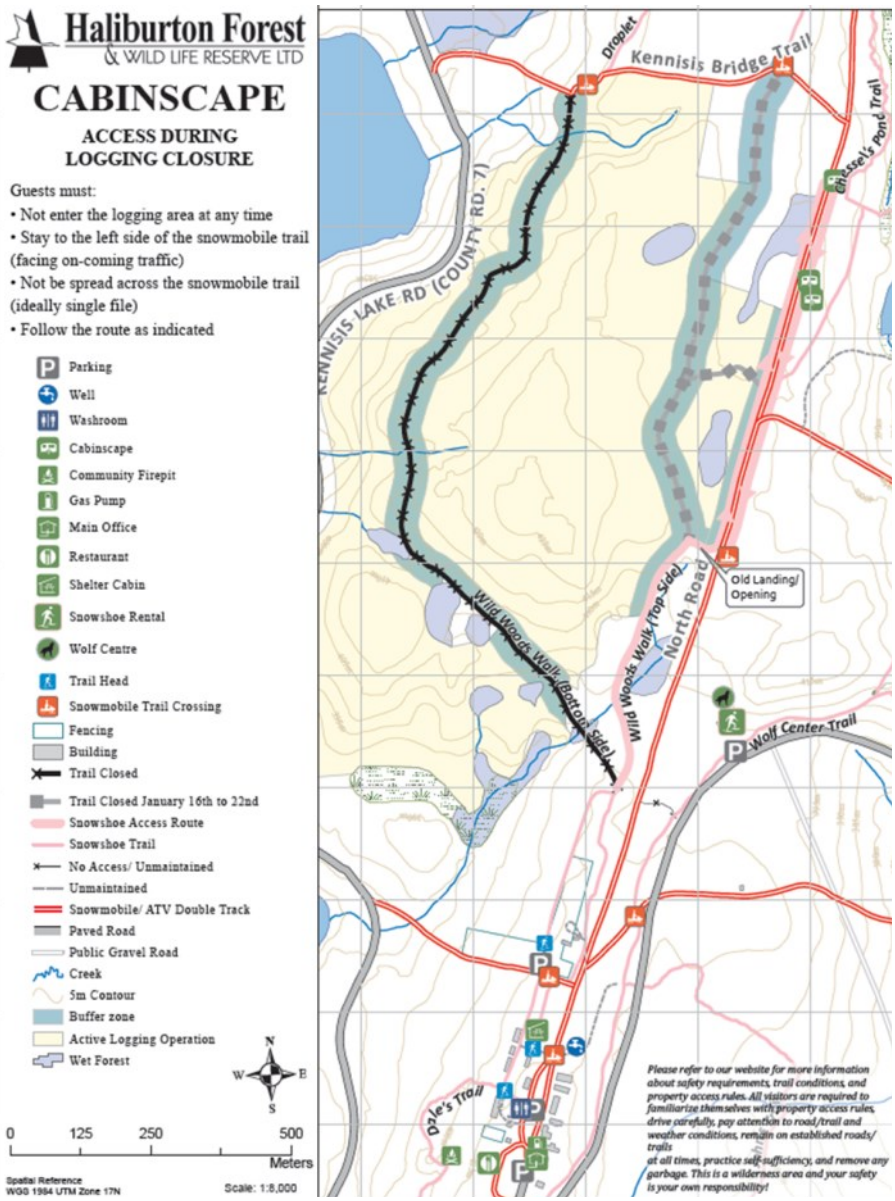
Multi-use forest management at Haliburton Forest & Wild Life Reserve

Thomas McCay, R.P.F., Forestry Manager, Haliburton Forest & Wild Life Reserve

At the close of the 2023 OPFA conference, Haliburton Forest & Wild Life Reserve had the privilege to host a tour of our harvest operations and silviculture research for a small group of conference participants. We typically host a dozen forestry tours a year for students and the public, but this was a rare opportunity to share our forest with practicing professionals.

Haliburton Forest is a private, sustainable, multi-use, forest management and forest products company. We steward 40,000 hectares of primarily hard maple forest in Central Ontario, are shareholders in four sustainable forest management licensees in the region, and operate four hardwood sawmills. We operate a thriving tourism and recreation business on our forest lands, and we operate and partner with value-added manufacturers. This is obviously a bit too much to fit into a half day tour on a Friday afternoon! But one tour stop we did make with the group is worth highlighting for OPFA members.

The location of Haliburton Forest in relation to Algonquin Provincial Park in Central Ontario. Haliburton Forest is on the southwest edge of the Algonquin Dome and is in prime country for both cottage tourism and tolerant hardwood forest management.



This map for the trail users and campers demonstrates the overlap of logging operations and tourism activity. The Haliburton Forest base camp – the hub of recreation activity – can be seen at the southern edge. The harvest area, modified harvest areas for trail aesthetics, and necessary trail closures can also be seen.

Haliburton Forest has always believed that timber harvesting and recreation can and should happen right on top of each other. A car of happy campers is likely to meet a logging truck heading in the other direction. A hiker will see the effect of a thinning or removal cut – or may find their favourite trail closed for the season so that such a harvest can take place. This is a compromise on what some tourists may expect to find, but it is essential to the character of Haliburton Forest as a working forest. There are two main benefits to this approach. First, we get to spread the costs of a single road network between both forestry and tourism. And second, we take the visibility of our operations as an opportunity to educate our users and the public. This is preferred to users and the public believing that the area is a semi-wilderness, only to be at risk of a shock when encountering an operation for the first time.

(Continued on page 22)

(Continued from page 21)

It is in this spirit that we conducted a harvest which overlapped the Wild Woods Walk - our busiest recreation trail - in Winter 2023. The block is primarily maple, and the silviculture included elements of single tree selection and continuous cover irregular shelterwood. It also contains patches of beech bark disease (BBD) salvage: a significant aesthetic and ecological impact. When planning a harvest that may interfere with recreational use, the tourism staff are important contributors who review drafts of the prescription and provide input on how to implement the harvest. The trail was closed during the operation, and the logging was professionally done by Faraday Forestry Services using a Rottne wheeled dangle-head harvester and a forwarder. We implemented aesthetic buffer strips of 25 meters around the trails, where a higher residual basal area was retained (if it wasn't Beech), and the logging slash was cut closer to the ground. When the logging was completed, signage explaining the silviculture associated with the harvest was installed. We also walked the area with the tourism staff – who are on the front lines with the public - so they could have firsthand experience with why we did what we did, and what the future holds for the trees and regeneration left behind.

A beech tree infected with advanced beech bark disease. Both the scale (white flecks) and fungal infection (red blotches) are clearly visible. The progression of beech bark disease contributed to the urgency to harvest this block and resulted in more timber removal and aesthetic impacts around the recreation trails.

Especially with the volume of diseased beech removed, this was a dramatic activity. As the snow melted there was mounting concern about the reception the trails and the harvest would receive from the public. But now, by August, we can say that there has been no significant negativity associated with this operation. Meanwhile there have been many benefits. The amount of BBD infected beech around the recreation trails was becoming a safety hazard and in the absence of a timber harvest would have required removal anyway. The logging trails were laid out to jump-start an expansion of the recreation trail network in the area. We achieved the forest management benefits of log supply, stumpage revenue, and forest health improvement.

The multi-use activities at the Wild Woods Walk provide a great example of how we can implement multi-use forest management. We believe that forestry and tourism can and should closely coexist. And we have now had the opportunity to share this case study with our recreation users, field camp students from Fleming College and University of Toronto, and Professional Foresters fresh from the Peterborough conference!

Council corner

Scot Rubin, R.P.F., Councillor Northwest

OPFA's council and the amazing staff have been busy ensuring that the organization keeps moving and progressing in a world of change and uncertainty. The OPFA has been adapting and preparing for the next stages in its development and growth. The past number of months have been filled with annual budgeting, implementation of the strategic plan and forethought on future succession planning and human resources. The organization is operating fully remotely using new technologies perfected during the COVID era that increase employee flexibility and reduce the association's overhead.

Hylio-116 Aerial Seeding Drone and Aerial Seeding a Forest Fire North East of Nipigon.

With rapid technological advancements occurring, foresters have been at the forefront of the implementation of these new tools, using them to increase efficiencies and develop new businesses. Many of these advancements are adaptations of platforms created and used by different sectors such as agriculture, water management, oil and gas, and land planning. One item that I find most exciting is the advancements in drone technologies. Silviculture foresters can now operationally aerial seed areas using drones with high precision allowing small blocks to be treated immediately after harvest, and at a reduced cost compared to traditional tree planting (when the ground is suitable). Information can now be collected faster and more accurately using satellite imagery captured almost daily, higher resolution supplemental aerial photography and lidar; all now introduced as tools of our profession. Some of the cleantech innovations occurring also have the potential to dramatically change the way we look at forest management. Foresters can be part of the solution to reducing the carbon intensity of the country while providing energy solutions, allowing for more utilization, better forest management and increased local employment opportunities. In the near future we will likely move into using artificial intelligence and machine learning for monitoring, forest inventories, forest management and product optimization. With these exciting developments, forestry continues to adapt and evolve with foresters at the leading edge of this promising future.

Navigating new terrains: My experience with the OPFA's job shadowing program

Temitope Ojo, R.P.F. in Training

In 2019, I relocated from Nigeria to Canada to pursue a Ph.D. in Forestry at Lakehead University. As an immigrant with only Nigerian work experience, integrating into the Canadian forestry sector presented unique challenges. My Ph.D. supervisor, Dr. Michel Beaulieu, offered me sound advice during this transition. He recommended joining professional organizations and societies to understand the Canadian professional landscape, and importantly, as a strategic move for networking and to position myself for potential opportunities. This insight led me to join the Canadian Institute of Forestry (CIF) and the Ontario Professional Foresters Association (OPFA) as well as other Thunder Bay community organizations shortly after my arrival.

Upon obtaining my student membership in the OPFA, I discovered the "Shadow a Forester" program. Eager to immerse myself in the real-world dynamics of the forestry sector, I promptly registered my interest, as I saw it as a means to offer the vital support and timely advice I needed for my transition.

Within a week of expressing my interest, several OPFA members who had volunteered to be shadowed responded. My primary aim was to secure mentorship that could steer me toward viable job and career opportunities.

Among the four individuals who contacted me, I found Mike Rosen and Joe Yaraskavitch's profiles particularly compelling. Their extensive professional experience and enthusiastic willingness to mentor captured my interest. Consequently, we exchanged resumes and set up a regular meeting schedule on Microsoft Teams.

Both Mike and Joe proved to be invaluable mentors, generously sharing their insights and experiences. They provided career advice, reviewed my resume and cover letters, and regularly shared links to job postings and resourceful websites. This proactive and personalized approach empowered me to conduct an informed and strategic job search. Their consistent effort made me feel seen, valued, and actively involved in my career progression.

Mike was also helpful in orienting me to better understand the "forestry culture" in Ontario and the Ontario Ministry of Natural Resources and Forestry (MNRF). I won't forget his observations on the importance of hockey (amongst other things) in the culture. Although the opportunities to play (ice) hockey are very limited in Nigeria, I can say that I am doing my best to understand the game and have aspirations to play goal. Mike said that, "When I asked Temitope why he chose Canada as his adoptive country I was unprepared for his answer. 'I was impressed with Canada's commitment to diversity', I remember him saying. The "Shadow a Forester" program has been one of the most satisfying experiences of my career and the fact that Temitope successfully obtained employment as a professional forester, is a great personal accomplishment", he said.

Temitope Ojo and family proudly pose in his MNRF office in Thunder Bay.

(Continued on page 25)

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Joe provided me with some great advice on opportunities to expand my forestry field work experience in Ontario as well as tips and tricks for the Ontario government style cover letter and my resume. Joe was very happy with the mentor experience similar to Mike. "It is a pleasure to pass along advice to younger foresters and it was really gratifying to help someone like Temitope on his career path and see him succeed" Joe stated.

With their help, I began applying for opportunities, especially within the MNRF. The process was arduous, and there were moments of doubt. However, after my second application, I was thrilled to secure my dream job. Mike and Joe's unwavering support and timely advice were instrumental in this achievement. I feel privileged to have seasoned and professional mentors to offer the best of both worlds!

Reflecting on this journey, the "Shadow a Forester" program was transformative, serving as a crucial stepping stone in my career and helping me to achieve my professional goals. Importantly, it offered much-needed support, instrumental in integrating into the Canadian forestry sector as an international student. What struck me as particularly effective about the program was the ability to specify one's area of specialization during registration, which allowed for a more tailored and focused experience. This feature was instrumental in linking me with professionals sharing similar passions and areas of expertise.

In conclusion, the OPFA "Shadow a Forester" program was more than just a program—it was a life-changing experience that equipped me with the connections, knowledge, and experience needed to succeed in my career. I am deeply grateful for the support I received and wholeheartedly recommend it to others, especially international students and immigrants aspiring to make their mark in the forestry profession.

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

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

As an R.P.F. now living in Quebec, I have a unique opportunity to look at forestry practices in a neighbouring province to Ontario. The following are observations I have made in my 39-year forestry career, a career in which I have worked in four forest "Regions" (Boreal, Great Lakes-St. Lawrence, Deciduous and Urban) where herbicide use has been a constant and contentious topic. Although Quebec foresters are far from unanimous as to the "success" of over 20 years of a provincial forestry herbicide ban, I chose to highlight the work of Thiffault and Roy (2011) to complement my own personal observations of silviculture in western Quebec.

Vegetation management lies at the core of forestry - crucial to meeting specific objectives of growing new forests. Forests normally regenerate into some sort of cover but without management, stand composition may not be what is desired and the length of time for regeneration can be long. Graduating in forestry in the early

1980's, pesticides were always depicted as "necessary tools" in forest management. Every forestry student who walked up the main staircase at the University of New Brunswick faced a 20-foot diorama of wingtip-to-wingtip aircraft, complete with spray trails for spruce budworm (a most sobering start to the day!). A 1983 policy paper by the *Canadian Institute of Forestry* summed it up this way:

Until continuing research can provide viable alternatives to chemical pesticides, foresters are dependent upon them…. Without their availability, it is certain that forest production goals…will not be met; the annual allowable cut from productive forest land will be decreased, and the viability of the forest industry will be substantially reduced.

Whether it was the universities, governments, or any forestry organization, the message was similar: without herbicides our forests cannot adequately regenerate at a reasonable cost in a reasonable time frame.

Historically, this has been at odds with the public who were rarely positive about herbicide use in the forest. First Nation communities and environmental groups frequently mention the health risks and point to new research on the symbiotic relationship between "crop trees" and their "competitors" to justify herbicide bans. First Nations have decried the use of herbicides on their traditional lands for years – a lawsuit has been initiated against the provincial government by three northeastern Ontario First Nations.

Enter Quebec. Whether it is their birth rate, attendance at religious institutions or the number of swimming pools/ person, Quebec can differ from the rest of Canada. Herbicide use has now been banned on Quebec Crown lands (and in their many assistance programs for private landowners) since 2001. Twenty years later and Quebec continues to have: Canada's second largest forest economy (behind B.C.), a vibrant forest industry and satisfactory results in regeneration after harvest. How did this happen and what are the lessons for Ontario (and other jurisdictions)?

The" Quebec experience", has been extensively reviewed by Thiffault and Roy (2011). Their conclusion was that crop trees can be brought to the free-to-grow stage without herbicides and without major effects on vegetation diversity when, "…vegetation management…is based on early reforestation, the use of tall planting stock and intensive mechanical release." It should be noted that Thiffault and Roy (2011) state that the direct costs of these treatments are higher than those where other regeneration strategies are used.

Tree nurseries and planting began in Quebec in the early 20th century but really ramped up after WWII. In the 1970's, as tree improvement began in earnest, Quebec also began herbicide applications (with 2,4-D and 2,4,5-T). Public concern in the early 1980's led to the first Bureau d'audiences publiques sur l'environnement (BAPE) on pesticide use, a public forum initiated by the Quebec Ministry of Environment. This concern was based in part on the use of "Agent Orange" in the Vietnam war. "Agent Orange" was never registered in Canada, but it contained in part 2,4-D and a contaminated version of 2,4,5-T. When the Quebec public learned that its government was using herbicides that may contain similar components in its forests, they were understandably concerned. The BAPE recommended that 2,4 - D and 2,4, 5-T be banned and replaced with mechanical tending. Further innovations in the use of glyphosate ("Vision"/"Round-Up"), an increase in seedling production, and the development of containerized seedlings led to changes in forest policy.

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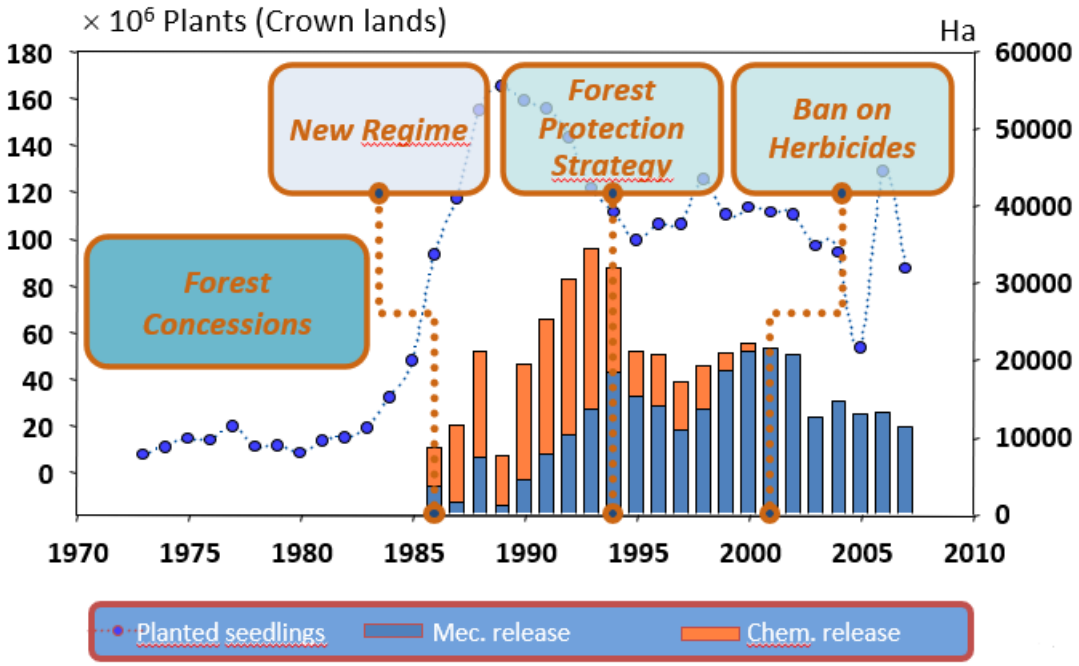

Figure 1. The historical and political contexts have influenced the actual strategy.

Beginning in the 1980's, protection of advanced growth became de rigeur, known as Coupe avec Protection de la Regeneration et des Sols (CPRS - similar to Ontario's Careful Logging Around Advanced Growth — CLAAG). Reductions in planting followed. After the publication of the province's first Pesticides Act (1989) the government created a new Forest Protection Strategy submitted under a new BAPE. With continuing public concern for herbicide use, the BAPE again recommended a ban on herbicide use, to be replaced with mechanical tending. This has now generally been well received by those who created the Strategy. The government committed to banning all herbicide applications by 2001 by promoting the use of CPRS, using large dimension planting stock soon after the cut, and mechanical tending. Research throughout the 1990's and 2000's gave greater precision to the use of various treatments (see Figure 1).

The Forest Protection Strategy proposed silvicultural scenarios based more on "natural dynamics" which led to expanding the use of the shelterwood and selection systems in the southern (Great Lakes-St. Lawrence) areas. In the north, especially in black spruce stands, preservation of advance growth became the norm. Research into mechanical site preparation showed species specific responses to scarification, especially in "ericaceous dominated sites" (Labrador tea, sheep laurel, blueberry). A major result of the research was the development of large dimension containerized plugs (310 cm3). Early planting after harvest was also identified as crucial in reforestation success.

With regards to mechanical release, two passes are frequently needed in highly fertile sites to ensure free-to-grow status within five years, with effectiveness negatively affected by the resprouting of shade intolerant competitors. Worker productivity has also been identified as another constraint on mechanical tending - training and finding crews can be challenging. The work is arduous, with a new payment system based on production while taking into effect slash, rocks, stumps, and slope. Costs of mechanical tending are high, varying between two and three times the cost of herbicide spraying (Thiffault & Roy 2011) with the amount of tending in Quebec like Ontario – about 50,000 ha/year. I have also heard that the herbicide ban makes it more difficult to deal with an increasing invasive species problem. Quebec happens to be in the best position to do substantial amounts of mechanical tending, as they have always led Canada in a related work, pre-commercial thinning. Another advantage of mechanical tending is that the operator can also make on-the-spot decisions to leave beneficial regeneration (Brunette, 2023) that may otherwise be killed by herbicides.

(Continued on page 28)

(Continued from page 27)

In Ontario, most of the incentive for minimizing herbicide use in forestry seems to be coming through Indigenous Forestry based on traditional knowledge sources - decisions on herbicide use are delegated to the Sustainable Forestry Licensee (Kayahara, 2018). Initiatives such as the Herbicides Alternative Program (HAP) by *Green First* now involve the *Ontario Ministry of Natural Resources and Forestry* (MNRF) and *Natural Resources Canada* (McConnell, 2021) for scientific support, with MNRF using its experiences from the 1990's *Vegetation Management Alternatives Program* (VMAP).

The Quebec experience may look promising. In a 2021 study, it was concluded that 84-91% of the sites examined achieved crucial 5th year free to-grow-status under the "no herbicide" regime (MFFP 2021). Public criticism of herbicide spraying for forestry is nonexistent within the province. As in their private land forestry programs, Quebec is showing leadership in this regard and is touted by some as an example for other provinces to follow.

Good and appropriate site preparation, regeneration quickly following harvest, large dimension planting stock and mechanical tending are all having positive results in "La Belle Province". The lesson for foresters in other jurisdictions may be that part of being a professional is the ability to find innovative solutions to public concerns, even when those concerns are contested by the profession.

Author in a 5 year old red pine plantation, mechanically tended near Kazabazua, Quebec.

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Update on changes to OPFA's registration processes and annual reporting requirements

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

There are two important aspects to being a regulated professional. One is the requirement to have and maintain the professional knowledge competencies required to practise professional forestry. The other equally important aspect is the requirement for regulated professionals to be of good character.

The OPFA has been working to provide assurance to the public that professional foresters can be trusted to provide excellent care to the forests and urban woodlands in Ontario because they are competent and of good character. Here is a summary of what the OPFA has done and is doing to ensure that this trust can be demonstrated every day to our clients and the people of Ontario.

Competence

The Fair Access to Regulated Professions and Compulsory Trades Act (FARPACTA) was amended recently. One of the changes is the elimination of any Canadian experience requirements by December 2, 2023. However, the OPFA removed its Canadian experience requirement for registration a decade ago. All applicants (domestic or internationally trained) must meet an 18-month mentored work experience requirement to become licensed. Relevant experience gained outside of Canada that was mentored by a registered forestry professional licensed in that country is accepted. In the 2013 annual report from the Office of the Fairness Commissioner of Ontario this is what Jean Augustine, Fairness Commissioner, wrote commending the Ontario Professional Foresters Association "Foresters are a small regulatory body with limited resources. However, they are focused on ensuring professional competence, and not on defending the way things have always been. They understand that immigrant professionals have important contributions to make to the profession and to the province".

As a regulator, the OPFA is constantly reviewing the requirements it sets for its licensing requirements related to the principal object of the Professional Foresters Act which is to protect the public interest. A few years ago a review of the academic standards found that the knowledge requirements were lacking in their coverage of the Indigenous jurisdiction in Canada. This resulted in the development of a stand-alone Indigenous jurisdiction professional standard. We are working on developing the resources needed to implement this requirement so that all practising members will have access to this training.

The registration process is also under constant review by the Registration Committee and OPFA staff, to ensure that it maintains the standards of entry and competence, while being responsive to new conditions. For example, today over 60% or around 110 Provisional Members are from university and college programs which are not accredited by the Canadian Forestry Accredited Board (CFAB). Many of these members apply for OPFA membership after working for several years, and already have experience in the field. This is a major change from the past when Provisional Members came almost solely from CFAB accredited university programs right after graduation. It means that these new Provisional Members are required to undergo the Credential Assessment Process (CAP).

The CAP is designed and maintained by the Forest Professional Regulators of Canada (FPRC), membership of which consists primarily of the Registrars from each regulatory body. To adapt to the increasing number of candidates for the CAP and the significant preparation time involved in the process, the FPRC has decided to divide the CAP into two parts. Phase 1 is an academic assessment of course work and Phase 2 is an assessment of work experience. After the Phase 1 assessment, OPFA candidates will be eligible, if they have the necessary mentored experience, professional ethics and legislative and policy competencies to qualify as an Associate Member with a scope of practice that includes those areas in which they have demonstrated competence. They will then have the ability to work within that limited license while they progress towards meeting additional competencies for a more comprehensive Associate Member scope of practice or Full Membership. It is hoped that this new process will reduce the time it takes Provisional Members from programs that are not CFAB

(Continued on page 30)

(Continued from page 29)

accredited to move towards a licensed category of membership.

Good Character

Last year the OPFA undertook a review of its good character requirements. The good character requirement for regulated professionals is important as it ensures that clients and the public can be assured of the trust that they place in professional foresters and the services we provide. A review of other regulators good character requirements that are publicly available was conducted and is summarised in Table 1.

Table 1. Good Character Assessment in Selected Regulated Professions in 2021 (prior to changes).

Organization	Good Character Requirement	Application Declaration	Third Party References	CPIC Check	Annual Declaration	Requirement to Notify Change in Status
Ontario Professional Foresters Association	X		X			
Alberta Forest Management Professionals	X	X			X	
Forest Professionals of B.C.	X	X			X	
Ontario Association of Architects	X	X				X
Law Society of Ontario	X	X				X
Ontario College of Pharmacists	X	X		X	X	

To determine what changes were needed to good character requirements the OPFA considered:

1. Its legal requirements, especially the OPFA's due diligence to ensure the protection of the public interest.

2. The probability of members being involved with vulnerable persons.

3. The importance of the organization knowing if a member's good character status has changed from the original application.

The OPFA found that the questions related to good character asked of candidates for registration needed to be updated. Regulatory bodies like the OPFA, whose primary object is to protect the public, require members to disclose convictions and charges for offences to confirm whether the member continues to meet the good character requirement. Other forest regulators require an annual declaration related to good character (see Table 1). To ensure that the OPFA is able to demonstrate that the good character of its members is continually assessed, Council approved the addition of annual good character reporting.

While the OPFA members may undertake professional forestry with vulnerable persons, it is likely not a regular occurrence. This fact suggests that the requirement for a criminal background check (i.e., CPIC) may not be warranted. Requiring self-declared criminal convictions is justified. For example, fraud, theft, or assault convictions of members or candidates must be known and understood by the OPFA to fulfil its role of protecting the public interest.

(Continued on page 31)

(Continued from page 30)

If a member has been charged with an offence or has a civil lawsuit filed against them (which is publicly available information) that does not mean that the OPFA will necessarily take any action but means that the OPFA will monitor the situation until a finding is made, or not made. Please note that the OPFA good character declaration process is similar to the procedure and questions used by many regulatory bodies across Ontario.

The Future

Professional forestry is alive and well in Ontario, with increasing numbers of Provisional Members joining the OPFA and becoming Associate and Full Members. We have many qualified volunteers for OPFA's committees and other groups. Many new employers are seeking professional foresters. There is a greater awareness by the public and allied occupations of the role of professional forestry in Ontario, and there is excellent participation in OPFA tasks by our members.

The advent of Artificial Intelligence tools also suggests that trust will be an important aspect of professional work. At the current time machines and algorithms are not legally accountable for their decisions in Canada, persons using the machine or algorithm are responsible for the decision made. The assurance of competence and good character, which is aimed at improving the trust that all clients, employers and the general public develop with our profession, will continue to play an important role in societies of the future.

Annual membership renewal is coming

Annual Membership fees and reporting (both competency and good character) are due December 1. Detailed information on how to renew your membership will be emailed and mailed to members in October. Council has approved the following Fee Schedule effective December 1, 2023.

FEE SCHEDULE

Effective December 1, 2023

This Fee Schedule was approved by Council pursuant to the OPFA Bylaw on May 31, 2023

Fee (*HST is not charged*)	**Fee starting Dec 1, 2023**
Student Member Fees	
Application Fee	$0
Annual Membership Fee	$0
Provisional Member Fees	
Application Fee-current or past Student Members within six months of graduation)	$60
Application Fee-regular	$120
Annual Membership Fee- first to sixth fiscal year[1]	$110
Annual Membership Fee-after a total of six years as a Provisional Member	$340[2]
Scope of Practice Academic Assessment Fee	$500[3]
Full/Associate Member Fees	
Application Fee-registered forestry professionals transferring from another province	$110
Annual Membership Fee-regular[1]	$680
Replacement of Seal	$75
Readmission Fee -after 1 year or less, limited to 1 time total per member	$0
Readmission Fee-after more than 1 year or after one free readmission	$500
Temporary Permit to Practice	
Per 3-month period[4]	$225
Other Membership Fees	
Non-Resident Member Annual Membership Fee	$275
Inactive Member Annual Membership Fee	$275
Life Member Fee-one-time payment equal to that of Full Membership fees in effect in the fiscal year when payment is due	$680
Miscellaneous Fees	
Category Change Fee between Full, Associate, Non-Resident, Life, and Inactive membership categories only	$50
Late Payment Fee-Provisional Membership	$75
Late Payment Fee-all other categories	$100
Late Reporting Fee-all applicable membership categories	$100
NSF payment charge	$10 + bank charges
Split (2) Payment Plan, paid Dec. 1 and June 1 (Full & Associate Members only)	$20
Four (4) Payment Plan, paid Dec. 1, Mar. 1, June 1 & Sept 1 (Full & Associate Members only)	$40

1 Annual membership fees for Provisional, Full and Associate Membership are prorated throughout the fiscal year (December - November 30) from the time of acceptance.

2 Half of Full/Associate Annual Membership Fee

3 Matches first phase (academic assessment) of national CAP fee

4 Non-Resident members may receive two Temporary Permits free of charge. A maximum of three 3-month permits in one year or nine 3-month periods in ten years is permitted.

Note: Applicants who are required to undergo the national Credential Assessment Process (CAP) will be required to pay the CAP Assessment Fee which must be submitted directly to the Forest Professional Regulators of Canada (FPRC) The amount of the fee is determined by the FPRC.

Grey Areas has a new look!

Steinecke Maciura LeBlanc (SML) Grey Areas newsletter has been in publication since July 1992 and discusses the latest developments in professional regulation. They have recently updated their newsletter header (see below) but continue to provide articles about recent studies, case law and legislative updates in the regulatory world. New issues are published monthly – subscribe at https://sml-law.com/resources/grey-areas/ to receive issues to your email.

We would like to hear from you!

We have been posting the full Grey Area articles in the Professional Forester. We are considering a change to this approach and we are interested in hearing from you, would you like us to publish:

- Reprints of full articles
- Links only

Email opfanewsletter@gmail.com with your thoughts or fill out our survey at:

https://forms.office.com/r/MjS1VFp1QS

Recent articles:

August 2023, Issue No. 281 – Addressing Indigenous-Specific Racism

July 2023, Issue No. 280 – The Evolution of Screening Complaints

June 2023, Issue No. 279– Conflict of Interest Registers

In Memoriam

Brent A. Connelly, R.P.F. (Ret.)

Brent Connelly was raised in Brownsburg, Quebec. He graduated in 1961 from the University of New Brunswick (UNB) with a bachelor of science degree in forestry and started his first full-time job in 1962 as an operational forester with McRae Lumber Company at Rock Lake in Algonquin Park. Prior to that, while attending UNB, he worked for parts of three years in Algonquin Park for the former Eastern Forest Products Lab of. Ottawa.

From 1965 to 1975, Brent worked for Weyerhaeuser Canada in Sault Ste Marie and Mattawa (both in Ontario) in the positions of road engineer, branch forester, logging superintendent, and woods manager.

In 1975, Brent was one of the first four foresters hired to work for the newly established Algonquin Forestry Authority (AFA), and throughout the subsequent twenty-five years, he worked from the AFA's Pembroke office, where he held the positions of area supervisor, operations manager, and acting general manager. Retirement came in 2000; that same year, he received the Friends of Algonquin Directors Award in recognition of a career dedicated to the enhancement of Algonquin Park values.

Brent was proud of the fact that he worked as a professional forester on logging operations in two provincial parks for his entire forty-year career: thirty years in Algonquin Provincial Park and ten years in Lake Superior Provincial Park. In 1965, he became a full member of the Ontario Professional Foresters Association (OPFA) and remained a life member.

https://ottawacitizen.remembering.ca/obituary/brent-connelly-1088433171/

Member News

New Associate (Associate R.P.F.) Members:

Patrick Bazinet
Cheyene Brunet

New Full (R.P.F.) Members:

Robert Glover
Alexander MacLeod
Taylor Mongston-Murray
Joshua Quattrociocchi
Tyler Rea
Bridget Trerise

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)

Ivan Adarme
Mathieu Alain
Michael Armstrong
Tyler Brisson
Sharley De Freitas
Mark Engel
Nicole Grgic
Aidan Holland
Kim Hyemin
Michael Jennings
Lucas Klages
Scott Macdonald
Isaac Mazer
Temitope Ojo
Hailey Orchard
Ngaire Roubal

New Student Members:

Alexander Martin
Madeline Sousa

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

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

Cory Wiseman

Deceased Member:

Brent Connelly

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/

Coming Events

CIF-IFC 2023 National Conference & 115th Annual General Meeting: Forestry for All
September 24 to 27, 2023
Nanaimo, BC
https://www.cif-ifc.org/conference-agm/2023cif/

Oak Wilt in Woodlots: What Can We Do?
November 16, 2023
Online
https://www.ontariowoodlot.com/event-5392734

2024 OPFA Annual Conference and AGM
April 16 to 18, 2024
Sault Ste Marie, ON
https://opfa.ca/about-us/event-list

Ontario Woodlot Association Annual Meeting, Conference and Tour 2024
April 23 to 24, 2024
Barrie, ON
https://www.ontariowoodlot.com

Please send any upcoming events to opfanewsletter@gmail.com