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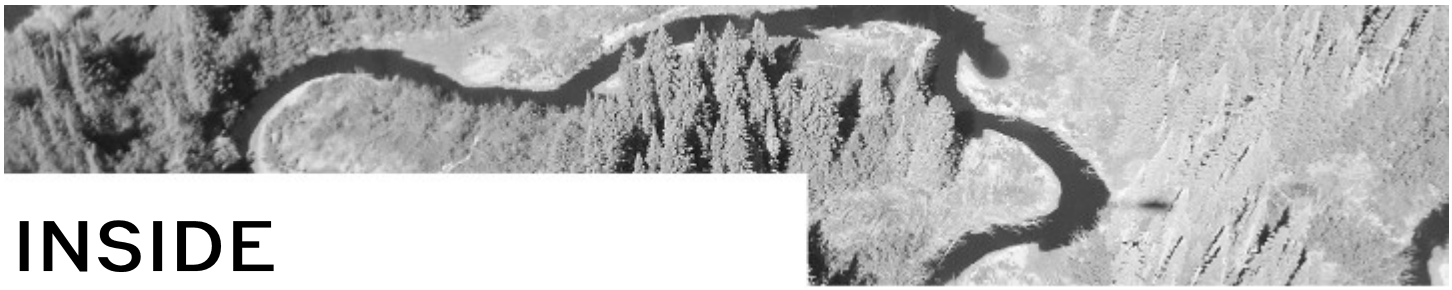

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Strength in Capacity, Indigenous Emergence in Forest Management

Tess Sullivan, R.P.F. in Training, MPA, Director of Lands and Resources for Missanabie Cree First Nation, with help from:
David Flood, R.P.F., General Manager Wahkohtowin Development GP Inc

Ontario's forest management system has for decades been an ironclad paradigm of large forest companies maintaining the lion share of forest tenure, with provincial government as regulator trying to balance conflicting mandates of environmental sustainability and economic stability.

The government reflects the socio-political views of the day, with the pendulum swinging back and forth between economic capitalism and environmental conservation to varying degrees.

Nested within this paradigm is the Duty to Consult and Accommodate Indigenous communities on resource development projects and policy decisions that may impact Aboriginal and Treaty rights. Mounting case law from *Haida Nation* 2004 to *Mikisew* 2018 and beyond, have set a labyrinth of precedents and conditions on the Duty to Consult and Accommodate that has brought layers of complexity to the business of natural resource development. The United Nations Declaration on the Rights of Indigenous People 2007, endorsed by Canada in 2010 has elevated the Duty to Consult to the international level, and brought about the requirement of "free prior and informed consent" (FPIC) as the new measure for meeting this obligation.

Action 92 of *Honouring the Truth, Reconciling the Future*, 2015, Calls to Action of the Truth and Reconciliation Commission of Canada reinforces FPIC and makes it a responsibility of business:

> 92) We call upon the corporate sector in Canada to adopt the United Nations Declaration on the Rights of Indigenous Peoples as a reconciliation framework and to apply its principles, norms, and standards to corporate policy and core operational activities involving Indigenous peoples and their lands and resources. This would include, but not be limited to, the following: i. Commit to meaningful consultation, building respectful relationships, and obtaining the free, prior, and informed consent of Indigenous peoples before proceeding with economic development projects.

However complex, the simple bottom line is that it is all about the relationship between Indigenous, government, and industry regarding the sharing of power and economic benefit of natural resource extraction. Case law and International legislation has obliged government and industry to engage with Indigenous people on higher rungs of Arnstein's Ladder of Citizen Participation (1964). It is no longer acceptable to notify, consult and placate; finally, it is about partnership, shared benefit, and shared decision making.

The Ontario government has made strides towards establishment of this new relationship. In 2012 Nawiinginokiima Forest Management Corporation was established, with the mandate to be locally managed by a board comprising directors from the management area's three First Nations and local municipalities. In April 2018, the Ontario government signed pilot resource revenue sharing (RRS) agreements with three First Nation organizations; Grand Council Treaty #3, Mushkegowuk Council and the Wabun Tribal Council, representing 32 First Nations across Northern Ontario. These Partner First Nations receive 45% of government revenue from forestry stumpage, and 40% of the annual mining tax and royalties from active mines (Canadianminingjournal.com).

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RRS is a working success. Missanabie Cree First Nation, Chapleau Cree First Nation, and Brunswick House First Nation have the opportunity to invest RRS funds into critical need areas such as infrastructure, health, culture and education and where able have the opportunity to invest a portion of the 5-year pilot RRS funds into growing their respective Lands and Resources Department. A functioning Lands and Resources Department is an essential faculty as it equips Indigenous communities with the people power and expertise to analyse the business of resource extracting proponents and be able to influence development decisions as rightful stewards of the land.

Wahkohtowin Development GP Inc. (comprised of the above named First Nations) was established in April 2016 to continue the work of the North Superior Regional Chiefs Forum (NSRCF). It was strategically resourced from earlier MNRF RRS pilot funds and pooled New Relationship Funds from Ministry of Indigenous Affairs. The corporation is focused on operationalizing key business areas in forest management (Forestry | Wahkohtowin Development GP Inc.). Currently these First Nations hold an equity position in the Hornepayne Sawmill and cogeneration plant, and Wahkohtowin has just launched its Guardian Program aimed at getting youth engaged in forestry. Wahkohtowin has also been steadily working toward a customized consultation approach and the formation of a relationship table to coordinate partnered decision-making in forest management with sustainable forest licensees and the Ministry of Natural Resources and Forestry.

The much-needed capacity to be meaningfully and capably involved in the working relationship of natural resource management is growing noticeably. There is strength in this capacity and First Nations are emerging as leaders in the arena of forest management, bioeconomy, forest carbon management, conservation and climate action readiness. First Nations in Ontario are increasingly enabled in various ways with the support of federal and provincial programs to help them reach capacity fulfillment by way of *Section 92* call to action and *Section 35* of the Constitution affording protection of Aboriginal and Treaty Rights. Indigenous people have always maintained that they have right to walk in both worlds and, while there is much yet to be done to fully realize the new relationship, there is a spirit of reconciliation.

Seeking Herbicide Alternatives: A Collaborative Path

Chris McDonell, R.P.F., A/Chief Forester-Ontario, Manager, Aboriginal and Environmental Relations, Rayonier Advanced Materials

A familiar challenge for managers in the forest sector is public and Indigenous community concern about the use of chemical herbicides as a silvicultural tool in the forest. Many a manager has faced opposition to herbicide use and demands for alternatives at the planning table, in community meetings or in social media. This can be frustrating for managers who observe the effectiveness of herbicides in treating large harvest areas, restoring challenging species such as white pine or limiting the advance of invasive species, all while ensuring safe application at reasonable cost. The positive experiences of herbicide use as a forest renewal tool for site preparation and tending create a high bar against which viable alternatives must compete. The calls for elimination and phase out continue and present a challenge to maintain and improve relationships with Indigenous communities and the public.

First Nation community members, First Nation RPFs, federal, provincial and industry forestry personnel, consultants and academic advisors gathered to review silvicultural practices for the purpose of advancing herbicide alternatives on RYAM SFLs in NE Ontario.

In 2011, Rayonier Advanced Materials (RYAM, formerly Tembec) invited First Nation land managers, elders and researchers to join practitioners to begin to unpack the issue. Through conversation and numerous joint visits to forests in Ontario and Quebec, the Herbicide Alternatives Program (HAP) began. The early days were more about foresters listening than defending, about understanding contrasting world views with a conscious effort to avoid pitting traditional science against traditional knowledge. These conversations highlighted the imperative of recognizing that public lands and Indigenous traditional territory overlap, while the expectations, values and laws held for and by each are not the same.

The importance of successful forest renewal was common ground; for wildlife habitat, traditional medicines, forest products, economic opportunity and community comfort on the land. The partners recognized that Indigenous communities and the forest sector are the most natural of partners. Chiefs and councilors, elders and youth emphasized the importance of forestry, of development and economic opportunity while urging practitioners to be innovative, think holistically and long term. A blending of traditional Indigenous knowledge and silviculture expertise began to emerge. While very much a work in progress, what has been sustained is a shared commitment to actively pursue opportunities to reduce use, seek alternatives and apply them where feasible and when the decision to apply herbicides is made, demonstrate judicious use.

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Across RYAM forestry operations, foresters examined application rates, pre-spray survey methodology, silvicultural ground rules for mixedwoods, site preparation techniques, larger tree seedlings, community values mapping, eFRI and LiDAR information and natural regeneration techniques. To communicate the level of care and attention taken to herbicide application, a decision tree was created to facilitate dialogue.

In 2017, the HAP initiative gathered new momentum as Wahkohtowin Development, a First Nation corporation owned by Brunswick House, Chapleau Cree, and Missanabie Cree First Nations joined RYAM as a co-leader of HAP. Rebranded as HAP 2.0, Wahkohtowin professional foresters and community technical staff brought new capacity to assist RYAM in the northeast Superior region with a special focus on the culturally significant Chapleau Crown Game Preserve, an area of 400,000 ha within the Martel Forest. The implementation of pre-tending survey assessments using a vegetation index methodology undertaken by Wahkohtowin field staff, has yielded multiple benefits. Field surveys have supported the net down of tending area in excess of 50% on the Martel Forest. This and other HAP efforts have yielded a 33% reduction in herbicide use (measured in kg of active ingredient) across RYAM tenures from 2011-2020 when compared to the previous 10-year period. First Nation employment and community engagement have been important co-benefits.

Concurrent with reducing herbicide use, meeting forest renewal targets remains a primary objective. While treatment block sizes have become smaller as stratification of sites is more precise, regeneration results to date remain on track.

Following a successful field season and strong interest in the on-going efforts of the parties, in 2018, RYAM and Wahkohtowin saw an opportunity to broaden the base of support for the HAP 2.0 initiative. Recognizing the wealth of expertise in government and academia, the parties worked collaboratively to support an NRCAN Innovation Fund proposal titled "Weaving Indigenous Knowledge and 21st century technology into sustainable solutions". Approved in late 2019, lead researcher Nelson Thiffault from Canadian Wood Fibre Centre with colleagues from Canadian Forest Service, MNRF and various universities are providing technical support to HAP 2.0 for a variety of themes (Table 1). Look for progress updates at www.wahkohtowin.com in the coming months.

As challenging as finding a way forward can be, doing so is more important than ever. Chemical pesticide use can be affected by numerous factors outside the control of the forest manager such as new forest tenure arrangements, changing community expectations, legal and insurance risks. First Nations as co-managers of SFLs and active partners in the forest sector will bring their community's perspectives to board room tables. Neighbouring landowners, tourism-based business and concerned citizens will keep herbicide use concerns top of mind for forest managers.

We have the opportunity to collaborate, to share best practices and to learn from the experiences of other jurisdictions in support of the shared objective of ensuring our silvicultural toolbox remains resilient to manage forests sustainably in an ever-evolving social, environmental and economic landscape.

Table 1. Collaboration Themes

NRCAN/RYAM/MNRF/OFRI/Wahkohtowin - Partnership 2020-2022

A) Synthesis of challenges, needs, and opportunities.

Finding potential Herbicide Alternative Practices by learning from natural systems.

A basis for collaboration and a way forward to find herbicide alternatives

B) Explore state-of-the-art technologies.

*Potential **use of technology** to identify sites with limited vegetation competition (i.e., new LIDAR-based inventory, ecological site classification and soils mapping)*

C) Mining the knowledge of past experiences and evaluate promising practices.

***Learning from experience** to find options for the future (Literature review, Ontario Vegetation Management Alternatives Program, Quebec approach)*

D) Practitioner's Toolkit

Decision support guidance with supporting tools for applying herbicide alternatives

E) Develop and grow **Indigenous practitioners** in forestry.

Tapping the innovative talent and potential of Indigenous businesses and communities

Silva21 - Advancing Silviculture in Canadian Forests: Adapting to new realities from seed to timber

Alexis Achim, ing.f., Ph.D., Full professor and director of the Center for Research on Renewable Materials, Université Laval
Nicholas Coops, Ph.D., Canada Research Chair in Remote Sensing (I), Head pro tem, Department of Forest Resources Management, University of British Columbia

In March 2019, the National Science and Engineering Research Council (NSERC) sponsored a workshop at FPInnovations (FPI), co-organised with the Canadian Wood Fibre Center (CWFC) in Montreal. The workshop brought together university, government and forest industry stakeholders to discuss silvicultural needs across Canada, on both private and public forest lands. The meeting brought a diverse range of perspectives from forest managers and wood processors, as well as natural and social scientists. All recognised that Canadian forest ecosystems are facing increased anthropogenic and non-anthropogenic stresses and disturbances due to the impacts of global change, with a shared sense of urgency. Silviculture is of increasing importance to improve and adapt our management of forests under this climatic and financial uncertainty.

As a result of the workshop a new NSERC Alliance project has been funded, dedicated to advancing science and innovation in silviculture. Silva21 is a collaborative project with strong links to existing national efforts assembling stakeholders from governments, communities, industries, and universities. Fourteen industry, government and community partners will provide cash and in-kind support to the project, which will have a total budget of $5.5M over the next five years. The Ontario Ministry of Natural Resources and Forestry is among five provincial government stakeholders of the project, alongside British Columbia, Quebec, New Brunswick and Nova Scotia. Industrial partners include also Haliburton Forest & Wildlife Research Ltd and Rayonier Advanced Materials Corporate (RYAM) from Ontario. Silva21 is designed as a synoptic, Canada-wide research initiative that re-examines the role of silviculture as a simple, yet a fundamentally important solution to respond to the new socio-environmental constraints facing the forest sector.

Silva21 addresses key research and stakeholder needs to:

1) ensure the accessibility and continuity of wood fibre supply at a competitive cost;
2) better understand impacts of changing climate on timber availability and access
3) implement socially acceptable adaptive silvicultural and forest management measures to ensure a viable and sustainable forest industry through the 21st century.

A key component of Silva21 will be our focus on technology transfer to ensure the research outcomes, methods, and tools developed within the project are transferred to the forest industry, provincial agencies, and partners. Silva21 is specifically designed to leverage ongoing research already underway across Canada such as within the CFS-CWFC and FPI and complement important initiatives in these organisations.

Silva21 will address 38 questions through three themes i.e. **'Observe'**, **'Anticipate'**, '**Adapt**', which are summarized in Figure 1.

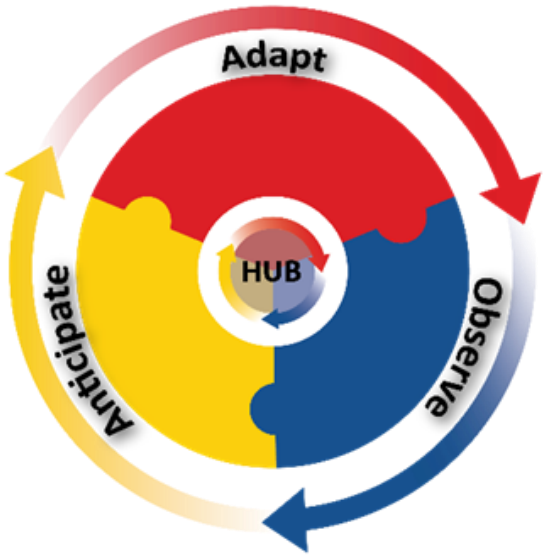

Figure 1. Silva21 revolves around three research themes i.e. to 'Observe' changes to forest condition using state-of-the-art technologies, 'Anticipate' changes induced by climate change, and ultimately 'Adapt' silviculture to new realities.

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Within these projects, we will produce a variety of novel research outcomes that will be put into practice by project stakeholders. To ensure that these outcomes are maximized for the sector as well as for the communities across Canada that live in and depend on forests for their socio-economic wellbeing, a series of forest transition "Hub" sites will be developed across Canada which will be the focus of most of Silva21 research efforts (Figure 2). Three Hub sites will be established in Ontario in the Romeo Mallette forest, Haliburton Forest & Wildlife Reserve and Petawawa research forest. Core activities will take place at these Hub sites, as well as long-term investments by forestry companies, communities and governments. We welcome researchers and collaborators who are willing to come join us in our efforts to meet the challenge of adapting Canadian silviculture to new realities. To contact us or to obtain more information, please email our project coordinator Ms. Claude Durocher. (claude.durocher@sbf.ulaval.ca).

Code	Symbol	Forest type	Location
QN		Dry Inland (DI)	Quesnel, BC
MKF		Coastal Forest (CF)	Malcolm Knapp Research forest, BC
LSJ		Boreal Forest (BF)	Lac-St-Jean, QC
HE			Romeo Malette, ON
HR			Harry's River, NL
MRF			Montmorency research forest, QC
HA		Temperate Hardwood (TH)	Haliburton, ON
ES			Estrie, QC
PRF			Petawawa research forest, ON
AC		Acadian Forest (AC)	Black Brook, NB
			Acadia, NB
			Nova Scotia, NS

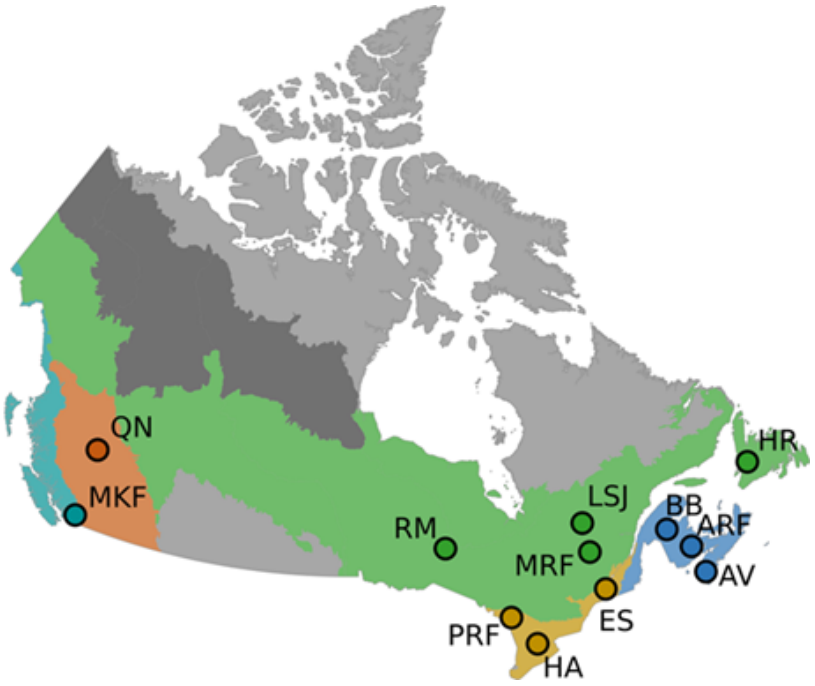

Figure 2. Forest types covered by Silva21 Hub sites.

Canadian Forestry - Driving economic recovery and a net-zero carbon future

Derek Nighbor, President and CEO, Forest Products Association of Canada (FPAC)

In December of 2020, Prime Minister Trudeau announced the government's climate plan which, supported by an initial $15 billion in investments, is intended to drive Canada to a net-zero economy by 2050. Canada's forest sector is well-positioned to be a powerful contributor to this important shift. In fact, it is one of the few industries that has the potential to go beyond net-zero, given its ability to remove carbon, store it in wood-based products, green our operations, transition other sectors away from fossil-fuel derived energy in Canada, and reduce land-based emissions through climate smart forestry.

Notwithstanding forestry's clear potential, federal support is required to move Canada forward on the path to a green recovery. FPAC's recent submission to the federal budget consultation exercise makes the case for support: https://www.fpac.ca/wp-content/uploads/2021-FPAC-Pre-Budget-Consultation-Submission_Final.pdf

With a federal focus on lower carbon solutions and the promise of an emerging forest bioeconomy, we have seen significant investments over the past decade in green energy (e.g. co-generation) and measures to derive value from every part of the tree by reducing waste and improving full fibre utilization.

The sector is an established leader in green transformation. Mill emissions have been reduced by nearly 70% in Canada since the early 1990s. Our commitment to continuous improvement has put Canada in a leading global position - the GHG emission intensity of Canada's pulp and paper sector is now among the lowest in the world at approximately 0.2 CO_2 equivalent/tonne, lower than Finland, the United States, and Germany.

As we map the path to net-zero carbon by 2050, the sector continues to pursue opportunities towards next-generation bio-refinery capabilities and the development of new bio-sourced products.

Displacing carbon intensive materials is just one of the ways the forest sector can help lead the charge to net-zero. This is done by replacing fossil fuel intensive materials with lower carbon, forest-based bio-products that would otherwise be wood waste. There are some great examples of decarbonization happening across Canada and with the appropriate government and community partnerships, we see the opportunity to do more:

Mercer Celgar, located in the interior of British Columbia, is a high-quality, continuous process kraft pulp mill with modern power generation and environmental treatment facilities – designed to meet the highest degree of environmental protection for the land, water, and air. Mercer Celgar is currently working on a natural gas replacement strategy that would dramatically lower greenhouse gas emissions. This involves replacing natural gas usage at the mill with biogenic fuels derived from the pulping process, namely lignin. Lignin is the glue that holds cellulose fibres together and it is separated from cellulose fibres in the pulping process. Currently, energy-rich lignin is burned in a boiler to generate steam for surplus green electricity production. In an electricity market like BC's, one that is well-supplied and already substantially green (hydro-electricity), this provides an opportunity to rebalance the regional energy profile and make a meaningful impact on climate targets.

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The total impact of ~2.0 million gigajoule (GJ) per year of natural gas replacement is equivalent to heating over 20,000 homes each year. If realized, Mercer Celgar could be the first pulp mill in North America to deploy net-zero carbon technology.

West Fraser's Hinton pulp mill operates Canada's first commercial-scale lignin recovery plant, which produces 30 tonnes of lignin per day. This biochemical can be used to displace petrochemical equivalents with biomass-based alternatives. As a natural, renewable green alternative, it is a bio-based alterative for fossil-fuel based chemicals that are used in adhesives, resins, and composite materials. Sourced from certified sustainably managed forests, lignin can be incorporated into many processes that save both money and energy. As a sustainable choice, every tonne of lignin substituted in phenol-formaldehyde resin prevents one tonne of CO_2e from entering the atmosphere.

Resolute's Saint-Félicien pulp mill sits adjacent to Toundra Greenhouse - a cucumber-growing complex in which Resolute owns a 49% joint-venture interest. Formed in 2016, it has become a major player in the province's greenhouse industry by using heat waste and low-temperature hot water generated by the Saint-Félicien mill's co-generation plant to produce more than 50 million cucumbers annually. The complex operates using state-of-the-art technology and sustainable practices, such as collecting rain and snow for plant watering, and offering polystyrene-free packaging for its products. Cucumbers grown in this greenhouse can be found on dinner tables across Québec.

Canadian mill innovation and our working forests provide powerful solutions to fight climate change while bringing family-supporting jobs to Canadians at a critical time for our economy. To maximize the opportunity, we need a renewed commitment from the federal government to strengthen Canada's position as a global leader in sustainable forest management, forest products manufacturing, and enable our potential to be a key driver of a low carbon economic recovery.

CANADA GROWS ON TREES

Part Three of a Four Part Series

Ontario's Vegetation Sampling Network

Ian Sinclair, R.P.F. in Training, Science and Research Branch, Ministry of Natural Resources and Forestry

MNRF's Science and Research Branch is establishing fixed area plots in what's referred to as a Vegetation Sampling Network (VSN) using standardized field sampling protocols, to support MNRF's integrated monitoring and inventory programs, including FRI, forest growth and yield, forest health, and wildlife monitoring. The network sample design leverages the single photon lidar (SPL) data being collected for 45 million hectares in the area of the managed forest (previously the Area of the Undertaking).

Described briefly are key aspects of how the lidar data and field sampling are being integrated via a standardized protocol, with lidar details followed by plot details, ending with an update on VSN sampling progress.

Vegetation Sampling Network design

The VSN ground-based sampling design is based on published best practices for using an area-based approach (ABA) to predict forest inventory attributes using lidar data. The ABA process integrates lidar metrics and predicted attributes derived by combining spatially aligned field data and lidar metrics. The best practices were applied and developed through the Forestry Futures Knowledge Transfer and Tool Development (KTTD) research program by Martin Queinnec, a PhD student at the University of British Columbia. Martin developed the approach using lidar on the Romeo Malette Forest in 2019 and assisted in applying it more broadly to four additional forest management units (FMUs) during the 2020 field season. MNRF staff, led by Dave Morris, integrated additional ministry needs for terrestrial data into Martin's main design for the FRI.

First, a principal component analysis (PCA) is done on the lidar data to identify the range of structural variation that needs to be sampled to support the modelling of inventory attributes across each forested area of interest (forest management unit or large park). Lidar metrics, including tree height and density, are calculated *wall to wall* (over the entire area) at 20 m x 20 m resolution. The height metrics are grouped into height percentiles (i.e., the height at which the specified percentage of points within the cell meet the criteria, for example P05, P10–P90, or P99), cover, and density. These percentiles assist in describing the point distribution in relation to the ground in a 20 m x 20 m grid cell (raster) over the entire FMU. For the Romeo-Malette forest, lidar-derived attributes were generated for nearly 3.4 million cells. Cell-based statistics are then calculated for the points in each cell, including kurtosis (the sharpness of the change in height of the points), standard deviation (the variation of the height of the points), mean (average height of the points), skewness (direction of the deviation from the normal height, which defines the direction of symmetry), and mean absolute deviation (median value of the deviation from median height). These inputs are processed independently of age and species, thereby eliminating the bias or error associated with interpreting species and age. All lidar metrics are processed using PCA to reduce the complexity of the data but fully express the variance. Data is then summarized and projected along two orthogonal axes that, collectively, define the forest conditions represented in the geographic area.

The field (ground) sampling design requires further spatial data analysis to assist in final plot selection. Inputs such as forest cover, updated depletions since the time of lidar capture, annual work schedules (to avoid putting plots in areas scheduled for depletion), ownership, and active accessible roads layers are collectively used to create a mask that is applied to identify the PCA candidates.

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Figure 1. An example of a mask applied to limit plot selection based on forested lands, ownership, and truck accessible road networks. The mask creates a buffered area for selecting candidate cells from the principal component analysis.

(Continued from page 11)

Additional analysis is conducted on existing permanent growth and yield plots to maximize the number of existing plots with multiple remeasurements that can be incorporated into the design, where feasible. New plots are established to capture forest conditions required by the PCA that are not adequately represented in the existing plot network.

Figures 2 and 3 illustrate the two PCA axes that describe structural variation in forested conditions in the area of interest and how existing plots are evaluated within that framework.

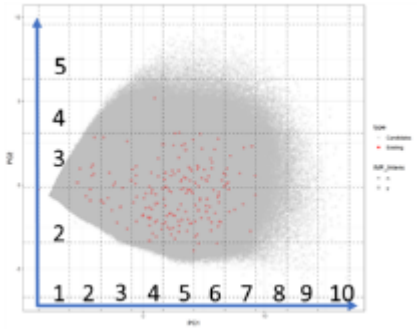

Figure 2. Principal component analysis summarizing the variance amongst the wall to wall lidar height, density, and cover metrics into two evenly spaced x and y axes. In this example, the full range of candidate plots are outlined in grey and red dots represent existing permanent plots.

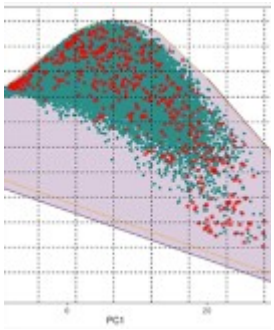

Figure 3. The convex hull illustrates where the point density and existing vs. new plots can be evaluated. The green points reference the total population, whereas the red points are the selected existing and new plots to be sampled. Capturing (sampling) the full range of conditions represented in the convex hull is necessary to predict attributes.

Stratification

Given that VSN ground plots need to represent the range of structural variation that occurs in each forested area of interest (as defined by the PCA), a stratified sampling approach is used in the plot selection process.

Tables 1-3 illustrate how PCA-based strata are used to select the final set of ground plots. PCA candidates are first allocated to strata (Table 1). Existing growth and yield plots of interest are likewise partitioned to the strata (Table 2) to determine where they can be used to fulfill required strata conditions and for which plot types (described later). The overall process determines the number of new and existing plots needed in each strata in the final plot set for each area of interest (Table 3).

A fully defined range of strata (the grey portion of Figure 2) is needed to predict attributes across each forested area of interest and strata with higher point densities are allocated more field plots. Referencing the matrix in Table 3, the strata in the middle (allocated 10 plots) are the more common strata in this particular forest and, as a result, proportionally more field plots are assigned.

(Continued on page 13)

	1	2	3	4	5
1	0	288746	112463	0	0
2	0	384225	411734	3292	0
3	69	405693	368367	23884	5
4	4747	348414	285798	23116	407
5	14295	210878	183305	22218	591
6	7277	92709	90889	17051	497
7	2482	24910	29012	8409	251
8	466	5099	7582	2488	41
9	90	898	1146	220	1
10	10	72	46	7	0

Table 1. Partitioning of the total number of candidate cells into PCA-based strata (e.g., 384,225 fall within strata 2-2).

	1	2	3	4	5
1	0	1	0	0	0
2	0	3 (1)	7 (1)	0	0
3	0	8 (2)	6 (1)	0	0
4	0	28 (4)	7	1	0
5	1	35 (1)	23 (5)	2	0
6	2	26 (4)	18	0	0
7	0	6	9 (1)	0	0
8	0	0	0	0	0
9	0	0	0	0	0
10	0	0	0	0	0

Table 2. Partitioning of the number of existing growth and yield plots (black font) into PCA-based strata. In this example, red font indicates how many Type C plots are being selected for this FMU (plot types are described later).

	1	2	3	4	5
1	0	4 (+3)	4 (+4)	0	0
2	0	6 (+3)	7	3 (+3)	0
3	2 (+2)	8	8 (+2)	6 (+6)	0
4	2 (+2)	10 (-18)	10 (+3)	10 (+9)	4 (+4)
5	3 (+2)	10 (-25)	10 (-13)	10 (+10)	6 (+6)
6	3 (+1)	10 (-16)	10 (-18)	10 (+10)	5 (+5)
7	3 (+3)	10 (+4)	10 (+1)	10 (+10)	4 (+4)
8	5 (+5)	7 (+7)	7 (+7)	6 (+6)	3 (+3)
9	4 (+4)	7 (+7)	7 (+7)	4 (+4)	0
10	2 (+2)	4 (+4)	3 (+3)	2 (+2)	0

Table 3. An example of the final plot set for a forested area of interest, showing the distribution of plot numbers by PCA-based strata. Numbers in each cell are the total number of plots being sampled for each strata; positive numbers in parentheses indicate number of new plots selected from the candidate cells; negative numbers indicate number of existing plots that will not be remeasured for that particular strata.

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Plot level strata

Lidar data can be clipped at the plot level. The five boreal examples below illustrate the height, density and cover aspects from selected strata (Figure 4).

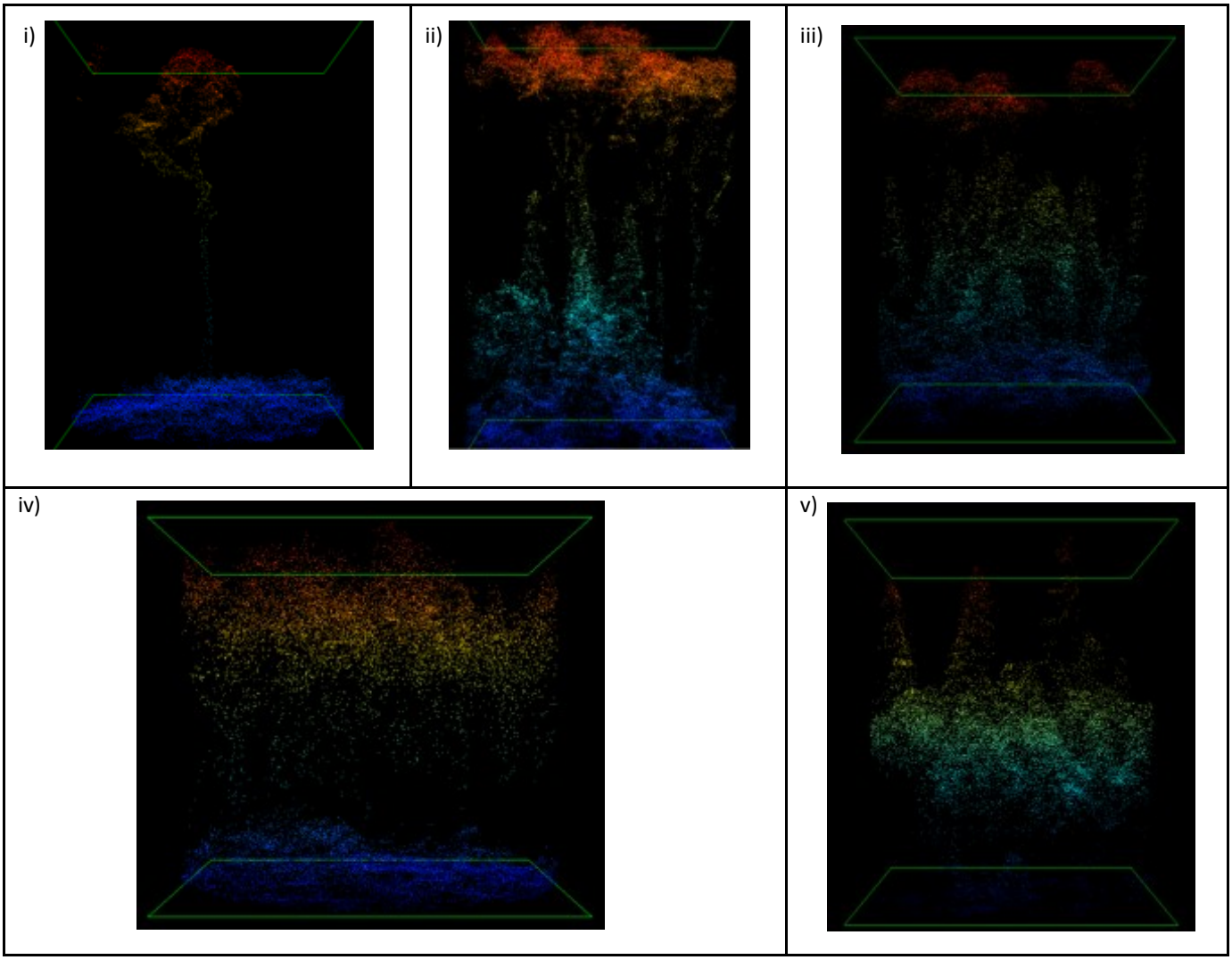

Figure 4. Examples of strata, which often comprise different species leads and ages, with each strata referencing different height, cover, and density aspects of the forest: i) one large poplar wildlife tree in a depletion; ii) two hardwoods; iii) mixedwood strata; iv) jack pine plantation; and v) conifer mixedwood.

Plot types and measurements

Each VSN plot is an 11.28 m fixed radius plot (400 m^2) that matches the resolution of the derivatives and attributes produced to support an area-based assessment (ABA) in developing a lidar-enhanced forest inventory for the province. Accurate ground plot locations are essential and are collected using high accuracy global positioning receivers.

Plots selected for each area of interest are organized into three plot types (A, B, and C), all of which are used to calibrate the lidar data and support the ABA inventory system. Type A plots are focused on stand, site, and tree attributes; type B are focused on individual stems and small trees/shrubs; and type C on understory plants, downed wood, and wildlife use. Plot allocation to each type varies by the forested area of interest but is generally 60% Type A, 25% Type B, and 15% Type C. Type A and Type B plots are temporary (reselected each inventory cycle) and Type C plots are permanent plots that will be remeasured.

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Measurements on Type A plots include tree species for both live and dead trees, height, and diameter at breast height (DBH) for all trees, crown position, tree form (i.e., straight, not straight, limited use), canopy position, height to live crown, and forest health information (e.g., degree of defoliation). In addition, tree ages are determined from increment cores, a full soil pit description is done (with pit location recorded), and 16 high-resolution panoramic images are taken.

Type B plots include all measurements from Type A plots, with additional measurements aimed at capturing individual tree metrics. On the B plots, all live stems >7.1 cm DBH are stem mapped and crowns delineated. A complete census of all trees smaller than 7.1 cm DBH are collected in a 3.99 m radius (50 m^2) plot overlapping the large tree plot centre, with species and height class tallied for each stem.

Type C plots include all measurements from Type A and B plots, with additional information recorded on a range of other ecosystem attributes, including wildlife use, downed wood (transects), and understory plants (5.64 m radius (100 m^2) subplot plus a broader main plot census). Type C plots were selected at ecoregional level to represent a range of species compositional groups and stand development stages for both unmanaged (natural origin) and managed (harvest origin) stand conditions in each forested area of interest.

The VSN field season typically occurs during leaf on conditions starting at the end of May to beginning of June and extends into October. Leaf on conditions are key for determining live vs. dead trees, assessing live crown, and documenting forest health (defoliation) issues and herbaceous plant communities. Within that framework, the intent is to have field crews identify potential forest health concerns as a way of signalling where further investigation by a trained forest health technician may be warranted.

Next steps

The program will continue to apply the VSN plot selection method in areas where lidar has been acquired and to collect the associated ground data to support the development of the lidar-based ABA inventories as part of the current inventory cycle. Additional research work is underway by UBC Remote Sensing Studio to further develop a toolbox to help resource managers optimize plot networks to support lidar use. The goal is to be able to leverage ground plot data from one forested area of interest (FMU or large park) to support lidar modelling in adjacent areas with similar conditions. This approach may improve overall sampling efficiency and reduce the number of plots needed in areas where ground access is challenging.

Progress update: Implementation

VSN ground sampling is proceeding in step with lidar acquisition across Ontario's managed forest area. Generally, to ensure good modelling results, ground data needs to be collected within 1–2 years of lidar acquisition.

In 2019, ground plots were established (or, for selected existing plots, revisited) on the Romeo Malette forest, with all plot types completed. In 2020, Type A attributes were completed on the Dog River Matawin, Algonquin Provincial Park, French Severn, and a portion of the Kenogami forests. Plans for the 2021 collection season include the additional attributes for B and C plots for the forests started in 2020 and all plot measurements on the Nipissing, Hearst, remaining portion of the Kenogami, Boundary Waters, and the eastern portion of the Black Spruce forests.

Precise location of ground plots and accurate field measurements are key aspects of developing high quality, allometric summaries or correlations between plot measurements and lidar point data that are, in turn, used to generate area-based predictions of FRI attributes. The allometric models being used are documented by the growth and yield program. The final article in this series will focus on the new set of attributes being produced by Ontario's FRI program.

Are Ontario's Community Canopy Covers in Decline?

Mike Rosen, R.P.F.

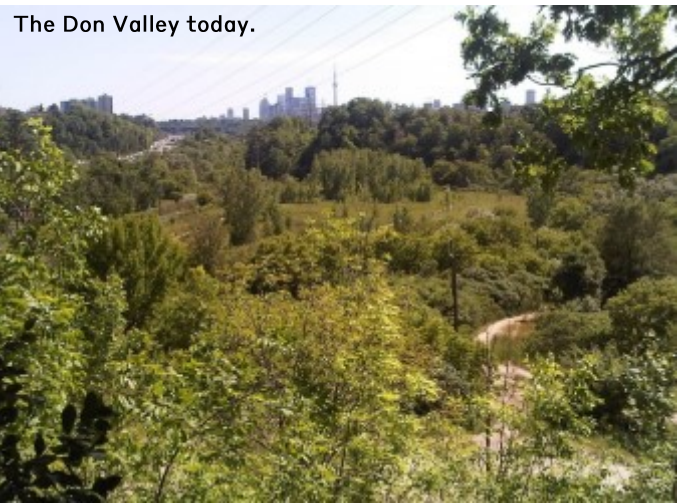
Urban Forests – It's Personal

"Canopy cover", a conventional standard of measurement of an urban forest is generally defined as, "the layer of tree leaves, branches and stems that provide tree coverage of the ground when viewed from above" (NCC, 2019). Several techniques are used to measure it with a generally accepted opinion that 40% represents an "optimal" amount (although this has since been retracted). Many factors constrain canopy cover including, development densities, land use patterns, tree regulations and climate (i.e., canopy cover in desert cities is often less than tropical cities - American Forests, 2017). This is reinforced by Dean (2011) who also points out significant differences in her analysis of canopy cover in various Ottawa neighbourhoods.

My own life has paralleled many of Ontario's fluctuations of canopy cover. I grew up in Toronto in the 1960's where I learned to downhill ski at the now-defunct "Don Valley Ski Centre" – Whistler, it was not. Today, trying to find that hill is impossible – the Don Valley is now an amazing, closed canopy urban forest. The 70's was the start of my career in forestry. Armed with a Pioneer "P26" chainsaw I cut firewood near Peterborough, ON - mostly dead American elms – killed by Dutch Elm Disease. I was unaware at the time that the landscape of southern Ontario (and of eastern North America) was going through a tremendous change because of the much-vaulted role of elm in communities. In 2018, my parents' condominium in Toronto needed to replace the deteriorating 40-year-old impermeable membrane protecting an extensive underground parking garage. This meant the removal of a row of impeccably managed 40 cm dbh hackberries. These personal stories all heralded historic changes in the urban forests of Ontario.

Early 20th Century

It was in the 20th century that communities in Ontario began to urbanize and commercialize. The population of Toronto went from 208,000 in 1901 to over 522,000 by 1921. A hundred years ago (in 1921) encouraged by 19th century programs to plant trees, the now maturing trees evoked the first debates of management, especially in Ottawa as the trees came into conflict with the rapidly expanding infrastructure of sidewalks, asphalt paving, and utility wires. Experts called on the municipality to have the trees managed professionally, to address the "disadvantage of too dense shade for lawn and dwelling, unhealthy and misshapen trees, the breaking up of sidewalks and the obstruction of other utilities by tree roots." In response, during the 1920s and 1930s the city engaged in extensive programs of pruning and removal (Dean, 2005). Declining forest cover was a serious concern in the countryside. Also, in 1921, the Reforestation Act was passed – the Act enabled the province to assist municipalities in purchasing and managing "blow sand" and other fragile areas in southern Ontario. Here, deforestation had led to classic signs of environmental degradation: dried up wells, floods and droughts, wildlife scarcity and an infertility of soils. Photographs rarely showed trees in the cities and photos of the countryside frequently showed desolate landscapes where forests had been cut, burnt, de-stumped, deep ploughed and cropped. Authorities recommended inappropriate agricultural practices including livestock grazing in those woodlots that remained which favoured species disliked by grazing cattle and that tolerated compacted soils. This all led to the creation of the "Agreement Forests" (between the province and municipalities), today these are forests of impeccable quality with an almost European style of management.



The Don Valley today.

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Mid-20th Century

In the 1960's the pressures on urban trees continued with the introduction of Dutch Elm Disease. Erik Jorgensen, the U of T professor who coined and marketed the term "urban forest" and "urban forestry" was to have a long-term effect on the management of trees in cities and towns. His leadership was sought to help manage the native elm population which was virtually eliminated from the landscape of urban (and rural) Ontario in a matter of about 20 years. The elms were eventually replaced with other trees, notably green ash which (at the time) seemed to be resistant to the increasingly harsh reality of the environment of Ontario cities. Although no formal study was ever commissioned, from about 1970 to the early 1990's urban forest cover was again on the rise with an upsurge in planting and to a lesser extent, the maintenance of trees. This coincided with the training of urban foresters by Jorgensen and others and the explosive growth of the arboricultural trade and the International Society of Arboriculture.

When Emerald Ash Borer (EAB), an invasive insect from Asia was detected in Windsor, ON in 2002, it marked the beginning of another decline of urban forest cover in Ontario. What an irony it was that after all the recent emphasis on education, on staffing positions with qualified staff and with a greater appreciation of trees by the urban public, that monocultural practices were once again leading to the urban forest's decline. Urban planners were at the same time now advocating "smart growth" (or "densification" or "intensification"). Provincial Policy Statements were asking municipalities to abandon the "suburban sprawl" model of the post war period in favour of "building up", maximizing the use of infrastructure (water, sewer, transit). "Vacant" spaces and larger lots were now being subdivided as never before, complete with an increase in impervious surfaces, all of which took place at the expense of trees. Although techniques to preserve trees within the hard surface matrix were quickly developing (products such as "Root Barriers", "CU-Structural Soil" and "Silva Cells") these were only being used in a very small percentage of projects, as it was expensive and difficult to retrofit into hard surface landscapes that were never designed for trees. Coupled with this was the growing trend to convey infrastructure underground: electricity, natural gas, cable, water, sewer, fibre optic cable and parking. Ongoing maintenance of these services played havoc with tree roots and urban forest survival. Trees often took a secondary role and were replaced repeatedly. Adding to this scenario, climate change was wreaking havoc and continues to be a negative factor in canopy cover, mostly because of the violent and unpredictable storms that present themselves as hurricanes, ice storms and other catastrophic events but also because of how the warming trends favour the proliferation of exotic and invasive plants, diseases and insects.


Ice storm damage.


Ash killed by EAB.

And unfortunately, in too many cases, tree replacement is a numbers game. That is, if 10 trees are destroyed for whatever reason (a membrane failure over a parking lot, vandalism, a "mistake" by a developer) they are all too often ordered replaced with an equivalent number (or if very lucky, double the number). The problem is that the environmental benefits of a large tree are exponentially greater than a small one so that the canopy cover is still greatly reduced and will be for many years after.

Most cities in Canada reported a drop in canopy cover from the 1980's to the 2000's – a good example of this is found in the City of Vancouver which went from 22.5% canopy cover in 1995 to 18% in 2013 (Vancouver, 2014). This trend seems to have stabilized or in some cases even reversed as cities have moved to more planting and maintenance programs (City of Toronto, 2018).

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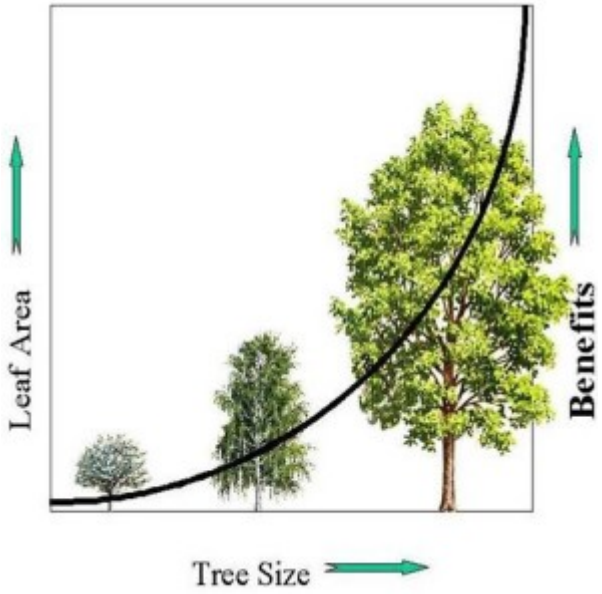

Exponential importance of big trees. Credit: Andy Kenney.


Infill development and tree protection.

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The seemingly up and down trend of urban forest cover is complicated by the fact that the methods of analysis change over time, and that there does not exist a municipality with a system of permanent sample plots to observe these changes. Therefore, several factors must be in place for municipalities to keep growing their canopy. This would include:

- Elevating the discussion of the important environmental/social role of trees in the city (as something more than aesthetics);
- Incentives to retain trees on private land through reduced taxation or other mechanisms – we know that most of the urban forest is privately owned (to the tune of 60%-90%!) and that those "private" trees offer very "public" benefits – owners should be compensated for their stewardship;
- Enacting and enforcing tree protection in law and in policy on public and private land;
- Maintaining viable growing space for trees because once that is gone it is really gone forever;
- An increase in planting trees so that a diverse canopy can be promoted with species that would be resistant to extreme storms and the maintenance of those trees;
- Better integration with the engineering side of urban management so that the installation of hard infrastructure is in concert with prolonging the life of trees as much as possible.

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Urban Forests in a Changing Climate

Dr. Tenley Conway, Professor of Environmental Geography, University of Toronto Mississauga
Jacqueline L. Scott, PhD student, University of Toronto

Summer in Southern Ontario can bring long and dry heat waves that have many people looking for relief. One form of respite comes from the shade of trees in backyards, parks, and natural spaces in and around communities. These trees in and around cities and communities including forests in nearby rural (or peri-urban) areas like those in the Greenbelt are collectively referred to as the urban forest.

The Greater Golden Horseshoe region once had nearly continuous forest cover, representing a mixed forest that includes species of maple, ash, oak, and hemlock. After centuries of settlers clearing for agriculture and urban development, much of this forest cover was lost. Yet, some natural forest patches remain, new ones have regenerated, and many individual trees have been planted in urban and suburban communities. Today, the Greater Toronto Area has an estimated 34.2 million trees representing over 100 species in its urban forest, resulting in approximately 26% tree canopy cover across the region.

Trees have a key role in climate change mitigation and adaptation

Urban trees play an important role helping communities mitigate and adapt to a changing climate. Urban forests store carbon and reduce the amount of carbon dioxide in the atmosphere. A recent report by the City of Toronto estimated that Toronto's urban forest stores over 1.1 million metric tonnes of carbon.

Urban forests have an even larger role to play in climate change adaptation. In the Greater Golden Horseshoe, ongoing climate change is expected to cause more frequent summer heat waves and droughts, as well as more intense storms. Urban and suburban areas are already typically several degrees warmer than nearby rural areas, due to the urban heat island effect. Any additional temperature increases will worsen hot summer conditions.

Planting trees can help regulate temperature in direct and indirect ways. Large shade trees planted on the south and west sides of buildings can directly reduce temperatures, keeping buildings cooler and reducing the need for air conditioning. A recent study in Toronto found that shade from trees could make building surfaces as much as 12°C cooler. In the winter, evergreen trees planted on the north side of buildings can block cold winds, reducing heating costs and associated emissions. In 2008, it was estimated that York Region's tree canopy cover reduces energy costs by approximately $8 million per year as compared to a scenario with no trees. In addition to shading, trees indirectly cool the air through evaporation of moisture from their leaves and branches. This is why it immediately feels cooler walking into a forest during the summer. Recent research by the Greenbelt Foundation found adding urban trees could make it feel up to 11°C cooler during a heat wave in suburban neighbourhoods in Peel Region. Research also suggests that clusters of trees have greater cooling benefits due to evapotranspiration effects than the same number of trees planted in a more disperse pattern. Protecting pocket forests, or small clusters of trees, and larger forest patches across the region safeguards these positive impacts.

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Rainstorms are predicted to become more intense due to climate change. Trees can decrease flooding as their leaves and branches intercept water, reducing the amount of run-off when it rains. Trees also pull water from the soil, increasing the potential for soil to absorb more precipitation. As a result, many cities are planting trees as part of storm water management efforts!

Importantly, urban forests can help protect local biodiversity in a changing climate. For example, flowering trees provide bees with an early spring source of food before many perennial plants begin flowering. In the Greater Golden Horseshoe, red maples, Ohio buckeye, and red bud are examples of native trees that support native bees and other pollinators. Regular interactions with trees and woodlands also positively impacts human health and well-being, including mental health.

Development Threats

Urban forests are also facing several threats. One significant on-going threat in the Greater Golden Horseshoe is urban development and redevelopment. Existing trees are frequently cut down during construction of new development. While new trees may be planted, it will take several decades for them to produce the cooling and stormwater management benefits of existing mature trees. On already developed property, renovations and more significant property redevelopment is often associated with removal of trees, as property owners increase building footprints and other hard surfaces.

Climate Change Threats

Hot, dry summers

A second major threat to the urban forests is climate change itself. While trees can create more hospitable environments during heat waves, many trees will struggle to survive hotter summer temperatures, particularly when combined with drought conditions. A recent study found that the majority of common species planted in our urban forest will not be able to survive future climate conditions due to heat and water stress. While the changing climate will hurt many native species, some of the commonly relied upon non-native species, including Norway maple, are also vulnerable to projected climate conditions.

Intense storms

Urban forests are vulnerable to intense wind and ice storms. Both are projected to become more common in the Greater Golden Horseshoe due to on-going climate change. While summer drought will likely be the norm, it is also expected that infrequent but intense summer storms will occur. These storms have the potential to bring heavy wind that can damage branches and topple entire trees. During winter, some regional climate projections suggest more frequent ice storms. The weight of ice build-up can break branches and make trees weaker, thus more vulnerable in future storms.

Novels pests and diseases

Human mobility will likely enable outbreaks of novel pests and diseases that can impact the urban forests. Threats from pests and disease are not new. In the last decade, emerald ash borer has decimated ash trees across the Greater Golden Horseshoe, and much of eastern and central North America. Before that Dutch Elm Disease similarly devastated populations of native elm trees. While we cannot know for certain which pests and diseases will arrive in the Greater Golden Horseshoe, a warmer climate will allow new pests and diseases to thrive in the region.

Growing Resilient Urban Forests

One of the best strategies for protecting urban forests is to ensure a diversity of tree species are present in our urban forests. Many pests and diseases are species-specific, so incorporating a diversity of species will reduce the overall impact a novel pest or disease has on the forest as a whole. This is a lesson that many municipalities have learned from the over reliance on ash trees that resulted in substantial loss of forest cover due to the emerald ash borer.

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Different species also have varied responses to long-term shifts in climate and storm impacts. Selecting a diversity of species that can withstand water stress and hot summer temperatures is important. Many municipalities in the Greater Golden Horseshoe have formally recognized the need to diversify the urban forest through their long-term management plans, taking steps to make sure no one species represents more than 5% of all trees. In addition to species diversity, there are a diversity of spaces where protecting existing trees and planting new ones will support resilient urban forests. Across the Greater Golden Horseshoe residential yards include a substantial number of existing trees and opportunities to plant additional ones. For example, in Mississauga, a city that was just recognized as a Tree City by the UN, 43% of current tree canopy cover is located on residential property and city-wide canopy cover could increase by 12 to 19% if all available spaces on residential land were planted with trees. School yards are another space that often lacks trees, and where there are clear benefits of providing shading. Finally, planting and protecting trees in areas around urban areas has the potential to contribute to mitigation efforts by storing carbon.

Trees, Race and Black History

Jacqueline L. Scott is a PhD student, at the University of Toronto. Here she explores the intersection of trees, race and Black history, part of her larger research project on how to make outdoor recreation and environmental discourse more welcoming for Black people.

Planting trees is one of the easiest ways to improve the environment in the city and to reduce the negative impact of the climate crisis. However, race shapes where trees are planted, who benefits from the trees and who takes part in tree planting.

Urban trees bring many benefits. They are pretty to look at, provide shade, lower asthma rates, reduce summer temperatures and improve air quality. Yet, the benefits are not equally distributed. Research shows that poor and racialized communities have less access to greenspace in the city, including public parks and tree canopy cover. Thus, they receive fewer benefits from them. The absence of trees is another layer of inequality in lives shaped by oppression.

In the city, tree planting can be done by the municipal government, non-profit agencies or private citizens. Race is a factor here too. Municipal tree planting is more likely to occur in rich White areas, and less likely to happen in poor Black neighbourhoods, even though it is these areas which have the greatest need for tree cover. Tree planting by non-profit groups is also less likely to occur in poor Black neighbourhoods. And home-owners, who are more likely to be White, tend to plant more trees on their property compared to renters, who are more likely to be Black or racialized. As trees improve property values, fewer trees lower the economic base and desirability of racialized neighbourhoods.

Urban trees can have a long life-span, depending on if they are planted in containers, gardens, parks or ravines. One of the oldest trees in Toronto is a red oak in North York, aged 250-350 years. It is older than the city and the modern country. City trees can also function as historical markers. For example, the graceful horsechestnut trees in Toronto were planted in the 1860s for a royal visit. They appear to be natural, but these are non-native trees from Europe, and as such reflect the ongoing settler-colonial project on Turtle Island.

Furthermore, current tree planting, whether in a front garden or on a mass scale to restore a ravine, may also reinforce setter-colonial notions of being rooted in the land. This is of course divergent with Indigenous demands for sovereignty. In other words, planting trees feels good, it is doing something when the climate crisis feels overwhelming, and, at the same time it is critical to acknowledge that the tree planting is on contested land.

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Tree planting groups are mainly White, as shown by the absence of Black faces in their media communication and on their staff. This creates a visual apartheid, reinforcing the message that environmentalism, including tree planting, is a White space and activity, where Black people are seen as out of place.

There are some practical strategies, which can be used to make tree planting more welcoming for Black people. The first is acknowledging that race is an issue, as indicated by the absence of Black faces and the dominance of White ones. Second, groups need to build relationships with the Black community in areas selected for tree planting. Trusted relationships, and targeted outreach, are more likely to encourage Black people to participate.

Third, tree planting groups can increase Black community engagement by hiring Black staff to lead the project. People are more likely to support, and believe that an activity will benefit them, if they see others like themselves as the leaders.

Fourth, appealing to Black history can also increase community engagement. For example, tree planting in Cedarvale Ravine, in the Eglinton West area of Toronto, can draw on the fact that the area was a Black community hub in the 1980s. They can point out the heritage plaques and murals to Black history in the neighbourhood. Furthermore, they could also refer to Russell Hill Road, named after Peter Russell, a top government official and slave-owner in Toronto. He owned Peggy Pompadour and her children Jupiter, Amy and Milly. In 1806, he advertised for the sale of Peggy and Jupiter. The existence of the enslaved Pompadour family disrupt the common assumption that slavery did not exist in Canada. There was also Mrs. Pipkin, a servant in Spadina House in the 1870s. She escaped slavery from the USA via the Underground Railroad.

These stories illustrate the long and complex Black history in Canada. Talking about them creates a bridge that links social justice and caring for the environment. It is by knowing and appealing to this history that tree planting groups can increase Black people's interest in mitigating the climate crisis by planting trees.

Silvicultural History

Ken Armson O.C., R.P.F. (ret.)

Professional foresters know that one of their responsibilities is to keep abreast of the knowledge and practices that are related to their work. There are many ways in which this can occur – courses, meetings, reading and often through contacts with other professionals. Most often it is a looking to new ways of understanding and acquiring information, a looking ahead. But there is another way of looking and that is a looking back. At the heart of forestry are the silvicultural practices employed in the management of forests, and here time is a real factor. Sometimes the result, success or otherwise, of a regeneration treatment becomes obvious in a matter of weeks or months. But often, especially with treatments of established stands the results are not apparent for several years. Patience is one of the virtues that every silviculturist must have. Individually, I suspect that most foresters have revisited forests that they have been involved with and learned from those experiences and observations. Often these experiences coalesce collectively and become part of the general professional bag of knowledge and are codified in manuals. But there is another and more rare source of silvicultural history that combines for a specific forest an account of the initiation and development of silviculture over decades in the context of the political, social and economic conditions in which they took place.

A recent example of such an account is the history of the silvicultural development in the boreal forests managed by Kimberly-Clark in northern Ontario (Kuhlberg, M. 2020. "*A Forestry Program that cannot be equalled in Canada*" Kimberly–Clark's Extraordinary Silvicultural Project in Northern Ontario 1928- 1976. Ontario History, vol. CXII, no. 2, p.230 – 254.) It also portrays the influence that two young foresters (R.W. Lyons and G.G. Cosens) starting their professional careers in forest regeneration practices with the Laurnentide Paper Company at Grandmère in Québec, would have when they were employed by Kimberly–Clark in Kapuskasing in 1928 as the company's first foresters. Subsequently, as they rose in the company to senior executive positions they were able to enlarge and extend silvicultural practices within the company. Often, as their fellow foresters would attest, learning from their mistakes. Kuhlberg clearly brings out the interplay between corporate and provincial positions over the years reflecting the prevailing social, economic and political climates of the times and illustrates how these affect the nature and implementation of silvicultural practices. A full professor of history at Laurentian University, he is known for his comprehensive account of the rise and fall of newsprint in Ontario, 1894-1932 (In the Power of the Government, 2015, University of Toronto Press, p. 404 + illus.) and to members of the OPFA as a former public member of the Association's Council. He is the Past Chair of the Forest History Society of Ontario.

Developing a Forest Pest Strategy for Ontario

Ngaire Roubal, MEnvSci, Senior Policy Advisor, Forest Management Policy Section, Ministry of Natural Resources and Forestry

A "Discussion paper: Developing strategic direction for managing forest pests in Ontario" was released Dec 2019 on the Environmental Registry of Ontario (comments closed Feb 2020). The discussion paper was seeking feedback from Ontarians on how forest pest management can be enhanced within Ontario's current approach to sustainable forest management. As part of that responsibility, the MNRF is proposing strategic direction for managing forest pests to modernize and enhance current forest pest management efforts by enabling a cohesive and coordinated effort across the province. The proposed strategic direction is based on what we've learned from past experience and considers the ongoing need to respond quickly to both native forest pests and invasive species. The strategic direction will improve service delivery by ensuring strategic and efficient government response to pest outbreaks. Improved response will help to protect forest health and improve the resilience of Ontario's forests. A more resilient forest will help to protect the sustainability of Ontario's wood supply in the face of new and changing pressures on our natural resources.

The discussion paper proposed establishing strategic, risk-based direction to enhance our response to forest pest outbreaks, help protect forest health and improve resiliency of Ontario's forests by:

- increasing focus on integrating and coordinating forest pest management across government and jurisdictions that will support more timely and targeted action during an outbreak
- adopting a proactive approach, where risk of forest pests (e.g. to wood supply) are assessed in advance of an outbreak to action a response appropriately and allocate resources effectively
- improving efficient allocation of limited government resources to management actions that will have the greatest benefit for Ontarians

The proposal combines existing direction with new actions to establish a strategic approach for forest pest management. Most actions represent foundational, ongoing work that is critical to decision making like monitoring, research, and response. Other actions reflect new areas of focus that will help with overall preparedness, including risk assessment and communication.

Assessing risk will identify the highest priority pests and actions to improve efficient allocation of limited resources to management actions with the greatest benefit. This entails prioritizing pests posing greatest risk and actions to address individual pests. Not all management actions will be required - based on priorities and expected outcomes.

Fighting Spruce Budworm in the Northeast Region

Ministry of Natural Resources and Forestry, Northeast Region

Since 2014, the Ministry of Natural Resources and Forestry (MNRF) has been monitoring the growing infestation of spruce budworm in Northeastern Ontario. In 2018 there were 137,000 hectares of defoliation from the spruce budworm and by the summer of 2020 it had grown to 442,000 hectares. With no outside influence, it is expected that this infestation/outbreak will continue to expand in area and severity.

Spruce budworm is a native species to our forests; it feeds primarily on balsam fir and white spruce but can also be found at times in other conifer trees. Although ever-present in our forests, the population escalates into an outbreak every 30-40 years. These outbreaks can last up to 8-9 years, and during that time can defoliate extensive areas of white spruce, and balsam fir. Trees and forest stands that are damaged due to spruce budworm defoliation can lead to reduced volume – which directly affects wood supply – as well as increasing the risk of wildland fire due to the dead and dying forest cover.

MNRF is developing an insect pest management program (IPMP) to manage the ongoing spruce budworm infestation in Northeastern Ontario. This IPMP is being developed with information provided by forest industry, Local Citizen Committees, Indigenous communities and the general public. Forest industry has worked with MNRF to identify priority areas that require enhanced protection measures for conifer forests. Protecting forest health, as well as encouraging economic growth in the forestry sector, is a priority for the MNRF – the forest sector is critical to the provincial economy and many Indigenous, northern and rural communities, generating over $18 billion in revenue and supporting approximately 147,000 direct and indirect jobs in regions with few other industries.

A spruce budworm in its mature larval state.

So how will this plan be operationalized? First, we have to look at the lifecycle of the spruce budworm itself:

- Moths emerge in late-June to early-August and lay their egg masses on the underside of needles in crown of host trees.
- The eggs hatch in about 10 days, and the tiny larvae crawl or disperse on silken threads throughout the fir-spruce forest canopy. They spin overwintering shelters in the host tree foliage where they molt and remain dormant through the winter.
- The larvae then emerge in late April or early May and feed on vegetative and pollen buds and on new shoots.
- Most of the feeding damage to trees occurs in mid-to-late June. The pupal stage, where the larvae transform into adult moths, lasts about one week and occurs at feeding sites or lower branches.
- The moths emerge in late-June to early-August to complete the life cycle.

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An example of Spruce budworm damage on conifer needles.

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The ministry is targeting the timing of the IPMP to coincide with when the spruce budworms emerge as mature larvae and are eating the fresh shoots and needles (approx. mid-June). It's a tight window of opportunity (about 1-2 weeks) to apply the treatment to the trees so it will be effective on the budworm.

Next, we look at the treatment and how it will be applied. In this case, the ministry is using a biological insecticide *Bacillus thuringiensis* variety *kurstaki* (Btk). Btk is a naturally occurring bacteria that is found naturally in forest soils. It is a registered pesticide with the Ministry of the Environment Conservation and Parks and is often used in organic farming operations. The treatment will be applied aerially by fixed-wing or rotary aircrafts.

Aerial treatment programs are not new to the province; in fact, they have been carried out carried out since the 1980's. The insecticide that will be used has been thoroughly researched and has many commercial and non-commercial uses. For example, Btk is often used in agriculture to control pests that enjoy munching on produce: it is used on lettuce to keep cutworm populations low.

Btk only harms the larvae of Lepidoptera (moths and butterflies), and does not affect adult moths or butterflies, insects other than Lepidopterans, insect predators or parasites. Btk produces spores and crystal proteins, which are toxic to certain insects and has to be ingested by the mature spruce budworm larvae for it to cause mortality. The insects eat the foliage of the treated forest stands, become sick, stop feeding within hours and perish.

The ultimate goal is to prevent tree mortality by reducing the spruce budworm population, which is expected to protect foliage through the natural infestation cycle. As such, our final step is to ensure that the dosage and method of application will not completely eliminate the spruce budworm, but will bring the population back to a more natural level and reduce the amount of defoliation and potential impacts on the forest stands.

The northeast IPMP is a multi-year project that will treat up to 55,000 hectares of targeted forest stands, helping to protect important white spruce and balsam fir forest stands. By stemming the spruce budworm outbreak, the ministry is supporting our government's plan to create jobs and encourage economic growth in the forestry industry, and support the Indigenous, northern and rural communities that depend on the sector.

To facilitate review of the IPMP, information can be found on the Ontario government website: www.nrip.mnr.gov.on.ca/s/fmp-online (between March 1-15, 2021). Comments on the proposed Insect Pest Management Program and associated project proposals must be received by the MNRF by March 15, 2021.

For more information on the Insect Pest Management Program please contact NERbudworm@ontario.ca.

An aerial view of the defoliation caused by spruce budworms in Northeastern Ontario.

Jack Pine Budworm in the Northwest Region

Ministry of Natural Resources and Forestry, Northwest Region

The current jack pine budworm (*Choristoneura pinus pinus* Free.) infestation in Northwestern Ontario was originally identified in 2017 in Red Lake District, specifically northwest of the town of Red Lake. Since then, the infestation spread north and northeast into the Far North, south and southeast into Dryden and Sioux Lookout Districts and west into Kenora District (Figure 1).

The Ministry of Natural Resources and Forestry (MNRF) Biodiversity and Monitoring Section monitored the area during fall 2020 and was able to identify and map a total of 1,065,796 hectares of jack pine budworm infested forest in Northwestern Ontario (figures 2 and 3). This suggests that the infestation along the central and western boundaries, in Red Lake and Kenora Districts, is beginning to show signs of a natural collapse while the infestation along the southern and eastern boundaries, in Dryden and Sioux Lookout Districts, will persist over the next few years.

(Continued on page 27)

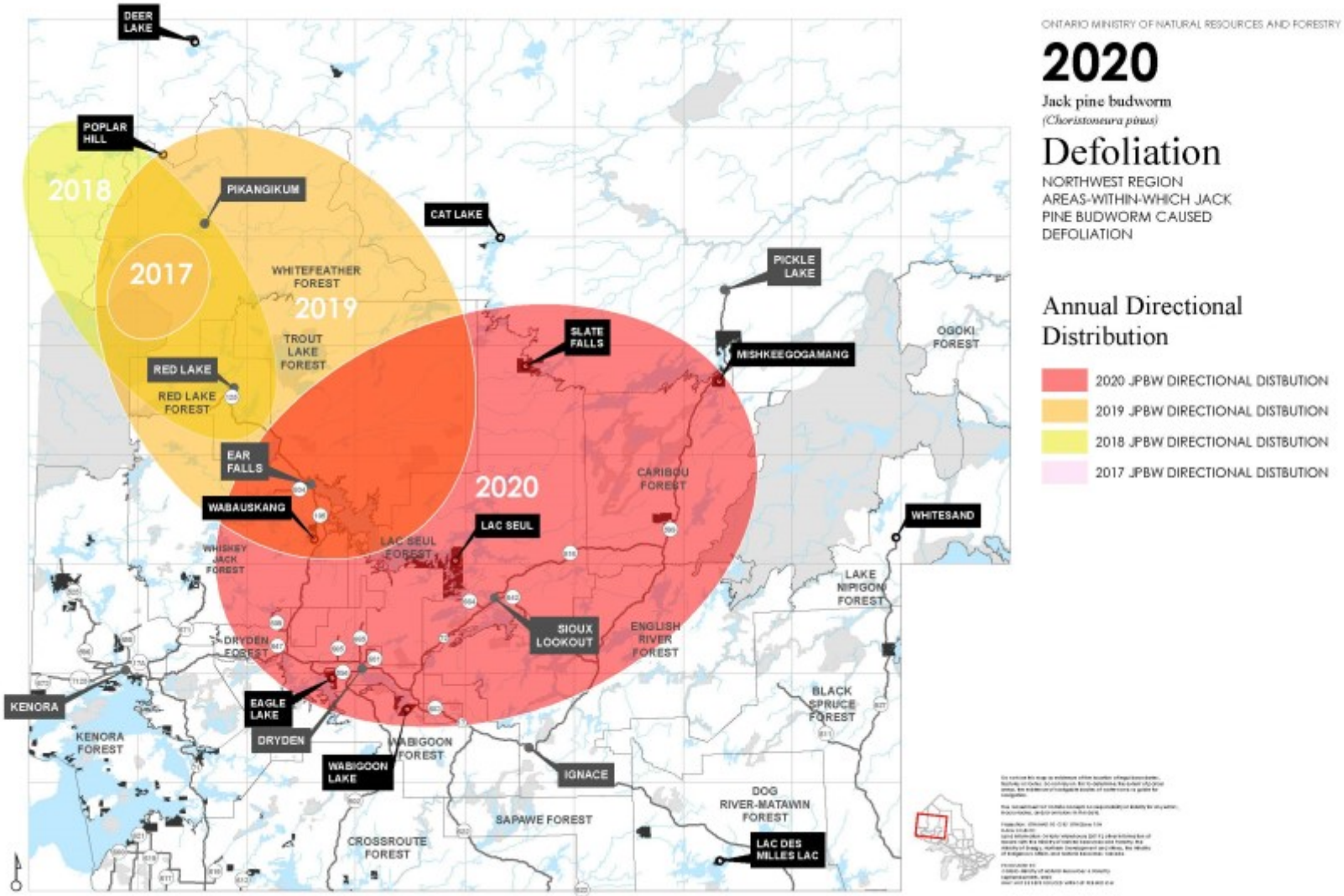

Figure 1: Generalized distribution of jack pine budworm defoliation. The ovals are generalized; areas of defoliation exist outside of the mapped ovals but not to the same level of concentration.

(Continued from page 26)

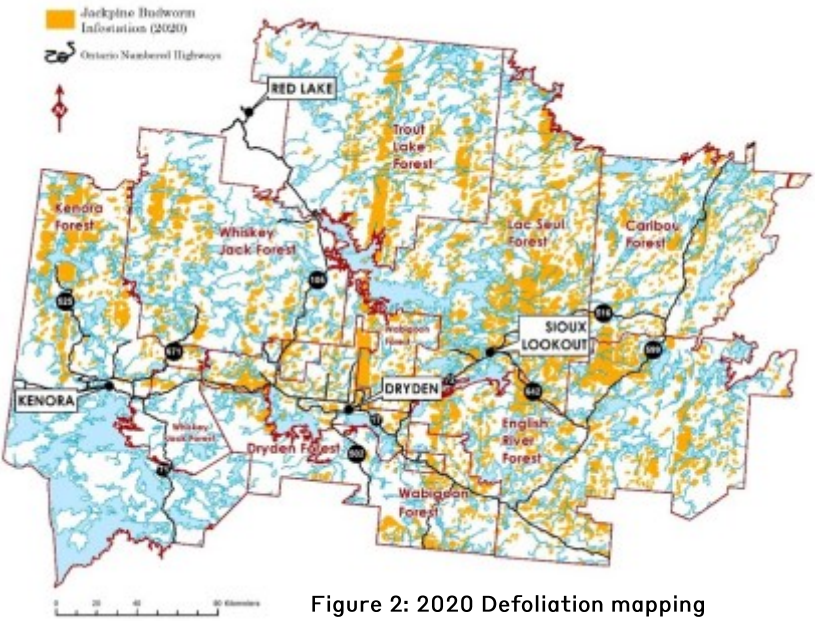

Figure 2: 2020 Defoliation mapping

Figure 3: Overview of 2020 jack pine budworm defoliation in Northwestern Ontario (MNRF Biodiversity and Monitoring Section, 2019)

After reviewing the results of the monitoring, the MNRF considered a variety of treatment methods that could be implemented in a single treatment or as part of a suite of treatments on a select area.

The treatment methods considered included redirected, accelerated and salvage harvest, prescribed burning and treating the most severely affected areas with a biological insecticide containing the active bacterial ingredient *Bacillus thuringiensis* variety *kurstaki* (Btk). Through consultation with affected Indigenous communities, as well as industry stakeholders and the public, the MNRF selected a preferred course of action that includes the aerial application of Btk.

Annual aerial and ground monitoring surveys conducted by the MNRF's Biodiversity and Monitoring Section to monitor forest health across Ontario will continue in order to monitor the success of the IPMP and track any further progression of the infestation. The data collected will also help the MNRF determine if a 2022 IPMP is needed.

The 2021 IPMP is scheduled to be implemented in spring and summer 2021. The program consists of a targeted aerial application of Btk to treat 70,000 hectares of moderately-severe defoliated jack pine-dominated forest stands; this would provide a measure of foliage retention and protection for infected jack pine trees in an effort to mitigate damage and mortality.

An application proposal for program funding has been submitted to the Forestry Futures Trust Committee. The IPMP will also include direct and in-kind contribution funding from the MNRF and forest industry stakeholders. The interdisciplinary IPMP planning team responsible for the 2021 IPMP is managed by Kevin Ride (MNRF Northwest Region).

Larvae feeding on developing needles of new shoots

(Continued on page 28)

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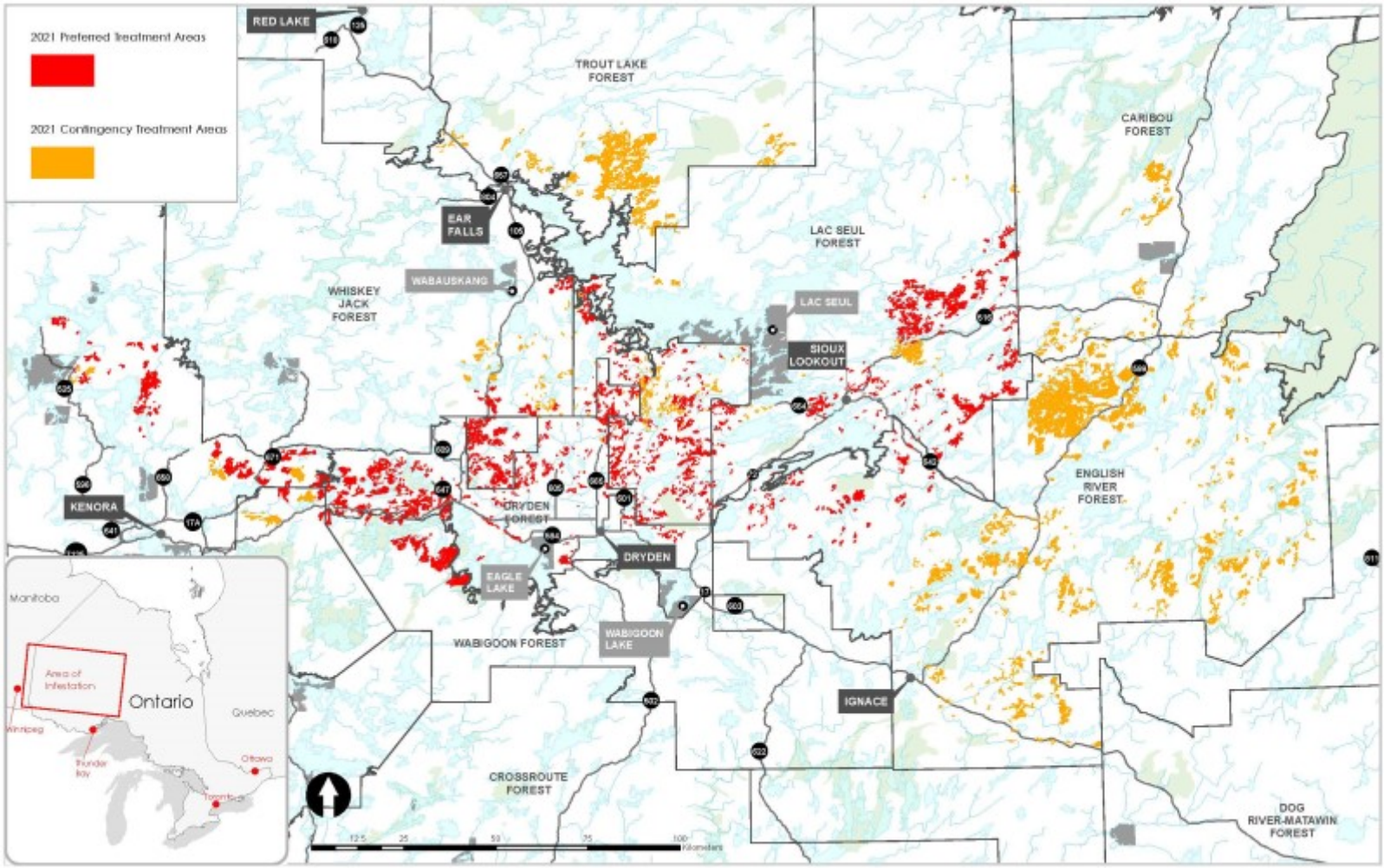
The proposed 2021 IPMP has several advantages. First, it will mitigate losses of jack pine volume, both to growth and from mortality, for areas of strategic wood supply, by limiting defoliation in treated stands to 40 per cent or less. Second, it will help reduce the risk of an increase in fire frequency and severity resulting from infestation-related mortality in jack pine stands. Third, it will help to preserve existing aesthetic values.

Proposed operations for the 2021 IPMP, based out of Dryden, are expected to start in late mid-May and be completed on or about June 30. The MNRF operations team includes district and region staff, managed by Michelle Glena (MNRF Dryden District). Field observers, including MNRF BAMS staff, will collect information on the host and larvae development to determine when the aerial applications would begin.

Forest Management Unit	2017 Total Infestation Area (Hectares)	2018 Total Infestation Area (Hectares)	2019 Total Infestation Area (Hectares)	2020 Total Infestation Area (Hectares)
Black Spruce Forest				5,810
Caribou Forest			1,572	78,801
Crossroute Forest			139	1,762
Dog River-Matawin Forest				1,051
Dryden Forest		1,136	37,232	51,757
English River Forest			3,826	179,515
Kenora Forest			7,685	97,715
Lac Seul Forest			32,846	199,466
Red Lake Forest		118,545	80,043	13,842
Sapawe Forest				887
Trout Lake Forest		66,774	193,441	110,244
Wabigoon Forest		2,466	63,795	90,805
Whiskey Jack Forest		28,810	115,407	83,380
Whitefeather Forest	95,574	279,320	297,059	33,449
Far North(Area of Undertaking)	4,613	130,404	200,333	117,311
Total Area (Hectares)	**100,187**	**627,455**	**1,033,378**	**1,065,796**



Overview of the 2021 IPMP Proposed Preferred and Proposed Contingency Treatment Areas

Gypsy Moth Management for 2021

Caroline Mach, R.P.F.

Gypsy moth has been on the rise across most of the range of oak in Ontario over the last several years, reaching an all-time high in 2020. I was curious to know what land managers were doing to manage the issue.

I contacted land managers through an e-mail list that covers southern, central, and eastern Ontario and is maintained by Forests Ontario. Responding to my inquiry for information was voluntary, and I did not have time to contact people on an individual basis, so the data is incomplete, but it does give a snapshot of what is happening with regard to gypsy moth management in 2021.

Thank you to everyone who sent in information to enable me to compile this update.

The decision to spray Btk to reduce gypsy moth populations is based on a combination of social, economic, and ecological factors. The majority of jurisdictions that responded are not planning on aerial spraying in the spring of 2021. These were: Simcoe County, Dufferin County, Renfrew County, Halton Region, Conservation Halton, Saugeen Conservation, and Larose Forest. As most of you are likely aware, gypsy moth is considered to be a deciduous tree stressor and not a tree killer. This means that healthy trees and forests can usually survive repeated defoliation. Areas that are not dominated by oak, or have not been subjected to multiple years of defoliation combined with other stressors such as drought, should be able to come through the upcoming season with little tree mortality. All of the respondents intend to monitor population and defoliation levels in 2021 in order to plan for the spring of 2022. In only one case was the decision not to aerial spray based on cost despite the fact that high levels of tree mortality are predicted.

The Grand River Conservation Authority plans to aerial spray about 70 ha that have had pressure from gypsy moth for several years. The spraying will also limit impacts on property users.

Some private landowners who have invested heavily in oak management, or do not wish to risk tree mortality, are choosing to embark on an aerial spray program.

The City of Toronto is not planning an aerial spray, but targeted ground treatments including removal of egg masses, TreeAzin injections, and ground-based sprays of Btk-based products.

It will be interesting to watch the populations of gypsy moth in 2021, as it is reasonable to predict that they will crash in a number of areas based on duration of high population levels, presence of nuclear polyhedrosis virus (NPV), and presence of egg parasites.

Larval Mortality: Larvae hanging straight down have been killed by fungus; larvae hanging in an upside-down "v" shape have been killed by virus. Photo credit: Caroline Mach.

Egg Mass Parasitism: Only the two egg masses in the bottom left are healthy enough to hatch a significant number of larvae in the spring. Photo credit: Caroline Mach.

One of the First Women to Graduate in Forestry[1] in the World

Ken Armson O.C.,R.P.F. (ret.)

Last year, the Canadian organization, "Women in Wood" celebrated its fifth anniversary and late that year a biography of the first English speaking woman to graduate with a forestry degree was published (Edwards 2020). All women in forestry but especially those who are members of the professional forester associations in Canada should know about that woman, Mary Sutherland, who blazed the trail in forestry for other women to follow.

She was born in 1893 in England of Scottish parents and after a secondary education and with a love of the outdoors applied to enter the program in agriculture and forestry at the University College of North Wales – the Department of Forestry was founded there in 1907 - coincidentally the same year the Faculty of Forestry at Toronto was established. Mary graduated in June, 1916 and with World War I in progress Britain was short of timber and male woods' workers with the result that a Women's Forestry Service was established to address the labour shortage. Mary became involved in tree nurseries and training women for forestry work, initially in Wales,then in Scotland and after the war continued her career in 1919 in the newly formed British Forestry Commission which was charged with establishing a "new" forest primarily of Canadian west coast conifer species. Three years later the afforestation work of the Forestry Commission was halted, it was resumed later but in the meantime Mary lost her job. Mary's sister Kate was living in New Zealand and with high recommendations Mary sailed for New Zealand in 1923 where she was offered a temporary position in the newly formed New Zealand State Forest Service by its Director, Leon Macintosh Ellis (a 1911 graduate of the forestry faculty at Toronto). Mary's career in New Zealand was a varied one and being a woman in an all male profession she was not always received in a friendly way. Mary was very much involved in many aspects of the establishment and management of new conifer plantations to replace the exploitation of New Zealand's native species. She was a founding member in 1927 of the New Zealand Society of Foresters – now the New Zealand Institute of Forestry. At the founding meeting Mary is quoted as saying,"*It is time to protect foresters and the public especially with afforestation companies. Forester is the better term, meaning one who grows trees for timber purposes. The term forest engineer is narrower, covering the conversion aspect, while a forester is engaged in the more essential task of producing trees".* It is interesting to note her observation in the Canadian context of the Canadian Institute of Forestry's name change from its predecessor the Canadian Society of Forest Engineers.

Mary's career in New Zealand took many twists and turns and the tension arising from her gender working in a male dominated environment is palpable throughout, although individual exceptions stand out such as Leon Ellis who first hired her. With the economic depression of the 1930's Forest Service funding was reduced and Mary began work in botany at the Dominion Museum in Wellington and here her interests in promoting public and youth education found expression. World War II changed the nature of her career when she became involved in working in a program supervising and assisting women in war industries. At the end of the war, instead of returning to the Dominion Museum she took a job with the Department of Agriculture to initiate a farm forestry program. In 1952 she took an unpaid leave to visit Britain and Norway and return to New Zealand via Canada where she arranged to visit extension farm forestry work. Her sister Daisy's daughter, Frances was an occupational therapist at the Veterans hospital, Sainte-Anne-de-Bellevue and while visiting her she toured the Morgan Arboretum.

In Ottawa, Mary met with staff from the Dominion Agriculture and Forestry departments and began field visits in Ontario. First, at the Ontario Department of Lands and Forests Research Station at Maple where she met Dr. Carl Heimburger and viewed his tree breeding program. Then to Hespeler with forester Isaac (Ike) Marritt who showed her a tree planting machine and W. (Bill) Thurston to discuss advising rural landowners and farmers on reforestation and woodlot management.

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[1] A Russian woman, Marie Kowalik graduated in agronomy and forestry from the Swiss Federal Institutes of Technology (ETH Zurich) in 1887.

(Continued from page 30)

She then went west to Indian Head, Saskatchewan the location of an early tree nursery. While there she gave a lecture to the Canadian Institute of Agriculture on agriculture and forestry in New Zealand. In Saskatchewan she visited the work being done under the Prairie Farm Rehabilitation Act (PFRA) and met its director Dr. Leonard Thompson, a New Zealand expatriate. Her final Canadian stop was on Vancouver Island to visit her brother-in-law Howard Clark. The B.C. Forest Service showed her reforestation of cutover lands in the Campbell River area and the Cathedral Grove near Port Alberni. By way of Seattle and San Francisco she then flew back to New Zealand. Mary Sutherland died in Wellington, March, 1955 after a series of illnesses.

As a footnote, the first woman to graduate with a forestry degree in Canada was Mona Roy from the University of New Brunswick in 1948, followed by Fern Wetton at UBC in 1952,Thèrése Simard from Laval in 1956 and Rose Marie Rauter from Toronto in 1965. Ms. Rauter was the first woman member of the OPFA joining in 1967. Currently there are 130 female practicing (Full, Associate and Non-Resident) members of the OPFA.

References

Edwards, Vivien. 2020. A Path through the Trees. Writes Hill Press, Wellington, New Zealand. p.201 + illus.

Council Corner

Carol Walker, R.P.F.
Councillor Southwest

Council Corner is to provide membership with insight into what happens at OPFA Council meetings.

My inaugural meeting on OPFA Council in December 2019 turned out to be our last in-person Council meeting. I am now in the second year of my 2-year term and while it would be great to be able to interact with my fellow Councillors in person, I think we have adapted quite well to conducting the business of the association in the virtual space. We have members from a variety of backgrounds both RPFs and public members who bring different experiences, perspectives and skills to the table. Everyone continues to be fully engaged, ready and committed to meeting our obligations as Councillors.

This term of Council has been quite active indeed with substantive items on the agenda to be advanced, including proposed changes to the Professional Foresters Act (PFA) and the development of a new strategic plan that will outline a clear path for the OPFA over the next few years. Information about the potential regulatory changes to the PFA has been posted on the OPFA website and many of our members would have participated in the webinar held on January 13th. The new strategic plan for the organization is in development and members of Council have had opportunities to provide input as it is being formulated. Much work continues to be done and progress is being made on these two key initiatives.

One of the things I would like to take some time here to highlight is the establishment of the Equity and Inclusion Task Team by Council in September 2020. The catalyst for this was the events of spring and summer 2020. The heightened awareness of racial injustice and inequality during the summer of 2020 has led to renewed demands for social justice, self-reflection and action on both an individual level and in the corporate world. Many organizations responded with statements of support and denouncing anti-black racism. During the question-and-answer portion of the AGM held in June 2020, the OPFA was asked whether there would be a policy on dealing with racism. I believe the intent of this question was to determine what was being done to demonstrate support for diversity. When the question was raised, what it said to me was that there is an interest in taking positive action and that fairness, diversity, and inclusivity are valued among our membership.

While Council had taken steps previously to ensure fairness in areas such as the membership registration and assessment processes (as confirmed by the Fairness Commissioner), and in the handling of complaints, this represents only one dimension. Inequities and discrimination are often buried or embedded in long standing practices and procedures of an organization and they can be systemic in nature. Council understood that until an intentional review is done to try to uncover situations that could be discriminatory or result in discrimination, marginalization or inequity; any underlying issues would persist.

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Discussions about racism and discrimination are uncomfortable at the best of times and the topic is often met with reluctance, reservation or even silence in some settings, but not at this Council. As we talked about what can be done, there were thoughtful contributions to the discussion clearly guided by the desire to do what was right. Members of Council were quite clear that it isn't enough to simply offer politically correct statements or platitudes, in response to social injustice. It is important to take actions that demonstrate core values, ethical behaviours and leadership by example.

Council acknowledged that there is always room for improvement and as a socially responsible organization, OPFA should be active in self-reflection and consider if we are doing all that we can to ensure OPFA is a welcoming organization. An organization where everyone is able and encouraged to participate fully in the activities, work and governance, free from barriers and any discrimination. One of the things this signalled is that Council is interested in demonstrating what it means to be committed to inclusion.

In September when the decision was made to create the Equity and Inclusion Task Team, the initial team membership included elected Councillors (including appointed public members) and members at large who were charged with developing the terms of reference. I was appointed to chair the task team. The terms of reference were subsequently approved in January 2021, and at the time of writing this article, recruitment was underway to obtain additional volunteers to supplement the initial team.

At a high level, the task team will work to identify any systemic discrimination or barriers within the organization and encourage the creation of a culture of inclusiveness that will benefit everyone. A work plan has been created to guide the work of the task team and work is in progress. For example, policies, practices, guidelines and communications will be reviewed with an equity lens. An anti-discrimination declaration consistent with the mandate of the OPFA will also be created in concert with development of the new OPFA strategic plan. In addition, the team will also explore mechanisms to gain a better understanding of the diversity of OPFA membership.

This is an important and timely initiative, and more information will be shared as work progresses, so stay tuned.

Update on the Review of the Professional Foresters Act 2000 and its Regulation, O. Reg. 145/01

This article is intended to update OPFA members on feedback received during the scoped review of the governing legislation and associated regulations.

Betty van Kerkhof, R.P.F.

Pre-Consultation Engagement

OPFA conducted a scoped review of the Professional Foresters Act, 2000 (PFA) and its Regulation, O. Reg. 145/01 in preparation for discussions with the Ministry of Natural Resources and Forestry (MNRF). The aim of the review was to provide recommendations to the Government of Ontario which would improve the clarity of the PFA and its Regulation so that the OPFA can better regulate the practice of professional forestry by registrants and protect the public interest.

In early January 2021, as part of this scoped review, the OPFA began conducting a pre-consultation engagement exercise with comments due by January 28th. The aim of this exercise was to obtain feedback from members, various stakeholders, and Indigenous organizations on the proposed changes that the OPFA is considering and to gather any additional input on other desired changes. Any comments received from Indigenous organizations will be shared with the Ontario Government so that if required, government to government consultation can take place. Hopefully, this will assist the Ontario Government in their review of potential changes to the PFA and regulations.

The OPFA is targeting completion of its submission for potential changes to MNRF by the end of March 2021. The Ontario Government will then conduct their own process of review and decision making to determine whether the recommended changes should be implemented. If the Ontario Government chooses to propose changes it will determine how and when these will be posted to the Environmental Registry.

Input Received to Date

The OPFA received approximately 500 responses to its engagement. Those included more than 400 responses from occupations presently excluded from the PFA, three provincial government ministries, five universities and colleges, seven non-government organizations, three municipalities, 14 Sustainable Forest Licensees (SFL) holders and 33 members of the OPFA. The OPFA received many responses from the International Society of Arboriculture of Ontario (ISAO) members who mounted a large campaign with concerns about the proposed changes. Their concerns required the OPFA to clarify its intent and to respond to specific questions about the exercise. Much of the concern identified by this group related to the definition of urban forestry, professional forestry, and their present exclusion from being governed by the PFA.

Some members of occupations currently excluded from the PFA do not support removal of their exclusions. A common concern is that if the exclusions are removed people in these occupations would have to be supervised by a member of the OPFA, join the OPFA, or run the risk of being prosecuted. They were concerned about an increasing burden on their businesses, the risk of job losses and being forced to abide by increasing regulations. Several comments indicated that any attempt to regulate the scope of practice within forestry and particularly “urban forestry” must involve discussion and cooperation amongst other disciplines and occupations, trades and professionals potentially affected by the changes.

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The OPFA is currently exploring with ISAO and others on how to better define professional forestry in the context of the urban forest, where many of the excluded occupations provide services. The OPFA believes the addition of better definitions in the Act on what is an "urban forest", "urban forest management" and what Urban Foresters do, will clarify as to where and what professional forester competencies are required so that individuals in all occupations can provide their services unimpeded.

OPFA members, forestry non-governmental organizations and SFLs were generally supportive of the potential changes. A number commented that the proposed changes to the PFA will enable more control over the profession and allow those registered as Professional Foresters in Ontario to truly utilize the "Professional Reliance" mechanisms now present in provincial regulated manuals used to manage Crown forests on behalf of the people of Ontario. Some members thought the changes should be more comprehensive, with the PFA inclusive to all "forest professions and occupations" while others thought urban forest management should be strengthened in other legislation, e.g., the Planning Act, to improve management of the urban forest. A number were in favour of a greater emphasis on competency criteria and training for all OPFA registrants, with particular guidance on forestry, urban forestry and Indigenous peoples' rights.

Responses from environmental organizations who also assumed that the changes would limit the use of other occupations, trades and professions in forestry were not supportive of removing the exclusions indicating that removal was not in the public interest.

Excluded Occupations

The OPFA knows that professional foresters work with individuals from a wide variety of occupations and professions while providing services in relation to the development, management, conservation, and sustainability of Ontario's forests. It is recognized that different skill sets are needed to provide the variety of forest related services needed by the people of Ontario and that all those involved need to work collaboratively.

The current exclusion of specific occupations from the PFA Regulation allows those occupations to practice "professional forestry". This makes it difficult for the OPFA to ensure it can meet the objective of the PFA. The primary objective of the OPFA is to: "*is to regulate the practice of professional forestry and to govern its members in accordance with this Act, the regulations and the by-laws in order that the public interest may be served and protected.*"

The PFA does not govern other occupations such as biologists, arborists, and ecologists. They can continue to provide their services as they currently do. The OPFA would like to propose revisions to the PFA, such as refining the scope of practice of professional forestry (including urban forestry) to meet its regulatory objectives without negatively impacting occupations such as forest technicians, arborists, ecologists, and biologists that provide critical services to municipalities and other clients.

For further information and associated updates consult the OPFA website:

https://opfa.ca/opfa-review-of-the-professional-foresters-act-2000/

2021 OPFA Conference and 64th Annual General Meeting

Join us for our first virtual conference: Our Roots, Our Future

Forestry Knowledge From Far and Wide - April 6-8, 2021

By acknowledging the past and recognizing the present, foresters are able to more effectively plan for the future. This year's Ontario Professional Foresters Association virtual conference *Our Roots Our Future* will have attendees networking with forestry professionals, friends and students, exploring how looking back can help us prepare for what is to come. Attendees will be delving into climate change and its impact on our rural and urban forests, perspectives from Ireland and Indigenous Knowledge experts here in Ontario, the status of professional forestry in all jurisdictions, laying the groundwork for our private and public forests, as well as many other topics. The conference will also feature post-graduate students giving synopses of their ground-breaking work in "research minutes".

A virtual field tour will provide attendees with a unique experience to visit York Region, Lake Simcoe Region Conservation Authority and Simcoe County Forest from home, providing a glimpse of the urban and semiurban landscapes managed by some of the Ontario Professional Foresters Association's committed members.

Whether you are an OPFA member, interested in becoming a member or just interested in learning about forestry, we challenge you to participate.

View the draft agenda on the OPFA website at www.opfa.ca.

All are welcome!

Registration is only $20 for students, $40 for OPFA members.

NOTICE OF THE ANNUAL GENERAL MEETING OF OPFA MEMBERS

Notice is hereby given of the Annual General Meeting of Members of the Ontario Professional Foresters Association to be held virtually using video conference technology at 6 p.m. (EDT) Wednesday, April 7, 2021 for the purpose of conducting the affairs of the Association, including:

Agenda Items (may be subject to change):

1. Call to order
   Notices, Members, and proxies
2. President's remarks
   - Virtual AGM procedures
   - Who can vote?
   - Accessing the 2020 Annual Report
3. In memoriam
4. Recognition of new Members
5. Approving the minutes of the 2020 Annual General Meeting
6. Resolution updates
7. Receive Annual Reports
   - Receive and consider reports of the President, Executive Director & Registrar, Auditor, and Committee Chairs for the fiscal year December 1, 2019, to November 30, 2020.
8. Auditor's Report and Financial Statements
   - Receive the audited Financial Statements as of November 30, 2020.
9. Council's appointment of Association Auditor
   - Report Council's appointment of the Auditor for the fiscal year ending November 30, 2021.
10. Concluding the Annual Report
    - Thank you to sponsors and exhibitors of the 2020 Annual Conference.
11. Confirming and approving the acts and procedures of Officers and Councillors
12. Confirming proposed 2020 by-law changes
    - Includes a summary of changes
13. Business highlights in 2020
14. Considering and, if desirable, approving resolutions, if any are received.
15. 2022 Annual Conference
    - Location
    - Acknowledging the conference organizing team
16. Termination of 2021 Annual General Meeting

If you are eligible to vote and are unable to attend this meeting, please complete the Instrument of Proxy (page 37) and return it to the OPFA office.

All Resolutions must be submitted before the start of the Annual General Meeting, in the approved Resolution Form format (see form), with a Mover and Seconder. Please note that only those Resolutions submitted to the OPFA office by 2:00 p.m. (EDT) on Thursday, April 1, 2021, will be presented and discussed at the Annual General Meeting.

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

INSTRUMENT OF PROXY

I, _____ _____
(Name of Member) (Member number)

of _____
(address of Member)

Being a Member of the Ontario Professional Foresters Association hereby appoint:

Denis Gagnon, R.P.F., of Sault Ste. Marie, Ontario
WHOM FAILING
Chris McDonell, R.P.F., of Callander, Ontario
OR

_____, (_____) of _____
designation

as my proxy to vote on my behalf at the
Annual General Meeting of the Members of the Association
to be held virtually at 6 p.m. (EDT) Wednesday, April 7, 2021.

Dated this_____day of_____, 2021 at_____

_____
(signature of Member)

IF YOU ARE NOT ABLE TO ATTEND THE 2020 OPFA ANNUAL GENERAL MEETING,
PLEASE RETURN THIS PROXY TO THE OPFA OFFICE by 2:00 p.m. (EDT) Thursday, April 1, 2021.
Email: opfa@opfa.ca, Fax: (905) 877-6766, Mail: 201 - 5 Wesleyan St., Georgetown, Ont. L7G 2E2

Grey Areas
SML Steinecke Maciura LeBlanc Barristers & Solicitors
A COMMENTARY ON LEGAL ISSUES AFFECTING PROFESSIONAL REGULATION

Is Irremediable Becoming the New Ungovernable?

by Natasha Danson
March 2021 - No. 254

A practitioner's past history can have a significant impact on subsequent disciplinary sanctions. Previously, a practitioner with a significant past history was labelled "ungovernable". It appears that term is being replaced with the less loaded term of "irremediable".

In *Hanson v. College of Physicians and Surgeons of Ontario*, 2021 ONSC 513 (CanLII), https://canlii.ca/t/jct84 the practitioner admitted engaging in three types of professional misconduct:

1. Being found guilty of an offence for billing for services unsupported by records;
2. Failing to meet the standards of practice with respect to patient assessment and treatment as well as record keeping, and demonstrating a lack of knowledge and judgment; and
3. Permitting a vaccine to be administered by a staff person and then engaging in a lengthy cover up to mislead the regulator, including by preparing a false record and encouraging a staff person to take responsibility for it.

The discipline panel revoked the practitioner's registration. The Court upheld that outcome despite the fact that the practitioner had, since the alleged conduct, successfully completed a course of clinical remediation and mentorship resulting in a report that the practitioner "was a skilled physician, his charting consistently met the standard of care, he did not expose his patients to danger and did not lack judgment or knowledge." If these were the only facts, a sanction of revocation would be difficult to justify.

However, the practitioner had an extensive prior history going back almost twenty years. The Court summarized the prior history as follows:

> … [the] disciplinary history encompassed two prior Discipline Committee hearings and 11 decisions of the ICRC or Complaints Committee which resulted in the Appellant:
>
> 1. Being suspended from practice in 2001 for six months, reduced by three months upon completion of an ethics course;
> 2. Receiving two reprimands;
> 3. Being cautioned five times;
> 4. Being counseled once;
> 5. Being referred to the Quality Assurance Committee to address clinical issues and poor records;
> 6. Being required to take numerous educational courses concerning clinical issues, record keeping and ethics;
> 7. Undergoing clinical supervision and/or re-assessment of his practice on three separate occasions; and
> 8. Entering into three separate undertakings with the College concerning his practice and health.

The concerns involved numerous examples of unethical conduct, including misleading other health care practitioners and the regulator, clinical concerns, and record keeping lapses.

In addressing the standard of review, the Court applied the case of *Mitelman v. College of Veterinarians of Ontario*, 2020 ONSC 3039 (CanLII),

FOR MORE INFORMATION
This newsletter is published by Steinecke Maciura LeBlanc, a law firm practising in the field of professional regulation. If you are not receiving a copy and would like one, please contact: Steinecke Maciura LeBlanc, 401 Bay Street, Suite 2308, P.O. Box 23, Toronto, ON M5H 2Y4, Tel: 416-599-2200 Fax: 416-593-7867,
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A COMMENTARY ON LEGAL ISSUES AFFECTING PROFESSIONAL REGULATION

https://canlii.ca/t/j883c to conclude that the test was whether the sanction was clearly unfit or contained errors in principle.

The Court held that in finding that the practitioner was irremediable, it was appropriate for the discipline panel to consider his entire disciplinary history. The Court said "when considering penalty, the Committee was entitled to consider the whole of the Appellant's disciplinary record, including conduct which occurred after the conduct that led to the misconduct in issue". The Court said:

> The Committee's decision that the Appellant was irremediable was based on its consideration of the Appellant's lengthy disciplinary record, that he already had several opportunities at rehabilitation, without success and that his improvements were not sustained over time. In reaching that conclusion the Committee considered both the 2018-2019 clinical assessment and the subsequent reassessment. The Committee made no error in principle.

The Court also found that the practitioner's history of mental illness and substance abuse did not establish a basis for a sanction less than revocation:

> While there was evidence before the Committee of the Appellant's diagnosis of substance use and bipolar disorders and that he had been subject to health monitoring since 2019, there was no evidence or submissions made to the Committee that the Appellant's mental health or the treatment of his disorders in any way contributed to the misconduct in issue.
>
> In the absence of such evidence or submissions, the Committee did not err in not considering those issues as mitigating factors. There must be some connection in the evidence between the health issue and the misconduct in question before the matter can be considered in respect of penalty.

In addition, the Court noted that the practitioner's compliance with three previous undertakings did not detract from the finding that he was irremediable. The Court accepted the panel's observation, borrowed from another case, that while the practitioner had "responded to the direction of the College in the sense that he completed the educational courses required of him, attended cautions, and worked under supervision, the Committee finds that they have had little or no impact and that he had made few of the fundamental changes necessary."

The Court concluded that the revocation was proportional both in the sense that it was appropriate for the finding made and in that it was consistent with prior similar cases:

> Given the evidence before the Committee together with its findings, I do not consider the penalty imposed on the Appellant of revocation was disproportionate. The misconduct in question involved clinical matters, record keeping, as well as integrity and dishonesty issues. In light of the serious, repetitive nature of the Appellant's misconduct, the lengthy history of disciplinary matters and the fact that the Appellant had not benefitted from repeated efforts at rehabilitation, the Committee's conclusion that rehabilitation was not a factor supports a penalty of revocation having regard to the principles in play, protection of the public,

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> general deterrence and public confidence in the regulation of the profession.
>
> The penalty proposed by the Appellant of a 12-month suspension followed by supervision and reassessment does not meet those principles.
>
> Finally, while no two cases are alike, the penalty of revocation is consistent with the misconduct in the cases of revocation the Committee considered, [*citations omitted*]. Revocation is not limited to matters of incompetence or breach of an undertaking.

This case shows that a finding that a practitioner is irremediable, similar to the more traditional finding that a practitioner is ungovernable, justifies a sanction of revocation.

In Memoriam

Professor Emeritus Dibyendu Roy

It is with sad regret to announce that Professor Emeritus Dibyendu Roy quietly passed away on February 16th.

Born in Calcutta, India, Dr. Roy started teaching at the Faculty of Forestry in the mid-1960s, spending the next forty years of his career here before retiring. He taught organic chemistry to all the undergraduate forestry students and specialized courses in wood chemistry to the Wood Science students.

Known as the "man who cured the elm tree," one could find Dr. Roy working in the Shade Tree Lab located in the Borden building for many years, and originally established by Dr. Erik Jorgensen. Together they conducted research and co-authored an article on injecting a systemic fungicide, Lignasan BLP (carbendazim phosphate), into elm tree roots resulting in a patent registered to the University of Toronto. This led to Dutch elm disease control programs still in action today based on their research.

https://www.cbc.ca/archives/entry/canadas-trees-the-man-who-cured-the-elm

Dr. Roy was beloved by his former students who held him in the highest regard. A true teacher who looked at the world through a different lens than most and always brought a unique perspective to the classroom. He changed many lives, and never stopped helping and advising his students, even when they left the halls of the University to pursue their forestry careers.

During his retirement, he often returned to campus to swim at the Athletic Centre, popping into the Faculty afterwards to chat with faculty, staff members and students. He loved talking about his former students and their career achievements, always proud of their successes.

Through Dr. Roy's kindness and dedication to teaching and research, he opened many eyes and minds to the fields of forestry and wood science. He will be missed greatly.

https://www.dignitymemorial.com/en-ca/obituaries/toronto-on/dibyendu-roy-10060281

Member News

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

Christa Campbell
Ritikaa Gupta
Ying Hong
Shanagh Hore
Amber-Lynne Lammers
Natasha Machado
Kimberley Mason (transfer from another province)
Jacob Outram
Joseph Welch (transfer from another province)

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):

Ayumi Akimoto
Julian Alvarez-Barkham
Melinda Casselman
Kayla Raycraft
Michael Sample
Madeleine Sansom
Matthew Shakespeare
Verna Valliere
Joseph Williams
Caitlin Zvanovec

New Student Members:

Brelynn Howard
Xi Lang
Aidan McDiarmid
Divyakumar Pandya
Sophia Stoltz

Deceased Member:

Gordon Breau

The following people are not entitled to practice professional forestry in Ontario but remain members of the OPFA:

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

Margaret Carruthers
Matthew Kendrick
Tyson Williams
Michael Young

New Life Members-R.P.F. (Ret.):

Brian Barkley
Trevor Isherwood
Norman Stephenson

The following people are not entitled to practice professional forestry in Ontario and are no longer a member of the OPFA:

Resigned, Full Members:

Lucy Szczesniak
Ken Van Every

Resigned, Inactive Members:

William Gaines

Resigned, Provisional Members:

Christine Davis

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

Membership Suspended for Administrative Reasons:

Willem Shola Akintola
Ahmad Alamad
Adrien Djomo
Aude Fournier
Praveen Kumar

Continuing Education

Webinars and Other Resources

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

1. Canadian Institute of Forestry

https://www.cif-ifc.org/e-lectures/

2. Ontario Ministry of Natural Resources and Forestry. MNRF Science Insights, contact Kristy Mckay, Science Transfer Specialist at Kristy.McKay@ontario.ca

3. Forestry and Natural Resources Webinars

http://www.forestrywebinars.net/

4. Conservation Webinars

http://www.conservationwebinars.net/

5. Urban Forestry Today

http://www.urbanforestrytoday.org/

6. Climate Webinars

http://www.climatewebinars.net/

7. Cornell University

http://blogs.cornell.edu/cceforestconnect/subscribe/

8. How To Do Urban Wood

http://illinoisurbanwood.org/urban-wood-network-announces-how-to-do-urban-wood-webinar-series/

9. Forestry Chronicle

http://pubs.cif-ifc.org/journal/tfc

10. Canadian Journal of Forest Research

http://www.nrcresearchpress.com/journal/cjfr

11. FPInnovations

http://blog.fpinnovations.ca/

Coming Events

Climate Change Response Framework: Adaptation Planning and Practices Online courses

Winter, Spring 2021

https://forestadaptation.org/learn/adaptation-planning-and-practices-online-courses-fall-2020-winter-spring-2021

E-LECTURE SERIES: CCFM Climate Change - Accelerating Informed Mitigation and Adaptation Actions for Sustainable Forest Management

February 11 - March 25, 2021

https://www.cif-ifc.org/e-lectures/

Enhanced Forest Resources Inventory (eFRI) Knowledge Transfer and Tool Development (KTTD) Round WebEx technology transfer presentations hosted by the Forestry Futures Trust Committee.

February 11 - March 25, 2021

http://www.forestryfutures.ca/latest-news

2021 Virtual 2021 OPFA Conference and 64th Annual General Meeting

April 6-8, 2021

https://opfa.ca/about-us/event-list/#!event-list

Ontario Woodlot Association 2021 Annual General Meeting and Conference - The Opportunities and Options our Woodlands Give - Zoom Webinar

April 20 - 22, 2021

https://www.ontariowoodlot.com/events/eventdetail/361/-/owa-2021-annual-general-meeting-and-conference