

BC

Forest PROFESSIONAL

MARCH - APRIL 2016

Land-Application of Bioenergy Ashes in Northern BC

Is Digital Aerial Photogrammetry
LiDAR's Biggest Competitor?

Maximizing Use of the Land Base With Berry Planting

FREP: What is it and How
You Can Take Advantage

Bioenergy and Wood Ash: Creating Value From Waste



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"In the field it has saved us time and simplified field surveys. In the office it has saved us a significant amount of staff time"...

Ricardo Velasquez,
District Silvicultural Forester
Ontario Ministry of
Natural Resources



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Photo: FPInnovations

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Is There a Cheaper Digital Signature Alternative?

I recently acquired my RFT designation and was interested to hear that there is a digital signature available through a partnership between the ABCFP and Notarius. I ran into a brick wall, however when I learned that there is a \$140 sign-up fee plus a \$185 yearly subscription to have the privilege of signing digital documents. This is rather expensive for something that can be re-created by buying the rubber stamp for \$25 and making a simple scan as an attachment. Notarius does offer the PDF converting software to make life easier when signing digital documents, but the price tag for that convenience is definitely not worth it. One could go out and make a one-time purchase of Adobe Pro on eBay ranging from \$50-150 and create the same thing.

Now that most forestry field staff are using tablets to collect data, build technical reports and mark up their digital maps in the field, it is (and will become) more of an issue for RFT's and RPFs to be able to sign their documents digitally.

This service is not something (in my experience) an employer would cover, and I for one am certainly not going to pay for. It would be interesting to hear others' perspectives on this (is this too much money? Are others using and satisfied with the service? How many member are actually subscribed?) and perhaps entertain the possibility that the creation and distribution of our own digital stamps fall under the jurisdiction of the ABCFP and be included in the annual member fees.

Chris Perry RFT

International Forestry Issues Merit More Discussion

I would like to continue the discussion started by Roy Strang (in the Letters section of the November/December issue of **BC Forest Professional**) about tree planting around the world. There is huge need to establish new forests in many parts of the world. Most of these forests have been degraded and removed for fuel and conversion to agriculture. Forests Without Borders (FWB), a Canadian charity, supports community based planting projects. FWB has active reforestation projects in Ghana, Cameroon, Madagascar and Nepal. The average cost of these projects is \$8,000 – \$10,000. There is a real need to work at the community level with local people. This is something that large governments and organizations cannot do.

FWB's goal is to improve people's lives through restoring or improving their forests to provide fuel wood, food, fodder, timber and other environmental benefits such as water. Its second goal is to promote sustainable forestry.

FWB is able to accomplish its goals by providing small amounts of funding and expertise to local communities for specific projects. These projects have as their main components the growing of trees and the education of local people on the benefits available if the trees are cared for and protected.

Forests without Borders' projects maximize the chance of success through the creation of partnerships with local citizens who have a personal relationship with a Canadian CIF member. These people live in the community and have a stake in the project's outcome.

We are interested in attracting additional help and volunteers to aid in project management and fund raising efforts. Please contact Peter Ackhurst at packhurst@telus.net for further information.

Fred Pinto

Forests Without Borders
National Chair

BC Forest PROFESSIONAL

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International Forestry Organizations Need Our Support

It was with interest that I found exposure to international forestry again in your November-December, 2015 issue. It is especially appropriate after the global warming conference in Paris, where reforestation was identified as one of the beneficial actions that nations can take to absorb some of the excess carbon dioxide floating around. I am also pleased that you quoted my article of Nov-Dec 2010 in your "Reflections on Ethical Requirements" on page 4. What I said then still applies today, only local people can make a substantial difference in a positive change from forest destruction to rejuvenation and protection. Although intensification of government-led and donor-supported reforestation projects can bring about an increase in the forest estate of a country, it will only be the active participation of local communities that will make a difference. Hundreds of forest villages, spread across the country, each with their forest tree nurseries and reforestation projects. Each one small perhaps, but many small ones make a big one. The work of NGOs such as Forests Without Borders should be actively supported. I believe our organization has a forestry charity, used for such programs as assisting forestry students. Maybe a portion of those funds could be earmarked for international forestry support projects. Perhaps this can be brought up at the next AGM to find out what the reaction of the membership is. We're all in this together.

Respectfully submitted,

Peter R Schatens, RPF (Ret.) Life Member

Correction Notice

On page 16 of the Jan/Feb 2016 issue, we stated that "Riparian air and stream mean weekly maximum temperatures increased up to 60°C." It should have read 6°C

On page 28 of the Jan/Feb 2016 issue, we incorrectly reprinted Elbert Stanley Reid's obituary with an incorrect photo. We apologize about the error and have corrected it in this issue.

Have a Compliment or Concern? Write us!

The **BC Forest Professional** letters section is intended primarily for feedback on recent articles and for brief statements about current association, professional or forestry issues. The editor reserves the right to edit and condense letters and encourages readers to keep letters to 300 words. Anonymous letters are not accepted. Please refer to our website for guidelines to help make sure your submission gets published. Send letters to:

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New Advocacy Strategy Required

I fully endorse Michael D. Meagher comments and concerns in the Letters Section of the November – December issue of **BC Forest Professional** magazine and, at the same time feel disappointed in the response he received.

I do not think the issue is about the money. I do, however, think it is about the ethics about HOW it is used.

It is my opinion that, in pursuing and upholding all our recognized areas of advocacy with members of government, all of our members would support the payment of legitimate expense accounts for the travel costs associated with this.

At the same time; however, it is also my opinion that, it is deplorable that our association feels we are obliged to 'buy our way in' to meet with elected government officials in the manner of patronage and lobbying practices. On the other side of the fence, it is probably my naive dream world that prompts me to think that, as part of the official's job description, in our areas of advocacy, that official should be seeking our input, not the other way around.

From a concerned member of 'the old boys club.'

Alf Farenholtz, RPF (Ret.) Life Member



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My Report Card

My year as president has flown by so I thought it would be a good time to review what we've achieved over the past year. An e-mail from a member got me thinking about the goals I laid out in my incoming president's speech a year ago and how much progress we've made towards achieving them.

Strategic Thinking and Planning – Grade: B+

We have been focused on executing the final year of our three-year strategic plan including a refresh and environmental scan to make sure we haven't missed anything. I feel that our strategic thinking is good, plus we've adopted some new tools and processes that we hope to use even more moving forward.

In 2016, the first order of business will be to get our new CEO, Christine Gelowitz, RPF, on the ground to meet with members. We can learn so much from members who are passionate about forestry, the profession and the association.

After these member consultations, we'll start work on a new three-year strategic plan to make sure we're setting ourselves up for the next few years.

Growing Our Leadership in the Resource Sector – Grade: B

We had made plans to reach out to the resources sector; however, with the market downturn and the fall in oil prices, we opted to sit back and wait until that sector was ready to speak with us. When the economic turmoil has calmed down a bit, we'll proceed with our plans to discuss the use of forest professionals for forestry and reclamation work with the oil and gas sector.

On the other hand, we have had some excellent conversations with key players at utilities such as BC Hydro. We met with several senior forest professionals working in BC Hydro's capital projects, road access and vegetation management divisions to discuss the increasingly valuable contributions our members are making to BC's largest utility. In many ways, BC Hydro is a leader with respect to stewardship, planning and on-the-ground practices due to the role their forest professionals play in their business.

Enhancing Our Professional Independence – Grade: C-

My first President's Report, "It's legal... but is it stewardship?" was meant to be a call to action: It's time to stand up and declare your commitment to doing better in voicing your professional independence. And, actually, I did receive some great commentary; unfortunately it was all in private. I guess that either my message didn't resonate with many members (except those who contacted me privately) or that it was the wrong message delivered at the wrong time because I'm not seeing anyone else stand up and say "Yes! We have to do better!"

I don't believe the ABCFP can do all the work on this one alone — we need grassroots buy-in to be credible and build the necessary momentum. I fully admit it takes leadership to light the way. I can only hope that I at least positioned us with a first step.

Recruiting and Developing New Members – Grade: A

The good news is that post-secondary forestry programs are doing well and enrollment is increasing. I am so proud of our new registration process. As an employer, I am looking forward to having my enrolled staff go through the program because the knowledge they will gain will enhance their skills and make them stronger employees.

I believe we have done an excellent job in setting ourselves up to access folks from across the country and the world with affiliated education that will bring a global perspective to our membership ranks — and yet still give them the opportunity to learn what it means to be a forest professional in BC. One area we can improve upon — and some groups like the National Forest Week Coalition is already working in this area — is increasing outreach to elementary and high schools. The earlier we plant the forestry seed, the better!

So, there you have it, my report card on my year as president. You may disagree with the grades I've assigned myself. If so, I'd love to hear from you. Drop me an e-mail anytime.

Best of luck to Chris Stagg, RPF, as he takes over as president. I know he'll do a great job with the help of a very strong council. ✕



Common Questions and Answers from the Director of Practice

Our new CEO, Christine Gelowitz, RPF, had been on the job a mere week when the magazine deadline rolled around. We'll see her first column in the next issue. Instead, we are sharing some of the common questions our director of professional practice and forest stewardship, Mike Larock, RPF, received from members.

1. As a professional, am I required to keep accessible copies of professional work that I sign and seal? Must I store my own file of professional documents or does the fact that my employer has its own filing system cover that requirement?

The professional standard of due diligence requires you to be able to retrieve past professional documents either in hard copy or electronic format. The standard is silent on the method and time requirement for this. In my opinion blind reliance on your employer to keep all records of your professional work is **not** enough. You need to demonstrate some aspect of personal professional due diligence.

2. A forest professional working for a consulting company independently accepts contract work from a client of his/her employer without informing the employer. The work is completed on the employee's own time. The professional employee signed a code of conduct which permits outside employment. The type of professional work performed is the same as what the consulting company conducts for the client and could be perceived as the employee being in competition with the employer. Is there an ethical problem with the actions of the professional employee?

Yes there is an ethical dilemma. Forest professionals must consider and follow all types of legislation and the fact that there is an employer code of conduct does not relieve the professional from other legal responsibilities and the expectation of professional conduct in the *Foresters Act*.

Bylaw 11.5.6: "To refuse any assignment that creates a conflict of interest." The guideline for interpretation says that "A conflict of interest exists when there is, or there is a perception, that the duty or loyalty owed by a member to one party, is, or is likely to become, adverse to the duty and loyalty which the member owes to another party."

A forest professional strives to be independent in fact and appearance. The conflict of interest erodes trust and credibility.

3. In the association's opinion, are Site Plans legally enforceable and are they professional documents?

Within the context of the *Foresters Act*, if the Site Plan contains the practice of professional forestry, then that content and the professional providing the content, are subject to the *Foresters Act* and ABCFP bylaws.

ABCFP Bylaw 10 describes professional work and indicates that some or all of the work in a professional document may be described as professional work. In my professional opinion,

the Site Plan is a professional document and contains professional work. It is therefore subject to the ABCFP guidance that is intended to signal a standard of expectation for practitioners.

The question of enforceability of the Site Plan needs to be put to the regulator of FRPA, the Ministry of Forests, Lands and Natural Resource Operations (FLNRO).

4. I am an RFT and I have recently applied for RESULTS permissions, including milestone declarations. I was told by managers of the RESULTS process that an RPF signature must be in the opening file. Doesn't this requirement contradict the ABCFP's guideline 'scope of practice for registered forest technologists', which declares milestones based on survey data is within the RFT scope of practice?

There appears to be a contradiction, however there is not one. It is true that FLNRO, as manager of the RESULTS process, can ask for any special requirements of a professional so long as they are consistent with the *Foresters Act*. It is also true that the milestone declaration as professional work under the *Foresters Act* is within the scope of RFT practice. The two circumstances occur at the same time. The ABCFP provides the rationale behind the professional legislation and the scope of practice guidance.

5. Does the Foresters Act qualify me to sign and seal an Environmental Management Plan (EMP)?

To be 'qualified' as a registered professional requires verification of two concepts, authority and competence.

The *Foresters Act* provides the authority for forest professionals who are registered and in good standing with the ABCFP to practise professional forestry. The *Foresters Act* and the practice of professional forestry apply broadly wherever there are forests that require management. The registered member has authority if the EMP is related to the description of forests, forest lands, forest resources and forest ecosystems.

Despite the range of authority that may apply to the individual professional, both RPFs and RFTs are required to have and maintain competence in areas where they engage in professional practice. It is incumbent on the individual professionals to undertake sufficient diligence so as to ensure they are competent to assess the content of the EMP.

6. Is a forest operator able to use a non-forest professional to oversee the harvest and road construction operations?

Yes, the non-forest professional can oversee tasks that are not the practice of professional forestry. And for those tasks that are the practice of professional forestry, the non-forest professional must be directly supervised by a registered ABCFP member. Direct supervision and the professional practice standard of due diligence requires that the forest professional have a process of regular inspections and consultation with the forest contractor; documenting the progress and communications as the operations were carried out.¹ ❧



ABCFP Suspends Member

Mr. Brian Stamp of Prince George has been suspended from the Association of BC Forest Professionals for a period of two months ending on March 7, 2016. Mr. Stamp is not allowed to practise forestry or use the title Registered Forest Technologist (RFT) until the suspension has ended.

Announcing the 69th Council

Please welcome your 69th Council:

- | | |
|---|----------------------------|
| • President, Chris Stagg, RPF | • Tom Hoffman, RPF |
| • Vice-President, Mauro Calabrese, RPF, RPBio | • Morgan Kennah, RPF |
| • Immediate Past President, Jonathan Lok, RFT | • Robin Modesto, RFP, PEng |
| • Jillian Affleck, RFT | • Lisa Perrault, RFT |
| • Gail Brewer, RFP(Ret) | • Trevor Swan, RPF |
| | • Rod Visser |
| | • Tom Walker |

These council members took their seats at the AGM that was part of the *Forestry: Branching Out* conference that took place in Vancouver last month.

New Registration Process Information Is Available

If you are an enrolled member who is thinking about transitioning to our new registration process, check out the website (Becoming a Member). We've added more information including a table to help you decide whether it is best for you to transition or stick with the old system. You'll also find a link to a webinar and more FAQs.

Reflections on Ethical Requirements

Forestry is a profession that rests on a foundation of science. Forest professionals use their science-based knowledge to solve real world problems in the public's interest, for their employers and clients. This sets up the requirement for forest professionals to be knowledgeable in their area of practice. Bylaw 11.3.9 states that a responsibility of a member to the public is to "express a professional opinion only when it is founded on adequate knowledge and experience."

One aspect of adequate knowledge means to be informed of current research in the area of a member's expertise. Current forest research provides opportunities to improve and enhance forest management.

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The Road to Innovation

NUMEROUS INDUSTRIES RELY ON RESEARCH BREAKTHROUGHS TO OPERATIONALIZE innovative practices and the forestry sector is no different. Looking back on the last few decades, some forest professionals would be hard pressed to remember a time when data was collected using paper and pen instead of on iPads and smartphones; others may be so accustomed to using LiDAR and drones to conduct inventory that the idea of manual processes seems outdated.

The sector has come a long way in utilizing research to create more streamlined, efficient and accurate practices. This issue of **BC Forest Professional** magazine shines a spotlight on both existing and emerging forest technologies, starting with West Fraser's foray into bioenergy generation through the use of wood waste in northern BC. We also explore FPInnovations' research and development program to mitigate the various challenges associated with working on steep terrain. Of

practical significance to those working in BC, we also feature three perspectives on the Forest and Range Evaluation Program (FREP), which monitors the effectiveness of forest and range practices in the province and has generated 9,000 samples and produced 71 reports on the subject since 2005. The article outlines how collected data informs resource districts, forest licensees and government, and also shares how the broader membership can access it as well.

This issue also features our most comprehensive membership statistics report, given the recent completion of the ABCFP's 2015 membership renewal process. Members may be interested to see which of their colleagues have entered or left the sector.

On a related note, this issue will mark my own departure as editor of the magazine, as I recently accepted a more senior communications position in the social services sector. It has been an absolute pleasure working in forestry and being part of a publication that attracts such passion and engagement — whether it be through the submission of letters, written articles, Moment in Forestry photos, and the like. It has also been great to work with the volunteer Editorial Board to set the content direction and also watch ideas and concepts come to life in these pages. I hope **BC Forest Professional** continues to be a great forum for the exchange of ideas and opinions. If you'd like to stay connected, feel free to look me up on LinkedIn. ✕



The Principles of Stewardship¹ and Forest Research

Timely forest research is a necessary element in the results-based model of forest stewardship through the *Forest and Range Practices Act* (FRPA). In addition, the *Foresters Act* has set objectives to ensure competence, integrity, independence and professional conduct of forest professional members. Continuous improvement through gathering of scientifically sound data, monitoring and adaptive management provides a foundation to support professional reliance; the system relies upon the decisions and advice of well-informed professionals who, in turn, can be held accountable for those decisions and advice in a changing environment.

Currently, there are many well-established sources of forest research through academic institutions, licensee trials, FPInnovations and local Ministry offices (to name a few). One of the Ministry of Forests, Lands and Natural Resource Operations (FLNRO) programs is the Forest and Range Evaluation Program (FREP). This program monitors operational results on the ground to ensure planning and practices, as well as policy, are effective in meeting FRPA objectives in a measurable and verifiable manner.

In the near future, the Forest Practices Board will be providing results from an analysis of the FREP program to determine if it is meeting the expected program outcomes and fulfilling its role within the FRPA framework. This is an opportune time for engagement of individual forest professionals, licensees, First Nations and other stakeholders to collaborate on the program moving forward.

¹ The main document can be seen at http://member.abcfp.ca/WEB/ABCFP/Practising_in_BC/Practising_in_BC.aspx

Northern BC Forging Ahead in Bioenergy

In the last few years, West Fraser has significantly expanded its energy production capabilities, mostly in the form of generating bioenergy from wood waste to help maximize the utilization of the resources consumed. The Chetwynd Forest Industries and Fraser Lake sawmill divisions have recently completed two exciting renewable bioenergy projects. The mills, which previously operated beehive burners to dispose of sawmill residuals, have developed large biomass power generators co-located on site with the operating sawmills.

These unique, innovative bioenergy facilities utilize well known technology to generate thermal energy by combusting biomass. These installations are independent of the mill and can generate as much as 12 megawatts of electricity from the mill's hog fuel. Although the bioenergy plants rely on the sawmill residuals to operate, they are not part of the mills' power system.

At the mills in Chetwynd and Fraser Lake, energy is converted into electricity utilizing an Organic Rankine Cycle process (ORC). This process is new to North America but is well adopted in Europe with over 200 applications. The projects at West Fraser are the largest facilities of this type worldwide and the only ones that are operated through the direct firing of biomass for the sole purpose of producing electricity.



A typical Turboden ORC turbine and condenser arrangement.

applications utilize low temperature waste heat as the thermal energy source. Small ORC units are common in Europe for capturing waste heat and converting it into electricity.

The energy systems installed at the Chetwynd and Fraser Lake mills are unique as they utilize high temperature working fluid generated specifically for the ORC process. These energy plants are the largest application of this technology worldwide designed specifically for power generation from biomass.

This ORC cycle has an overall energy efficiency of roughly 25% of incoming thermal power in the thermal oil that is transformed into electric energy. Low temperature applications have lower efficiencies. There are three closed liquid loops in the process used at West Fraser: a hot oil loop that heats the working fluid; the working fluid loop that drives the turbine and generates electricity and a water loop for cooling the working fluid back into a liquid after the turbine.

The working fluid is Cyclopentane which has a boiling point of 49 degrees Celsius. Air is commonly used for cooling in the small ORC applications, but water cooling towers are required for the large units at West Fraser. The hot oil used to vaporize the working fluid is generated by large, high-efficiency thermal units fed on biomass from the mill — some 90,000 tonnes of sawdust, bark and other residuals. These thermal oil systems have common application at sawmills on a smaller scale for producing thermal energy to be utilized for drying of lumber.

Each mill has two, six megawatt Turboden ORC energy units, two 100 million Btu/hr thermal plants and a large cooling tower building. These energy plants are 10 times larger than typical European units. For a sense of scale, 10 megawatts is enough renewable electricity to power approximately 8,000 homes.

Under the BC Clean energy plan, BC Hydro put out a call for projects in 2010. West Fraser was successful in responding to the call with our proposal to build power plants that would utilize biomass that was being incinerated in beehive burners. Our bioenergy plants are an innovative, energy efficient choice of technology to replace the existing beehive burners. They offer environmental benefits by dramatically reducing particulate emissions. Further, biomass power generation provides a stable income from sale of green energy for each sawmill at the same time helping BC Hydro meet the goals of the provincial clean energy plan. This renewable alternative is produced from waste heat that previously would have been vented to the atmosphere.

The project has provided both sites with revenue diversification and stability. It has great potential for replication where a secure source of waste energy from biomass or other sources can be obtained. It can be an option for reducing fossil fuel power generation and has application for reducing the impact of greenhouse gas across all industrial sectors. ☺

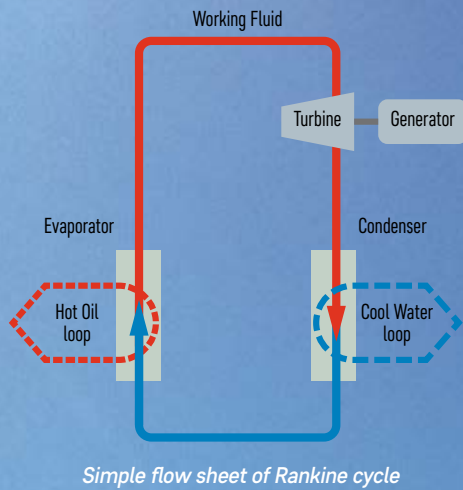
Rod Albers, PEng, MEng, is a professional engineer with a Master's degree in Pulp and Paper from UBC. Rod has 25 years' experience in management, operations and engineering in pulp and paper. As manager, energy and bioproduct development at West Fraser, he leads a team that is responsible for developing and implementing West Fraser's industrial energy and novel bioproduct programs. Over the past five years Rod has been personally engaged in bioenergy power generation and biorefinery process development utilizing forest-based biomass.

Rankine Cycle is a thermodynamic process where heat is transferred to a fluid at a constant pressure. Electrical energy production is traditionally completed using water in the Rankine Cycle. Water is vaporized and then expanded in a vapor turbine that drives a generator, producing electricity. The spent vapor is condensed to liquid and recycled back through the closed loop cycle. This cycle utilizes the familiar steam turbine in the process. Thermal energy to heat the water is provided through an external source — typically a biomass or coal boiler.

West Fraser's installations are a variation of the process called Organic Rankine Cycle. Instead of water, the ORC process uses a high molecular mass fluid that has a boiling point much lower than water. Due to this characteristic of the process, common ORC



TWO WEST FRASER MILLS OPERATING WORLD'S LARGEST ORC BIOENERGY PROJECTS



Biomass is delivered to both thermal oil plants with large incline conveyors.

This page and inset photo courtesy of: Rod Albee

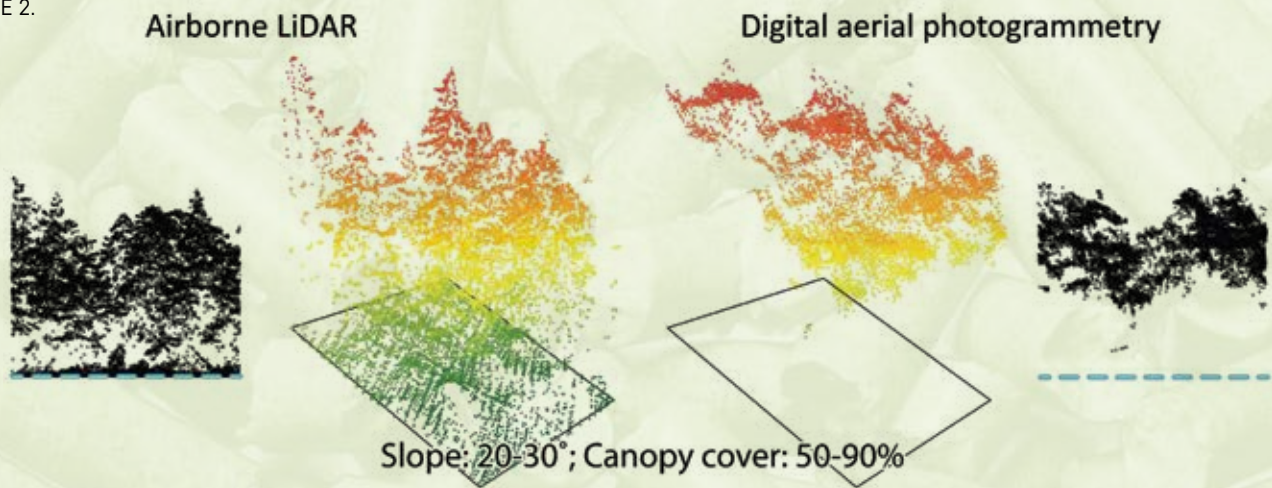
Characterizing Three-Dimensional Forest Structure From Digital Aerial Photogrammetry: A Competing or Complementary Technology to Airborne LiDAR?

The capability to acquire information characterizing three-dimensional (3D) forest vertical structure has revolutionized forest inventories (and operations). While airborne Light Detection and Ranging (LiDAR) data have been the primary source for this 3D information, there is growing interest from forest professionals in the use of high spatial resolution digital aerial photogrammetry (DAP)¹ to generate 3D information to support forest inventory and monitoring. Airborne imaging technologies and image processing software have advanced to the extent that it is now possible to generate canopy height models (CHMs) and 3D point clouds from digital airborne imagery that are similar, but not the same, as CHMs and point clouds generated from airborne LiDAR data (Figure 1). This interest in alternatives to LiDAR comes from a need to control costs, but also relates to the traditional role that aerial photography has played in forest inventory, the current technical capacity of forest companies and forest management agencies to work with LiDAR and related technologies, as well as current regulatory requirements.

Moreover, EFIs can provide an important and cost-saving bridge between strategic, tactical and operational forest information needs. LiDAR also provides an accurate characterization of the ground surface under forest canopy, enabling the generation of detailed digital elevation models (DEMs), which are a critical information source for forest operations (Figure 1). From an industry perspective, the cost savings associated with the use of a greatly improved DEM for road and block layout can be substantial, particularly when operating in areas with complex topography.

Although LiDAR and its application to forestry has been the subject of active research for more than three decades, the operationalization of the technology in Canada's forest sector is a more recent phenomenon.⁴ A new and emerging area of research is the generation and exploration of 3D information from airborne imagery,⁵ which has been enabled by recent advances in cameras and computing technology. Airborne digital cameras have improved substantially over time and have become more affordable, much the

FIGURE 2.



Airborne LiDAR data has become an important information source for enhanced forest inventories (EFIs),² providing accurate measurements of tree heights and detailed characterizations of forest vertical structure, which are then used in conjunction with quality field measurements in an area-based approach to model forest inventory attributes of interest such as height, basal area and volume.³ Although it is currently not possible to derive all required inventory attributes (e.g., species) from LiDAR data alone, LiDAR EFIs enable greater detail, accuracy and precision for a broad range of

same way that consumer-grade digital cameras have advanced. In addition, the algorithms that are used to generate the 3D information from digital air photos require a certain amount of image overlap to be successful, and it is much easier and cost-effective to acquire imagery with the required overlap using these new digital camera systems. Lastly, computing technology used for data processing has advanced dramatically in the past five years. As a result, it is becoming easier and cheaper to acquire and generate 3D information from digital airborne imagery.

1 Many terms are used to characterize these data including: image-based point clouds (IPC), SGM (one of more commonly used processing algorithms), and photogrammetric point clouds (PPC).

2 White, J. et al. 2013. A Best Practices Guide for Generating Forest Inventory Attributes From Airborne Laser Scanning Data Using an Area-Based Approach. BC Forest Professional, November – December 2013, p. 20.

3 Woods, M. 2013. Operational Implementation of LiDAR for Forest Inventory Purposes in Ontario. BC Forest Professional, January – February 2013, p. 14.

4 Frazer, G. et al. 2014. Operationalizing LiDAR – A User's Guide to Success. BC Forest Professional, March – April 2014, p. 20.

5 White, J. et al., 2013. The Utility of Image Based Point Clouds for Forest Inventory: A Comparison with Airborne Laser Scanning. *Forests*, 4(3): 518–536. <http://www.mdpi.com/1999-4907/4/3/518/>

ACRONYMS:

LiDAR: Light Detection and Ranging

DAP: digital aerial photogrammetry

3D: three dimensional

CHM: canopy height model

EFI: enhanced forest inventory

DEM: digital elevation model

FIGURE 1. A sample of a 1-m canopy height model (CHM) derived from LiDAR is shown on the left, while on the right is a hillshade of a 5-m digital elevation model (DEM) derived from LiDAR.

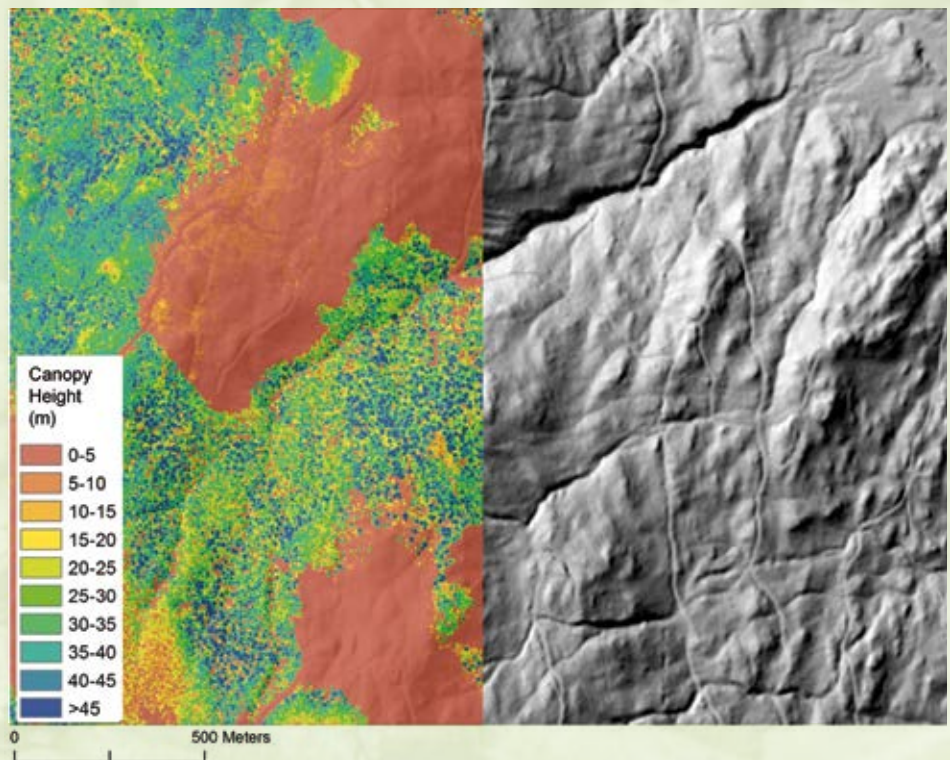


Diagram and model courtesy of Joanne White

Joanne White is a research scientist with the Canadian Forest Service (Pacific Forestry Centre, Victoria). Joanne has worked in the fields of remote sensing and GIS, in a forestry context, for more than 20 years and has been employed by private, provincial and federal forest agencies. Specializing in remote sensing applications in forestry, primarily with optical and LiDAR data, Joanne has co-authored more than 100 peer-reviewed scientific publications.

There have been numerous studies that have compared the use of LiDAR and DAP 3D information for estimating forest inventory attributes using an area-based approach. Initially, this research was conducted in even-aged, managed forest environments with few species. Recently, studies have been conducted in more complex forest environments, including studies in the boreal forest of Ontario⁶ and coastal forests on northern Vancouver Island.⁷ All of these studies have reached similar conclusions: LiDAR data provides more accurate forest inventory attribute estimates, but the differences between the estimates derived from the two data sources are small and often not statistically significant. Note that while LiDAR pulses can penetrate small openings in the forest canopy to characterize the vertical distribution of vegetation in the canopy, as well as the underlying terrain, the image-based information is limited to characterizing the outer canopy envelope (Figure 2). As such, the image-based information requires a high quality DEM to normalize the DAP CHM and point cloud to heights above ground. A DEM with sufficient spatial resolution and accuracy for this purpose is typically only possible from LiDAR data (particularly under dense forest canopy). Note that the studies indicated above have used a DEM from LiDAR to enable processing of the image-based information. Research studies have also documented important differences between LiDAR and DAP 3D information, including the lack of information provided by DAP on the vertical distribution of vegetation in the canopy, and differ-

ences in the way that DAP characterizes small canopy openings or gaps, which may have implications for studies of forest change.⁸

Digital aerial imagery currently costs about one-half to one-third that of LiDAR data. But as noted above, DAP 3D information does not provide the same accurate, detailed characterization of the ground surface as LiDAR data, and thus the substantial and rapid return on investment that is often associated with the use of a LiDAR DEM and CHM for forest operations is not realized to the same extent with DAP. Thus, a likely scenario for forest management would be an initial LiDAR acquisition, followed by subsequent acquisitions (at 5-year or other management-relevant intervals) of digital airborne imagery for inventory update purposes. The Ministry of Forests, Lands and Natural Resource Operations (FLNRO) is actively exploring the utility of 3D information generated from digital airborne imagery and assessing the accuracy of the derived CHM as a function of canopy density and ground sample distance (i.e., image resolution). The results of their work will ultimately define specifications for generating DAP CHMs.⁹ Such benchmarking in forest environments is key to ensuring transparency and reliability of these data products.

To conclude, investment decisions regarding 3D data sources for forest inventory and operations need to balance cost considerations against the full utility of the information derived for forest management. In this context, LiDAR and DAP should be considered as complementary and not competing technologies. ☘

6 Pitt, D. et al. 2014. A Comparison of Point Clouds Derived from Stereo Imagery and Airborne Laser Scanning for the Area-Based Estimation of Forest Inventory Attributes in Boreal Ontario. *Canadian Journal of Remote Sensing*, 40(3): 214–232.

7 White, J. et al. 2015 Comparing ALS and Image-Based Point Cloud Metrics and Modelled Forest Inventory Attributes in a Complex Coastal Forest Environment. *Forests*, 6(10): 3704–3732.

8 Vastaranta, M. et al. 2013. Airborne laser scanning and digital stereo imagery measures of forest structure: comparative results and implications to forest mapping and inventory update. *Canadian Journal of Remote Sensing*, 39(5): 382–395.

9 For more information, contact: Ann Morrison (ann.morrison@gov.bc.ca) at FAIB or Harald Steiner at GeoBC (harald.steiner@gov.bc.ca).

Along the Journey to Integrate Berry Management with Timber Production in BC

From direct seeding and bare-root stock to nursery grown seedlings nurtured with a perfectly balanced nutritional soup, we have come far in our ability to quickly regenerate a free-growing stand. On average, a stand will now reach crown closure earlier than it would have 20 years ago. By speeding up succession after logging, stands will be ready for a second harvest earlier and we increase the value of timber on the landbase. Unfortunately, speeding up succession gives berry producing plants such as black huckleberry (*Vaccinium membranaceum*) a much smaller window to produce abundant berries and provide food for wildlife. Although there are many delectable berry producing plant species in BC that also need a high light environment for substantial production, this article will focus on black huckleberry management because of its high popularity and wide distribution.

In addition to improved planting methods, the decrease in prescribed burning in BC is another factor that has limited the production of black huckleberry¹. Black huckleberry rhizomes can survive underground through a low severity fire and then resprout. Burning gives black huckleberry an advantage over other shrubs such as false azalea (*Menziesia ferruginea*) that don't grow back as quickly

Erica Lilles started working for the Ministry of Forests, Lands and Natural Resource Operations (Skeena Region) in August 2015 as a natural resource management researcher. Her background is in forest ecology and soils, which she uses to her advantage when searching for berry patches that are worth a detour.

after fire². In the absence of fire, black huckleberry can still produce berries in the right conditions given the higher light understories of old-growth forest or in the early successional environment after timber harvesting³. Production depends on the interaction of site and climatic factors – factors that may not coincide in any single year⁴. Research on the light requirements of black huckleberry production in the ICHmc² found that a patch reaches a maximum productivity between 60 and 70% light³, but the light requirement may differ among biogeoclimactic zones.

Although the gradual reduction of berry production across the landscape may not be noticeable for the casual berry picker, some

First Nations have expressed concern about this trend in their traditional territories. To address their concerns, NGOs, government and licensees are initiating projects on several scales to develop prescriptions for increased berry production. On the policy side, non-standard stocking standards are already permitted provided they do not “unduly reduce the timber supply,”⁵ and strategic documents are in progress to give more flexibility within the regulatory framework for non-timber resource management⁶. Options such as reduced stocking standards in order to manage for understory plants will be addressed. On an operational scale, some licensees are incorporating cluster planting and other silviculture strategies such as cluster planting into their site prescriptions. On a pilot project level, NGO, government and licensee collaborations also are implementing more prescribed burns.

Ecology and silviculture researchers have a long history of studying berry production requirements and suggesting silviculture treatments to maintain, enhance or create those conditions.^{1,3,7,8} Dr. Phil Burton, RPBio, one of those researchers, has identified that “the main challenge in British Columbia is to find berry management methods that are compatible with timber production³.” In 2016, with more pressure to manage for berries and more flexible policies on the way, there are more opportunities for forest professionals to integrate berry management into their practices. Where there are constraints on prescribed burning, steps can still be taken during planning and layout, harvesting, planting and silviculture follow-ups to manage for berry production. Effective strategies would limit damage to berry producing plants (e.g. by winter logging, avoiding herbicide use), reduce competition from planted trees or natural regeneration (e.g. by lowered stocking or planting gaps), and delay crown closure (e.g. by planting slower growing trees) or prevent crown closure (e.g. by brushing natural regeneration out of gaps). Starting with an appropriate and vigorous plant community with a high potential for berry production is a pre-requisite for any strategy. A well-considered rationale that includes the landscape and socio-economic context would also help promote berry management. The applicable measures (e.g., screening, road deactivation) to protect wildlife that may be attracted to the berry patches should also be in place.

Of many possible options, three different experimental silvi-

1 Mitchell, D. and T. Hobby. 2010. From rotations to revolutions: Non-timber forest products and the new world of forest management. BC J. Eco. Manag. 11(1&2):27–38. <http://jem.forrex.org/index.php/jem/article/view/58/22>

2 Hamilton, E.H. and L.D. Peterson. 2003. Response of vegetation to burning in a subalpine forest cutblock in central British Columbia: Otter Creek site. Res. Br., B.C. Min. For., Victoria, B.C. Res. Rep. 23. <http://www.for.gov.bc.ca/hfd/pubs/Docs/Rr/Rr23.htm>

3 Burton, P. 2006. Managing for wild berries. Pages 114 to 121 in W. Cocksedge, compiler. Incorporating Non-Timber Forest Products into Sustainable Forest Management: An Overview for Forest Managers. Centre for Non-Timber Resources, Royal Roads University, Victoria, B.C. <http://cle.royalroads.ca/files-cntr/Incorporating%20NTFPs.pdf>

4 Cocksedge, W. 2011. Managing for Non-Timber Forest Products (NTFPs) in the Burns Lake Community Forest. FSP Project Y11-3158 Executive Summary. https://www.for.gov.bc.ca/hfd/library/FIA/2011/FSP_Y113158.pdf

5 Forest Planning and Practices Regulation, Part II Forest Stewardship Plans

6 Type IV Silviculture Strategies and Integrated Silviculture Strategies (<https://www.for.gov.bc.ca/hfp/silstrat/index.htm>); Landscape-Level (Multi-Block) Reforestation Standards (https://www.for.gov.bc.ca/hfp/silviculture/multi_block/multi_block.htm); Forest Health Strategies with Climate Change adaptation elements (e.g., Forest Stewardship Action

Plan for Climate Change Adaptation 2012-2017: https://www.for.gov.bc.ca/ftp/HFP/external/publish/ClimateChange/Adaptation/MFLNR_CCAadaptation_Action_Plan_2012_final.pdf)

7 Burton, P., C. Burton and L. McCulloch. 2000. Exploring Options for the Management of Wild Berries in the Kispiox Forest District: Phase One of a Pilot Project Focusing on the Suskwa River Area. Report prepared for the B.C. Min. For., Kispiox Forest District, Hazelton, BC. http://sernbc.ca/pdf/Berry_Management/Options%20for%20Management%20of%20Wild%20Berries%20in%20KFD%20Final%20Report.pdf

8 Hobby, T. and M.E. Keefer. 2010. A black huckleberry case study in the Kootenay region of British Columbia. BC J. Eco. Manag. 11:52–61. <http://jem.forrex.org/index.php/jem/article/view/66/24>

9 Manning, Cooper and Associates. 2004. Silviculture Guidelines and Practices for Maintaining or Recruiting Key Habitat Objectives. B.C. Min. of Water, Land & Air Prot. Rep. Victoria, B.C. http://www.env.gov.bc.ca/fia/documents/mca_silvbmp.pdf

10 B.C. Ministry of Forests. 2000. Establishment to free growing guidebook. Prince Rupert Forest Region. Rev. ed., V. 2.2. For. Prac. Br., B.C. Min. For., Victoria, B.C. Forest Practices Code of British Columbia Guidebooks: <https://www.for.gov.bc.ca/tasb/legsregs/fpc/fpcguide/Guidetoc.htm>

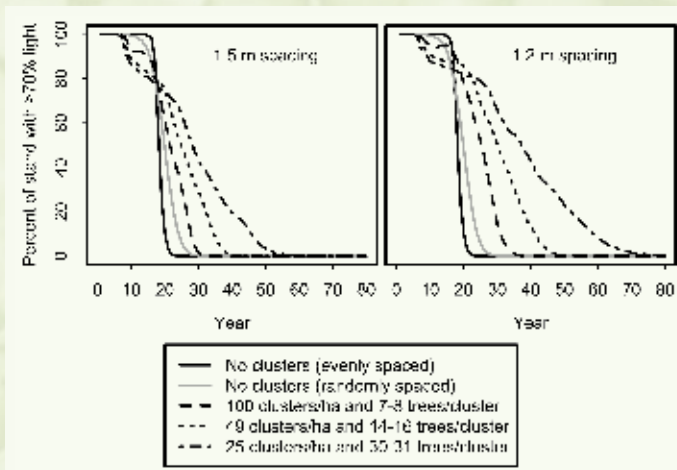


FIGURE 1. The percent area of a stand over time with understory light above 70% with different planting densities (stems per ha) of evenly spaced lodgepole pine and interior spruce. All lines were modeled using SORTIE-ND with parameter files for the SBSmc2 and based on achieving the listed approximate densities at free-growing of interior spruce.

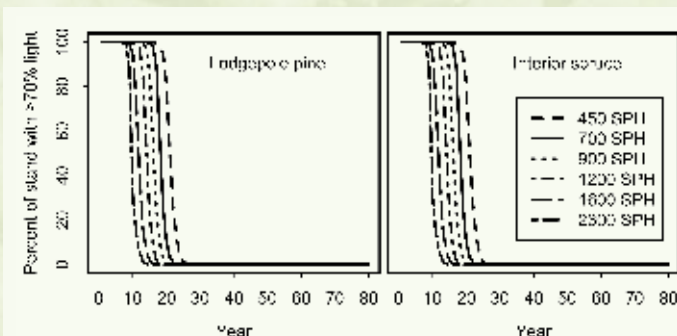


FIGURE 2. The percent area of a stand over time with understory light above 70% depending on different cluster planting prescriptions and at two different inter-tree spacing prescriptions. All lines were modeled using SORTIE-ND with parameter files for the SBSmc2 and based on achieving approximately 700 SPH at free-growing of interior spruce.

culture strategies to manage for berries are compared below. In the absence of tried and true strategies with years of follow-up data, modelling was used to predict the effect of different prescriptions on the light available for berry production over time.

Cluster planting:

Cluster planting is one reforestation technique that allows understory plants between clusters to have a longer period of abundance than they would under traditional even-spaced planting. Prescriptions for cluster planting include the number and size of clusters and the distance between clusters as well as the inter-tree spacing⁹. Stocking standards are often reduced in combination with cluster planting and more slowly growing tree species can be planted, but changes in stocking and species selection have a small effect on the light available for berries over time compared to implementing cluster planting (Figures 1 and 2). Light availability between the clusters will vary depending on the prescription,

with more light for berries in stands with fewer larger clusters and a closer inter-tree spacing (Figure 2). Cluster planting is a recognized best management practice¹⁰ and easy to incorporate into prescriptions and forest stewardship plans, but costs more than traditional planting and may involve brushing to control natural regeneration between clusters. The cost should decrease if cluster planting becomes more widespread and planting companies become more proficient. Amendments to the Interior and Coast Appraisal Manuals could be explored to offset the additional costs of cluster planting and brushing where those treatments are used to meet higher level objectives such as maintaining bear habitat.

Unplanted berry patches:

Current regulations also allow for another strategy that could create an abundant berry patch through a full rotation. Blocks are allowed to have up to 1 ha sized patches of not satisfactorily reforested area.¹¹ This allowance is sometimes needed to manage risk for blocks that are hard to regenerate, but for blocks with low risk, berry patches under 1 ha in size could purposely be left unplanted. Light availability for the understory would vary depending on patch size and orientation¹², but should remain higher for longer than it would between clusters after cluster planting. Succession in these areas would progress at a slower pace than in planted areas, extending the window for berry production. In the absence of natural regeneration or if natural regeneration was controlled with brushing, an unplanted berry patch could enhance berry production for a longer time period than cluster planting. This strategy is not a recognized best management practice such as cluster planting so it should be justified with a good rationale and follow-through plan (e.g. for monitored blocks in known grizzly bear habitat).

Berry wildlife tree patches:

Another strategy that fits within the current legislative framework is to strategically design wildlife tree patches to enhance existing berry producing plants. These retention patches would be located in hotspots for berry production quality and quantity and the patch edges would be oriented to maximize postharvest light infiltration to the understory. Ideally the original forest in each patch location would have had some natural gaps that contributed to the robust understory vegetation and would help boost the total light reaching the understory postharvest. A berry wildlife tree patch running east-west with a long edge on the south side would have a 5 m wide strip along the south edge which would receive at least 60-70% light (for a pine-spruce stand in the SBS with ~40 m²/ha basal area). Advantageously, the understory of a berry wildlife tree patch would receive less shock after logging compared to a fully cut-over site, which should bring the berry shrubs into production sooner.

Please see **Berry Management** continued on page 29

11. Forest planning and practices regulation, section 46.11

12. Coates, K.D., C.D. Canham, M. Beaudet, D.L. Sachs, and C. Messier. 2003. Use of a spatially explicit individual-tree model (SORTIE/BC) to explore the implications of patchiness in structurally complex forests. *For. Ecol. Manag.* 186:297-310.

FPIinnovations' Steep Slope Harvesting Initiative

Steep slopes are a major fibre pool in Western Canada. In fact, FPIinnovations' members are increasingly turning to steep slopes as a source of timber, representing a quarter of the annual allowable cut in British Columbia alone.

However, timber harvesting on steep terrain presents challenges around safety, costs, investment in equipment, regulatory compliance, environmental impacts, availability of skilled labour and planning. There is a strong need for increased research and development focused on new technologies and innovations for harvesting, trucking and road construction in steep slope environments.

In response to demand from its members, FPIinnovations is taking a lead role in finding solutions to the steep-slope challenges, by launching a new program called the Steep Slope Initiative. This five-year research and development plan is identifying and developing best practices and new harvesting technologies to provide the forest industry with safe, economic and sustainable solutions to access fibre located on steep slopes. The initiative is engaging forest industry members, equipment manufacturers and distributors, regulators and other stakeholders. Two committees, an industry-led steering committee and a manufacturer working group, were recently formed to help guide the initiative and facilitate knowledge transfer.

An important component of the Steep Slope Initiative is to identify and adapt new technologies that are emerging elsewhere to Canadian conditions.

in New Zealand to help reduce unacceptably high levels of worker injuries associated with hand falling. FPIinnovations and New Zealand's Future Forest Research (FFR), which leads the steep slope harvesting research in that country, enjoy an excellent relationship and have signed a Memorandum of Understanding (MOU), an information exchange benefiting both countries.

A key priority of this initiative is to deliver safe and effective steep slope operating solutions that will get workers off hazardous hillsides and into the protected cabs of equipment. With the financial support of WorkSafeBC, work is being done by FPIinnovations and its research partners to identify best practices and knowledge gaps or areas requiring improved operating methods to ensure maximum safety and efficiency.

During the five-year Steep Slope Initiative, targeted communication efforts will be undertaken to ensure all stakeholders are kept informed and engaged. The initiative will provide resources such as workshops, best practices manuals and demonstrations, in support of the safe implementation of new technologies. Collaboration is a big part of the initiative, and FPIinnovations is working with several stakeholders both domestically and internationally, such as New Zealand's FFR and Scion, as well as many equipment manufacturers including Ponsse, John Deere, Caterpillar, Tigercat and T-MarIndustries.

The first activities conducted under the initiative included the development of a five-year road map, formation of industry and manufacturing working groups, completing tilt-table tests of static machine stability of feller-bunchers, a tour of steep slope operations in Europe, two workshops and the first exploratory field studies of novel technologies operating on steep terrain. The information dissemination seems to be paying off as there are now eight winch-assist machines operating in BC, with 11 more planned to start in the coming months.

A number of harvesting, road construction and trucking projects will form part of the Steep Slope Initiative in 2016 – 2017, including assessments of new winch-assisted equipment, an international technology watch, improved road construction techniques, better truck configurations and enhanced communication on steep slope research. Monitoring the environmental impacts of harvesting on steep terrain is also planned. FPIinnovations will play a key role in developing best practices, and collaborating on the science to support the development of new standards for mechanized harvesting on steep ground. ❁

Jennifer Ellson is a senior communications specialist for FPIinnovations. She has held various editorial positions in the forest industry trade magazines Pulp & Paper Canada and RISI, as well as the Financial Times, Forbes Asia and Newsweek. Jennifer has a degree in communications and journalism from Concordia University in Montreal

An important component of the Steep Slope Initiative is to identify and adapt new technologies that are emerging elsewhere to Canadian conditions. For example, winch-assisted systems, where ground-based machines are tethered to anchors using cables to aid in their stability, are now being used safely and productively in several countries. Of special interest to the initiative are several mechanized harvesting technologies that have been developed





FPIinnovations' Steep Slope Harvesting Initiative:
Improving workers' safety, increasing operating
margins, and accessing economically and
sustainably available fibre

A Tigercat 635D skidder on steep terrain in BC. An important component of the Steep Slope Initiative is to identify and adapt new technologies that are emerging elsewhere to Canadian conditions.

Photo Courtesy of Jennifer Olson, FPIinnovations

Land-Application of Bioenergy Ashes at the Aleza Lake Research Forest

In the last decade, efficient bioenergy systems have become more prevalent in Canada to generate heat and electricity for industries, institutions and municipalities. For example, at the University of Northern British Columbia (UNBC), the Nexterra gasifier, operational since 2010, combusts clean woody sawmill waste and thereby offsets over 85% of the natural gas used to provide heat at its Prince George campus. Boilers, using wood waste as fuel, are common at many pulp and paper plants in Canada and have been used for many years.

However, although bioenergy systems are generally considered green and environmentally sustainable, they generate substantial quantities of wood ash. Such industrial wood ashes have historically been treated as waste in British Columbia and the standard practice has long been to bury them in landfills or when possible, as concrete additives. However these past practices need to change; they are neither desirable nor environmentally sustainable as many of the nutrients (e.g. calcium, potassium, magnesium and phosphorus), originally contained in the growing biomass, are thereby concentrated in the ash and not returned to the biosphere or forest ecosystems. Further, landfilling ash is being progressively phased out as many government agencies are becoming less willing to authorize permits for this purpose.

We are currently researching the use of wood ash produced from bio-energy systems as a soil amendment for agricultural and forest lands in central British Columbia. This practice is not commonly used in BC or western Canada, but more often deployed in northern Europe and other regions of North America. As wood ash is alkaline, its application can raise the pH of acid soils and enhance the availability of some nutrients. Clean

wood ash contains several macronutrients and micronutrients and can be considered to be a dilute fertilizer. The international literature cites examples where tree growth and agricultural crop yield has been enhanced following ash addition to some soils. Enhanced tree growth is not always the major goal of ash application; for example, ash application to forested ecosystems in parts of northern Europe has been used to offset the long-term effects of acid rain on watersheds.

Users of wood ash as a soil amendment in British Columbia must be cognizant of its chemical composition and applicable

Please see **Wood Ash** continued on page 30



Photo Courtesy of Michael Rutherford

Dr. Michael Rutherford (michael.rutherford@unbc.ca) is a faculty member within the Environmental Science Program at UNBC. He is a soil scientist with research interests in residuals management, reclamation and remediation.

Dr. Hugues Massicotte (hugues.massicotte@unbc.ca) has been a faculty member at UNBC since 1994 and is a Registered Forest Engineer (Ing. F., Québec) since 1983. He is a forest biologist with research interests in plant anatomy, mycology, root biology and soils.

Colin Chisholm (colin.chisholm@unbc.ca), RPF, and a UNBC M.Sc. Candidate, is the assistant forest manager with the Aleza Lake Research Forest. Colin supervises many aspects of ALRF forest operations and silviculture, and forest planning, and helps facilitate field research projects at the ALRF. His areas of special interest include photography, remote sensing, and soil sciences.

Mike Jull (michael.jull@unbc.ca), RPF, is the manager of the UNBC Aleza Lake Research Forest (<http://alrf.unbc.ca/>) near Prince George, BC. Mike has over 30 years of experience in operational forest management and silvicultural research throughout the BC Interior.

FOREST AND RANGE EVALUATION PROGRAM (FREP) –

Three Perspectives on 10 Years of Monitoring Data

FREP monitors the effectiveness of forest and range practices

in achieving the province's objectives for sustainable resource management under the *Forest and Range Practices Act*. Monitoring started in 2005 and with over 9,000 samples gathered and 71 reports released; the data has a lot to say. This article highlights a few examples of how resource districts, forest licensees and the Victoria FREP team are using FREP data. Three perspectives on collecting, using and communicating this data come from Sean Muise, RPF from Haida Gwaii Natural Resource District, Jill West, RPF on behalf of Taan Forest and Nancy Densmore from the Victoria FREP team.

Sean: For the last 10 years, we've been conducting effectiveness evaluations for resource values including riparian areas, stand-level biodiversity, water quality, cultural heritage and visual quality. Since 2007, we have monitored various Haida Gwaii ecosystems jointly with stewardship technicians from the Council of the Haida Nation (CHN). Our core team has annual training and quality assurance and it's our responsibility to ensure high quality data is collected to support provincial and local sustainable resource management initiatives. Together, we meet provincial sampling targets and Haida effectiveness monitoring goals. The FREP results are instrumental in operational discussions with licensees and development of local policy like the district manager's Expectations for Managing Visual Resources on Haida Gwaii. Haida Gwaii statutory decision makers from the province and the Haida Nation depend on FREP data for Forest Stewardship Plan determinations and Land Use Objective Order development. To inform future plans and practices we are moving forward with an integrated monitoring approach that includes other natural resource-based organizations and has increased licensee involvement in data collection and data use. So far we've forged local monitoring partnerships with Taan Forest, BC Timber Sales (BCTS), BC Parks and Parks Canada.

Jill: Taan Forest is owned by the Haida Nation under the Haida Enterprise Corporation (HaiCo). I've been working with Taan since 2010 to achieve and maintain the company's Forest Stewardship Council® (FSC®) certification. Certification is central in meeting the company's environmental, social and economic goals. FSC has in-depth monitoring requirements, in particular to assess the effectiveness of practices in protecting or conserving specific values, like biodiversity and High Conservation Value Forests. The FREP data is integral to Taan's annual monitoring plan and has helped us meet FSC requirements. To best understand the protocols and outcomes, Taan staff have gone out with the Haida Gwaii FREP team as field assistants. It's easy to obtain the FREP data specific to Taan's operations. Each year in early spring, I send an e-mail request to Nancy for the monitoring results and, when it's ready, she sends me the data via Microsoft Excel spreadsheets. Taan has been in operation for five years on Haida Gwaii and the monitoring results are valuable to establish a baseline and guide necessary changes to future operational plans and practices.

Nancy: Sean and Jill give a few examples of how FREP data can be used for continuous improvement of BC's forest and range practices and policies. Road management training is another example, using FREP baseline data in combination with water quality effectiveness evaluation tools to enhance licensee performance. These training sessions were jointly developed by Dave Maloney and Brian Carson (FREP water quality), with Clayton Gillies (FPInnovations). The training teaches evaluation of stream crossings and the means to control sediment and improve water quality. Other work in Skeena Stikine Natural Resource District has increased understanding and cooperation in the management of cultural heritage resources. Todd Bresser, stewardship forester has brought together government, First Nations and licensees to assess and better understand techniques to minimize harvest impacts on cultural heritage resource values and features. Lake Babine, Gitksan and Wet'suwet'en First Nations and BCTS, West Fraser Mills, Canfor and Wet'zin'kwa Community Forest in Skeena Stikine are now working together to improve harvest plans and outcomes near culturally modified trees, cultural depressions (e.g., cache pits), trails and other cultural heritage features.

Ultimately, communication (and lots of it) is important to inform professionals about monitoring outcomes and what they say about forest and range practices; what is working well and what could be improved. Forest and range licensees can get involved at many levels. The first step is to go to our website and join the FREP e-mail distribution list to receive new FREP publications <https://www.for.gov.bc.ca/hfp/frep/feedback/contacts.htm>. To better understand monitoring protocols, licensees and First Nations are welcome to attend FREP training and participate in data collection. Contact your local district to set that up. To get a sense of provincial-scale results, look to the most recent Assistant Deputy Minister Stewardship



Nancy Densmore, RPF, lives in Victoria and works for the Resource Practices Branch of the Ministry of Forests, Lands and Natural Resource Operations in the Forest and Range Evaluation Program. She is team lead for the biodiversity value and works in data analysis, program management, policy and guidance.

report on the FREP website, and for local results look to the Multiple Resource Value Assessment (MRVA) reports, also on the website. Finally, and most pertinent to an individual licensee, please ask me (Nancy.Densmore@gov.bc.ca 250.356.5890) for monitoring results relevant to your operations (cutblocks and roads). I have prepared datasets for a number of licensees that have helped them identify successes and potential opportunities to improve practices within their operating areas. ☘

Pursuing Public Trust

In this final article in our series on public trust, we'll look at the next steps with public trust: How do we maximize opportunities for improvement? Public trust must be the most important item on our agendas. We practise professional forestry and provide insight on appropriate forest stewardship decisions for our employer, and our credibility as forest professionals is imbedded in the expectation that our practice and stewardship insight is applied within the public interest. That is to say, our employment obligations related to professional practice and our public interest obligations are part of the same requirements.

In our first article (What Is Public Trust?) we examined the definition of public trust, the expectation of a public duty, and how forest professionals stack up against other natural resource professionals on a survey that measures how much the public trusts us.

In the second article (Do We Have the Public's Trust?) we looked at whether we are trusted as professionals by the public and how we can monitor that trust. We discussed the fact that the behaviour of a few rogue members can have a detrimental effect on the profession as a whole.

In the third article (How Does the ABCFP Achieve the Public's Trust?) we looked at the work being done by the ABCFP on behalf of the profession as a whole. Two of the key attributes are being transparent and providing a balanced view on forestry matters.

Today, the public hears a lot about uncertainty in the forest. Fires, insect infestations, damaged trees, water supply issues, floods, and more have put pressure on the forest ecosystem. In turn, there is increasing pressure on the forest professional to find solutions and meet the broadening appetite of the public for homes in the urban/forest interface, recreation experiences for families, a place of employment, products and pipelines. The public, mostly centered in urban settings, has expectations that the professional can protect the fragile forest and continue to provide the expected benefits.

The promise of public trust has never had so great a challenge. The profession, the professionals and our partners are meeting this challenge by pursuing public trust, including strengthening the team approach in the management of forest land, exercising independence in professional practice, facilitating consultation with stakeholders and others. How do we change the pressure of expectation and prospect of instability into a goal of maximizing the interest in a public resource? The answer is with communication.

First, anything that encourages the public to talk about the forest resource in BC is great! And we, as forest professionals, can do a lot

to maintain that interest. Little things you do make a big difference. Such as, being available for a public meeting; making the time to talk to that outspoken person; or reaching out to a special interest group can put you and the profession in a good light. Even when people disagree with you, they will respect that you took the time to talk to them and listen to their concerns.

When you are open to communicating, the public will begin to trust you. They know you are the professional with on-the-ground knowledge and the ability to apply that knowledge in a way that derives benefits for the province. We recommend that you touch base with as many segments of the public as possible — and not just the squeaky wheels — when activities impact them.

As the primary forest land manager, forest professionals often encounter outspoken members of the public. In these situations we must work harder and show respect to achieve a useful and practical outcome. You can't go into a conversation with the public with guns blazing and then expect to get good results.

Most of us think we're only professionals involved with the hard science of forest management but really we're also social science 'bridge builders.' We have to bridge the divide between segments of society and various uses, between our employers and others, and between the public and the forest. Not only do we have an obligation to listen to what the public says and ask questions, but we have just as strong an obligation to bring that information back to our employers either directly as feedback or indirectly in our professional opinions and recommendations. Employer interest and public interest are joined together.

Having a good connection with the public and touching base with them regularly in order to keep the dialogue going is an important continuous step. An open and regular dialogue with the public will help you anticipate problems that may be on the horizon. You'll be able to adapt your work in the early stages and alert yourself and others to aspects of forest management that require work.

The good news is that many of you already do this under various means such as FSP obligations and voluntary certification standards. If you are already engaged and making the effort, it's worth it to make sure you are being as effective as possible. Check out the list of tools in our second article (Do We Have the Public's Trust?)

Public trust occurs when people trust you regardless of the type of message you are bringing. Being a trustworthy forest professional will serve you well wherever and however you practise throughout your career. 🌲



Photo: Lukasz - Fotolia

Improving Safety Related to Road Construction Landslides

Accessing timber through resource road construction is a common activity throughout British Columbia. In order to ensure roads are constructed to a suitable standard, the province relies on qualified professionals, licensee accountability and compliance, and enforcement.

Under the *Forest Planning and Practices Regulation*, the legal requirement is for a person who constructs a road to ensure the road, and other structures associated with the road, are structurally sound and safe for use. In order to aid forest professionals in achieving this requirement, standards of engineering and construction, legislation and professional guidelines have been developed. Despite this fact, we still see landslides being reported both during and post road construction activities throughout the province.

According to recently collected data, there have been 26 construction initiated slides on the coast over the last three years, ranging in severity. Nine of these incidents involved an excavator sliding down slope from the road prism during road construction activities.



Significant construction initiated slide event on BC's coast involving road construction on a moderate to moderately steep slope through a wet draw containing organics over compact sandy-clay soils.

Photo Courtesy of: Dustin Meierhofer

from licensees, timberland owners, contractors (Truck Loggers Association) and the United Steelworkers.

My fellow members of the CISWG are Mike McCulley, RFT, BC Timber Sales; Jack Reynolds, RPF, Western Forest Products; Robert Shelley, RPF, Interfor; Tom Jackson, RFT, Ministry of Forests, Lands and Natural Resource Operations (FLNRO); Gino Fournier, RPF, PEng, FLNRO; Clayton Gillies, RPF, RPBio, FPInnovations; Del Ferguson, PGeo, Aztec Geoscience; and Mark Ponting, Ponting Logging.

Our focus as a group is on developing initiatives that support the elimination of slide-related incidents during road construction activities, with an early geographic focus on the BC coast, and sharing learnings with any interested parties throughout the province. We have developed a short to medium term strategy to address quick wins that will have an immediate impact, as well as a longer term strategy to sustain improvement.

One of the first things we did was investigate, collect and analyze data related to construction initiated slides (CIS) over the past several years. We also reviewed training methods and resources related to CIS for both road crews and professionals, and we continue to explore new ways to identify sensitive zones and options for monitoring and enforcement of road construction standards. In concert with these initiatives, key communications have been developed aimed at building increased awareness and better understanding among professionals and road construction crews about the issue.

Slide Costs are Significant

In looking at slide costs there is a range of potential outcomes; anything from a short interruption in operations to an indefinite shut down of the road construction project and the potential abandonment of timber being accessed for future harvest.

A full shutdown of road construction for five days can cost a company well over half a million dollars, after accounting for personal injury, equipment recovery, loss or damage, administrative measures, site remediation, crew transfer, lost production and other associated costs.

In addition to these direct costs, CIS events can have far-reaching impacts including the potential personal and social costs to workers and their families. All these factors point to the need for industry members to continue to ensure the tools, resources and processes are in place to avoid construction initiated slide incidents. Members of the CISWG are committed to aid in this endeavour. ☘

Dustin Meierhofer, RPF, is director of transportation safety at the BC Forest Safety Council and a member of numerous industry working groups committed to improving safety and efficiency. Dustin is a Registered Forest Professional and has more than 20 years' experience as operations forester within the province of BC.

These incidents have been very serious in nature with considerable human, environmental and operational costs, and consequences.

Over the past several decades or more, a number of groups, some including forest professionals, have explored and developed partial solutions to the issue. To date, however, there has not been a united front across the industry to address the breadth of the challenge.

Construction Initiated Slides Working Group

On October 7, 2014, an informal group of industry, government and consulting practitioners met to explore the issue. The meeting was sponsored by BC Timber Sales (BCTS). One of the actions stemming from the meeting was the formation of a safety working group, the Construction Initiated Slides Working Group (CISWG). This group is supported by the Coast Harvesting Advisory Group (CHAG) which was formed in 2012 when the CEOs of TimberWest, Island Timberlands, Western Forest Products, Interfor and the executive director of BCTS decided to establish a task force to focus on the reduction of fatalities and serious injuries associated with the various phases of logging on the BC coast. CHAG includes representatives



In Memoriam

It is very important to many members to receive word of the passing of a colleague. Members have the opportunity to publish their memories by sending photos and obituaries to editor@abcfp.ca. The association sends condolences to the family and friends of the following members:

Eric Windover Robinson

RPF #40

July 27, 1921 – October 1, 2015

It is with sadness that we report the passing of another elder forester and past Association president, Eric W. Robinson, who served on council in 1960, becoming president in 1962. Eric was a leader and mentor and a good friend to many in the forestry community.

Eric was born in Armstrong on July 27, 1921 and died in Vernon on October 1, 2015. He grew up in Britannia Beach where his father worked for Britannia Mining and Smelting Co. After formal schooling Eric began university in 1939 and graduated from UBC with bachelor degree in Commerce (1943) and Forestry (1944). He played basketball and soft ball in his younger days and later became an avid curler and golfer.

His forestry work began on Vancouver Island at Franklin River Camp B in 1942, working on a logging railway track gang and as a skidder chokerman with Bloedel Stewart and Welch and in 1943 he did forest regeneration studies there with MacMillan and Bloedel. During this period he met George Silburn of the BC Forest Service doing similar work in the area. The work impressed him so much he asked George for a job. George helped him contact FS McKinnon in-charge of the Forest Economic Division and Eric joined that in Victoria in September 1944, thus beginning his 35 year career with the BC Forest Service.

In 1945 he went to Kamloops to work in silviculture. While there he met Barbara Harris. They were married in the Anglican Church at Armstrong on August 22, 1947. Of all his accomplishments he later would say that marrying Barb was the most important thing he ever did.

He went to the Prince George Forest District in 1947 to work in forest management. He returned to Kamloops in 1952 to be involved with timber management, cruising, appraisals and timber sale contracts. Then in 1956 he went to Nelson where as assistant district forester his focus was forest fire protection.

He was made head of the Ranger School located at Green Timbers in Surrey in 1959. This facility was later renamed the Forest Service Training School. It was while spending eight years at the training school that Eric committed to memory the



hundreds of BC Forests Service personnel that attended.

In 1967, during the expansion of provincial reforestation, he was put in charge of the Reforestation Division in Victoria. In 1972 he went to Williams Lake to head up the newly created Forest District there. He retired in 1979 at Williams Lake.

Throughout his career, Eric and Barb made and kept contact with their many friends. Eric especially knew many foresters and their families from the training school days. He had a special skill that brought out the best in people. Of all the great chiefs he was one of the best.

Predeceased by his wife Barbara (April 2015); he leaves his daughters Kathy (Dennis) Cotter and Jean (Mike) Haug; granddaughters Shelly (Tyler) Cull, Janice (Ger) Larson,

Corinne (Mike) Litchfield, and Karin Haug; and great grand children Karlee, Hailey, MacKenzie, and Tanner; and niece Lynda (Brian) Jones and nephew Colin Robinson.

A private family interment will be held in the spring of 2016.

Those wishing to do so may make a memorial donation in Eric's name to the North Okanagan Hospice Society, 3506 – 27th Avenue, Vernon, BC V1T 1S4.

*Prepared by Jean, Mike and Karin Haug and
Bruce Devitt, RPF (Ret.) Life Member*

Jack Bakewell

RPF #314 (Retired) PEng (Retired)

October 8, 1927 – October 23, 2015

John (Jack) Malcolm Bakewell was born in Ocean Falls on October 8, 1927 and grew up in Gibsons and Kitsilano – a true British Columbian. Jack passed away on October 23, 2015, having spent a highly variable and wide ranging career in forestry, both in British Columbia and in the many parts of the world where his interests and career opportunities took him.

Jack spent his early years (1945 – 1953) employed in consulting, logging and construction companies as a compass man and instrument man, on timber cruising, scaling and as a boom man. He attended the University of Washington and graduated with a Bachelor of Science in Forestry (Logging Engineering) in 1954.

Jack spent his first year after graduating as the Camp Engineer of Anglo Canadian Timber Products Ltd. on layout and construction, moving on in 1955 as project manager for T & H Engineering and Forestry, in charge of forest inventories, management plans and logging engineering. The next step was as superintendent of Saltspring Contracting, supervising the clearing and logging of the BC Hydro's Clowhom Reservoir before a spell as chief forester of Peace River Forest Industries which included developing their annual wood supply. For a two year period, Jack was consulting forester for the BC Supreme Court, an appointment regarding logging and milling practices on disputed properties and contracts.

In the early 1960's, Jack was western manager for McGill & Gibbs Co., a position that included procuring some 20,000 poles for their Interior and Coastal operations. He then spent a short time as timber manager for the Mayo Lumber Company before moving to Reid Collins & Associates, engaged in road location and construction in the Interior. Moving again, Jack became a partner in Cranbrook Construction Ltd. on heavy construction projects for BC Hydro and CPR. For a couple of years, Jack was engaged in Environmental Impact Studies on the Mackenzie Highway in the Northwest Territories for F.F. Slaney & Company and before moving back to Reid Collins and Associates. He spent some time with C.D. Schultz and Company on engineering and forestry projects in the Middle East and South America.

During his time with Reid Collins, Jack was involved in feasibility studies for forest development projects in BC, on the potential forestry impacts of proposed Revelstoke Hydro development as well as on the design of a Folio Impact Procedure for BC Hydro rights-of-way.

From the late 1970s, Jack was a consulting forester and engineer, consulting to a wide range of organizations including Westcoast Energy, BC Hydro, Royal Bank of Canada, Allice Arm Timber Ltd., Pitt Timber Ltd., MacGillis & Gibbs, the federal government (Department of Indian and Northern Affairs), and



the Ministry of Forests and Lands where he was commissioned to study the woodlot tenure system, at which time he authored the report "The Woodlot Study." Other work involved pipeline location, inventory and valuation of forest cover on crown lands.

Jack was a person of strong opinions and at times, of a forceful nature. When he spoke of his memories of meetings with politicians, he could be quite hilarious and this was frequently seen in his letters and papers, translated into sketches in the form of 'stick men.' More often, he expressed his frustration at politicians and company executives directly through the mail, and his filing system of letters, newspaper cuttings and communications was legendary. Among his many social involvements, he spent some time as councillor in Terrace. Many of his memories were used in compilation of his book and can be found in "TNT:BC," the book he published in 1995. He maintained a meticulous record of his lobbying and communications with all levels of government, company executives, newspaper editors, and the like.

Jack was an avid fisherman and hunter, and in times past, took his children with him camping and on other outdoor activities. In his 'retirement' he worked with a number of other 'retired' professional foresters, giving freely of his time to promote safety issues in forestry, support for the woodlot sector and used his experience to support many facets of forestry here in BC, and elsewhere.

Jack was predeceased by his first wife, Marion, and then by Liz, his second wife, and his brother David (RPF #148), and survived by his sister Irene, children Dean, Robert, Cheryl and Greg and nine grandchildren. He is sorely missed by his friends and for his outspoken manner on political and forestry issues.

Submitted by Karen Waldie

Membership Statistics: ABCFP — December 2015

NEW REGISTERED MEMBERS

Tyrol Craig Forfar, RFT

NEW ENROLLED MEMBERS

Robert Frederick Pallister Brittain, FIT
Jillian Patricia MacDonald, FIT
Graeme Joseph Michener, TFT
Ian Donald Petersen, FIT
Sam Mackenzie Powell, TFT
Lauren Brittany Shinnimin, FIT
Jeremy Richard Siewert, FIT
Darren Phillip John Stanislaus, TFT
Tristan William Tyler, FIT
Troy Joseph Van Skiver, RFT, FIT

TRANSFER FROM FIT TO TFT

Joel Thomas McLay, TFT

REINSTATEMENTS (REGISTERED MEMBERS)

Jeremy Alan Beal, RPF
A. Brian Bustard, RPF

REINSTATEMENTS FROM LOA (REGISTERED MEMBERS)

Kenneth Matthew Anderson, RPF
Alison J. Burns, RPF
Jennifer May Catherall, RPF
Monika Fern Eriksen, RPF
Amanda Elizabeth Fouty, RPF
Krysta Giles-Hansen, RPF
Janna Lynne Jessee, RPF
Roger M. Marshall, RPF
Ayrilee Palm McCoubrey, RPF
Grant G.L. Parnell, RPF
Greg L. Rawling, RPF
Melanie Mahrusa Sherstobitoff, RPF
Timothy Adam Singer, RFT
Kristin Anne Storry, RPF
Paul James Toovey, RPF
Marc Paul Trudeau, RFT
Virginia Clare Vincent, RPF
Lia Catherine Wallace, RPF

REINSTATEMENTS FROM LOA (ENROLLED MEMBERS)

Alireza Araghi-Rahi, FIT
Sean David Nomme Pledger, FIT

REINSTATEMENTS - COMPULSORY (REGISTERED MEMBERS)

Pieter J. Bekker, RPF
John (Jackie) Victor Brown, RFT
George Dennis Buis, RFT

Suzanne Cairns, RPF
Adam Clynel Cooke, RFT
Hongyun Dong, RPF
Craig E. Dorion, RPF
Bradley John Eckford, RPF
Patrick George Ellis, RFT, ATE
Fred R. Elsaesser, RPF
Elizabeth Mary Grilo, RPF
Dennis Arthur Heigh, RFT
Stephen C. Hewitt, RPF
Gregory P. Johnston, RPF
James Ryan Jordan, RPF
Robert John Kendall, RPF
Steve Kozlowski, RPF
Denis Grant Marleau, RFT
William Douglas Merrie, RFT
Patrick Milton Sproule, RFT
D. Craig Donald Sutherland, RPF
Glen Eric Swanson, RPF
Deepa R. Tolia, RPF
Wade James Watson, RPF

REINSTATEMENTS - COMPULSORY (ENROLLED MEMBERS)

Betsy Cranmer, FIT
Candace Paige Dow, TFT

DECEASED

John G.Y. Murray, RPF(Ret)
W. Frederick Waldie, RPF(Ret)

**The following people are not entitled to
practise professional forestry in BC:**

NEW RETIRED MEMBERS

Timothy D. Baines, RPF(Ret)
D. Alan Barclay, RPF(Ret)
Rod D. Baumbach, RPF(Ret)
William H. Beard, RPF(Ret)
Dennis F. Bendickson, RPF(Ret)
Harry Adam Cameron, RFT(Ret)
Barbara J. Coupe, RPF(Ret)
Stephen W. Dodds, RPF(Ret)
T. Stuart Ellis, RPF(Ret)
Michael A. Fenger, RPF(Ret)
Jo Ellen Floer, RPF(Ret)
Cindy L. Fox, RPF(Ret)
Cynthia L. Gibson Robertson, RPF(Ret)
Mark D. Gillis, RPF(Ret)
Harjit Grewal, RPF(Ret)
Patrick D. Hughes, RPF(Ret)
Igor Franc Humar, RPF(Ret)

John A. Kelvin, RPF(Ret)
Nicholas Jacob Kleyn, RFT(Ret)
Paul J. Klotz, Jr., RPF(Ret)
Peter J. Kofoed, RPF(Ret)
James William Ladds, RPF(Ret)
Dan Motisca, RPF(Ret)
Timothy L. Napier, RPF(Ret)
Alexander Roy Norquay, RFT(Ret)
Candace E.B. Parsons, RPF(Ret)
Bernie E. Peschke, RPF(Ret)
John Paul Pezel, RFT(Ret)
Joanne D. Pickford, RPF(Ret)
Thomas D. Quirk, RPF(Ret)
Thomas Charles Rankin, RPF(Ret)
Dan R.S. Rollert, RPF(Ret)
Brent J. Sauder, RPF(Ret)
Raymond A. Savola, RPF(Ret)
Alan P. Shaw, RPF(Ret)
George J. Silvestrini, RPF(Ret)
James H. Stephenson, RPF(Ret)
Barry L. Trenholm, RPF(Ret)
Bruce P. W. Ward, RPF(Ret)
Frederick E. Waterer, RPF(Ret)
J. Brian Zak, RPF(Ret)

LEAVE OF ABSENCE (REGISTERED MEMBERS)

Paul M. Albu, RPF(on LOA)
Drew Marshall Alway, RPF(on LOA)
Gino Amato, RFT, ATC (on LOA)
Wade Russel Anderson, RPF(on LOA)
Michael Scott Aspeslet, RFT(on LOA)
David Christopher Banham, RFT(on LOA)
Anthony Drani Baru, RPF(on LOA)
John Bastone, RPF(on LOA)
Joyce A. Beaudry, RPF(on LOA)
Amy Michelle Beetham, RPF(on LOA)
Shane L. Berg, RPF(on LOA)
Sandi L. Best, RPF(on LOA)
James Fulton Blake, RPF(on LOA)
Katherine P. Bleiker, PhD, RPF(on LOA)
A. Paul Blueschke, RPF(on LOA)
Karl J.F. Branch, RPF(on LOA)
Douglas R. Braybrook, RPF(on LOA)
Susann Melissa Brown, RPF(on LOA)
Brian P. Broznitsky, RPF(on LOA)
David Wallace Bryant, RPF(on LOA)
Peter E.F. Buck, RPF(on LOA)
Rene Jacques Hermus Buys, RPF(on LOA)
R. Bruce Catton, RPF(on LOA)
Ken Chalmers, RPF(on LOA)
Steven Charles Chambers, RPF(on LOA)
Stephen John Chaplin, RFT(on LOA)

Marley Dana Chewter, RPF(on LOA)
 Jayme Louise Cloet, RPF(on LOA)
 Christel-Lynne Alice Culberson, RFT(on LOA)
 James Newton DeCoffe, RFT(on LOA)
 Kerry C.A. Deschamps, RPF(on LOA)
 Terence Russell Dodge, RPF(on LOA)
 Peter Dodic, RPF(on LOA)
 Krista Anne Dunleavy, RFT(on LOA)
 Leonard B. Eddy, RPF(on LOA)
 Stephen J. Edwards, RPF(on LOA)
 Craig E. Farnden, RPF(on LOA)
 Colette P. Fauchon, RFT(on LOA)
 Scott A. Folk, RPF(on LOA)
 Anne Marie Emily Fonda, RFT(on LOA)
 H. Signy Fredrickson, RPF(on LOA)
 James Kirkman Garbutt, RFT(on LOA)
 Rena Mary Gibson-Protzner, RFT(on LOA)
 Mark Timothy Gillis, RPF(on LOA)
 Donald A. Gosnell, RPF(on LOA)
 Stacey H. Gould, RPF(on LOA)
 Vicky V. Grainger, RPF(on LOA)
 Mark D. Greene, RPF(on LOA)
 Michael Eric Hak, RPF(on LOA)
 L.R. Mark Hall, RPF(on LOA)
 Dawna L. Harden, RPF(on LOA)
 Barbara Aline Harrison, RFT(on LOA)
 Kylie Maria Harrison, RPF(on LOA)
 Frank Peter Heller, RFT(on LOA)
 Sharon Anne Henderson, RFT(on LOA)
 J. Russell Hendry, RPF(on LOA)
 Roderick Lloyd Hillyard, RPF(on LOA)
 William P. Horbal, RFT(on LOA)
 Christie Marie Hoy, RPF(on LOA)
 Graham J. Hues, RPF(on LOA)
 Erin Naomi Hunter, RPF(on LOA)
 Jennifer Lynn Hutt, RFT(on LOA)
 Cara Helena Pauline Illerbrun, RPF(on LOA)
 Kurtis Randolph Isfeld, RFT(on LOA)
 Geneve Nicole Jasper, RPF(on LOA)
 Lucie Jerabkova, PhD, RPF(on LOA)
 Aaron B. Jones, RPF(on LOA)
 Mark Adrian Jones, RFT(on LOA)
 Laszlo Kardos, RPF(on LOA)
 David Alan Keely, RFT(on LOA)
 Jason Richard Kennedy, RPF(on LOA)
 Jodie Krakowski, RPF(on LOA)
 Colin John Kravontka, RFT(on LOA)
 Barry A. Kropp, RPF(on LOA)
 Stephen P. Lackey, RPF(on LOA)
 Arthur A. LaCourciere, RPF(on LOA)
 John Keith Lamb, RFT(on LOA)
 Janet Louise Lane, RPF(on LOA)
 Stacey D. Larsen, RPF(on LOA)
 R. Gregory Lay, RPF(on LOA)

Jeffrey Kevin Leahy, RPF(on LOA)
 W. Hugh Loughheed, RPF(on LOA)
 Kristina M.M. Luke-Airey, RPF(on LOA)
 Terrence Dale Mackay, RFT(on LOA)
 Colin Raymond Mahony, RPF(on LOA)
 Sharon Michele Mandrusiak, RFT(on LOA)
 Rodney Walter March, RPF(on LOA)
 Peter Markovich, RPF(on LOA)
 David Amos Maxwell, RFT(on LOA)
 Donald A. McDermid, RPF(on LOA)
 Margaret Jean (Peggy) McDougall, RPF(on LOA)
 Susanne Marie McElroy, RPF(on LOA)
 Denise L. McGowan, RPF(on LOA)
 Carl M. McLennan, RPF(on LOA)
 John Jason McLeod, RPF(on LOA)
 Tim Mergen, RFT(on LOA)
 Mark Messmer, RPF(on LOA)
 Kimberley Lillian Meyer, RFT(on LOA)
 Kyle James Miller, RFT(on LOA)
 Kaela A. Mitchell, RFT(on LOA)
 Anne Margaret Molony, RFT(on LOA)
 William Jordy Moore, RFT(on LOA)
 Keith Daniel Mullens, RFT(on LOA)
 Christopher Nowotny, RPF(on LOA)
 Andrew Eric Oetter, RFT(on LOA)
 Wesley John Ogloff, RFT(on LOA)
 W. Frederick Oliemans, RPF(on LOA)
 Leslie Olsen, RFT(on LOA)
 Elaine Ellen Oneil, RPF(on LOA)
 Pierre Andre Pelletier, RFT(on LOA)
 Sargent A. Pereverzoff, RPF(on LOA)
 Raeshelle Marie Pickering, RPF(on LOA)
 John Everett Pitts, RFT, ATE (on LOA)
 Jason Scott Pope, RPF(on LOA)
 Joanne A. Ramsay, RPF(on LOA)
 Dean W. Raven, RPF(on LOA)
 William Redhead, RPF(on LOA)
 Darrell A. Robb, RPF(on LOA)
 Craig Spencer Robinson, RPF(on LOA)
 Robert Henry Rose, Jr., RFT(on LOA)
 Stephanie Marie Sambo, RPF(on LOA)
 James A. Sayle, RPF(on LOA)
 Micheal Leonard Scarff, RFT(on LOA)
 Aliette Marion Seigel, RPF(on LOA)
 Michael Mathew R. Shook, RPF(on LOA)
 Karl Dean Sjodin, RFT(on LOA)
 Alina Janina Skiba, RFT(on LOA)
 Aaron Matthew Smeeth, RFT(on LOA)
 Kathrine Clare Smith, RFT(on LOA)
 Russel Garry Smith, RPF(on LOA)
 Brian Michael Stewart, RPF(on LOA)
 Kenneth William Taekema, RFT(on LOA)
 Roger D. Tailleir, RPF(on LOA)
 William I. Thibeault, RPF(on LOA)

Gregory Stephen Thompson, RPF(on LOA)
 Kathleen M. Thompson, RPF(on LOA)
 Robert Douglas Thompson, RPF(on LOA)
 Richard Ernest Toperczer, RPF(on LOA)
 Betty A. Van Kerkhof, RPF(on LOA)
 James Adam Veley, RFT(on LOA)
 Marc A. von der Gonna, RPF(on LOA)
 John G. Wakelin, RPF(on LOA)
 Lisa Helene Waldon, RFT(on LOA)
 Grant L. Walton, RPF(on LOA)
 Erik C. Wang, RPF(on LOA)
 Grant B. Webber, RPF(on LOA)
 Christy Patricia Weiss, RPF(on LOA)
 Kenneth Allan Whitehead, RFT(on LOA)
 Kelly James Williams, RFT(on LOA)
 Steven Donald Williams, RFT(on LOA)
 Richard Lee Winje, RFT(on LOA)
 Jennifer Dawn Wright, RPF(on LOA)
 Alvin D. Yanchuk, PhD, RPF(on LOA)
 Sarah Michelle York, RFT(on LOA)
 Abdel-Azim M.A. Zumrawi, PhD, RPF(on LOA)

LEAVE OF ABSENCE (ENROLLED MEMBERS)

Jillian Jane Atmore, FIT(on LOA)
 Ashley Francis Bunker, FIT(on LOA)
 Dillon Bay Chrimes, PhD, FIT(on LOA)
 Boris Sebastian Egli, FIT(on LOA)
 Claire Louise Errico, FIT(on LOA)
 Adam John Flintoft, TFT(on LOA)
 Raquel Evelyn Helene Gilstead, TFT(on LOA)
 Amanda Jean Girard, FIT(on LOA)
 Jesse Daniel Grigg, FIT(on LOA)
 Scott Matthew Howard, TFT(on LOA)
 Qinglin Li, PhD, FIT(on LOA)
 Darcy Allan Macleod, TFT(on LOA)
 Michael Robert Matichuk, TFT(on LOA)
 Janel Patricia McNish, TFT(on LOA)
 Victor Ramirez Nery, FIT(on LOA)
 Shiloh Michael Zayac, FIT(on LOA)

RESIGNATIONS - RPF

Steven M. Day
 Stephanie Nadine Haight
 Karen V. Jahraus
 Cynthia K. Kaufmann
 James J. Maselj
 Raymond J. Robazza
 Krista-Bay Lisa West
 Mitchell D. Yaremko

RESIGNATIONS - RFT

Anne Louisa Bulman
 Steven James Dodge
 Tanis Evelyn Forgues

Thomas Gregory Hughes
James Cory Robertson
Lorne Keith Walker

RESIGNATIONS - RETIRED RPF

David A. Bewick
Jeffrey A. Burrows
Richard D. Hodson
John D. Hoyrup
Anthony J. Kelly
Dag Arne Kristiansen
Warren K. Mitchell
Steven M. Northway
Robert A. Osmachenko
Barbara Diane Reed

RESIGNATIONS - RETIRED RFT

Jaqueline Hipwell
Alan Gary Newbert
Rosemarie O'Connor
John Barrie Richardson

RESIGNATIONS - FIT

John Trevor Harvey
Grant Kurt Huettmeyer

RESIGNATION - TNRP

Adam Van Nguyen

Membership Statistics: ABCFP — January 2016

NEW REGISTERED MEMBERS

Michelle Buck, RFT
Clinton Joseph Gould, RFT
John Andrew Murray, RPF
Navdeep Kaur Saini, RPF

NEW ENROLLED MEMBERS

Leif Terrell Bjornson, FIT
Jennifer Cleven, TFT
Taylor Douglas Frehr-Smith, FIT
Keegan Trevor Harley, TFT
Charles James Henderson, TFT
Adrienne Rebecca Langley, TFT
Richard Lee Major, FIT
Lee Owen Hiram Salmon, FIT
Derek Felix Sattler, PhD, FIT
Benjamin Dean Timmerman, FIT
Marie Catherine Vance, FIT
Alysha Sharon VanDelft, FIT
Jewel Irene Yurkewich, FIT

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REINSTATEMENT - FIT

Keiko Arakawa, RFT, FIT

REINSTATEMENT FROM LOA (REGISTERED MEMBER)

Brendan MacDonald, RPF

DECEASED

Elbert S. Reid, RPF(Ret)
Paul H. Veltmeyer, RPF

The following people are not entitled to
practise professional forestry in BC:

NEW LIFE MEMBER

Jane L. Perry, RPF(Ret)

NEW RETIRED MEMBERS

William James Adair, RPF(Ret)
Dale Ronald Andall, RFT(Ret)
Allan J. Barker, RPF(Ret)
Timothy Robert Chester, RFT(Ret)

David Anthony Flegel, RFT(Ret)
 Louis Gagne, RPF(Ret)
 Michael S. Lloyd, RPF(Ret)
 Wayne L. Martin, PhD, RPF(Ret)
 Karen Margaret Scheffers, RPF(Ret)
 Ron H. Sorensen, RPF(Ret)
 Murray D. Stech, RPF(Ret)
 Mark H. Vieweg, RPF(Ret)

LEAVE OF ABSENCE (REGISTERED MEMBERS)

Brian William Atwood, RFT(on LOA)
 Suzanne Cairns, RPF(on LOA)
 Michael Walter Cawley, RFT(on LOA)
 Gabriel Blair Coleman, RPF(on LOA)
 Craig E. Dorion, RPF(on LOA)
 Ronald Ewanyshyn, RFT(on LOA)
 Darren Louis Field, RFT(on LOA)
 Danielle Stephanie Gnoyke, RFT(on LOA)
 Victoria Mary Groves, RFT(on LOA)
 Murray Wayne Henry, RFT(on LOA)
 Stephen C. Hewitt, RPF(on LOA)
 Gregory P. Kockx, RPF(on LOA)
 Indra LaLari, RPF(on LOA)
 Paul Andrew Maika, RFT(on LOA)
 Robert A. McDougall, RPF(on LOA)
 Brian Gregory Pate, RFT(on LOA)
 Owen Lee Smith, RPF(on LOA)
 Gregory Paul Van Dolah, RFT(on LOA)
 Brian Westgate, RPF(on LOA)
 Robert G. Windeler, RPF(on LOA)

RESIGNATIONS - RPF

Robin F. Archdekin
 Scott C. Dunn
 Kevin D. Kriese
 Richard F. Krygier
 Philip J. Madeley
 John P. McClarnon
 Malfair E.E. Scott
 Julie E. Wilson

RESIGNATIONS - RFT

Lyle Murray Gawalko
 Dennis Arthur Heigh
 Lesley A. Kohorst
 Judith Anne Schieder
 William Laine Walker

RESIGNATIONS - RETIRED RPF

J. Brent Olsen
 Harold Edward Stevens
 George O. Zorn

RESIGNATIONS - FIT

Benjamin Michael Dippo
 Magnus Gunn
 Trent Edward MacAulay
 Alisha June Skelton

REMOVAL OVER ENROLMENT - FP

Jill Ann Macaulay, RFT*
 Joel Aubrey Runtz, RFT*
 *entitled to practice as an RFT

Membership Statistics: ABC FP — February 2016

NEW REGISTERED MEMBERS

Andrew Foster Ambery, RPF
 Kyle Joseph Anderson, RPF
 Craig Patrick Campbell, RFT
 Ross Lee Hobbs, RFT
 Trevor Roman Horrock, RFT
 Jillian Rae Schochter, RFT
 Jason Neil Whitehead, RFT

NEW ENROLLED MEMBERS

Mathieu Raymond Charbonneau, FIT
 Louis-Karl Gilles Fuchs, TFT
 Adam Russell Holman, TFT
 Morgan Ashley Klassen, TFT
 Vincent Quangvan Luu, FIT
 Wesley Cameron McKay, TFT
 Tracey Lyn Ofstie, TFT

REINSTATEMENTS (REGISTERED MEMBERS)

Ryan Douglas Monsen, RPF*
 Alan G. Smith, RPF

The following people are not entitled to practice professional forestry in BC:

NEW RETIRED MEMBERS

Alvin L. Boyer, RFT(Ret)
 Simon A. Crawley, RPF(Ret)
 Ronald Greschner, RPF(Ret)
 Reuben George Irvine, RFT(Ret)
 J. Andrew MacKinnon, RPF(Ret)
 William Douglas Merrie, RFT(Ret)
 Gregory B. Taylor, RPF(Ret)

LEAVE OF ABSENCE (REGISTERED MEMBERS)

Rayanne Alm, RFT(on LOA)
 Pieter J. Bekker, RPF(on LOA)
 John (Jackie) Victor Brown, RFT(on LOA)

George Dennis Buis, RFT(on LOA)
 Aaron Todd Cutler, RFT(on LOA)
 Sonja Jane Efford, RFT(on LOA)
 Paul Christian Ekel, RFT(on LOA)
 Jennifer Mary Fraser, RPF(on LOA)
 Brandy Deanne Hughes, RFT(on LOA)
 James Ryan Jordan, RPF(on LOA)
 Jamie Dean Kroschel, RPF(on LOA)
 Matthew John Lamb-Yorski, RFT(on LOA)
 Tavis Aaron McDonald, RPF(on LOA)
 Mary Delina Moran, RFT(on LOA)
 Marvin G. Nowlin, RPF(on LOA)
 Colleen Ann Ross, RPF(on LOA)
 Liane C. Spillios, RPF(on LOA)
 Christopher A. Waite, RPF(on LOA)
 Wade James Watson, RPF(on LOA)
LEAVE OF ABSENCE (ENROLLED MEMBERS)
 Theresa H.C.N. Denton, TFT(on LOA)
 Jeffrey John Forbes Walsh, FIT(on LOA)

RESIGNED RPF

Fred R. Elsaesser
 Jason Thomas Pond
 Doug B. Stewart
 Deepa R. Tolia

RESIGNED RFT

Jason Scott Blackwell
 Timothy William Cooper
 Mitchell Scott Green
 Nicholas Nussbaumer

RESIGNED ATE

Nicholas Nussbaumer

RESIGNED RPF RETIRED

David M. Armit
 Michael J. Buirs
 Michael R. Carlson
 Stephen G. Christiansen
 David R. Clark
 Paul J. Courtin
 Dean A. Currie
 Jim M. Gilliam
 Peter J. Hall
 Pentti E.O. Leppanen
 Stuart J. Macpherson
 Leo J. Rankin
 Diane L. Stuart
 James F. Tearoe
 Paul M. Wood
 Kim Charles Young

RESIGNED RFT RETIRED

Glen William Allan
 Laurence Michae Cosman
 Robert William Dice
 Kevin Michael Hanna
 Korinne Fay Anne Isbister
 Leslie Lloyd Quick
 Douglas Lorne Russell

RESIGNED FIT

Lucie Jana Babak
 Graham Peter Gubbe

RESIGNED TFT

Candace Paige Dow

REMOVAL NON-PAYMENT RPF

Wayne E. Arnold
 Hongyun Dong
 Elizabeth Mary Grilo
 Ross Takashi Hamilton
 Paul V. Hanna
 Graeme Duncan Jacques
 Wade Jarvis
 Steve Kozlowski
 Cassandra Mann
 J. Willem Markvoort
 Robert D. Marshall
 John D. McIntosh
 Alan A. McLeod
 Shawn M. Meisner
 Garry E. Merkel
 Davinder S. Minhas
 Ryan Douglas Monsen, RPF*
 Chris N. O'Connor
 Anand Pandarinath
 Eric A. Pascas
 Robert Louis Phaneuf
 Suzanne W. Simard
 John G. Stephen
 Steven William Stewart

D. Craig Donald Sutherland
 Matthew Tutsch

REMOVAL NON-PAYMENT RFT

Glenn Alvin Barker
 Conrad Earl Browne
 Adam Clynel Cooke
 Rodney John Gibney
 Henry Porter Grierson
 Michael Patrick Kamann
 Kelly B. LaRoy
 Denis Grant Marleau
 Gayle Caroline McMurray
 Larry Richard Paxman
 W. Evan Ross
 Joseph Walter Schochter
 Patrick Milton Sproule
 Augustine Frank Young

REMOVAL NON-PAYMENT ATC

Steven R. Anley

REMOVAL NON-PAYMENT FIT

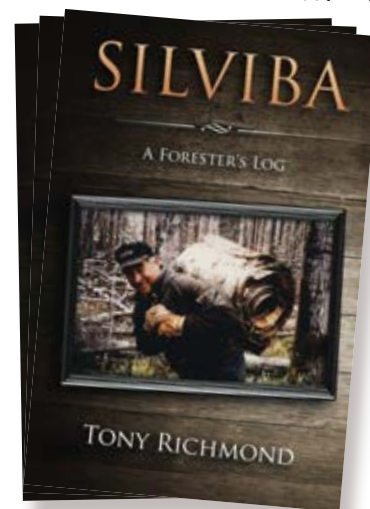
Joanna Bernardo
 Betsy Cranmer
 Jean Louise Eagleson
 Denise Lindsey Kuntz
 MacArthur J. Lowry
 Curtis William Macdonald
 Vojtech Prilesky
 Colin Edward Swan
 Andrew David Walker
 Karen Louise Wylie

REMOVAL NON-PAYMENT TFT

Steven R. Anley
 Christine Lynn Brown
 Brian Stephenson Cole
 Michael John Grebinski
 Stephen John Lenio
 Matthew Thomas Murray

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John Paul Oster
 Li Tiefer Yao
 Brody Francis Yoxall

REMOVAL NON-PAYMENT TNRP

Mario Philip Cottone

*active member, reinstated membership within same month of removal

Berry Management continued from page 29

Increased incorporation of some of these berry management strategies or other similar strategies into the timber harvesting land base across BC will give more forest professionals a solid answer the next time someone asks 'what are you doing to manage for berries on the landscape?' In combination with monitoring and follow-up research, we can also establish a stronger foundation of knowledge regarding

the different levels of success of berry management strategies in BC.

This article was developed with input from the BCTS and Forest Stewardship teams in the Skeena Stikine District, and the natural resource sciences team in the Skeena Region. Special thanks goes to Glen Buhr, RPF, Will MacKenzie, RPF, Dave Coates, RPF, and Sybille Haeussler, RPF. ❁

environmental regulations. There are maximum allowable limits for metals in ash materials intended for soil applications. At UNBC and the Aleza Lake Research Forest, we are currently undertaking more research to test the dosing of wood ash to a variety of forest soils (including fine-textured soils) and the growth response of different tree species and surrounding vegetation.

UNBC researchers are exploring several value-added options for biomass ash produced by industry and UNBC's bioenergy systems, in collaboration with Canfor Pulp Ltd. Our key goal is to determine if the application of ash to soils can provide an environmentally safe benefit to forest and agricultural lands. Initially, our work focused on characterizing the chemical and physical properties of various ashes produced at UNBC and industry. We first used pot and greenhouse trials to investigate the response of seedlings (Douglas-fir, lodgepole pine, hybrid spruce) to surface ash applications in reconstructed forest soil profiles typical of northcentral British Columbia. Growth responses were not observed in ash-only treatments, but positive growth responses were observed in pine and spruce when ash was applied in combination with fertilizer nitrogen (greater than fertilizer nitrogen alone, too). Undergraduate student Nichola Gilbert found that hybrid poplar and hybrid willow responded very well to ash application to nursery soils when done in combination with biosolids (a by-product of wastewater treatment facilities). Nichola is now continuing her ash research in an MSc project at UNBC.

In May 2015, UNBC researchers were permitted by the BC Ministry of Environment to apply UNBC and Canfor Pulp wood ashes in a replicated field research trial at the Aleza Lake Research Forest, about 60 km east of Prince George. Funding was provided by Canfor Pulp and NSERC. Our objectives for the study are to determine whether the application of either types of biomass ash to forest soil will (i) stimulate conifer growth (18-24 year old spruce plantations), with or without supplementary nitrogen, and (ii) impact soil properties and understory plants. Our study design includes a 'rich' site and a 'poorer' site.

Our current research work in 2016 includes:

- Assessing whether tree nutritional status has benefited from the ash/fertilizer nitrogen additions and if soil chemical properties in the forest floor and underlying mineral horizons have responded to the May 2015 ash/fertilization treatments.
- Investigating whether the ash treatments influences understory plants on the plots.

Additional Student Research Projects

Researcher	Level	Project Description
Nichola Gilbert Forestry	Undergraduate	Application of ash and biosolids to potted hybrid poplars and willows
Nichola Gilbert Forestry	Graduate	Examination of an innovative ash delivery system to seedlings (results pending)
Nicholas Dormaar Forestry	Undergraduate	Optimization of ash hardening conditions to improve physical characteristics for ash transportation and application
Erwin Rehl Chemistry	Graduate	Changes in leachability and chemistry of ash constituents upon hardening
Karl Domes Forestry	Undergraduate	Foliar nutrient analysis following broadcast application of ash (results pending)
Trevor de Zeeuw Forestry	Undergraduate	Evaluation of soil chemical properties following broadcast application of ash (results pending)
Saskia Hart Biology	Undergraduate	Impacts of broadcast ash application to herbaceous plant communities (results pending)
Shawna Bygrave Chemistry	Undergraduate	Influence of ash-biosolids mix-ratios on losses of ammonia nitrogen
Adrian James Environmental Science	Graduate	Potential use of high-carbon ash as an energy source

Our goals for future research are to scale up to larger operational applications in order to examine the logistics and economics associated with field scale ash applications in plantations.

In addition, the UNBC wood-ash research team is very interested in the potential applications that could be derived from these trials, and greatly appreciates its ongoing support from Canfor Pulp and NSERC. In future, we look forward to further expanded collaboration with other companies, researchers, NGOs and government agencies.

For Further information, please contact Michael Rutherford (michael.rutherford@unbc.ca) or Hugues Massicotte (hugues.massicotte@unbc.ca). ☒



A Moment in **Forestry**

Signs of Life *Submitted by Mark Serediuk, RFT*

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