

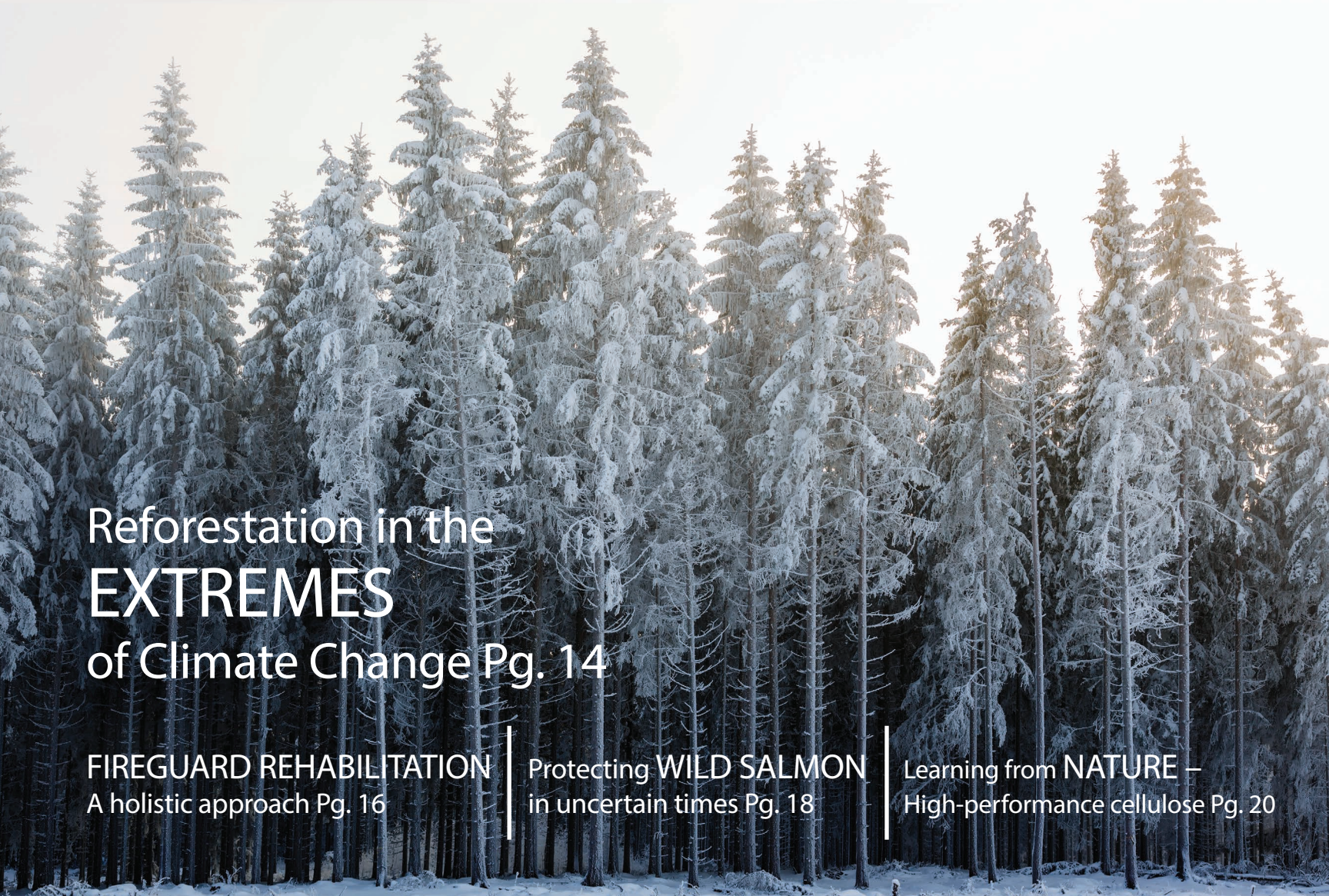


THE UNIVERSITY OF BRITISH COLUMBIA

Faculty of Forestry

# branchlines

Volume 30#4 Winter 2019



Reforestation in the  
**EXTREMES**  
of Climate Change Pg. 14

**FIREGUARD REHABILITATION**  
A holistic approach Pg. 16

Protecting **WILD SALMON**  
in uncertain times Pg. 18

Learning from **NATURE** –  
High-performance cellulose Pg. 20

# dean's message



Winter is now upon us. Looking back on 2019, the year has been memorable for the Faculty of Forestry. We have won international awards for our research and educational programs and shared our scientific findings with our colleagues abroad. We are launching exciting new educational programs such as BEST and continue to experience the highest student enrollment numbers in the history of our Faculty. We refreshed our strategic plan for the next decade that emphasized four core strategic areas all of which rely, to a large degree, on strong and diverse partnerships.

We deeply value our partnerships – from those here at home to those all over the world. They include partnerships within our Faculty such as with students, faculty, and staff to colleagues at other academic institutions, government, Indigenous communities, industry and so many others closely connected to our planet's forests. They allow us to engage with the big issues of our time and help us to realize our vision, which is to be a global exemplar in supporting the health and well-being of our planet's forested ecosystems and all who interact with them.

This year has not been kind to some of our partners, specifically, the forest industry in British Columbia. While the people in the industry formed the very basis of our Faculty's roots, starting from early in the last century, those in today's industry are feeling the acute effects of climate change, international trade disputes, and, more recently, job losses. As partners, we are all now faced with painful challenges and difficult choices.

Opportunities can arise from difficult challenges. Transformation can lend itself to opportunity. The research conducted by our Faculty

can support smart and innovative decisions and policy that can pave the way for new approaches and solutions. One example includes the partnership between our UBC Faculty of Forestry Alex Fraser Research Forest and the Province of British Columbia, outlined in Kyle Miller and Stephanie Ewen's article about a comprehensive plan to fireguard rehabilitation. Elsewhere, Feng Jiang discusses how fibre from forests can be manufactured into the high-performance materials of the future. Gary Bull discusses how research in genetics informs more effective reforestation techniques in the face of the extremes of climate change. These are just a few examples of subject areas that we can contribute to best when we explore them within collaborative partnerships.

Our Faculty, our partners, and our partnerships have changed and evolved substantially over the past century. Sometimes we don't all see eye-to-eye. Today, however, we have an opportunity. If we face the challenges of BC's forests together, we all have a unique opportunity to build on our similar visions, values and approaches. At the same time, we have the chance to re-examine some of our differences and adapt and refine them to serve as shared solutions to our common challenges.

A handwritten signature in blue ink, appearing to read 'John L. Innes'.

**John L Innes**  
Professor and Dean

# CONTENTS



## NEWS

- 4 New Appointments
- 5 Awards and Recognition
- 6 UBC Forestry Receives Honours at IUFRO
- 7 Mentoring and Student Engagement at the IUFRO World Congress
- 8 TEK Conference Showcases Inclusive Forest Stewardship
- 9 Multilingual Dictionary Addresses Diversity
- 10 Research in the Media
- 12 Upcoming Lectureship to Discuss Nanocellulosic Materials Applications
- 13 'BEST' Degree for Students who Want to Make a Difference
- 13 Land One Program Builds Close-Knit Community

## RESEARCH

- 14 Building Reforestation Strategies Through Macroscale Analysis
- 16 Alex Fraser Fireguard Rehabilitation Plan Addresses Forest Values
- 18 Protecting Wild Salmon in Uncertain Times
- 20 Learning From Nature – Reconstructing Cellulose Into High Performance Materials

## DEVELOPMENT & ALUMNI NEWS

- 22 Accomplished Alumnus is Still Planning for the Future
- 23 Alumni Keep it in the Family
- 24 Faculty of Forestry Alumni Reception at the ABCFP Conference 2020

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THE UNIVERSITY OF BRITISH COLUMBIA  
Faculty of Forestry

# NEW APPOINTMENTS



**Dr Andrew Almas** has joined the Department of Forest Resources Management as a lecturer. Andrew will be working on all aspects of the Urban Forestry undergraduate program, including teaching or co-teaching a number of program courses, leading Field Camp and Capstone. Andrew brings a wealth of professional and academic urban forestry experience to UBC. He worked as an urban forester for the Town of Oakville, – a city of more than 200,000 people, – and later as an environmental consultant, where he worked on multiple large-scale projects. You can reach Andrew at [andrew.almas@ubc.ca](mailto:andrew.almas@ubc.ca).



**Rob Van Buskirk** has been appointed as resident forester for the Faculty of Forestry's Malcolm Knapp Research Forest in Maple Ridge and Alex Fraser Research Forest in Williams Lake where he is also serving as the acting manager. He holds a Bachelor of Science in Forestry and is a Registered Professional Forester. Rob has over a decade of experience working across the forest industry supply chain. In his previous roles, Rob has overseen: forest planning and operations, landscape-level planning, sawmill and forest residual fibre supply procurement, and quality control. More recently, Rob served in sawmill management roles in the Central Interior. You can reach rob at [rob.vanbuskirk@ubc.ca](mailto:rob.vanbuskirk@ubc.ca).



**Natasha Carter** is excited to join the Faculty's Communications and Marketing team as the Marketing and communications manager. Natasha brings with her over 10 years of experience spanning market research, digital marketing, and event management. Coming from UBC's School of Public Policy and Global Affairs and having had the opportunity to work in government, technology and tourism sectors, she is keen to continue to grow and build her skills during her time with the Faculty. You can reach Natasha at [natasha.carter@ubc.ca](mailto:natasha.carter@ubc.ca).



**Jennifer Lim** recently joined the Faculty as the HR facilities and safety coordinator. Previously she worked in Central Payroll and Benefits as the faculty & staff benefits representative. Before coming to UBC, she was a project coordinator with Home Depot for several years. A licensed interior designer by trade, Jennifer has also consulted extensively on large-scale interior design projects. Jennifer is eager to meet everyone at the Faculty and continue to assist with safety and facility needs.

# AWARDS AND RECOGNITION

## DR SCOTT HINCH RECEIVES THE 2019 AWARD OF EXCELLENCE FROM THE AMERICAN FISHERIES SOCIETY



Forest and conservation sciences faculty professor Dr Scott Hinch received the Award of Excellence from the American Fisheries Society (AFS) at an October 2019 conference held in Reno, Nevada and hosted by the AFS and Wildlife Society.

The Award of Excellence is presented to a living person for original and outstanding contributions to fisheries and aquatic biology. It is the Society's highest award for scientific achievement.

"We applaud the distinguished contributions of Dr Hinch and thank him for his continuous efforts to share the value of fisheries and aquatic biology," said AFS President Jesse Trushenski.

This is the fourth AFS award for Dr Hinch, having previously won the society's Fisheries Education Award, the Fisheries Management Section Award of Excellence and the Washington/British Columbia Chapter Certificate of Achievement. He is among only a few Canadians to be recently elected into the AFS inaugural class as a Fellow of the Society.

Dr Hinch is head of the Pacific Salmon Ecology and Conservation Laboratory at the University of British Columbia. He is considered a world-renowned expert in salmon ecology with a transdisciplinary research program linking ecology, behavior, physiology, genomics, and the social sciences. He also serves as the Pacific Ocean lead investigator for Canada's Ocean Tracking Network. Dr Hinch has trained many students and postdocs who have gone on themselves to become influential members of the aquatic science and management communities.

*To learn more about the Pacific Salmon Ecology and Conservation program, turn to page 18.*

## CONGRATULATIONS TO DON SKEA, UBC PRESIDENT'S SERVICE AWARD FOR EXCELLENCE RECIPIENT



Don Skea, UBC Forestry's Alex Fraser Research Forest operations supervisor, was named as one of this year's UBC President's Service Awards for Excellence recipients for his outstanding work in sustainable forest management, research, and education initiatives.

Don received the award for several milestone accomplishments, achieved throughout his more-than 47-year career. His measured success with detecting and controlling bark beetle infestations was one of his accomplishments recognized, as was the strategic planning he did during the recession of 2008-2012, which involved supervising fuel reduction treatments that were next to local communities.

Don's work during the summer of 2017, when he was instrumental in the control of wildfires that ignited within the 10,000 ha research forest, was also highlighted as one of his award-winning accomplishments. At the time of the fires they were described as "possibly unprecedented in terms of size" and his work was instrumental in preventing further loss.

# UBC FORESTRY RECEIVES HONOURS AT IUFRO

The Faculty received special honours at the 25th International Union of Forest Research Organizations (IUFRO) World Congress held this fall in Curitiba, Brazil. Held every five years, the IUFRO World Congress attracts delegates from as many as 120 countries who come together to advance forest research and scientific understanding that is vital to the health of our planet's forests.

Through a brand new booth, informative talks and ceremonial event participation, UBC Forestry's delegation of almost 30, successfully promoted the Faculty's world-renowned research and innovative educational programs to over 2,500 attendees.

Dr Suzanne Simard was selected by the Scientific Committee, the IUFRO Board, and the event's organizing committee as a keynote speaker for one of the plenary sessions. Forest & conservation sciences professor and Centre for International Forestry Research senior associate Dr Terry Sunderland was presented with the IUFRO Scientific Achievement Award. The award is given to scientists whose collection of outstanding published research demonstrates the importance of scientific or technical achievements directly linked to the advancement of forestry or forest research. Sunderland was congratulated for making significant contributions across a wide range of disciplines that began in tropical forest botany and more recently has encompassed the application of a landscape approach to sustainable resource management and biodiversity conservation.

Two of the IUFRO student awards for Excellence in Forest Science went to Andrea M. Vásquez-Fernández and Khalil Walji. Vásquez-Fernández was recognized for her master thesis on "Indigenous Federations in the Peruvian Amazon: Perspectives from Ashéninka and Yine-Yami Peoples". Judges said her thesis demonstrated an impressive commitment to intercultural collaboration between Indigenous communities and institutions as well as Peruvian institu-



tions. They also said her thesis showed a strong commitment to Canadian research ethics and the rigors of academic professionalism.

Walji was commended for continuing to collaborate and enhance the outreach of both soil and forest sciences along with pushing strongly for enhanced methods in forest education. His project, "Sustainable Forest Management and Soil Quality: An Enhanced Virtual Education Experience", was generously supported by the Teaching and Learning Enhancement Fund at the University of British Columbia and, capitalized on international collaboration between two internationally recognized forest research institutions, UBC and Stellenbosch University. His project combined the forestry, soils, and water nexus to create an immersive, enriched student educational experience with the creation of an open source forest and soil management case study.

Dr Guangyu Wang and his team received the Best Practices in Forest Education Award for their innovative networking program that brings together many higher education institutes from an extensive geographical area. Wang's team runs the Asia Pacific Forestry Education Coordination Mechanism which promotes forestry education in the Asia-Pacific region and makes knowledge accessible through five existing online courses and 10 new courses in development.



# MENTORING AND STUDENT ENGAGEMENT AT THE IUFRO WORLD CONGRESS

*Sarah Dickson-Hoyle*



As exciting as it can be to attend a world-renowned international scientific conference, it can also be a daunting new experience for many students. How do you navigate the thousands of presentations, find the courage to speak up in discussions, or approach networking with senior scientists? The International Forestry Students' Association (IFSA) program at the International Union of Forest Research Organizations (IUFRO) World Congress was designed to address these challenges through a comprehensive program of science skills training, student research, and mentoring.

I travelled to Brazil as a representative of both the Faculty of Forestry and IFSA's Forestry Education and Training Sub-Commission. Our delegation of 15 IFSA students representing 11 countries arrived early in Curitiba to take part in the pre-congress training day. Coordinated by the IFSA-IUFRO Joint Task Force on Forestry Education, this session brought together 33 early career researchers for a day of entrepreneurship training, open science publishing seminars, and peer mentoring.

Mentoring has grown to become a key focus of IFSA's student programs, and over the past five years, IFSA has run mentoring programs at numerous conferences worldwide. For the IUFRO World Congress, over 70 students and early career researchers were matched with senior scientists for the duration of the congress, encouraging them to attend sessions together and for mentors to support their mentees in networking and other congress goals. Seeing many mentoring pairs walking around the venue together, or deep in conversation, was a highlight of the congress for me!

Another goal of the program was to showcase student research.

In addition to the many student presentations in the core technical program, IFSA coordinated two 'student incubator' sessions in which students were challenged to present their research in a three-minute thesis format. Featuring interdisciplinary panels of senior scientists who led a series of Q&A sessions, this interactive and dynamic format offered students the opportunity to present their research in greater depth while also sparking engaging discussions.

A final highlight was coordinating the sub-plenary to present the IUFRO Student Awards, including to current UBC Faculty of Forestry PhD candidate Andrea Vásquez-Fernández and former Master's student Khalil Walji. From Suzanne Simard's opening speech to a panel discussion with all 15 award winners, a focus of this session was on sharing insights and experiences from conducting graduate research, while emphasizing the role of scientists in taking our research beyond the lab to ensure it has meaningful impact.

*If you are interested in supporting student and early career foresters mentoring, this toolkit will show you how [ypard.gitbook.io/mentoring/](http://ypard.gitbook.io/mentoring/).*



# TEK CONFERENCE SHOWCASES INCLUSIVE FOREST STEWARDSHIP

Marie Nosten



Conference participants develop a timeline of BC's Forestry history contextualizing how colonial practices are still felt today.

In August, UBC's Faculty of Forestry hosted the *Transforming Approaches to Forests and Forestry through Traditional and Local Knowledges (TEK) Conference* at the Point Grey campus, located on the traditional territory of the Musqueam First Nation. The session drew together 77 local community knowledge holders, researchers, students, and policy makers to discuss inclusive forest stewardship and management.

The conference was officially organized as an International Union of Forest Research Organizations (IUFRO) working party. In keeping with the conference theme, the organizing committee, which was comprised of 12 students and supervised by Prof. Janette Bulkan, explored what it meant to hold a transformative gathering, challenging preconceived notions to avoid bias.

Throughout our planning, we questioned what norms were in place at academic conferences that marginalized certain voices and prioritized others. What practices have retained colonial mentalities, and how do we decolonize our ways of knowing? What kinds of topics ought to be covered to truly understand the place of Traditional Ecological

Knowledge in today's forestry decisions?

The result? A three-day gathering which provided a space for stories and experiences to be shared by the multi-national attendants. Conference workshops and presentations were connected through a running theme of identifying power dynamics that hinder fruitful collaborations between knowledge holders and decision-makers.

This gathering also identified the need to bring a historical lens to the role of research to fully understand the ongoing colonization of peoples and communities that is in part perpetuated by universities. Global and regional examples of the empowerment of local communities were showcased by our multi-national attendants, with a common theme being the need to localize forest stewardship and management. Our dialogues, reflections, and interactions gave us a glimpse of the multiplicity of inclusive and reciprocal relationships people hold with forests, and create common visions and processes for honoring these relationships in forestry research.

To learn more, please reach us at [tek.forests@ubc.ca](mailto:tek.forests@ubc.ca) or visit our website [www.tek.forestry.ubc.ca](http://www.tek.forestry.ubc.ca).



# MULTILINGUAL DICTIONARY ADDRESSES DIVERSITY

*Patrick Culbert, Ingrid Jarvis, and Estefania Milla-Moreno*

With over 40 per-cent of our undergraduate students coming from around the world, the Faculty of Forestry is one of the most diverse faculties at UBC. Our international partnerships include a large number of students from the 2+2/3+2 Cooperative Transfer Programs, where students begin their academic career at one of the Faculty's partner universities in China and transfer to the Faculty for the final two years of their degree program.

Even though all international students meet UBC's English language admission requirements, technical and forestry-specific terminology can add a significant learning barrier as they are not included in general-purpose dictionaries. This challenge was raised last fall by Xunqing (Walter) Xu – a Cooperative Transfer Program student from Nanjing Forestry University – during a meeting of the Forestry Diversity Crew. The crew is a grassroots organization comprised of students, faculty, and staff which educates, raises awareness, and celebrates diversity and inclusion in the Faculty.

Our Crew felt the development of an online multilingual forestry dictionary would address this challenge. They began the project process by developing a proposal for the creation of a collaborative, online multilingual forestry dictionary. They then applied for and received a UBC Teaching and Learning Enhancement Fund grant to support the dictionary's development.

Work progressed over the summer and involved a group of students developing the dictionary in the form of a wiki, which ensured the dictionary would be freely available and that anyone with a UBC campus-wide login could make additions and revisions. We began populating the dictionary with terms selected from a Natural Resources Canada French/English glossary and a multilin-

gual glossary from the United Nations Food and Agriculture Organization. This term, more students are contributing to the dictionary by adding relevant terms from their current courses.

A key dictionary feature is that terms may be tagged as being relevant to a specific topic or faculty course. This allows a student to select a course and generate a list of the relevant terms, enabling them to familiarize themselves with new terms right at the start of the semester.

“ We are confident that this dictionary will be a vital tool for international students as they transition to UBC.”

Though numerous languages are spoken by students in the Faculty, we are initially focusing on translating terms into French, Spanish, and Mandarin. We hope that as the dictionary grows, students will help us add translations into even more languages. We are confident that this dictionary will be a vital tool for international students as they transition to UBC.

We encourage you to look at the dictionary ([bit.ly/UBCMFD](http://bit.ly/UBCMFD)) and contribute a definition.

*Dr Culbert is an Instructor in the Department of Forest and Conservation Sciences. He can be reached at [patrick.culbert@ubc.ca](mailto:patrick.culbert@ubc.ca). Ingrid Jarvis and Estefania Milla-Moreno are PhD candidates at the Faculty of Forestry and they can be reached at [Ingrid.jarvis@ubc.ca](mailto:Ingrid.jarvis@ubc.ca) and [info@eamimo.cl](mailto:info@eamimo.cl).*



# RESEARCH IN THE MEDIA

Here's a few excerpts taken straight from some of the media stories coming out of the Faculty of Forestry. Visit the *Forestry in the News* section of our website to read more.

## Science looks beyond the pine beetle to a landscape of pests in BC forests

September 13, 2019, published in the *Vancouver Sun*  
Dr Allan Carroll



While British Columbia's forest industry is occupied with the mountain-pine-beetle infestation's aftermath, forest managers haven't lost sight of other pest problems looming among the trees in a changing climate. News this summer has been dominated by mill closures and production cuts, as companies adjust to timber supplies depleted by the unprecedented infestation that killed off pine trees in up to 18,000 square kilometres of forests.

To read the full article and Dr Allan Carroll's comments, visit [vancouversun.com/news/local-news/science-looks-beyond-the-pine-beetle-to-a-landscape-of-pests-in-b-c-forests](http://vancouversun.com/news/local-news/science-looks-beyond-the-pine-beetle-to-a-landscape-of-pests-in-b-c-forests).

## Indigenous lands have the highest biodiversity: "We must manage a larger fraction of world's area in ways that protect species"

August 5, 2019, published in *Newsweek*

Dr Peter Arcese and former UBC PhD student Richard Schuster

Lands managed by Indigenous Peoples may be key to saving the planet's biodiversity, according to a study published in the journal, *Environmental Science & Policy*. Currently, the earth is in the grips of what scientists have dubbed the "Sixth Mass Extinction," with the global rate of species extinction at least "tens- to-hundreds of times higher" than the average over the past 10-million years, a recent, major United Nations report suggested. Furthermore, around one million species "already face extinction, many within decades, unless action is taken to reduce the intensity of drivers of biodiversity loss" – which include factors such as land conversion, habitat loss and climate change.

To read the full article, visit [newsweek.com/indigenous-lands-highest-biodiversity-protect-species-1452556](http://newsweek.com/indigenous-lands-highest-biodiversity-protect-species-1452556).

To read the paper published in *Environmental Science & Policy*, visit [sciencedirect.com/science/article/pii/S1462901119301042](http://sciencedirect.com/science/article/pii/S1462901119301042).

## Drones help track wildfires, count wildlife and map plants

October 28 2019, published in *The Conversation*  
Dr Nicholas Coops and postdoc Tristan Goodbody



Drones are revolutionizing the way scientists observe, measure and monitor the natural environment. From mapping the patterns of wildfires, like those in California, to measuring the size of jellyfish populations, drones have the potential to improve our understanding of the natural environment. Although we use different names to refer to drones – for example, remotely piloted aircraft systems or unmanned aerial systems/vehicles – there is strong consensus among the scientific community about their potential to improve our understanding of the natural world.

To read the full article, visit: [theconversation.com/drones-help-track-wildfires-count-wildlife-and-map-plants-125115](http://theconversation.com/drones-help-track-wildfires-count-wildlife-and-map-plants-125115).

## Alex Fraser Research Forest gives students hands-on experience

September 21, 2019 published in *The Williams Lake Tribune*  
Stephanie Ewen, Alex Fraser Research Forest manager

As mills continue to close and fears are raised about the sustainability of the BC Lumber industry, organizations like the Alex Fraser Research Forest are working to educate the next generation of foresters and environmental stewards with hands-on experience. The Alex Fraser Research Forest consists of 10,000 hectares of Crown forest that has been set aside for the purpose of research and education conducted by the Faculty of Forestry at the University of British Columbia. Its primary goal over the last 32 years of its operation is to find ways to enhance British Columbians' and Canadians' approach to maintaining sustainable forest ecosystems, to protect industry, the environment, and our way of life.

To read the full article, visit [wltribune.com/community/alex-fraser-research-forest-gives-students-hands-on-experience/](http://wltribune.com/community/alex-fraser-research-forest-gives-students-hands-on-experience/).

## In the Sierra, scientists bet on 'survivor' trees to withstand drought and climate change

November 20, 2019, published in *L.A. Times*  
Dr Sally Aitken



The sugar pine, with its foot-long cones and feathery branches that stretch out high above the forest, used to be one of the most common trees standing guard over Lake Tahoe's clear waters. But drought, bark beetles and climate change have ravaged this beloved conifer, whose population was already diminished by logging, development and other human activities. From 2012 to 2016, drought and bark beetles killed more than 129 million trees in California, most of them conifers in the Sierra Nevada. On the drier, south-facing slopes on this basin's north side, sugar pines were hit especially hard as mountain pine beetles attacked the water-starved trees, tunneling through their bark until many of them died.

To read the full article and Dr Sally Aitken's comments, visit [latimes.com/california/story/2019-11-18/sierra-trees-climate-change-adaptation-lake-tahoe](http://latimes.com/california/story/2019-11-18/sierra-trees-climate-change-adaptation-lake-tahoe).

## Climate change is coming for America's favorite wine grape

October 17, 2019 published in *Mother Jones*  
Dr Elizabeth Wolkovich



Larkmead Vineyards in Calistoga, California, embodies the Napa Valley of popular imagination. At the beginning of harvest, vines heavy with inky clumps of grapes stretch out in perfect rows, their leaves showing the faintest yellow tinge of autumn's impending turn. The grapevines run for 110 acres to the base of the Mayacamas and Vaca Mountains, interrupted only by the occasional service road and a quaint white farmhouse. But picturesque landscapes are not what Dan Petroski, Larkmead's winemaker, wants to show me when I arrive at the 124-year-old vineyard at the end of August.

To read the full article and Dr Elizabeth Wolkovich's comments, visit [motherjones.com/food/2019/10/climate-change-is-coming-for-americas-favorite-wine-grape/](http://motherjones.com/food/2019/10/climate-change-is-coming-for-americas-favorite-wine-grape/).

## Burning questions: The quest to protect BC's woodlands from climate change

August 19, 2019, published in *BC Business*  
Dr Lori Daniels

Erik Leslie remembers walking through the woods along the west arm of Kootenay Lake in July 2017 and feeling the snap and pop of dry brush underfoot. "We had a wet fall, winter, and spring, and then we didn't get a drop of rain after June 15 until mid-August," recalls Leslie, manager of the 11,300-hectare Harrop-Procter Community Forest near Nelson. At the time, he was halfway through implementation of a five-year pioneering climate change adaptive forest management strategy that emerged from the West Kootenay Climate Vulnerability and Resilience Project, a provincial government study of climate change impacts on the region. Of the three climate models the researchers used to forecast conditions, even the most optimistic scenario showed that by 2050, summers will be between 3 and 7 C warmer and 30 per cent drier, resulting in a threefold increase in forest area burned on average.

To read the full article and Dr Lori Daniels' comments, visit [bcbusiness.ca/Burning-Questions-The-quest-to-protect-BCs-woodlands-from-climate-change](http://bcbusiness.ca/Burning-Questions-The-quest-to-protect-BCs-woodlands-from-climate-change).

# UPCOMING LECTURESHIP TO DISCUSS NANOCELLULOSIC MATERIALS APPLICATIONS

Tara Lee

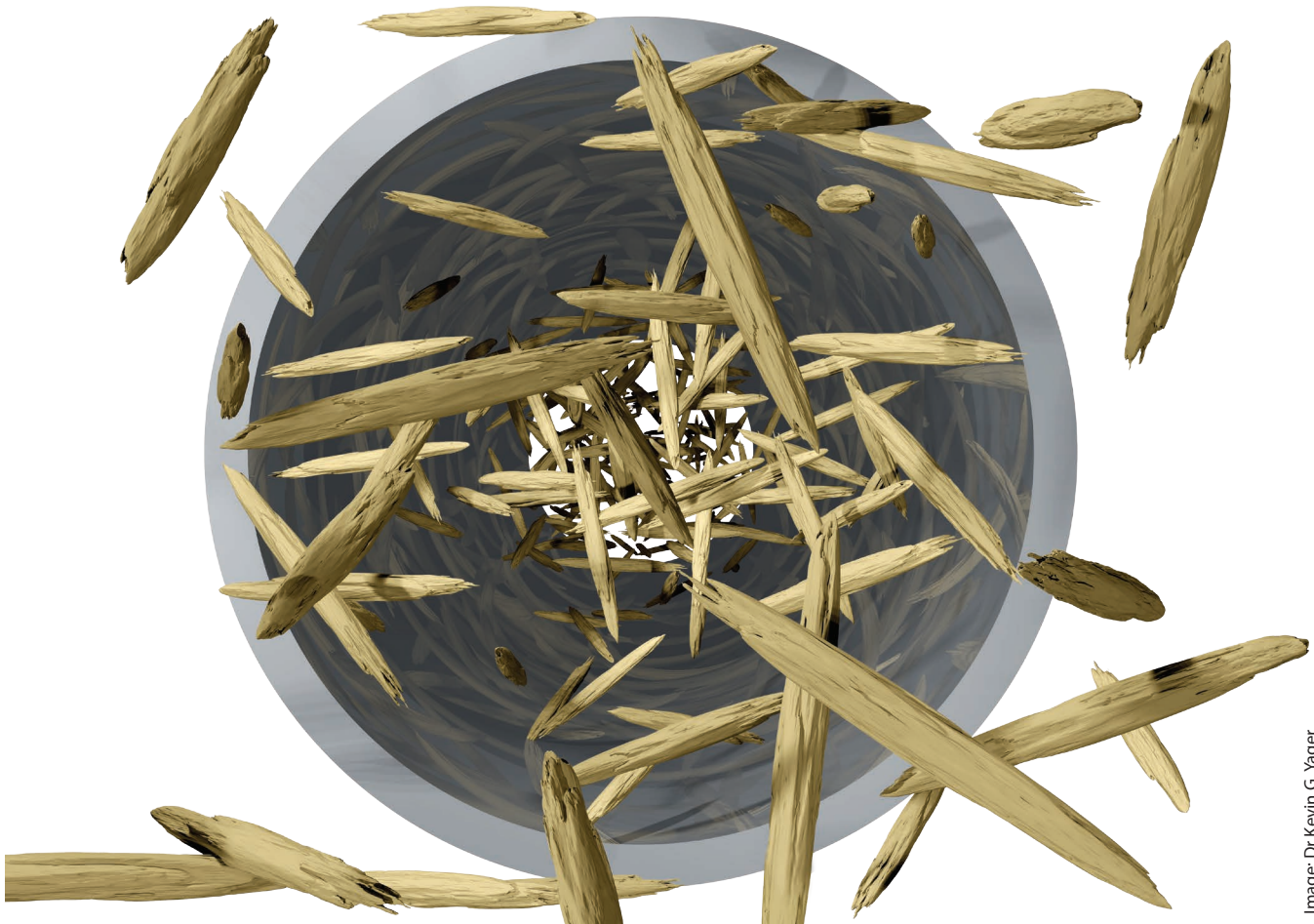


Image: Dr Kevin G. Yager

With increased pressures on forestry-based industries to shift to even more renewable alternatives, researchers worldwide have been coming up with novel solutions that incorporate cutting-edge science. This March, students, faculty, staff, and members of the larger community are invited to a talk on cellulose nanomaterials, which have significant market potential.

Nanomaterials – which could completely revolutionize traditional wood products and offer solutions – are a topic of much discussion and will be the theme of the upcoming Burgess-Lane Memorial Lectureship in Forestry. Presented by the Department of Wood Science, the event takes place on March 2, 2020, at 5:30 p.m. in FSC 1005.

This year's speaker is Dr Derek G. Gray, Professor Emeritus from the Department of Chemistry at McGill University. In his lecture entitled "Forest-based nanocellulosic materials", Dr Gray will make a compelling case for the possibility of producing wood-based nanomaterials that would supplement traditional forest products in a wide variety of non-traditional applications. Dr Gray has received numerous awards over his career, including the Marcus Wallenberg Prize for research relevant to forestry (2013) and the Lifetime Achievement Award from the Pulp and Paper Technical

Association of Canada (2013).

Dr Gray's talk will be followed by a poster display of graduate student research, as well as a reception with light refreshments. This year's event marks the 21st Burgess-Lane Memorial Lectureship in Forestry, established in honour of Thomas E. Burgess and David E. Lane, who served as vice presidents of then British Columbia Forest Products Ltd.

Since 1974, prominent academics and experts have showcased the Faculty of Forestry's contribution to global conversations on sustainable forest management and innovative wood product design. Past participants include J.F. Saemen (1980) from the USDA Forest Products Laboratory in Wisconsin, USA; Petro Piussi (1990), Professor of Silviculture at the University of Florence; and Lars Berglund (2011) from the Wallenberg Wood Science Center in Stockholm, Sweden.

The event promises to be an exciting evening of groundbreaking research, networking, and education.

“ Dr Gray will make a compelling case for the possibility of producing wood-based nanomaterials that would supplement traditional forest products...”

# 'BEST' DEGREE FOR STUDENTS WHO WANT TO MAKE A DIFFERENCE

The voices of younger generations are growing stronger on the issues of climate change. In Canada's most recent federal election, millennial voters made up the biggest voting bloc for the first time ever while 16-year-old environmentalist Greta Thunberg has risen to worldwide fame with *TIME* magazine naming her a "next-generation leader" for her activism on global warming.

As part of its vision, the Faculty of Forestry is set on educating our next leaders who are determined to make a difference. As the time to launch the Faculty's newest Bachelor of Science undergraduate degree – the Forest Bioeconomy Science and Technology (BEST) program – draws near, program director Dr Scott Rennekar is review-

ing everything from course outlines to key student learning opportunities.

"The degree focuses on a grand challenge, combatting climate change by developing fossil-free alternatives and quantifying the sustainability of these new bio-based products," notes Rennekar.

The first of its kind in Canada, the BEST program aims to provide graduates with the interdisciplinary skill set required to imagine and implement a viable manufacturing sector focused on sustainable bioproducts, including those originating from forests. Applications are open now and due by January 15 2020.

*To learn more about the program, please contact Scott Rennekar at [scott.rennekar@ubc.ca](mailto:scott.rennekar@ubc.ca).*



## LAND ONE PROGRAM BUILDS CLOSE-KNIT COMMUNITY



Team-building activities at UBC's Botanical Garden (above and left)

The Land One program, a collaboration between the faculties of forestry and land and food systems, provides an alternative to regular first-year course work for 60 students annually. It aims to improve a student's experience at the University of British Columbia by building a close-knit community, offering experiential learning, and directly tying course work with important current issues ranging from land use

to food security.

Students benefit from smaller class sizes and a high student-instructor ratio. This helps foster connection and relationships – between students, students and instructors, and between topics and disciplines. The program also offers several experiential and practical activities, by making use of the multiple outdoor opportunities available throughout the Lower Mainland. Recent examples include

the second cohort of Land One students, who jumpstarted their studies in September with a visit to the UBC Botanical Garden and Greenheart Tree Walk, where they explored both forests and food systems through interactive, hands-on and team-building activities. Application deadline for the September 2020 cohort is May 31, 2020.

*For more information visit, [land-one.ubc.ca/](http://land-one.ubc.ca/).*



# BUILDING REFORESTATION STRATEGIES THROUGH MACROSCALE ANALYSIS

*Gary Bull*

This week, Dr Sally Aitken, a colleague of mine, was quoted in the L.A. Times on the topic of climate change as it pertains to genetic diversity and reforestation. More and more, today's North American forests are undergoing a myriad of large-scale changes and adversities that affect forest planning and policy decisions. From drought to record snowfall to fires to infestation and disease, forest health, productivity and economics are being severely impacted. Addressing these impacts using the best available science and information tools is critical to finding a sustainable path for all concerned, including the Canadian forest products and renewable energy industries.

Some of my colleagues and I at UBC Faculty of Forestry have been looking at finding research-based solutions that provide ecologically, socially, and economically viable ways for Canadian forestry companies to decide on the best reforestation practices in regions experiencing dryer and warmer conditions. Collaborating with Natural Resources Canada and the Canadian Forest Service, and with the support of Genome Canada, Genome Quebec, Genome British Columbia and Genome Alberta, we looked to the latest tools being developed from genomics to help find

better solutions at the macroscale.

Climate change events occur on a macroscale yet traditional industry practices, such as reforestation, are mostly dealt with at a stand-level scale. In a recent research project, we set out to examine the vulnerabilities of localized stand-level reforestation strategies to climate change events. We decided to focus on a single climate change threat, drought-induced seedling mortality, and looked at how our decisions around this factor, including the use of genetically improved planting stock, (genetic variants within a species selected for specific traits), could affect reforestation success and future forest growth rates.

Prolonged drought impacts are regionally dependent yet have cumulative effects that affect much larger areas such as entire forest areas in the boreal for indeterminate amounts of time. We wanted to know where, when and how much genetically improved planting stock should be planted, how we should prioritize across the macroscale, and how effective would the planting be in addressing the vulnerability of the forest to a climate stressor such as drought.

Traditionally, decision support tools have either



From drought to record snowfall to fires to infestation and disease, forest health, productivity and economics are being severely impacted.”

focused on just the economic or ecological perspective with little thought about how to integrate them into the management of the forest. Our decision support tool, called Q3 (quantify, query and queue) took into account both the economic and ecological factors in order to analyze the link between genetic improvements, stand-level decisions and macroscale outcomes. We applied this to run several scenarios describing planting effort, improved yields and risk to drought-induced seedling mortality.

Our findings showed that adopting genetically improved planting stock strategies across a macroscale could be financially beneficial when factoring in stand establishment constraints and the risks of drought. We are also able to link across spatial and temporal scales to develop macroscale forest management strategies and policies that are consistent with local stand-level forest operation requirements. For example, forest companies operating in Canada's western Boreal forest could now demonstrate the rationale to prioritize younger stands closer to processing mills that had a smaller percentage of conifer growing stocks prior to harvest.

Climate change effects are forcing us to reexamine our existing silvicultural policies and traditional ways of operating in forests. While many of these effects are difficult to predict, utilizing the new research tools, such as Q3, will allow companies to adapt and evolve to the ongoing challenge of managing the forest sustainably.

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# ALEX FRASER FIREGUARD REHABILITATION PLAN ADDRESSES FOREST VALUES

*Kyle Miller and Stephanie Ewen*

On July 7, 2017, lightning ignited fires in the Alex Fraser Research Forest, a 10,000-hectare parcel of crown land managed by the Faculty of Forestry to provide teaching and research opportunities.

Resources and equipment were immediately deployed to suppress the fires. This included the construction of fireguards, areas strategically cleared of trees and other vegetation that serve as barriers around the perimeter of a wildfire. Fireguards work to stop a fire's spread by removing all sources of fuel.

Lasting several months, suppression efforts to manage seven fires that tore through the research area succeeded in protecting 90 per cent of the forest

Although critical to the successful fire suppression efforts, the fireguards did impact the forest's environmental, economic, and social values. However, when assessing some of the potentially negative impacts of fireguards it is important to remember that fireguard construction is often an essential tool in the protection of life and property.

What happened next presented partnership and new



Fireguard impact to natural drainage patterns. Stream has been diverted out of its original channel – North Chilcotin, BC.



research opportunities for the Faculty.

By October 2017, the University of British Columbia and the Cariboo-Chilcotin Natural Resource District forest professionals had collectively assessed the impacts of suppression efforts and developed Wildfire Suppression Rehabilitation Plans (WSRP) to address the impacts of the fires and fireguards. The WSRP's address four key areas: impacts to natural drainage patterns; increased exposure to erosion processes and slope destabilization; increased fuel loading as a result of pushed over coarse woody debris; and increased potential for invasive species establishment on disturbed soils. The sendai framework for disaster risk reduction was considered during development of the WSRPs to identify opportunities to build back better post suppression activities. Treatments in accordance with the Wildfire Regulation were selected and rehabilitation began.

At the same time, it was recognized that the establishment of fireguards also created other impacts to the research forest that would not be directly addressed through the Wildfire Regulation. For example, merchantable coarse woody debris does not always qualify for fire hazard abatement treatments, and fireguards showed evidence of continuous disturbance due to public access. Public access would inhibit the fireguards from recovering naturally whilst continually impacting aquatic and terrestrial habitat dependent on successful recovery of the fireguard.

UBC forest professionals were able to plan and implement treatments that both aligned with the Wildfire Regulation and had secondary benefits that addressed many of the additional impacts identified.

One eligible treatment that could address multiple

impacts is pullback. Pullback is the replacement of the organic soil, and/or mineral soil, and/or coarse woody debris that was displaced during the construction of the fireguard. A rough and loose mounded appearance occurs where displaced soil and debris is replaced across the width of the mineral soil fireguard. The benefits of pullback include returning displaced productive soils and seedbeds; creating a suitable environment for re-vegetation, restricting increased access to the public, and increasing the rate at which the fireguard will return to a productive land base. Although pullback can be more costly than other treatments such as water bars or ditching, the additional benefits seem to resolve common impacts identified by various land users from foresters to ranchers to recreationalists. Further study may help guide forest professionals by analyzing the cost/benefit analysis of various rehabilitation treatments.

The Alex Fraser Research Forest, the Faculty, UBC, and the Natural Resource District were able to address environmental, social, and economic needs with the creative use of treatments. By utilizing UBC staff to create the WSRP, UBC was able to fund treatments outside of the scope of wildfire suppression rehabilitation such as wood fibre recovery that complemented a holistic approach to the recovery of land disturbed from fire suppression activities. The ongoing monitoring of results continues, and will allow for even further improvements as we learn more.

*Stephanie Ewen, MF, R.P.F., is the manager of the Alex Fraser Research Forest. Kyle Miller is the fire rehabilitation coordinator for the Ministry of Forests, Lands, Natural Resource Operations and Rural Development Cariboo region and can be reached at [Kyle.Miller@gov.bc.ca](mailto:Kyle.Miller@gov.bc.ca).*



# PROTECTING WILD SALMON IN UNCERTAIN TIMES

*Scott Hinch*

When I started my academic career in British Columbia in the early 1990s, I had no idea how much ecological transformation was to come, and how it would impact my research on wild Pacific salmon, a keystone species of the forest ecosystem.

Climate change is central to our work at the Faculty of Forestry's Pacific Salmon Ecology and Conservation Laboratory, where the team observes and responds to its impacts on fisheries. Most evident changes include rising water temperatures in fresh and marine environments; changing food webs; and migration patterns and survival rates.

Addressing these challenges to protect, conserve, and manage wild Pacific salmon is a significant aspect of my research. I was quite humbled by the recognition of this research when this October I had the distinct honour of accepting the American Fisheries Society's 2019 Award of Excellence.

Although the award – the Society's highest for scientific achievement – is presented to an individual for outstanding contributions to fisheries and aquatic biology, the strength of my research team has played a major role in this achievement. I am extremely grateful and would like to acknowledge the contributions of the many researchers and students over the years who have worked with me.

Over 20 years ago, one of the first key moments in my career, eventually led to a first-of-its-kind, small fish tracking and health monitoring method.

At that time, some of the largest salmon runs in Canada – Fraser River sockeye – started to return to spawning grounds over a month early. Millions of salmon were dying prematurely with no explanation. As a young professor, I had one of those pivotal “what if” moments? What if we tag and track salmon with telemetry during their long coastal and river migration, but before they



are released, take a little blood or tissue sample so that we could characterize differences between normal and abnormal migrants? And what if we test hypotheses about the causes of the problem by exposing migrants first to different thermal, salinity, and hormonal treatments before allowing them to continue on with their migrations?

The findings were remarkable, discovering the role of warming rivers and newly discovered viruses. Extraordinary insights into wild fish behaviour and survival were realized by the evolution of linking tissue biopsy with telemetry tracking which relies on miniature transmitters implanted in the fish that communicate with receivers strategically located at points along the marine system.

Each sequential study involved adding additional collaborators bringing unique talents and approaches in physiology, genomics, and recently with the social sciences so that we could learn how to get our research results mobilized by management and policy decision makers.

Currently, my focus is on the future of fisheries. What more can we do to ensure science-based decision making plays an integral role to the development of fisheries policies? And what research will help us protect and conserve species impacted by climate change?

In a mere 20 years, I have witnessed the decline of some of the greatest and most iconic salmon stocks in Canada. This is concerning in itself, but also when considering the vital connection between strong salmon runs and healthy forests. Salmon runs play a key role in moving nutrients

from freshwater environments to the ocean and back, following spawning their carcasses provide nutrients for the forest; and they are a vital food source for a wide range of forest wildlife.

My research is largely with Pacific salmon, but it highlights the uncertainty and unpredictability of fisheries. From the 1950s to 1990s, fisheries models that predicted the numbers of returning sockeye salmon to the Fraser River worked well, but now the environmental conditions these models were based on no longer exist.

Our team's recent work has shown that some salmon populations are more resilient to warming climates than others. One sockeye population we have studied has a unique cardiovascular system enabling higher cardiac capacity at high water temperatures. But there is still more research needed to better understand rapid adaptation and how it may enable some populations to sustain themselves in a warmer future. Many populations have a portion that stray from their natal areas. Strays that possess thermal adaptations could save populations that are unable to adapt to increasing temperatures.

Although much has been achieved, there is more to do as we address pressing challenges and work with policy makers to ensure our fisheries are able to thrive.

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# LEARNING FROM NATURE – RECONSTRUCTING CELLULOSE INTO HIGH PERFORMANCE MATERIALS

*Feng Jiang*



As the oldest and largest living creatures on earth, trees have been pivotal both ecologically and economically in supporting the prosperity of humankind for millennia. Although the invention of petroleum-based plastics saw the prominence of forest products fade, over the past decade we have witnessed a resurgence in the popularity as concerns around plastic pollution increase and the benefits of a circular economy are advanced.

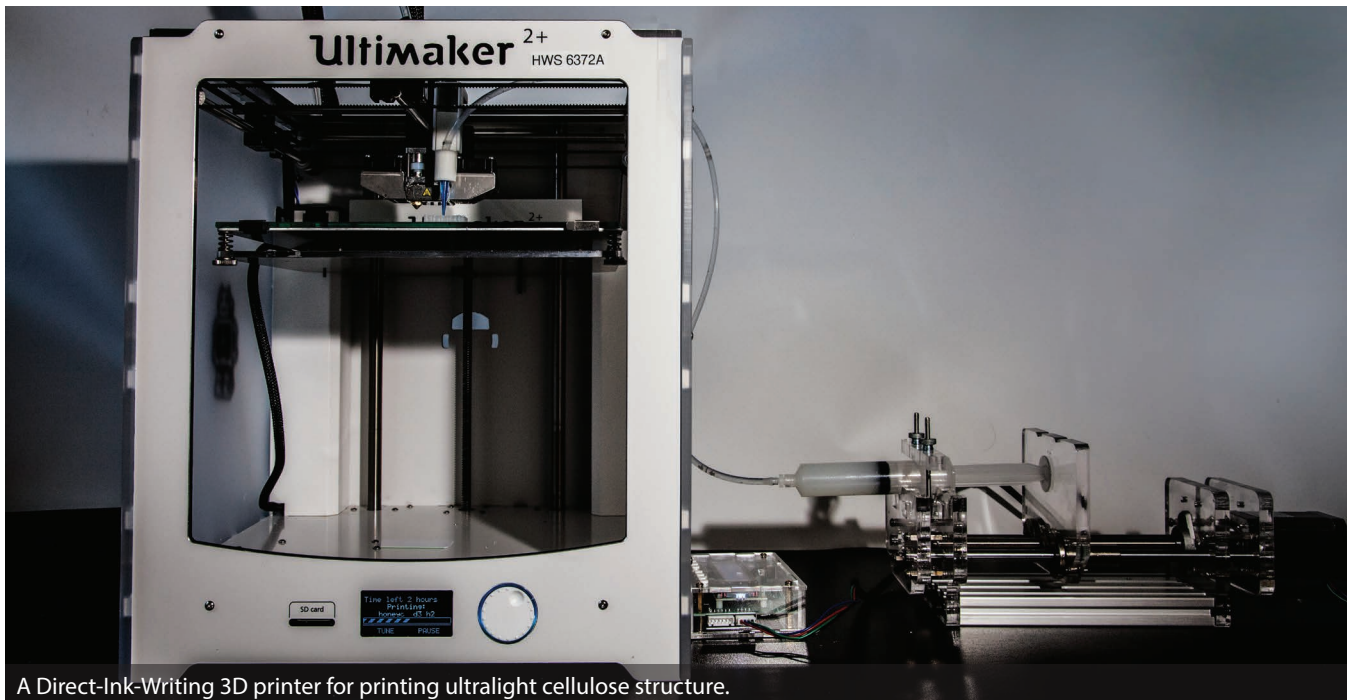
With this resurgence, we are seeing the range of forest products expand beyond conventional wood, pulp, and paper products to include high-performance cellulose-based materials. My lab is focused on the latter. We design high-performance materials by mimicking nature's processes and using simple and abundantly available elements and materials.

Nature has created numerous smart and sophisticated designs – from butterfly wings to beetle shells – reflecting

millions of years of evolution. It is always inspiring to learn how nature can manipulate these sophisticated designs with less than 10 out of the 118 elements in the periodic table.

Structural materials that are lightweight, strong, and tough are highly desirable in many fields including building and construction, transportation, and aerospace. In general, strength and ductility are considered two opposite characteristics that cannot be found in a single material. However, strong and ductile materials have existed in nature for thousands of years. One excellent example is the abalone nacre which consists of no more than six elements, and the only adhesive is a hydrogen bond, the same force holding the DNA double helices together.

Inspired by the simplicity of nature, my lab investigates how cellulose – the most abundant polymer on Earth – can be used to develop materials with the strength and toughness suitable for engineering applications. Cellulose is one



A Direct-Ink-Writing 3D printer for printing ultralight cellulose structure.

of the major components that can be found in all lignocellulosic biomass, including trees, herbaceous plants, agricultural residues, and marine plants. From the molecular level, a cellulose chain consists of hundreds to thousands of glucose units strung together. When 30-40 cellulose chains pack together in parallel by hydrogen bonds, a very strong nanomaterial, nanocellulose, can be formed with the mechanical strength comparable to some existing engineered materials such as Kevlar, carbon fibres, and steel. However, it is a tremendous challenge to transfer the nano-scaled mechanical properties to the bulk materials, such as wood and other wood products, owing to both the vascular structure and the limited hydrogen bond networks in the wood cell walls due to the presence of other heterogeneous polymers such as lignin and hemicellulose.

My lab recently published a paper in the *Journal of Materials Chemistry A* outlining our research to address this challenge and make strong and tough materials out of cellulose using simple processes found in nature. In order to resume the hydrogen bond networks among cellulose elementary fibrils, lignin, and hemicellulose are first removed by chemical treatments. This enables additional hydrogen bonds

to form by compressing the wood under different moisture contents, where water molecules can serve as structural components to bridge the neighbouring elementary fibrils by forming 3D hydrogen bond networks.

Our key finding is this “water-glued wood” showed significantly improved tensile strength and toughness, more than six and 10 times greater than the original wood, respectively. Due to the low density of cellulose, the specific strength of this “water-glued wood” is much higher than concrete, stainless steel, and superlight aluminum alloy, manifesting a new type of material inspired from nature.

Delicate architecture design represents another research direction in my lab inspired by nature. Paper wasps can be considered as a pioneer in house design using cellulosic materials. Wasps diligently gather fibres from wood and produce pulp using saliva which they reconstruct into a honeycomb structure. By learning from wasps, we have developed a 3D printing technology – a high-resolution computer-aided design and fabrication technology that enables production of complicated and customized 3D objects in a controlled manner – that can produce a similar structure using cellulose fibres.

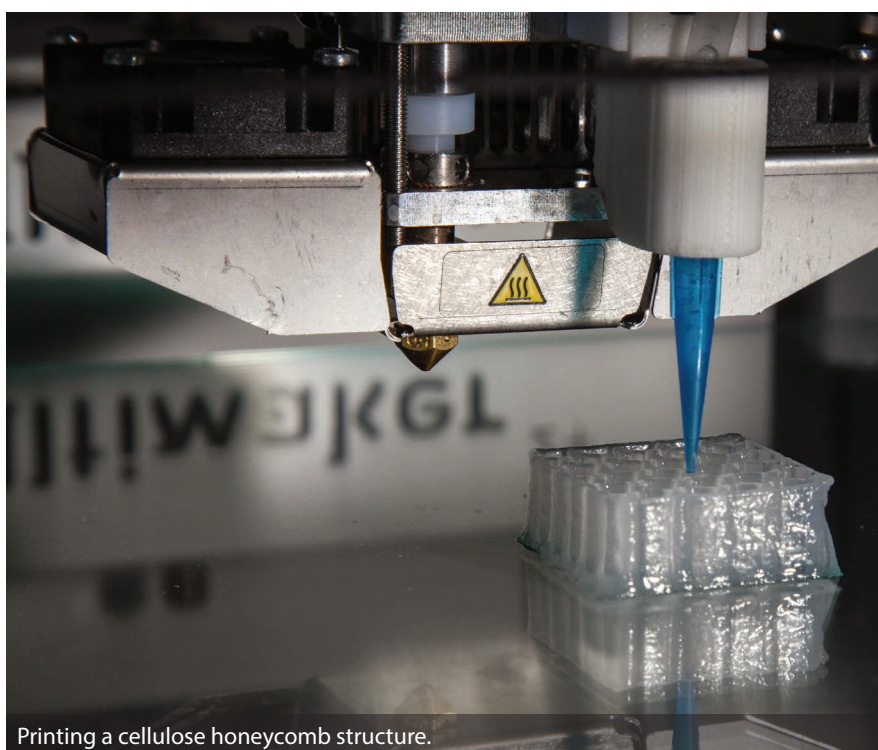
Once again hydrogen bonding

plays a critical role in binding cellulose fibres together, owing to the large surface area created by breaking down large cellulose fibres into nanofibrils or even molecular level by nanotechnology. By comparing 20 micrometre wide cellulose fibres and 2 nm nanofibrils, the surface area of the latter is approximately 10,000 times greater than the former, meaning more hydrogen bonds can be formed between these cellulose nanofibrils.

By using this technology, we have printed a lightweight honeycomb structure with excellent mechanical properties. It is light enough to stand on top of a dandelion, yet strong enough to withstand over 15,000 times of its own weight or the weight of a kettle ball standing on top of the cellulose honeycomb structure. When wet, this structure also demonstrates superior flexibility that can be bent, rolled, and twisted in all directions. It is envisioned that this type of cellulose honeycomb structure could be used in the future as a lightweight structural component, thermal insulation layers, or for other consumer products.

In my lab, we are trying to push the limits of 3D printing of cellulosic materials by printing different types of cellulose, exploring varied geometry and complexity, tuning the mechanical performance, and incorporating other ingredients for improved functionalities such as fire-retardancy, water treatment, and biomedical applications. In addition to the nacre-mimicry and 3D printing technologies, our team is also developing technologies including high-yield and high-performance lignocellulosic nanomaterials that can be used for making commodity products, thermal insulation, ionic conducting materials, fire-retardant wood products, polymer emulsions, and thermal-regulating fibres and foams for infrared shielding and thermal comfort.

*Dr Feng Jiang is a Canada Research Chair (Tier II) in Sustainable Functional Biomaterials at the Department of Wood Science. He can be reached at [feng.jiang@ubc.ca](mailto:feng.jiang@ubc.ca).*



Printing a cellulose honeycomb structure.

# ACCOMPLISHED ALUMNUS IS STILL PLANNING FOR THE FUTURE



By the time you get to be 96 years old, it's fair to say that you know a thing or two. For Faculty of Forestry alumnus **Gerry Burch** (BASc '48), the list of things he knows is extensive: a brief conversation can touch on the history of forestry in British Columbia, the growth of the Faculty, and the importance of philanthropy.

Get him going, and this highly respected "forester's forester" will entertain a listener with anecdotes, like the time he watched the harvesting of a second growth stand that he had planted 50 years previously, or what it was like back in the day when the role of forester was underappreciated.

"After I graduated from UBC and had my first job interview with the vice president of a major company, I learned that there were no jobs for a forester, only for a cruiser or forest engineer," he says. Gerry took the job as a timber cruiser, and gradually worked his way up the ladder at BC Forest Products, culminating in the position of vice president.

Another thing Gerry knows about is charitable giving. He's done a lot of it, and plans to do even more once he passes from this world. By leaving a bequest to the Faculty in his will, Gerry is blending a current gift with a future one to create a long-term impact.

Currently, Gerry supports the Gerry Burch Scholarship in Forestry, for undergraduate students entering second or third year in the BSF program. Since it was established in 2009, this scholarship has boosted confidence and relieved financial stress for 10 students.

His will includes a gift to continue this scholarship.

"By putting a bequest to the Faculty in my will, I can still take care of my own needs and leave something to my family. They come first, of course," he says. "I like knowing I can still have an impact on students after I'm gone."

In 1994, Gerry helped found the Faculty Alumni

"I like knowing I can still have an impact on students after I'm gone."

Fundraising Committee and acted as the vice-chair. He was also co-chair of the fundraising campaign that built the Forest Sciences Centre. "We had a three-person organizing committee, and we encouraged forestry companies to donate funds for specific rooms in the Centre," he says. "My wife and I donated a lab, because you can't ask people to give if you aren't giving yourself"

Unlike many people, Gerry is not following a family tradition of giving; he's making one. "My family didn't have much when I was growing up," he says. "I guess I just got into the habit of making donations, and I'm still doing it!"

Gerry also encourages his fellow alumni who are retired or semi-retired to consider establishing a student scholarship or bursary. "It doesn't take much money to set up, but it means a lot for students," he says. "I receive thank you letters from students that are amazing and heartwarming."

To find out more about bequests or setting up a student award, please contact Emma Tully at [emma.tully@ubc.ca](mailto:emma.tully@ubc.ca) or 604.822.8716.

## Benefits of leaving a gift in your will:

- A bequest costs nothing now, and will allow you to support something you care about in the future.
- You may change your will at any time if your circumstances change.
- You retain control and use of your assets during your lifetime.
- Your estate receives a donation receipt for income tax purposes.

# ALUMNI KEEP IT IN THE FAMILY



**Rick Girard** (BSF 1992) and **Shawna Girard** (BSF 2018) are never at a loss for dinner-table conversation. Growing up in, studying, and working in forestry a generation apart makes for lively discussions.

"It's been really cool going into the same industry as my dad. He's been able to give me some great insights over the years," Shawna says. "It's also nice to be one of multiple generations of my family in forestry."

But Rick never pushed forestry on his daughter. In fact, Shawna's first degree is a BSc in Psychology from Queen's University.

Rick's family has lived in Prince George, BC for four generations, starting with his grandfather who moved there in the early 1960s. Both Rick's grandfather and father worked in logging, trucking and the local sawmills. So forestry was a natural direction for Rick's post-secondary education.

"I was in the Forest Resource Technology Program at the College of New Caledonia, and made a connection with UBC by convincing the faculty at CNC to reinstate the Coastal Field Trip, which had been cancelled in previous years," he says. "We visited the Faculty of Forestry and I particularly remember Dr John Worrall's class on dendrology, as well as our visit to the Malcolm Knapp Research Forest."

For two years after graduating from CNC Rick worked at Clear Lake Sawmills in Prince George. With encouragement from his supervisor he applied to UBC Forestry, and graduated with his BSF in 1992.

After graduating, Rick returned to Prince George to

continue his career at Clear Lake (by then owned by Canfor). He and his wife Jane were married that same year and started their family. Shawna came first, then Kristie, and then Jackson.

In 1998 Rick left Canfor to join DWB Consulting Services, helping them open a branch office in Prince George. "The opportunity to try the consulting business and change my career path was exciting," he says. "It was also scary to leave an established company, but my colleagues at Canfor gave me lots of encouragement."

David and Daniel Bedford founded DWB Consulting Services in 1990. The firm provides a full suite of environmental, engineering, and forestry services to clients throughout western Canada. DWB currently has five offices in northern and central British Columbia, and over 200 staff.

In 2003, Rick became the General Manager for DWB's northern operations, and became a corporate partner in 2006. Just a few years later, Shawna began working in the DWB office during the summer. "I enjoyed the exposure to the office environment, but then I wanted to try out field positions," Shawna says. "I did field work for a few summers while studying at Queen's, and one summer I just decided that I liked forestry more than psychology."

Shawna applied to UBC, and began her forestry studies immediately after graduating from Queen's. "I adjusted really well to the faculty because there are a lot of mature students there who are on their second degree or started their first degree a little later than usual," she says.

As for her decision to get the same degree as her dad, Shawna is pragmatic. "Working at DWB I had been mostly exposed to the operations side of forestry, so I leaned that way at school. Then calculus got in the way, so I shifted my focus to forest resources management."

After graduating with her BSF in 2018, Shawna moved to Kimberly, BC to work for Canfor as a Forester in Training.

"I was very proud when she graduated, and I supported her transition to working for Canfor," Rick says. "Her career path is the opposite of mine: she started out working as a consultant with me, and now she's working for a licensee."

Shawna aims to get her RPF within the next several months, and hopes to also become an applied biologist. She's also keen to stay in the Kootenays for a while. "As much as my dad has an incredible reputation, I don't want to ride his coattails," she says. "Moving away has given me the opportunity to find out where I fit in the forest industry."

Both father and daughter have stayed involved with the Faculty. In 2017 Rick and several classmates organized their 25th class reunion, which included campus tours led by Shawna. And in 2019 Shawna and Rick attended the annual alumni reception together at the ABCFP Conference. "It was another proud moment in my forestry career," Rick says.

One of many moments to spark dinner table conversation whenever Rick and Shawna get together.

# FACULTY OF FORESTRY ALUMNI RECEPTION AT THE ABCFP CONFERENCE 2020

Whether you are attending the 2020 ABCFP Conference or live in the Nanaimo area, join us for an Alumni Social hosted by the UBC Faculty of Forestry. Come catch up with old friends and meet new people.

Thursday, February 6, 2020 | 5:00-6:30 pm  
Vancouver Island Conference Centre, Departure Bay Room,  
101 Gordon Street, Nanaimo, BC.

Guests are welcome. Advance registration is required. Register online at [getinvolved.forestry.ubc.ca/alumni/events/](http://getinvolved.forestry.ubc.ca/alumni/events/) or contact Michelle Lindsay at 604.827.0297 or [michelle.lindsay@ubc.ca](mailto:michelle.lindsay@ubc.ca).



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