Colin Chisholm

RPF, MSc.
Assistant Forest Manager
Aleza Lake Research Forest

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Education

2016 – 2021 **Masters of Science**, Natural Resources and Environmental Studies – Forestry. Graduated *with distinction*.

Thesis: Quantifying key metrics of ecosystem biodiversity in natural and managed sub-boreal forests of British Columbia.
https://doi.org:/10.24124/2021/59149

Supervisor: Dr. Ché Elkin
University of Northern British Columbia

1994 – 2000 **Bachelor of Science**, Natural Resources Management – Forestry
University of Northern British Columbia

Research and Teaching Interests

Personal interests include:

- Forest Ecology and Biodiversity
- Remote sensing applications in Forestry (e.g. Aerial laser scanning/lidar)
- Forest Growth and Yield and Site Productivity

Research Projects and Experience

2016 – Present Predictive Ecosystem Classification

A collaborative research project involving the Province of British Columbia (MoFLNRORD, MoE), University of Northern BC, University of BC, Thompson Rivers University, Dalhousie University, and the Aleza Lake Research Forest.

Models creating high-resolution predictive ecosystem classification maps are generated across three pilot sites of which the ALRF is one. I provided oversight for the initial lidar data processing for all three pilot

sites. At the ALRF, I coordinated field data collection, modelling, and production of predictive maps.

I am the lead developer/coordinator for an R package/library providing key computational functions used for sampling design, field data processing, creation of raster covariates, and predictive modelling.

2016 – Present Rapid Assessment of Forest Ecosystems using LiDAR.

In collaboration with Dr. Ché Elkin: Assessing metrics indicative of forest structural attributes, biodiversity, and site productivity. Including:

- Forest stand measurements
- Cataloguing forest herbaceous and shrub species abundance
- Surveys of Course Woody debris
- Statistical analysis and modelling of empirical and remote sensing data

2015 – 2019 Ash Nutrient Cycling

In partnership with UNBC faculty and the federal AshNet group experiments are ongoing relating to the use of ash products from Bio-energy facilities as potential soil amendments. I provide mapping and GIS support; I have assisted with: the establishment of field plots, tree growth data collection, and collection of tissue samples for analysis. In the second phase of the project, I have planned and coordinated the use of heavy equipment for the mechanical spreading of ash.

2015 & 2016 Established long-term Spruce, Western White Pine, and Western Larch seedling trials at the Aleza Lake Research Forest.

2013 – 2014 Assisted a M.Sc. Student with the establishment of an Ash Soil Amendment and Seedling trial at the Aleza Lake Research Forest.

2002 – 2005 Research Assistant to Dr Lito Arocena, UNBC.

Responsibilities included management of lab space, field sample and data collection, processing soil and mineral samples, and subsequent cataloguing and generation summation tables and graphics. Sample processing included:

- Operation of Scanning Electron Microscopy: Imaging and elemental analysis
- Operations of X-ray Diffraction Unit for the identification of mineral compositions
- Preparation of samples for ICP (Inductively coupled plasma-mass spectrometer)

Teaching Experience[1]

2016 – Present — Forest Practices and Management — *FSTY408*

Guest lectures and led lab exercises integrating prior teachings, legislation related to forest planning, and modelling of sustained yield forest harvest scheduling. The Aleza Lake Research Forest Management Plan and Timber Supply Analysis are often used as a case study.

2022 – Present — Forest Ecosystem Modelling — *FSTY405*

Guest lecture highlighting model methods and products, and product use from BC's Predictive Ecosystem Modelling of Biogeoecosystem Classification (BEC) project. This project models BEC Site Series across broad landscapes. The Aleza Lake Research Forest is used as a case study area.

2013 – Present — Silvculture — *FSTY305*

Guest lectures and leading or assisting with various lab modules. Integration of forest silvicultural theory with professional practitioner experience. Laboratory exercises focused on quantitative forest measurements and modelling, and experiential learning opportunities.

2016 – Present — Geographic Information Systems — *GEOG300*
and Advanced Remote Sensing — *GEOG457*

Provided lectures including various topics related to Aerial Laser Scanning covering a range from a general introduction to advanced applications. Advanced applications included best practices for Enhanced Forest Inventory, Forest structure metrics for habitat indices, and my research with this data.

2015 – Present — Field Applications in Resource Management — *NREM333, FSTY333*

Taught or co-taught various modules in forest and classroom. Modules ranged in time from one hour to full-day sessions. Provide logistical to field camp instructors. Topics have included: Forest Stand Dynamics, Mixedwood Forests, Forest Stand Regeneration, and Integration of Remote Sensing Data for Strategic and Operational Forest Planning.

2013 – Present — Forest Biology and Silvics — *FSTY209*

Leading forest-based laboratory exercises integrating semester's learning into real-world examples.

2015 – Present — Undergraduate Projects — *NRES422*

Supervision, co-supervision, and advising of various undergraduate independent study projects including:

- Supervision of Hannah Kluss' *Remote sensing for enhanced forest inventories* (2019).

[1] For clarity, *20xx – Present* indicates that I have provided teaching and lab support services during the period and that I generally remain available to do so. However, I may not have provided these services every year.

- Advised on Alivia Cavallin's *Using LiDAR Data to Predict Soil Physical Characteristics* (2019). I provided instruction and technical review of lidar data processing.
- Supervision of Samantha Pederson's *Review of silvicultural systems* (2016).

2013 – Present Graduate Projects

I have provided guidance and support for graduate projects. Examples include:

- Nicola Gilbert (MSc., 2018) *Application of bioenergy ash as a fertilizer for conifer seedlings in a sub-boreal reforestation site in the central interior, British Columbia'.* Supervised by Hugues Massicotte and Michael Rutherford. Advised on experimental design and location.
- Malek Haghshenas (MSc., 2021) *The response of subalpine fir (Abies lasiocarpa (Hook.) Nutt)) growth and resilience to climate change in Northern Rockies, Interior British Columbia, Canada.* Supervised by Lisa Wood. Advised on sampling within the Aleza Lake Research Forest.
- Luiz Terazan (MSc., 2022) *Evaluating Site Index models derived topography and predictive ecosystem models.* Supervised by Ché Elkin. Advised on sampling design, models, and modelling processes.
- Faezehalsadat Khalifehsoltanian's (PhD, *on-going*) *Evaluating forest growth potential using remote sensing data, and assessing the sensitivity of site index models to future climate change* . Supervision by Ché Elkin. Advised on experimental design including sampling intensity, plot establishment, and key metrics collected. Provided relevant geo-spatial data from the Aleza Lake Research Forest.

Conferences and Presentations

Sept. 2021 *Partial Retention Silviculture Systems in Central and Northern BC Ecosystems: Practical approaches for improved planning in stand structural retention.* Co-led/hosted this two-day professional development workshop for forest professionals from industry, government, consultants, and First Nations at the Aleza Lake Research Forest. Activities included classroom and field-based presentations, discussions, and tours.

Feb. 2021 Association of British Columbia Forest Professionals – Forestry Conference. Presented online *Enhancing your forest planning and practices with LiDAR.*

Feb. 2019 Northern Silviculture Committee Conference. Presented *Forests, Biodiversity, and Lasers: tools for taking inventory of our forested ecosystems using aerial laser scanning.*

Oct 2018 Operational Strategies and Measures for Achieving the Chief Forester's Forest Retention Guidance at a Stand and Landscape level in Omineca Region spruce-beetle-impacted areas.

	A professional workshop facilitating learning and discussion between various forest lands managers from government and industry. As an active member of the planning team, I assisted with scoping and vision setting, coordinated speakers, managed implementation logistics, moderated sessions, and presented modules.
Oct. 2018	Keynote speaker at BC Timber Sales' Provincial GIS Users Group. Presented: An overview of current GIS/RS forest research projects at UNBC highlighting lab and faculty resources, graduate student projects, my research, and operational applications of research areas.
Dec. 2017	Sustainable Forestry Initiative sponsored webinar. Co-presented: Remote-sensing LiDAR to measure biodiversity on land certified to the SFI program standard.
July 2017	North American Forest Ecology Workshop hosted by the University of Alberta, Edmonton. Attended the conference. Presented: Examining Biodiversity in Old Forest and Old Growth Forest Stand Structures Using Aerial Laser Scanning.
March 2017	Canadian Institute of Forestry – UNBC Masters Night. Presented: Managing Landscape Level Biodiversity Objectives through Aerial Laser Scanning of Forest Ecosystems

Publications

Chisholm, C. E., Elkin, C., Perkins, G., MacKenzie, W., Ryan, M, Filatow, D., Hengl, T., MacMillian, R., Heung, B., Hill, D., Coops, N., & Dykstra, P. (*in prep.*) Predictive forest ecosystem mapping as indicative of ecosystem processes.
Submission expected: March 2022

Chisholm, C. E. and Elkin, C. (*in prep.*). Long term impacts of forest harvesting on stand structure and vegetation in sub-boreal forests of British Columbia.
Submission expected May. 2022. Target journal: Canadian Journal of Forest Research.

Emilson, C. E., Bélanger, N., Brais, S., Chisholm, C. E., Diochon, A., Joseph, R., Markham, J., Morris, D., Rees, K. V., Rutherford, P. M., Venier, L. A., & Hazlett, P. W. (2019). Short-term growth response of jack pine and spruce spp. To wood ash amendment across Canada. GCB Bioenergy. `https://doi.org/10.1111/gcbb.12661`

Domes, K. A., de Zeeuw, T., Massicotte, H. B., Elkin, C., McGill, W. B., Jull, M. J., Chisholm, C. E., & Rutherford, P. M. (2018). Short-term changes in spruce foliar nutrients and soil properties in response to wood ash application in the sub-boreal climate zone of British Columbia. Canadian Journal of Soil Science. `https://doi.org/10.1139/CJSS-2017-0115`

Professional and Technical Expertise

Registered Professional Forester with the Association of British Columbia Forest Professionals (since 2012).

Project Management: I have extensive experience managing projects of various scales from small budget individual projects to projects involving hundreds of employees and subcontractors with budgets in the millions of dollars. Projects have been located regionally and internationally.

Technical skills

- Geographic Information Systems, including the management and maintenance of the ALRF's GIS system, LAS data processing for research and operational use, design of customized map graphics for publication

  Proficient with: ESRI ArcMap, QGIS, SAGA, LASTools, FUSION/LDV

- Web and desktop publishing, including creation and management of websites using CMS systems such as WordPress, Joomla, Moodle; proficient with standard desktop document processing; proficient with the LaTeX typesetting system.

- Statistical Analysis and modelling using CRAN-R including proficiency with R for spatial analysis and modelling. Including: `tidyverse, geo-computation, lidR, randomForest, lmer, rmarkdown, bookdown`, and more.

- Forest modelling for Growth and Yield and Timber Supply Review. Including TiPSY, TASS, VDYP, and others.

- Forest measurements and surveys for operational site-level and landscape-level planning, and research projects. This includes coaching and training undergraduate and graduate students on forest data measurements

Work Experience

2012 – Present Assistant Forest Manager, Aleza Lake Research Forest.

Strategic and operational management of the research forest and broad organizational objectives. Sample responsibilities include:

- Strategic planning including preparation of multi-year management plans
- Operational planning and supervision of activities on the land including site-level planning and supervision of activities (e.g. harvesting, planting, road construction, etc.)
- Management of staff including hiring, orientation, and specific task training including safety training
- Engagement with UNBC and other community groups assisting with research initiatives and educational objectives

2006 to 2012	Project Coordinator, Folklore Contracting Ltd. Coordinating activities of multiple tree planting camps (50 - 150 people) including ordering trees, establishing and reviewing plans, and ensuring adherence to standards and expectations. Trained and facilitated training of staff. Managing GIS and web applications. Auditing operations for certification processes and continual improvement.
2001, 2005-2008	On Site Director (Guatemala), Canadian Mennonite University Coordinated volunteer placement with various humanitarian aid projects in Guatemala (e.g. orphanages, community development groups, and housing construction), language and cultural studies, and administration of budget (January – April of each year). Liaison between school staff and instructors, facilities personnel, and special event coordinators. Responsible for the care and safety of staff and students.
1997 – 2001	Silviculture Field Supervisor, Canfor. Managed silviculture operations including tree planting, site preparation and Integrated Pest Management. Trained and led staff. Conducted a First Nations training initiative. Solved problems and developed action plans. Developed performance management systems. Reported on program development to supervisors.

References

These persons are familiar with my professional qualifications and my character:

Michael Jull RPF, MSc. (*supervisor*)
Manager, Aleza Lake Research Forest

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Dr. Ché Elkin
Associate Professor – Mixedwood Ecology Chair
Ecosystem System Science and Management
University of Northern British Columbia

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John Pousette MSc.
Major Projects Team Lead – Omenica Region (Retired)
BC Ministry of Forest Lands Natural Resources Operations and Rural Development

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