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Canadian Wood Fibre Centre

Who we are and what we do

2010–2011

Canadian Wood Fibre Centre
Working together to optimize wood fibre value – creating forest sector solutions with FPInnovations

Canada

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Canadian Wood Fibre Centre – Who we are and what we do 2010–2011

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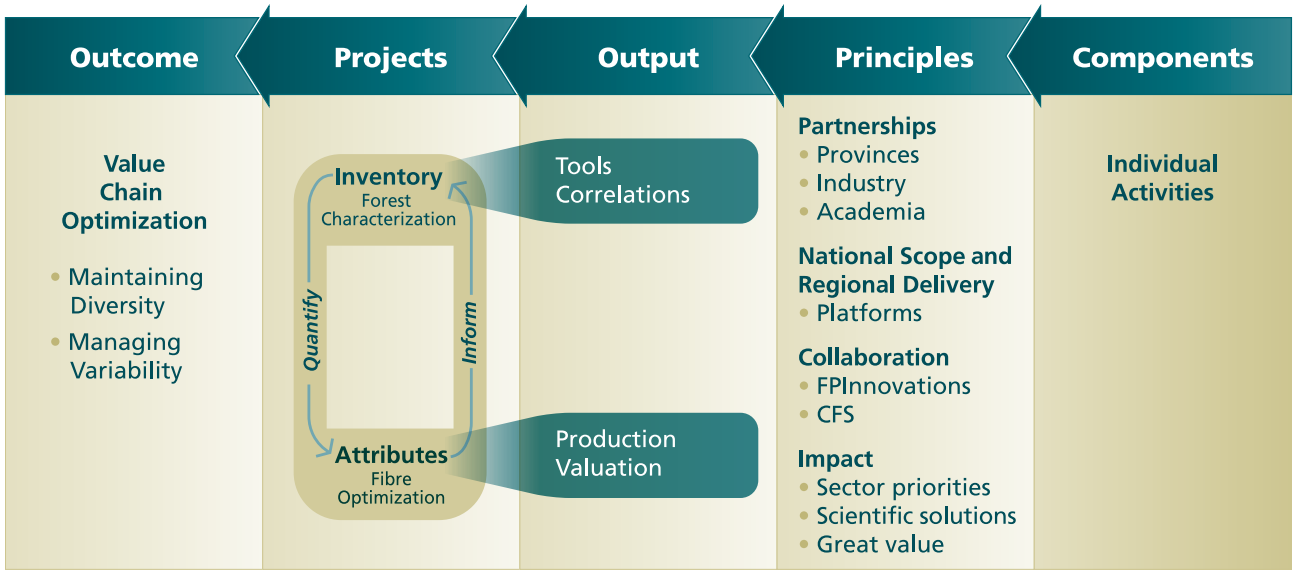
Canadian Wood Fibre Centre – Who we are and what we do

The following is an overview of the research and employees of the Canadian Wood Fibre Centre (CWFC) as of June 1, 2010.

Value chain optimization provides integrated solutions that enable the right tree to be grown, harvested, transported and manufactured into the right products for the right market at the right price. This goal, shared by FPInnovations and the CWFC, is the guiding force of the CWFC Research Framework and drives research activities as shown below.

Canadian Wood Fibre Centre Research Framework



All research components of the CWFC respond to the Research Framework.

For more detailed information, refer to the *Canadian Wood Fibre Centre Implementation Plan, 2009–2011*, which you can find at warehouse.pfc.forestry.ca/HQ/31720_e.pdf.

Tools: Locating diversity

Inventory systems for spatially quantifying forest structure and resource and related fibre attributes to enable product segregation and maximize value recovery.

CWFC components and their leads and locations*

Impact of partial harvesting on tree grade projections for northern hardwoods of Acadian forest region To develop accurate predictions for product yields from partial harvesting operations in northern hardwood forests, the accuracy of tree grade projections needs to be quantified. The impact of partial harvesting on tree grade projections is largely unknown and is assumed to be constant in yield forecast models. Such information is required for inventory processes and the optimization of the wood process chain on the "upstream" section of the product value chain.	EdwinSwift (AFC)
Enhanced forest inventory The main objective is to develop methods for using ground-based and airborne imageries (e.g. terrestrial and air Light Detection and Ranging [LiDAR]) to assess wood qualities and quantities at high spatial resolution. These methods will be validated with data sets collected across Canada. A secondary objective is to improve the flow of information on wood resources along the forest/wood products chain by adapting forest information and planning systems to use improved information from imagery-aided inventories. The k nearest neighbour (KNN) method has been developed to effectively map the stand attributes from the group of pixels.	Chhun-Huor Ung (LFC)
Toward a forest inventory that can predict the properties and economic value of hardwood in eastern Canada Tree characterization as part of the forest inventory will give users of hardwood trees information on the quantity and quality of timber available in a stand before trees are harvested. This information will lead to better decisions based on linking wood attributes to market needs. Two types of methods are being developed. The first type concerns the non-destructive measurements of velocity by the acoustic probe and of the parameters of the crown, branchiness and bole taper through the terrestrial LiDAR. The second type is the statistical analysis of correlation between physico-mechanical properties of wood and non-destructive measurements.	Chhun-Huor Ung (LFC)

***Locations**

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Evaluation of structural stand density management models for boreal conifers The objective is to evaluate the empirical predictive ability of structural stand density management models for boreal conifers when used in stand-level management planning and forest inventory applications. These structural yield prediction models enable resource managers to predict size-dependent volumetric yields, recoverable products, fibre attributes and economic values by species, site quality and density management regime.	Peter Newton (GLFC)
IVY-FIBRE: an integrated decision-support system for predicting tree growth and fibre attributes Development will continue on an integrated decision-support system called IVY-FIBRE, which combines prediction of tree growth, fibre attributes and product recovery for major Canadian boreal tree species for stand structures ranging from simple to complex. A beta-version of the system software has been completed, and feedback from the user community will be used to increase the system's functionality and uptake.	Art Groot (GLFC)
Advanced Forest Resource Inventory Technologies (AFRIT) project Forest resource inventories represent the basic information that forest managers and planners need to improve efficiency, reduce costs and add value to the resource. The AFRIT project is an aggressive research and development program that focuses on developing innovative forest inventory technologies, techniques and tools targeted at enhancing the accuracy, precision and spatially explicit knowledge of the volume, value and distribution of wood fibre in Canada.	Doug Pitt (GLFC)
Managing for value in lodgepole pine: Using LiDAR to improve prediction of wood quality and fibre attributes from forest inventory High-resolution LiDAR data for the Alberta foothills can be used to generate stand structure information for the sampling sites used in the wood quality study at Weldwood of Canada Limited's site in Hinton, Alberta. Development will continue on the partnerships and research capacity to use this improved data set to evaluate the relationships among inventory variables and wood and fibre attributes of interest. The objective is to produce robust statistical relationships that will be used to generate new models for forest management.	Jim Stewart (NoFC), Roger Whitehead (PFC)

Correlations: Understanding diversity

Techniques and methods to relate fibre attributes to tree, stand and site characteristics.

CWFC components and their leads and locations*

Mapping fibre attributes from forest and environmental variables in Newfoundland and Labrador (NL) Methods and tools will be developed to map fibre attributes to support the optimal management and use of fibre resources in NL. This includes (i) the development of models that link forest and fibre attributes at tree, plot and landscape levels and (ii) the application of emerging inventory tools to enhance mapping capabilities. Products will be integrated within operational inventory systems and will contribute to a regional partnership effort addressing the competitiveness of NL's forest industry.	Joan Luther (Cornerbrook)
Correlation between crown characteristics and wood attributes in plantation-grown white spruce The aim is to determine whether wood traits can be predicted by crown characteristics by estimating the strength of relationships between the two variables. Research will build upon marker-aided selection for white spruce, which measured crown and branch characteristics of close to 700 trees in a replicated provenance-progeny test. The research also assessed the radial profile for 12 wood physical traits at breast height using SilviScan™ technology.	Jean Beaulieu (LFC)
Linking white spruce wood fibre traits to site and stand conditions at the southern Quebec scale Models will be developed to help predict white spruce wood traits using site and stand conditions. Until recently, decisions made along the wood value chain considered location, volume and species composition of the forest, but little attention was paid to wood quality. Site and stand conditions may generate important variations.	Jean Beaulieu (LFC)

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Nationally integrated testing of crown-fibre attribute relationships (CFAR) To diversify and add value to Canadian forest products, forest resource inventories must include information about fibre attributes. The development of relationships among fibre attributes and crown characteristics is a promising path to incorporating fibre attribute information into forest resource inventories. This component integrates several CWFC activities that test hypotheses on relationships between fibre attributes and crown characteristics.	Art Groot (GLFC)
Long-Term Research Installation Compendium (LTRIC) The compendium is a Web-based and easily searchable tool for determining the nature and location of forestry research conducted by the Canadian Forest Service (CFS) and FPInnovations. It will give government and industry the opportunity to leverage from long-term projects and incorporate long-term data into new studies on fibre quality and forest products.	Tom Bown (PFC)
Boreal Plains Mixedwood Fibre Initiative An integrated information system of mixedwood stand and tree bole/crown characteristics linked with internal fibre attributes will be built. This system will provide a value chain assessment framework for querying potential product options and values. CWFC research outputs will be addressed using several long-term research sites, exploring managed versus natural systems in the Prairie provinces, northeastern British Columbia and the Northwest Territories.	Derek Sidders (NoFC)
Tools and techniques: Non-destructive evaluation Site and stand characteristics in conjunction with silvicultural practices at long-term forest research sites will provide immediate inputs for science-based ecological indicators that best predict the potential to supply desirable fibre attributes. This project will focus on the use of non-destructive evaluation, particularly acoustic velocity, to assess fibre quality in standing trees and logs. Acoustic velocity is a technology used operationally in such countries as New Zealand, Australia and the United States.	Ross Koppenaal, Tom Bown, Graeme Goodmanson (PFC)

Production: Managing variability

Techniques and methods for managing current and future forests to deliver trees and stands with specific fibre attributes.

CWFC components and their leads and locations*

Impact of timing and intensity of pre-commercial thinning on stand dynamics and on tree grade quality for northern hardwoods of Acadian forest region The effects of timing and intensity of pre-commercial thinning (PCT) on stand dynamics, tree grade projections, fibre attributes and product potential in the northern hardwoods of eastern Canada will be examined. Such information is needed to develop models for use in regional inventories and improve the use of the northern hardwood resources in forest manufacturing.	Edwin Swift (AFC)
National Network of Somatic Embryogenesis Laboratories In somatic embryogenesis (SE), genetically identical copies of trees are produced in unlimited numbers. The most important application of SE is in multi-varietal forestry (MVF), which is the use of genetically tested tree varieties in plantation forestry. SE and MVF are effective ways to breed and deploy tree varieties with desirable wood and fibre attributes. A network of SE labs has been established consisting of federal and provincial governments, universities and industry.	Yill-Sung Park (AFC)
Refinement of somatic embryogenesis (SE) of conifers and development of industrial multi-varietal forestry to optimize fibre value chain Built on the framework of the National Network of Somatic Embryogenesis Laboratories, multi-varietal forestry (MVF) using the SE system can produce wood and fibre with desirable attributes and uniform quality at easily accessible locations. Thus it reduces the cost of sorting, harvesting and transportation. MVF is a new model of plantation forestry using advances in tree biotechnology. An MVF deployment strategy is needed to balance economic gain and ecological and social risks.	Yill-Sung Park (AFC)

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Impacts of root disease on fibre supply and quality in treated spruce-fir stands Root and butt rots are a major pest of boreal spruce-fir forests, affecting fibre quality and growth and yield. Stand replacement treatments after harvesting have focused on methods to increase fibre yield and tree form with no consideration of root diseases. This study is based on the observed increase of rots in treated spruce and fir stands and will provide non-destructive sampling methods, data and models to assess current impacts and forecast future impacts of root diseases on fibre supply and quality.	Gary Warren (Cornerbrook)
Impact of intensive silviculture on wood productivity and quality traits for fibre and timber products in Jack pine stands Mechanized commercial thinning is becoming a more prevalent silvicultural prescription in naturally regenerated forests and plantations of eastern Canada. In the mid-1970s, an operational commercial thinning that mimics current mechanized harvesting operations was conducted in a 40-year-old natural Jack pine stand in Tracadie, New Brunswick. The CWFC is examining the effect on tree growth, fibre and lumber attributes and crown relationships to develop new forest inventories.	Edwin Swift (AFC)
Discovery of genes controlling wood fibre traits in white spruce and black spruce and the development of genetic markers for the selection of superior trees To maximize plantation yield and shorten harvest cycles, spruce-breeding programs have been set up in most of Canada's provinces. Growth and adaptive traits are prioritized, largely because they are easily evaluated at a young age. Wood properties are yet to be incorporated into breeding programs, due to the high cost of phenotypic determinations. This component aims to identify molecular markers associated with juvenile wood traits that will be used as selection tools.	Jean Beaulieu (LFC)
Risk of blowdown associated with the deployment of tactics for partial cutting in coniferous forests Making partial cuts in stands before making the final cut is a promising tactic for increasing forestry opportunities in management units that have an imminent critical period. The risk of blowdown is an ill-documented factor that worries managers and can limit deployment of the management tactic. This project aims to quantify the partial cutting phenomenon in eastern Canada.	Jean-Martin Lussier (LFC)

Responses of Jack pine to density manipulation: growth, biomass and products The primary objective of this study is to assess and quantify the short- and long-term effects of density manipulation (e.g. pre-commercial thinning and commercial thinning) on the structural yields, growth, allometry, biomass partitioning, wood products, quality and value of Jack pine at the individual tree and stand levels. The secondary objective is to investigate the underlying causes driving mortality processes and stability within treated stands, including crown dynamics and interactions.	Peter Newton (GLFC)
Decision-support systems for optimal density management and associated growth and wood quality model derivatives for boreal conifers An enhanced suite of integrated modular-based structural stand density management models and associated growth and quality model derivatives will be developed for natural and managed Jack pine and black spruce stand-types. This suite will enable precise determination of the optimal density management regime by management objective and an estimation of growth, structural yield, quality and value outcomes for the selected density management regime.	Peter Newton (GLFC)
Effects of PCT on production of high-value fibre attributes (Green River PCT study) The 50-year-old Green River pre-commercial thinning (PCT) trials compare three spacing treatments in naturally regenerated balsam fir with unthinned controls. Three of the six replicated blocks were operationally harvested in 2008. This study, involving all divisions of FPInnovations, is providing the data to conduct long-term PCT treatment comparisons on growth and yield, harvesting efficiency, disease impacts, pulp and solid wood properties, and economics. Data will be used to link wood quality attributes to inventory.	Doug Pitt (GLFC)
Prime site silviculture for the production of high-value fibre attributes: Contribution to growth, yield and economics Capitalizing on several research installations, this project aims to investigate prime-site silviculture as a way to increase up- and down-stream value by lowering costs and increasing the volume of quality raw material produced sustainably, on a reduced footprint. Nine studies – involving growth, yield, quality and economics – already contribute to the CWFC theme of knowing how to grow the right fibre with the right attributes and produce near-term deliverables.	Doug Pitt (GLFC)
Operational biomass trial in the Great Lakes–St. Lawrence Forest Several white pine study sites at the Petawawa Research Forest are ideal for answering questions of long-term effects of biomass harvesting. Knowledge gained from these past experiments will be tested on poor pine-mixedwood sites, where biomass harvests and subsequent silvicultural intervention will be evaluated as an economic driver for restoring degraded sites back to pine.	Suzanne Wetzel (GLFC)

Algoma Biofibre Initiative This initiative looks at the economic, social and environmental impact of biomass harvesting in the Great Lakes–St. Lawrence Forest and characterizes biomass for potential use in a biorefinery for energy and other bioproducts. FPInnovations, the CWFC, the University of Toronto, the Ontario Ministry of Natural Resources and St. Marys Renewable Energy Corp. are collaborating in this initiative on the use of biomass from marginal hardwood stands.	Suzanne Wetzel (GLFC)
Alternative harvesting to produce less-expensive natural regeneration Intensive plantation renewal methods, adopted to achieve free-to-grow regeneration on large clear-cut blocks, cost about $1,000 per hectare (ha) and produce vulnerable boreal conifer monocultures or near monocultures. Long-term research installations are required to demonstrate alternative harvesting, costing less than $500/ha, that maximizes future biological and market flexibility with diverse, multi-species regeneration by approximating natural temperate forest gap replacement dynamics in eastern Canada.	Peter Salonius (AFC)
Investigating the silviculture of, and wood fibre opportunities presented by, short-rotation intensive culture (SRIC) willow and poplar plantations, using municipal wastewater and biosolids and using pulpmill sludge as a water and nutrient source The incorporation of municipal wastewater and municipal and pulpmill sludge into SRIC willow and poplar plantations will be researched and demonstrated. SRIC plantations could create innovative economic and social opportunities for forest communities and industry across Canada. This technology will provide a new diversification opportunity to produce specialty fibre while realizing value from waste products and minimizing environmental impacts.	Richard Krygier (NoFC)
Root disease and growth and yield-model integration for timber supply and value impacts in Douglas fir The project aims to improve landscape-level prediction models for timber supply, value and economic analyses. A computer simulator called TASS/ROTSIM (Tree and Stand Simulator / Root Rot Simulator) provides estimates of logs, lumber and chips for economic decisions. Calibrating enables the evaluation of root disease effects on timber supply and the value chain. The simulator is the result of a project in Douglas fir between the governments of British Columbia and Canada. The project also serves as a starting point on how to estimate impacts in other species and other provinces for this widely distributed fungus.	Mike Cruickshank (PFC)

Valuation: Optimizing variability

Techniques and methods to optimize management decisions that maximize profit and market competitiveness.

CWFC components and their leads and locations*

Meta-analysis of the published literature on the impact of silvicultural and management practices on wood fibre attributes for Canadian tree species The component aims to identify the key fibre attributes of significant importance to the Canadian forest industry and those that confer a competitive advantage on the global market. In the large body of published literature on the subject, however, each study represents a single point that, taken alone, cannot draw the overall picture and significance of selected key wood fibre attributes. This component will identify both strong knowledge areas and gaps in our understanding of the impacts of silvicultural and management practices on wood fibre attributes for Canadian tree species.	Edwin Swift (AFC)
Optimization of partial harvest strategies and practices: Applications to uneven-aged hardwood management The goal of the project is to improve and evaluate Biolley, a decision-support model, to optimize selection-cutting prescriptions in tolerant hardwood forests. This model, based on linear and goal programming, searches for partial-cutting rules that maximize the sustained profitability for the hardwood value chain. An analysis will be done to evaluate the robustness of the solutions given by the model considering the uncertainty on growth and market projections.	Jean-Martin Lussier (LFC)
Short-rotation fibre production, management and value-chain analysis Short-rotation (3–20 years) woody crops under intensive management regimes are developing sources of quality wood fibre. This fibre and other sources recovered from forest operations as residues will diversify the forest products supply chain and introduce new forest values. Innovative management practices and associated costs will be included in the value chain analysis for the new sources of fibre. Developing practices will reduce costs and enhance operational efficiencies.	Derek Sidders (NoFC)

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Understanding the desirable attributes of Canadian wood fibre that add value to end-products and confer a competitive advantage on the global market The aims of this project are to increase the understanding of the principal attributes of Canada's diverse wood fibre resources, develop a suite of specific fibre attributes required for different end-uses and identify desirable fibre attributes that add value to end-products and confer a competitive advantage on the global market. This knowledge will help the forest industry take advantage of the Canadian fibre attributes to manufacture value-added specialty products and gain a competitive edge in the marketplace.	Sen Wang (HQ)
Understanding the value proposition of Canadian wood fibre It is important for the Canadian forest sector to better understand the value proposition of Canada's diverse wood fibre resources, particularly the innovative ways of adding value to products and conferring a competitive advantage on the global market. Building this knowledge base will help the forest industry take advantage of the Canadian fibre attributes to manufacture value-added products and gain a competitive edge in the marketplace.	Sen Wang (HQ)

CWFC employee listing as of June 1, 2010

- **George Bruemmer – Executive Director**
  George is responsible for the overall direction of the CWFC. In this role, he serves on the senior leadership teams of NRCan's Canadian Forest Service (CFS) and FPInnovations.

- **Mike Adams – Silviculture Technician**
  Mike provides support in the field and laboratory for silvicultural research in the boreal forest and the development of models used to forecast stand development.

- **Joseph Anawati – Business Development Specialist**
  Joseph manages business processes for human resources, finance and partnering activities and coordinates the development and delivery of partner agreements.

- **Peter Arbour – Field Coordinator, Petawawa Research Forest**
  Peter is responsible for the day-to-day operations of the 10 000-hectare research forest. He also assists researchers in accessing and using the forest for experiments and demonstrations.

- **Patricia Baines – Forest Pathology Technician, Technical and Scientific Support**
  Patricia provides support to research on root and stem pathogens and their impacts on tree growth and wood quality.

- **Jean Beaulieu – Research Scientist, Forest Genomics; Regional Coordinator**
  Jean specializes in population and quantitative genetics and forest genomics. He is also Regional Coordinator at the Laurentian Forestry Centre.

- **Jason Bernard – Specialized Field Technician, Petawawa Research Forest**
  Jason supervises harvesting operations and reforestation and assists scientific users of the research forest.

- **Martin Blank – Nutrient-Cycling Technician**
  Martin's responsibilities include collecting and analyzing data and reporting on partial harvest system research and boreal mixedwood growth and yield studies.

- **Tom Bown – Forest Ecophysiology Technician**
  Tom heads the Long-Term Research Installation Compendium (LTRIC), a national project to record long-term research sites initiated by or partnered with the CFS. Tom also researches, coordinates and provides information on acoustic velocity, a non-destructive method of assessing wood stiffness and other fibre attributes in standing trees.

- **Laura Chittick – Wood Fibre Development Technician**
  Laura is involved with silvicultural research at the CFS, focusing on partial harvest systems in the boreal mixedwood.

- **Sébastien Clément – Biologist, Forest Genomics**
  Sébastien studies the spruce genes involved in wood formation, develops databases for the storage of data on these genes and their related phenotypes and links this knowledge to reforestation strategies for increasing the production of desirable fibre attributes.

- **Joanne Côté-Pilon – Administration and Finance Officer**
  Joanne provides administrative and financial advice and support to the CWFC, including the coordination of meetings and other events.

- **Mike Cruickshank – Research Scientist, Root Diseases**
  Mike is a forest pathologist with a specialty in the epidemiology, control and impact of Armillaria root disease. In British Columbia, he works with provincial colleagues to develop models that help incorporate risk assessment into forest-planning strategies.

- **Steve D'Eon – Knowledge Exchange Specialist**
  Steve provides support to the transfer and exchange of knowledge with key collaborators and stakeholders and is responsible for knowledge exchange in western Canada. He works with the Ontario Ministry of Natural Resources on forest management and silvicultural strategies for the Great Lakes–St. Lawrence Forest.

- **Marie Deslauriers – Biologist, Forest Genomics**
  Marie is an expert in population genetics and has studied the genetic diversity of white and black spruce, ground hemlock, and butternut. She brings this knowledge to studies of wood fibre attributes.

- **James Farrell – Tree Growth Impact Advisor**
  James coordinates and carries out field activities and acts as a technical advisor to project leaders of research projects on silviculture, pest management and forest inventories. He also maintains the Stem Analysis Laboratory at the Atlantic Forestry Centre.

- **Jeff Fera – Forest Mensurationist**
  Jeff assesses biomass partitioning and the growth responses of boreal conifers to various intensive forest management treatments. He leads field work to support the calibration and validation of stand density management diagrams for boreal conifers.

- **Roger Gagné – Forest Research Technician**
  Roger provides support for silvicultural research and the development of partial-cutting techniques, as well as for operational and innovation development.

- **Graeme Goodmanson – Silvicultural Research Technician**
  Graeme provides technical support for coastal silvicultural studies. These studies include alternative silvicultural systems and the effects of silvicultural treatments on wood attributes. Graeme is the CFS contact technician for the Shawnigan Lake Research Forest.

- **Caroline Gosselin – Knowledge Exchange Specialist**
  Caroline is responsible for knowledge exchange between the CWFC and FPInnovations, as well as other key stakeholders, and works mainly in Quebec. She is a member of the FPInnovations Knowledge Exchange Group and provides leadership in the use of collaborative tools.

- **Art Groot – Research Scientist, Ecophysiology**
  Art specializes in the growth and development of boreal forest tree species and is working to incorporate fibre quality attributes into IVY-FIBRE, an individual tree growth model. He also provides national leadership for the team developing relationships between tree crowns and fibre attributes.

- **Harinderjit Hans – Artificial Intelligence Application Specialist**
  Harinderjit provides GIS support and helps develop computerized databases, decision-support systems (DSS) and models for forest management.

- **Mike Hobbs – Research Technician**
  Mike's work involves field studies on hybrid poplar and willow and greenhouse operations.

- **Michael Hoepting – Silviculture Research Forester**
  Michael coordinates field activities and provides analysis for research into prime site silviculture, thinning experiments and advanced forest inventory development and validation.

- **Brent Joss – Fibre Bio-Geoinformatics Analyst**
  Brent develops spatial models, such as the site suitability models for hybrid poplar and willow; develops and manages information systems; creates Web-based decision support tools; and designs products to assist technology transfer.

- **Tim Keddy – Wood Fibre Development Specialist**
  Tim coordinates the field activities associated with establishing, managing and monitoring forest silviculture, afforestation and bioenergy research trials.

- **Ross Koppenaal – Research Biologist**
  Ross researches and applies acoustic velocity technology to evaluate fibre quality in standing and harvested trees in relation to silvicultural and ecological influences and species differences.

- **Richard Krygier – Intensive Fibre Management Specialist**
  Richard's research interests are in plantation establishment, bioenergy crop production (short-rotation cycle willow) and intensive stand management.

- **Antoine Lalumière – Forest Pathology Technician**
  Antoine provides research assistance on the ecology, epidemiology, control and impacts of Armillaria root disease. He also coordinates and organizes projects.

- **Len Lanteigne – Reforestation Officer**
  Len focuses on research and technology transfer related to forest management topics, such as silviculture, integrated forest vegetation management, the impacts of pests, stand density management and the registration of pest-control products.

- **Patrick Laplante – Biologist**
  Patrick studies genetic variations in the genes of white spruce and black spruce, particularly genes related to quality and the formation of wood.

- **Mike Laporte – Tree Biology Technician**
  Mike provides technical support to correlations and production research projects using inventory for forest characterization. He also works on the knowledge retention of legacy research within the Ontario Research Sites (ORS) Database and the Long-Term Research Installation Compendium.

- **Dominique Lejour – Forest Pathology Technician**
  Dominique provides technical advice on the set-up of field plots and laboratory experiments on the pathogenicity, epidemiology, ecology-host response and control of root diseases, especially Armillaria root disease.

- **Chao Li – Landscape Dynamics Research Scientist**
  Chao works on the forest-level forecast of wood fibre supply and valuation under uncertainties induced by various disturbance regimes, the optimal use of Canadian wood fibre and forest value chain integration through systems modelling.

- **Jean-Martin Lussier – Research Scientist, Silviculture and Forest Productivity**
  Jean-Martin develops silvicultural systems adapted to mixed and resinous forest stands. He also researches the response of stands to partial cutting.

- **Katalijn MacAfee – Knowledge Exchange Specialist**
  Katalijn provides knowledge exchange support at the headquarters level and promotes the use of collaborative tools across CWFC and with FPInnovations collaborators. She is responsible for the production of the CWFC's internal newsletter, *Fibre Focus*.

- **Ian MacEacheron – Forest Genetics Technician**
  Ian assists with research that focuses on somatic embryogenesis methodology development in pine and spruce.

- **Dan MacIsaac – Regional Group Leader**
  Dan specializes in boreal mixedwood stand dynamics and supports research into crown-fibre attributes relationships.

- **Wendy Mills – Nursery Grower**
  Wendy conducts and manages greenhouse trials that include the propagation, management, handling and storage of various deciduous species.

- **Peter Newton – Research Scientist, Analysis Stand Dynamics**
  Peter has developed several innovative products for boreal conifers, including structural stand density management models and software and competition and meta-analytical frameworks.

- **Denis Ouellet – Director, Strategic Partnerships**
  Denis works closely with FPInnovations and other research partners to develop research partnerships and structure programs to address strategic business objectives. He collaborates with the Director of Operations in CWFC management.

- **Yill-Sung Park – Research Scientist, Forest Genetics**
  Yill-Sung's research focuses on conifer somatic embryogenesis and its implementation in multi-varietal forestry.

- **Doug Pitt – Research Scientist, Vegetation Management Strategy and Biometry**
  Doug's research addresses various silvicultural and forest inventory applications across Canada. His work provides foresters with many practical tools for crop establishment, stand tending and remote sensing applications in forest sampling.

- **Peter Salonius – Soil Microbiologist**
  Peter's research covers various microbial ecology, soil organic matter decomposition and silvicultural issues.

- **Derek Sidders – Regional Coordinator and Group Leader**
  Derek specializes in innovative silvicultural and afforestation practices, development, demonstration and promotion. He is also Regional Coordinator at the Northern Forestry Centre.

- **Guy Smith – Manager, Knowledge Exchange; Regional Coordinator**
  Guy provides leadership to the CWFC Knowledge Exchange (KE) team and collaborates with FPInnovations management in coordinating FPInnovations' KE activities. He is also Regional Coordinator at Great Lakes Forestry Centre.

- **Jim Stewart – Scientist**
  Jim's research investigates ecophysiological and growth responses to thinning and fertilization of lodgepole pine. He also investigates partial-harvesting effects on microclimate and white spruce regeneration in boreal mixedwood forests.

- **Edwin Swift – Forest Research Officer**
  Edwin's research involves various regeneration, silvicultural and ecology studies.

- **Dean Toole – Project Manager**
  Dean is the Regional Coordinator at Atlantic Forestry Centre and the manager for Canada's two national research forests. He is a member of the Knowledge Exchange Group and is involved with several initiatives in eastern Canada.

- **Dan Turcotte – Forestry Technician, Petawawa Research Forest**
  Dan is responsible for road maintenance, timber harvesting and forest fire protection.

- **Chhun-Huor Ung – Research Scientist**
  Chhun-Huor is developing an integrated resource information system to optimize the wood information basis. He works in cooperation with several academic and industry partners.

- **John Vallentgoed – Silvicultural Technician**
  John focuses on field work on forest insects and diseases, silvicultural research and mountain pine beetle research.

- **William Wagner – Forest Economist**
  William's activities focus on forest sector economic issues on the Pacific coast. These issues include the economic evaluation of Armillaria root rot in Douglas fir and the economics of managing the mountain pine beetle.

- **Sen Wang – Scientist/Economist**
  Sen researches Canada's competitiveness in the national and international forest products market. He specializes in forest economics and policy.

- **Gary Warren – Forest Pathologist/Mycologist**
  Gary's research concentrates on wood decay and associated fungi in the boreal forest ecosystem.

- **Suzanne Wetzel – Research Scientist**
  Suzanne's research focuses on the opportunities for forestry within the bioeconomy. She examines biomass harvesting in the Great Lakes–St. Lawrence Forest and how this biomass can best supply feedstock for new emerging industries.

- **Roger Whitehead – Research Scientist, Silviculture**
  Roger's research focuses on the silviculture of lodgepole pine, including commercial thinning to reduce the susceptibility of mature stands to mountain pine beetle attack and to improve stand growth.

- **Raoul Wiart – Director, Operations**
  Raoul directs the day-to-day regional research activities of the CWFC. He contributes to the development of long-term research strategies and the implementation and evolution of the CWFC development plan. He works with the Director, Strategic Partnerships, on CWFC program planning and delivery.