



# **FPInnovations**

**Canada's Forest Sector  
Innovation Hub**

**Forest Operations  
Research Highlights**

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Silvicultural Operations**

# What Is FPInnovations?

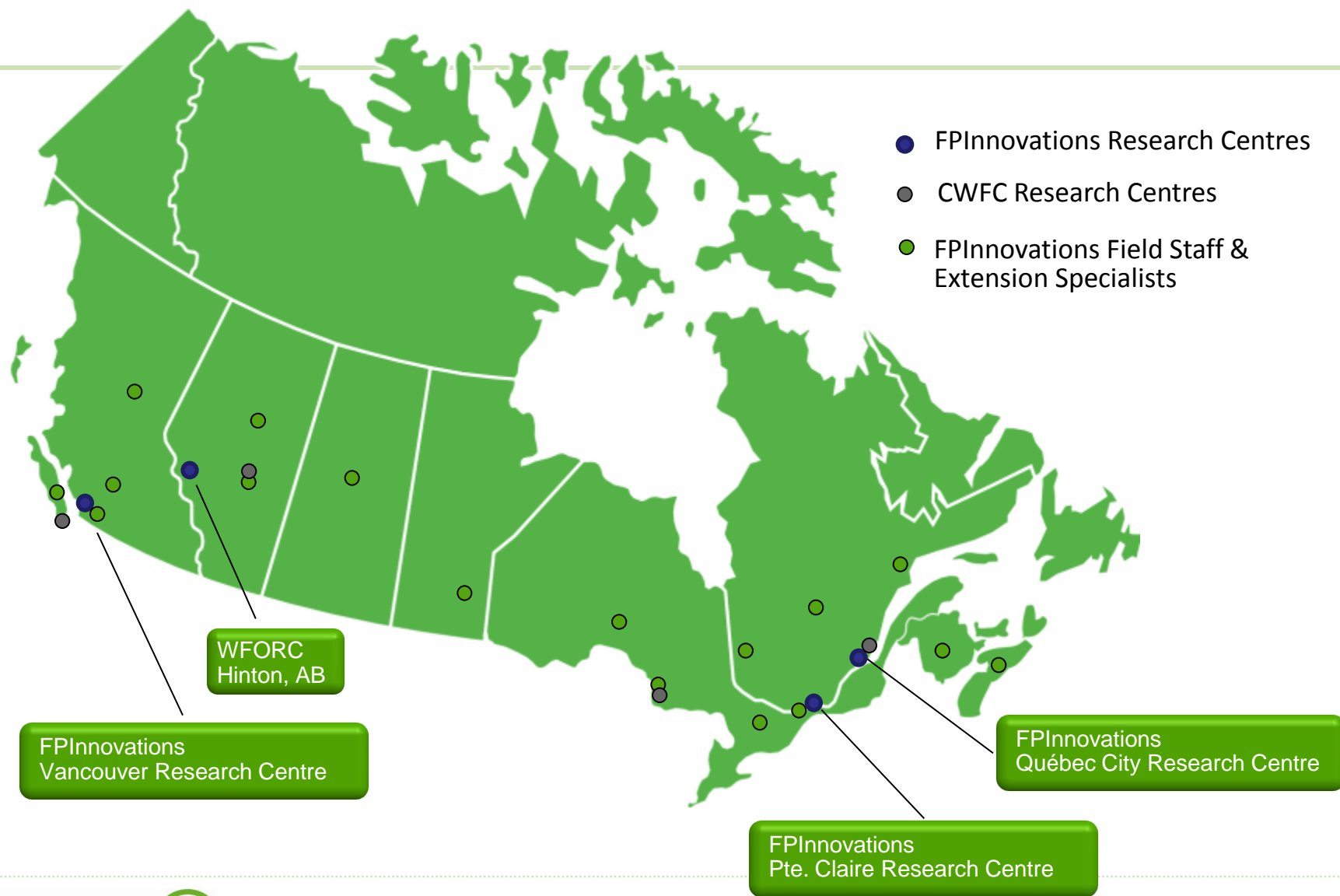
- ▶ A private non-profit corporation
- ▶ Merger April 2007 between FERIC, Paprican, Forintek & Canadian Wood Fibre Centre
- ▶ Supports competitiveness of the Canadian forest sector
- ▶ Science & technology based solutions for:
  - current market & business challenges
  - future opportunities
- ▶ Facilitates collaborative approaches to innovation
- ▶ A proven track record of delivering bottom-line impact



# Member Supported Research

- ▶ A partnership between industry and federal & provincial governments
  - *Pooled investment creates critical mass*
  - *Shared priorities, technical risk and benefit*
- ▶ Members set priorities, FPI delivers results
  - *ROI typically 3-7 times after-tax investment for industry members*
- ▶ Members include:
  - *Over 400 forest product companies*
  - *Industry suppliers*
  - *8 provinces (BC, AB, SK, ON, QC, NS, NB, NL)*
  - *Federal Government – NRCan CFS*

# Supporting Members from Coast to Coast



# The Forest Operations Program

- ▶ Reduction of phase operating costs
- ▶ Value maximization
- ▶ Worker health & safety
- ▶ Sustainability of forest operations



# Forest Operations Research Programs & Themes

## ► Fibre Supply

- Silvicultural Operations
- Forest Feedstocks

## ► Harvesting Systems

- Harvesting Operations
- Precision Forestry

## ► Roads & Transportation

- Resource Roads
- Transportation & Energy

## ► Value Maximization

- Decision Support Systems





# Technology Transfer & Knowledge Exchange

- ▶ Workshops
- ▶ Field tours
- ▶ Seminars
- ▶ Courses
- ▶ Information requests
- ▶ Advantage reports
- ▶ Website:

[www.FPInnovations.ca](http://www.FPInnovations.ca)



# Forest Feedstocks

Provide solutions to deliver a sustainable feedstock supply for an emerging bioeconomy

## Focus:

- Assess economics of supply
- Develop efficient biomass supply chains
- Evaluate processing and delivery systems
- Enhance the quality of forest biomass





# Strategies to Improve Quality

- Improve the quality of biomass through effective management and storage practices
- ▶ Approach
  - Understanding the impacts of operational practices on moisture content and degradation of different feedstocks
  - Developing storage strategies to maximize drying and minimize fire risks and fibre degradation
  - In-woods piling, roundwood storage, and use of protective tarps



# Harvesting Operations

## ► Goal

- Develop safe, cost-effective and sustainable ways to plan and carry out forest harvesting operations

## ► Focus

- Harvest planning
- Harvesting equipment & practices
- Steep slope harvesting
- Partial-cutting systems
- Sustainability of the workforce and the competitiveness of forest contractors



# Steep Slope Research Program

- ▶ TigerCat 635D skidder on steep slopes
- ▶ Best practices guide for operating ground-based equipment on slopes
- ▶ Remote control for forest machinery
- ▶ Review of tethered machines
- ▶ Testing machine slope stability



# Precision Forestry

## ► Goals

- Develop operational performance and production monitoring and reporting systems for woodlands operations
- Provide electronic & programming services to other groups and research programs within FPInnovations

## ► Focus

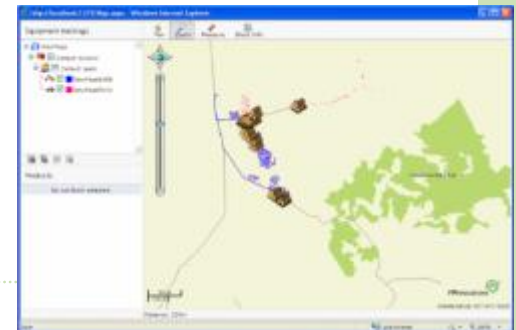
- Planning and scheduling tools
- Productivity & performance monitoring
- Data communication and reporting systems





# FPSuite

- ▶ The FPSuite family of products:
  - *FPInterface* – planning & scheduling software
  - *FPDat* – onboard data logger in machines
  - *FPCom* – automated data communication system
  - *FPTrak* – web-based data management portal
- ▶ Benefits:
  - Improved process control
  - Better production tracking
  - 5-10% cost reductions





# Resource Roads

## Goal

- Develop and implement tools and solutions for high performance, safe and environmentally friendly resource road networks

## Focus

- Maintenance and management
- Road safety and design
- Road/vehicle interface
- Planning and construction



# Road Safety

## New system for assessing roads

- Automated data collection
- Laser scanners and digital video cameras
- Software tools to analyze sight distance
- >50% reduction in road surveying time



## Recent activities:

- 450 km surveyed on Finlay FSR
- 50 km in the Okanagan
- Webinars delivered
- > 1000 km now surveyed in the BC Interior

# Transportation & Energy

## ► Goals

- Optimize forest transportation in terms of cost, productivity & safety

## ► Focus

- Work with government agencies to approve more-productive configurations
- Improve overall transportation system efficiency
- Research methods & technologies to improve truck safety



# Driver Recruitment & Retention

- Automated Transmission Evaluation
  - Evaluate their potential to attract new drivers into the industry & to retain older drivers who are considering retiring
  - Identify operational issues, costs, and benefits for logging operations
  - Working with contractor in Quesnel; installed OBCs on two new trucks
- Ergonomics of Load Wrappers
  - Developing a project to identify the best technologies & techniques to use when securing a load
  - Focus on the effects of an aging driver pool & more stringent cargo securement standards





# Silvicultural Operations

## ► Goal

- Develop safe, cost-efficient silvicultural strategies and tools to help member companies and provincial partners in achieving regeneration targets and AAC objectives

## ► Focus

- System approach to stand regeneration
- Planning and tracking tools
- Reducing MSI in tree planters
- Innovative regeneration practices
- Regeneration strategies for natural disturbances





# System Approach to Stand Regeneration

- Roadside slash redistribution on cutover
  - Harvesting impacts
  - Redistribution quality
  - Site preparation quality
- Redistributing DDC residues
  - Harvesting impacts
  - Redistribution and microsite quality
- Slash management on steep slopes
  - Site preparation productivity
  - Planter safety



# Tools & Support for Rate Setting

- Support provinces and companies in developing fair silvicultural treatment rates
- Costing framework for Quebec and New Brunswick



## Precommercial thinning cost summary

Thinner costs		% of total cost
Total expected revenue (\$/week)	830,77 \$	
Days/week	5,0	
Weeks/year	20	
Scheduled hours/day (SH)	9	
Productive time (%)	75%	
Adjusted utilization-site dispersion (%)		
<b>Labor &amp; benefits (\$/day)</b>	<b>183,05 \$</b>	<b>55%</b>
Transportation to work site (km/day)	102	
No. of passengers	2	
<b>Thinner transport (\$/day)</b>	<b>26,52 \$</b>	<b>8%</b>
Thinning equipment costs (\$/day)	27,17 \$	8%
Brush saw operating costs (\$/day)	9,79 \$	3%
Safety equipment (\$/day)	4,77 \$	1%
<b>Total thinner costs (\$/day)</b>	<b>251,31 \$</b>	<b>75%</b>

Supervision costs		
Labor & benefits (\$/day)	36,37 \$	11%
Transport (\$/day)	10,46 \$	3%
Safety equipment (\$/day)	0,45 \$	0%
<b>Total supervision costs (\$/day)</b>	<b>47,28 \$</b>	<b>14%</b>

<b>Total thinner and supervision (\$/day)</b>	<b>298,59 \$</b>	<b>89%</b>
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Overhead, risk and profit costs		
Operational overhead	12,44 \$	4%
Cash flow charges	1,00 \$	0%
Contractor risk & profit	22,39 \$	7%
<b>Total overhead and profit costs (\$/day)</b>	<b>35,83 \$</b>	<b>11%</b>

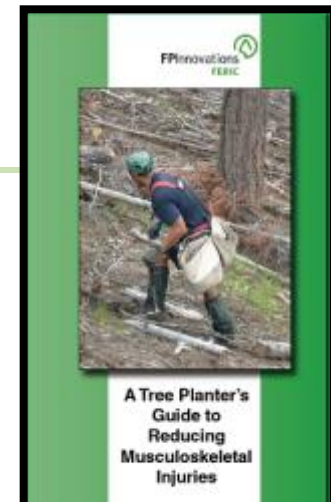
<b>Total costs (\$/day)</b>	<b>334,42 \$</b>
<b>Total costs (\$/PH)</b>	<b>49,54 \$</b>
<b>Total costs (\$/ha)</b>	<b>863,18 \$</b>

# Reducing Musculoskeletal Injuries in Tree Planters

**NEW** On-line guide:

<http://fpi.na5.acrobat.com/tree-planters/>

- “Train-the-trainer” workshops
- Checklists
- Exercise posters
- How-to videos
- A Tree Planter’s Guide to Reducing Musculoskeletal Injuries – infoflip



**A new online tool to help tree planters reduce injuries**

➤ To access the guide: <http://fpi.na5.acrobat.com/tree-planters/>

This interactive tool, produced by FPIinnovations, provides guidelines on how to practice safe work procedures while staying healthy and efficient throughout the planting season. Based on the best-selling booklet *A Tree Planter's Guide to Reducing Musculoskeletal Disorders*, it covers the following topics:

- Musculoskeletal injuries (disorders) and their hazards, risks and symptoms
- Pre-work warm-up exercises
- Injury prevention stretches
- Good and poor planting techniques
- How to size your equipment to fit you

For more information, please contact:  
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**FPIinnovations**



# Innovative Regeneration Practices

- 4-row disc trencher
  - Cost-effective regeneration options
  - New site preparation techniques & equipment
  - Report available soon



# Regeneration Strategies for Natural Disturbances

- Effective treatments on MPB & wildfire-impacted sites to remove dead overstory and establish a productive stand

## ► Approach

- Overstory removal
- Understory protection
- Precision seeding
- Prototype mulcher/scarifier for young burnt stands

## ► Benefits

- Reduce NSR area
- Low cost solutions for remote locations





# Regeneration Strategies for Natural Disturbances

## Understory protection

- Ground-based partial cutting
- Manual vs. mechanical
- CTL vs. full tree
- Advantage reports available



# Regeneration Strategies for Natural Disturbances

## Precision seeder trials

- Slave Lake, Alberta
  - Winter access
  - Komatsu D355A-5 crawler tractor with plow
  - Winter seed
  - Non-stratified seed





# Regeneration Strategies for Natural Disturbances

## Precision seeder trials

- Fort Babine (Smithers)
  - Hitachi EX200LC excavator moulder
  - High brush site
  - Spring seeding (low/high)
  - Stratified seed (pine/spruce)



# Regeneration Strategies for Natural Disturbances

## Precision seeder trials

- Williams Lake
  - John Deere 748G skidder with disc trencher
  - June – July seed
  - Pine





# Regeneration Strategies for Natural Disturbances

Prototype mulcher/scarifier

- Prototype
- Young burnt stands
- Grind standing trees
- Scarify in a single pass



# Regeneration Strategies for Natural Disturbances

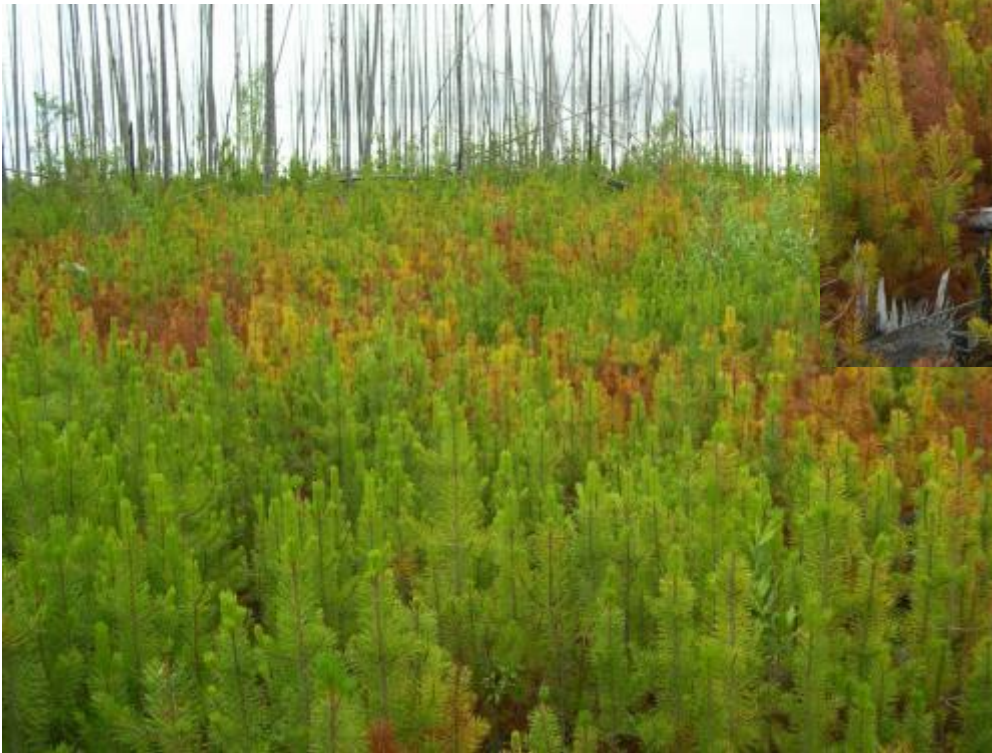
- Lamtrac 8290Q mulcher
- Juvenile thin dense pine regeneration
- Mulch living/dead standing, stumps, logs, slash & brush
- Rocks are an issue





# Regeneration Strategies for Natural Disturbances

## Herbicides



# Regeneration Strategies for Natural Disturbances

## Past studies

- Williams Lake, Quesnel & 100 Mile House
- Young stands
- Rehabilitate the MPB-impacted stands
- No biomass removal
- Quadco horizontal mulcher





# Regeneration Strategies for Natural Disturbances

## Past studies

- Williams Lake, Quesnel & 100 Mile House
- Feller-processor
- Cut to length
- Some biomass removed



# More Information?

## Fibre Supply

- ▶ Silviculture ([Janet.Mitchell@FPInnovations.ca](mailto:Janet.Mitchell@FPInnovations.ca))
- ▶ Forest Feedstocks ([Denis.Cormier@FPInnovations.ca](mailto:Denis.Cormier@FPInnovations.ca))

## Harvesting Systems

- ▶ Harvesting ([Jack.MacDonald@FPInnovations.ca](mailto:Jack.MacDonald@FPInnovations.ca))
- ▶ Precision Forestry ([Martin.Castonguay@FPInnovations.ca](mailto:Martin.Castonguay@FPInnovations.ca))

## Roads & Transportation

- ▶ Resource Roads ([Allan.Bradley@FPInnovations.ca](mailto:Allan.Bradley@FPInnovations.ca))
- ▶ Transportation & Energy ([James.Sinnett@FPInnovations.ca](mailto:James.Sinnett@FPInnovations.ca))

# More Information?

## Research Managers

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### Harvesting Systems

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### Roads & Transportation

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### Value Maximization

- ▶ Jean Favreau ([Jean.Favreau@FPInnovations.ca](mailto:Jean.Favreau@FPInnovations.ca))